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2 The Determinants of Foreign Direct Investment in the United States, 1979–85

Edward John Ray

While a great deal of theoretical work and a number of empirical pieces have dealt with the determinants of U.S. foreign direct investment (FDI) in the rest of the world, very little is known about direct investment by foreign countries in the United States.[1] My purpose in the present study is to partially redress that imbalance. I establish at the outset that, whereas U.S. foreign direct investment abroad is concentrated in manufacturing and petroleum, foreign investment in the United States is diversified across all sectors of the economy. In addition, I provide evidence that differences in relative growth in GNP across countries and movements in currency exchange rates affect the magnitude and timing of foreign direct investments in the United States.

In this paper, I develop a simple partial equilibrium model of foreign direct investment in the manufacturing sector that focuses on how contracting costs influence parent firms' decisions to invest in or to license foreign firms. The model suggests that high contracting costs are associated with goods that use firm-specific human and physical capital inputs and require substantial research and development effort in production. While this argument is hardly new or uncommon,[2] the simplicity of my contracting model and the uniqueness of the empirical work that follows from it represent novel contributions to the basic approach.

I also consider the relation between foreign firms' investments in the manufacturing sector of the U.S. economy and protectionism in the United States. Specifically, I test whether U.S. tariffs or nontariff trade barriers have

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encouraged foreign firms investing in the United States either to circumvent existing trade restrictions or to neutralize the risk of future protectionist measures.[3] Furthermore, I attempt to determine the effect of intraindustry trade on foreign firms' decisions to invest in the United States.

The data consist of the values of transactions that occurred within a given industry summed to provide an industry-level value of investments at the four-digit SIC level for each year from 1979 to 1985. By pooling time-series and cross-sectional data, samples are generated that are on the order of 1,800 observations for manufacturing industries. The industry-level investment data are grouped according to the home of the parent firm and separate estimates provided of foreign direct investment in the United States for Japan, Canada, and the European Community (EC) as well as for all countries combined.

The paper has several important policy implications. First, it provides evidence that recent changes in exchange rates and relative economic growth across industrialized economies have played a role in promoting foreign direct investment in the United States. Second, it clarifies the extent to which the recent rise in nontariff trade barrier protection in the United States has induced greater foreign investment in U.S. manufacturing activities. Finally, it provides evidence regarding the extent to which foreign direct investment in the United States might create the jobs needed to reduce the structural unemployment problems that were apparent in the United States in 1979 and 1980.

2.1 Background

While most previous work on foreign direct investment has focused on the manufacturing sector, we need to have some perspective on the role that foreign investment has played in the nonmanufacturing sector. In addition to assessing the characteristics of overall foreign investment in the United States, we also need to examine the components of that investment. Therefore, I will review both overall foreign investment in the United States and the relative importance of foreign direct investment in the United States originating in Japan, the EC, and Canada.

Table 2.1 provides a summary of foreign direct investment in the United States for each year from 1979 to 1985. The data include annual investments in all sectors and in manufacturing by firms from Japan, the EC, Canada, and the rest of the world. For the period as a whole, manufacturing investment accounted for only 33.4 percent of the total foreign direct investment in the United States. Together, Japan, Canada, and the EC accounted for 79 percent of all foreign direct investment and 80.5 percent of total manufacturing foreign direct investment in the United States between 1979 and 1985.

Table 2.2 provides a summary of the largest foreign direct investments in manufacturing in the United States between 1979 and 1985 for foreign firms in general and by firms from Japan, Canada, and the EC. Table 2.3 indicates

Table 2.1 Foreign Direct Investment Comparisons (billions of U.S. dollars)

Year	World		Japan	
	All	Manufacturing	All	Manufacturing
1979	17.973	6.381 (35.5)	.723	.555 (76.7)
1980	16.103	5.550 (34.5)	1.263	.698 (55.3)
1981	31.880	9.260 (29.0)	1.510	.879 (58.2)
1982	17.723	4.450 (25.1)	1.746	.477 (27.3)
1983	19.388	4.286 (22.1)	2.226	.728 (32.7)
1984	43.014	14.103 (32.8)	10.460	3.723 (35.6)
1985	21.062	11.782 (55.9)	2.475	1.551 (62.7)
	Canada		European Community	
	All	Manufacturing	All	Manufacturing
1979	3.265	1.096 (33.6)	12.339	3.880 (31.3)
1980	4.234	1.022 (24.1)	8.288	3.139 (37.9)
1981	12.369	4.187 (33.8)	11.841	3.119 (26.3)
1982	4.659	.890 (19.1)	8.297	2.846 (34.3)
1983	4.029	.698 (17.3)	6.739	2.531 (37.6)
1984	5.451	1.122 (20.6)	17.531	4.901 (28.0)
1985	2.577	.685 (26.6)	10.011	5.682 (56.8)
	Joint Totals (Canada, EC, and Japan)		Joint Shares (Canada, EC, and Japan)	
	All	Manufacturing	All[a]	Manufacturing [a]
1979	16.327	5.531	90.8	86.7
1980	13.785	4.859	85.6	87.5
1981	25.720	8.185	80.7	88.4
1982	14.702	4.213	83.0	94.7
1983	12.994	3.957	67.0	92.3
1984	33.442	9.746	77.7	69.1
1985	15.063	7.918	71.5	67.2

Note: Percentages are given in parentheses.

[a]Values given are percentages.

Table 2.2 **Top Foreign Direct Investment Transactions in U.S. Manufacturing Industries (millions of U.S. dollars)**

SIC	Description	All		Japan		Canada		EC	
		Rank	FDI	Rank	FDI	Rank	FDI	Rank	FDI
2023	Condensed & evaporated milk	1	6,000.0	. . .		. . .		. . .	
2044	Rice milling	. . .		4	500.0	. . .		. . .	
2611	Pulp mills	. . .		. . .		4	562.8	. . .	
2621	Paper mills[a]	7	1,584.7	. . .		2	888.1	10	696.6
2631	Paperboard mills	. . .		. . .		. . .		7	837.7
2821	Plastics & resins	3	3,475.4	. . .		1	2,645.1	. . .	
2851	Paints etc.	. . .		. . .		. . .		4	1,037.0
2879	Agricultural chemicals NEC	5	1,779.1	. . .		. . .		2	1,774.5
2911	Petroleum refining	4	2,818.1	. . .		. . .		1	2,598.0
3241	Cement, hydrolic	. . .		. . .		. . .		5	991.6
3272	Concrete products NEC	. . .		. . .		8	350.9	. . .	
3312	Blast furnaces[b]	8	1,497.2	2	604.2	10	303.1	. . .	
3317	Steel pipes & tubes	. . .		. . .		6	403.0	. . .	
3341	Secondary smelting and refining of nonferrous metals	. . .		9	250.0	. . .		. . .	
3353	Aluminum sheet[c]	6	1,734.6	. . .		3	873.6	8	800.0
3541	Machine tools[d]	. . .		. . .		9	312.5	. . .	
3562	Ball & roller bearings	. . .		7	266.3	. . .		. . .	
3573	Electrical Computing Equipment	9	1,398.4	5	446.5	. . .		6	899.9
3624	Carbon & graphite products	. . .		. . .		7	378.0	. . .	
3634	Electrical housewares[e]	. . .		. . .		5	523.0	. . .	
3651	Radio & TV Sets	. . .		10	217.1	. . .		. . .	
3662	Radio & TV Commercial Equipment	. . .		6	339.4	. . .		. . .	
3674	Semiconductors	10	1,394.8	3	566.3	. . .		9	737.9
3711	Motor vehicles	2	3,782.1	1	2,489.5	. . .		3	1,208.5
3714	Motor Vehicle Parts	. . .		8	264.9	. . .		. . .	
Total			55,811.6		8,611.9		9,700.4		26,096.5

Note: NEC = not elsewhere considered.

[a]Except building paper.

[b]And steel mills.

[c]And plate and foils.

[d]Metal cutting types.

[e]And fans.

the values and sources of the largest foreign direct investments in the United States during the period 1979–85 and shows the relative importance of investments made by Japanese, Canadian, and EC firms. The ten largest EC firm investments are among the top twenty investments that were undertaken during the period. In contrast, the second through the tenth largest Japanese

Table 2.3 **Top Foreign Direct Investment Transactions (all industries in millions of U.S. dollars)**

Rank	SIC Code	Description	Transaction Value	Country of Origin			
				Japan	Canada	EC	Other
1	4899	Communications	5,099	1			
2	1311	Crude petroleum & natural gas	5,000			1	
3	5172	Petroleum products	3,650			2	
4	2023	Cond. & evap. milk	3,000				Switzerland
5	2023	Cond. & evap. milk	3,000				Switzerland
6	2821	Plastics	2,580		1		
7	1381	Oil & gas drilling	2,500				Kuwait
8	1021	Copper ores	2,500			3	
9	1211	Bituminous coal & lignite	2,400				Australia
10	1211	Bituminous coal & lignite	2,000				Australia
11	1311	Crude petroleum & natural gas	1,062			4	
12	1311	Crude petroleum & natural gas	1,000				Australia
13	2851	Paints etc.	1,000			5	
14	1381	Oil & gas drilling	967			6	
15	1021	Copper ores	938			7	
16	6020	Commercial banks	820			8	
17	6020	Commercial banks	820			9	
18	6300	Insurance	780			10	
19	1382	Oil & gas exploration	750				Australia
20	3353	Aluminum sheet & foil	750		2		
29	1311	Crude petroleum & natural gas	630		3		
30	. . .	. . .	600		4		
33	4011	Operating railroads	571		5		
34	4011	Operating railroads	571		6		
35	4011	Operating railroads	571		7		
38	6000	Banking	547		8		
41	3634	Electric housewares	523		9		
42	. . .	. . .	500		10		
47	3711	Motor vehicles	500	2			
51	2044	Rice milling	500	3			
56	3711	Motor vehicles	450	4			
60	6100	Credit agencies	425	5			
67	1061	Ferroalloy ores	400	6			
91	3711	Motor vehicles	338	7			
92	. . .	. . .	330	8			
93	6000	Banking	325	9			
111	3312	Blast furnaces	292	10			

[a]The investment was not identified.

investments ranked between forty-seventh and one hundred eleventh overall. The second through the tenth largest Canadian investments ranked between twentieth and forty-second overall.

As we pursue the relevance of previous theoretical and empirical work to U.S. experience, it is worth remembering that in-bound investment is not

concentrated in manufacturing. It is also worth noting that, for the period under consideration, the share of foreign direct investment in the United States originating in the EC was 44.9 percent while the shares originating in Canada and Japan were 21.9 percent and 12.2 percent respectively.

2.2 Contract Costs and Foreign Direct Investment

This section provides a partial analysis of the decision to undertake foreign direct investment that focuses on how contracting costs influence direct investment decisions. Specifically, I begin with the assumption that a firm has decided to enter a foreign market directly rather than rely on exports. Given that decision, the firm must then decide whether to enter that market through an affiliate or through a licensee. The process of explaining how a firm chooses between direct investment and licensing provides insight into firm and market characteristics that are conducive to foreign direct investment.

While my focus here is on the decision-making process of a single firm, that process can be placed in context by assuming that the market setting within which the investment decision is made is that of a firm producing a differentiated product in an industry characterized by Chamberlinian-type monopolistic competition. Assuming either Dixit-Stiglitz (1977) or Lancaster (1979) type preferences for the differentiated goods by consumers abroad will permit us to derive foreign market demand curves for the product of each firm, including our single producer.

In simplest terms, the choice between foreign direct investment and licensing of a foreign firm will depend on the expected present value of the discounted profit stream accruing to the firm from investing compared to licensing. Empirical evidence on U.S. direct investment abroad in manufacturing and on foreign direct investment in manufacturing in the United States in recent years reflects a strong preference for majority-owned and, almost as often, wholly owned foreign subsidiaries rather than licensing arrangements to take advantage of opportunities to earn profits in foreign markets.[4] Therefore, the model must be able to explain market, production, and/or contracting conditions that generate a general preference for direct investment over licensing and for substantial majority control when foreign direct investment takes place.

2.2.1 Foreign Direct Investment versus Licensing

Let P_F and Q_F represent the foreign price of the product and the output by a foreign subsidiary in a given market period. In addition, assume that production can be characterized as follows:

$$Q_F = F(L_F, K_F, H_F, K_F^s) , \tag{1}$$

where L_F and K_F are basic labor and capital inputs and H_F and K_F^s are specialized human and physical capital assets associated with the production of the firm's differentiated product. The process of deciding whether to invest

or to license is essentially one of determining which method of operating in the foreign market will maximize the expected discounted value of appropriable rents that the firm can get from the use of H_F and K_F^s. The term H_F represents managerial and marketing know-how as well as technical expertise that can be conveyed to the foreign subsidiary directly from the home office or provided to a licensing firm through consulting arrangements. I presume that the specialized capital inputs, K_F^s, are constructed in the foreign country under the scrutiny of the parent firm or subject to contractual restraints in the case of licensing. Abstracting from issues of production and/or consumption smoothing over time, I assume that all the current output is sold.

Costs in each production period include factor input costs, C_F, plus marketing costs associated with the foreign market, M_F. Marketing costs are assumed to be a positive and increasing function of sales and of the degree of adaptation that the firm has to make to market its product abroad, d. Adaptation could include anything from a modest differentiation of an existing product sold in the home market, in which case d would be small, to the development of totally unrelated products for sale abroad, in which case d would be large. I assume that d is a positive and increasing function of the degree of nonsubstitutability between parent firm and subsidiary firm products.

The profitability of investment abroad at any point in time, π_t, is simply

$$\pi_t = R_{Ft} - C_{Ft} - M_{Ft}, \tag{2}$$

where R_{Ft} represents current revenue and the discounted present value of expected profits from foreign direct investment can be written as π_I. The assumption that the firm is concerned only with the discounted present value of its foreign operations presumes that the firm is risk neutral and that there are no bankruptcy risks.

The alternative possibility facing the firm would be to license the use of specialized human and physical assets to a foreign producer, who would provide royalty payments to the firm in return for the use of the specialized assets. The returns to the licensing firm will be equal to the value of the licensed services less the costs of defining and enforcing the terms of the contract. The value of the firm's specialized assets in any period is equal to the sum of the implicit value of specialized human and physical capital assets, $w_h H_{Ft} + r_s K_{Ft}^s$, where w_h and r_s are specialized asset prices per unit time.

The cost of contracting with the licensee can be thought of as simply the sum of the costs of monitoring and enforcing the terms of the agreement by which the licensee has access to the use of the specialized human and physical capital assets of the home-country firm. The licensing firm incurs positive contracting costs either because there exists the possibility of opportunistic behavior by the licensed firm in the use of specialized assets or because it is difficult to assess the implicit value of the use of the specialized assets that are licensed. I assume that licensing contract costs, C_L, are positively related to

the use of both kinds of specialized assets and to the ratio of specialized physical capital to human capital required in production. This last argument will be denoted by $k_{Ft} = K^s_{Ft}/H_{Ft}$. Therefore, the value of the licensing arrangement to the licensing firm, π_{Lt}, in any period, should be equal to the net revenues accruing from licensing,

$$\pi_{Lt} = w_h H_{Ft} + r_s K^s_{Ft} - C_{Lt}(H_{Ft}, K^s_{Ft}, k_{Ft}) , \tag{3}$$

and the discounted present value of a licensing agreement to the licensing firm can be written as π_L. The firm in possession of the specialized assets will choose to invest abroad when

$$\pi_I - \pi_L > 0. \tag{4}$$

Therefore, the desire to invest abroad rather than license a foreign producer will be positively related to licensing contracting costs and negatively related to the marketing costs of the investing firm.

To this point, I have not discussed the conditions under which anyone would be interested in buying a license abroad. Assuming that marketing costs associated with selling abroad, M_F, are not relevant to a host-country producer,[5] we can denote the discounted expected profitability of a license to a buyer as π_B. The profit from licensing a firm in any given period, π_{Lt}, represents a cost to the licensee. If contracting costs are high enough, it will never pay to offer to sell licenses abroad. If licensing costs, π_L, are high enough, it will never pay to purchase a license. In the case in which licensing and investing abroad are both feasible, direct investment abroad will be preferred when

$$\pi_I - \pi_L > 0, \tag{5a}$$

and

$$\pi_B - \pi_L > 0. \tag{5b}$$

In effect, the likelihood that a firm will choose to invest abroad, and therefore the value of foreign direct investment within an industry in any given period of time, will be negatively related to the cost of marketing the product abroad and positively related to the costs of defining and enforcing licensing agreements (i.e., contracting costs). More formally, the value of industry investment abroad, FDI, can be written as a function of marketing and contracting costs as follows:

$$\begin{aligned} \text{FDI} = {} & f(M_F, C_L) \\ & <0, \ >0 \end{aligned} \tag{6}$$

where the inequality signs reflect the derivatives of $f(\cdot)$ with respect to M_F and C_L. Marketing costs increase as the degree of substitutability between the parent firm's product and the subsidiary firm's product decreases or as the diversity, d, between the two products increases. I assume that product

diversity and therefore M_F will be smallest and FDI greatest when the foreign direct investment is in production in the same industry as the one in which the parent is already operating. In the empirical work in section 2.3 below, I use the percentage of investment within an industry for which the parent and subsidiary firms have the same four-digit SIC code as a direct measure of the substitutability between parent and affiliate products. Therefore, I expect the within-parent industry index to be positively related to foreign direct investment in the United States.

Contracting costs are directly related to the requirements of specialized human and physical capital inputs per unit of output. In the empirical work that follows, I use the research and development intensity of production (R&D) as an indicator of the need for specialized asset inputs per unit of output.

I also assume that specialized asset values are more easily appropriable by the owner over time through licenses if they are embodied in human capital than if they are embodied in physical capital, which can be disassembled, copied, and therefore stolen by a licensee. Therefore, foreign direct investment would be more likely the greater the share of physical capital in the specialized asset mix of the parent company. Holding scale phenomena constant, as measured by midpoint plant shipments in an industry, MPS, I use the capital-labor ratio to measure the ratio of firm-specific specialized physical capital to specialized human capital.

In the empirical section, I use industry investment, which is the sum of investment decisions across representative firms in our monopolistically competitive framework, as the unit of analysis. These points can be summarized as follows:

$$\text{(7)} \qquad \underset{\substack{\\ <0,}}{\text{FDI}} = \underset{\substack{d, \\ <0,}}{g(} \quad \underset{\substack{\text{R\&D}, \\ >0,}}{} \quad \underset{\substack{K/L; \\ >0,}}{} \underset{\substack{\\ >0,}}{\text{MPS}}),$$

where the inequalities below the variables reflect the expected effect of each right-hand-side variable on the value of industry foreign direct investment.

The analysis I have presented presumes that the parent firm behaves like a Chamberlinian monopolistic competitor in the foreign market. That assumption permitted me to focus on the relative attractiveness of licensing and investing to the parent firm without regard to the choices made by producers of other variants of the product and to think about industry behavior as the simple sum of decisions by individually and independently acting parent firms. To the extent that the market is dominated by a few firms in oligopolistic competition, the choices facing our single producer are much more complex.

The original Gruber, Mehta, and Vernon (1967) argument that foreign direct investment could be interpreted as a defensive strategy to maintain market shares abroad by oligopolistic producers of differentiated consumer goods could lead to very different relations among the key variables under

discussion here. I include a consumer goods measure and a measure of industry concentration in the estimated investment equations in section 2.3 with the expectation that neither will be positively related to foreign direct investment decisions. Along those same lines, we would expect midpoint plant size within industries in which direct investment occurs to be insignificant, which is consistent with easy entry into the industry.

The functional relation tested in the next section is based on the discussion here but includes consideration of two other factors that tend to promote both foreign direct investment and licensing of foreign firms by a parent company. First, I include a measure of growth within individual industries as well as a measure of growth in the foreign country relative to growth in the parent-company country. Finally, I assume that, given the decision to invest abroad, a firm will be more likely to time that investment when the foreign currency is cheap than when it is expensive. That timing makes sense only if a decline in the value of the foreign currency is assumed to be temporary.

2.3 Empirical Evidence

While the regressions summarized in table 2.4 are directly related to the partial equilibrium model of section 2.2, the empirical work summarized in tables 2.5–2.8 below is more exploratory. Those results represent an effort to provide preliminary evidence of the relevance of factors that were not part of the model but have been suggested in previous work as potentially important determinants of foreign direct investment activity.

Referring to table 2.4, I proceeded with the analysis of firm-specific foreign direct investment activity in the context of a model of monopolistic competition. A priori, there is no reason to presume that markets are not highly concentrated and difficult to enter and that oligopolistic interactions are not at the heart of an explanation of foreign direct investment decisions in manufacturing. The evidence in table 2.4 indicates that in fact industries in which foreign direct investment is likely to occur and in which large transactions will be realized tend to be industries in which plant size is likely to be relatively small (except for Japan) and market concentration is insignificant or a negative factor. In addition, there is no particular bias in foreign direct investment activity in the United States toward consumer goods, which are often thought of as possible targets for oligopolistic competition.

As expected, the value of foreign direct investment in the United States is positively related to whether the subsidiary is producing goods that belong to the same four-digit SIC category as those of the parent firm. That relation reflects a minimum of diversification between the parent and the subsidiary firms.

I argued that foreign direct investment would be positively related to the research and development intensity of production and/or the capital-labor ratio

holding plant size constant (reflecting the ratio of firm-specific physical capital to human capital). The research and development factor is significant as a determinant of the value and likelihood of foreign direct investment from each area into the United States (except for Japan and Canada in terms of value). Foreign direct investment in the United States is positively related to the capital-labor ratio, holding plant size constant, except in the case of Japan (and Canada in terms of likelihood).

Industry-specific growth and relative growth in GNP in the United States were positively related to foreign direct investment from each of the major areas considered. Industry growth was significant with respect to the value of foreign direct investment by Japan and all investors as a group. Industry growth was significant with respect to the likelihood of foreign direct investment in the United States for the EC and for investors in general. Relative GNP growth in the United States was significant in explaining the value of Japanese and general investment.

The exchange rate effect indicates that a relatively cheap U.S. dollar served as a significant stimulus to foreign direct investment into the United States from each of the major investing areas except Japan. Such opportunism presumes that a cheap U.S. dollar is a temporary phenomenon, which was not the case relative to the yen.

The regressions also include industry size (the log value of industry shipments in the United States in 1982). That variable is intended to reflect the possible significance of measurement errors associated with the use of industry rather than firm data to explain the probability and magnitude of foreign direct investments. As indicated in table 2.4, measurement problems may be relevant.

The results obtained in table 2.4 suggest that manufacturing sectors in which foreign direct investment has been significant in the United States during the early 1980s can be characterized as relatively unconcentrated research- and specific-factor-intensive industries. There is no particular bias toward consumer or intermediate goods production and generally no evidence of scale economies in production, except in the case of Japanese investments. To the extent that individual market expansion and macroeconomic factors have influenced foreign decisions to undertake direct investments in the United States, they have worked in predictable fashion. Relative real economic growth in the United States during the 1980s and industry-specific growth encouraged foreign direct investment from abroad, and foreigners took advantage of periods when the U.S. dollar was relatively cheap to undertake U.S. investment projects.

2.3.1 Alternative Explanations of Foreign Direct Investment

Early efforts to explain the phenomenon of U.S. foreign direct investment around the world after World War II took two forms.[6] On the one hand, it was

Table 2.4 **Foreign Direct Investment in the United States: Production Characteristics**

Dependent Variable	Independent Variables												
	Constant	Consumer Goods[a]	Midpoint Plant Size[b]	R&D Intensity[c]	Capital-Labor Ratio[d]	Market Concentration[e]	Within Parent Industry[f]	Industry Size[g]	Industry Growth[h]	U.S. Growth Trend[i]	Exchange Rate[j]	R^2	No. of Observations
Industry-level FDI:													
All countries	−5.00	−.03	.0003	1.93	.0001	−.01	1.29	.31	.001	.03	3.47		
	(6.15)	(.30)	(.61)	(2.42)	(5.07)	(2.49)	(12.54)	(7.89)	(2.59)	(2.50)	(2.02)	.118	1,806
Japan	−2.16	.03	.003	1.86	-2.8×10^{-5}	−.001	2.03	.20	7.0×10^{-4}	.24	−3.41		
	(1.66)	(.25)	(3.68)	(1.63)	(.84)	(.35)	(13.61)	(3.22)	(1.68)	(2.96)	(1.23)	.353	1,806
EC	−4.39	−.09	2.5×10^{-5}	3.07	1.1×10^{-4}	−.01	1.27	.33	.001	.01	.01		
	(10.26)	(.78)	(.04)	(3.51)	(4.68)	(2.21)	(10.20)	(7.38)	(4.00)	(1.80)	(2.28)	.165	1,806
Canada	−6.69	−.22	−.002	−.45	.0001	−.003	1.47	.30	.0002	.11	.03		
	(4.54)	(1.14)	(1.77)	(.33)	(3.56)	(.84)	(5.42)	(4.47)	(.42)	(.57)	(2.03)	.006	1,806

Probability of industry-level FDI:													
All countries	−7.50	.09	−.002	3.61	.0001	−.006	56.26	.41	.001	.007	7.87		
	(7.70)	(.75)	(1.91)	(3.63)	(3.92)	(2.50)	(.003)	(8.63)	(2.52)	(.47)	(3.87)	.409	1,806
Japan	−3.64	.15	−.0003	4.98	-1.4×10^{-5}	−.002	66.49	.22	.0004	.11	−.36		
	(2.57)	(1.02)	(.32)	(3.79)	(.38)	(.62)	(.01)	(3.21)	(.83)	(1.29)	(.12)	.481	1,806
EC	−5.55	−.17	−.002	4.49	1.5×10^{-5}	−.004	40.36	.43	.001	.01	.02		
	(11.02)	(1.32)	(2.03)	(4.37)	(.48)	(1.54)	(.002)	(8.18)	(2.73)	(1.60)	(4.64)	.399	1,806
Canada	−7.23	−.21	−.002	−1.79	9.3×10^{-5}	−.003	12.51	.33	6.0×10^{-4}	.25	.03		
	(4.80)	(1.12)	(1.60)	(1.24)	(2.92)	(.82)	(.06)	(4.69)	(1.30)	(1.29)	(2.21)	.220	1,806

Note: The first four regressions in the table are estimated using tobit since the dependent variables are bounded below by 0.00 and there are a substantial number of limit observations. Each of the last four regressions is estimated using probit since the dependent variable is a 1.0 or 0.0 dummy value, depending on whether there was any investment in a given industry in a given year in the United States. Absolute *t*-ratios appear in parentheses below the coefficients. Dependent variable observations are at the four-digit industry level for each of the years 1979–85.

[a]This is a 1972 measure of the proportion of industry sales for final consumption purposes.

[b]Midpoint plant size is measured by the midpoint plant shipment value for each industry using 1972 data.

[c]Research and development is measured by the ratio of total research and development expenditures to total costs across industries in 1972.

[d]The capital-labor ratio is the average value in 1972 for each industry.

[e]This is the industry four-firm concentration ratio in 1982.

[f]This is a constructed variable that represents the percentage of individual investments within an industry in a given year that are in the same four- digit SIC category as the parent firm's four-digit SIC.

[g]Industry size is measured by the log of the value of industry shipments in 1982.

[h]Industry growth is measured by the percentage change in the value of shipments within each given four-digit SIC industry between 1972 and 1982.

[i]U.S. growth trend in the all industry regressions is measured by real GNP changes in the current year. U.S. growth trends are measured by real GNP growth in the United States relative to real GNP growth in Japan, the EC, and Canada for the corresponding regressions. The measures are for the current year.

[j]The exchange rate trend in the all industry regressions is measured by the average of the U.S. dollar/yen exchange rate during the current year. The EC and Canadian regressions use the deutsche mark and the Canadian dollar in place of the yen as appropriate in the exchange rate.

presumed that the formation of the EC and the separate European free trade area in the early 1950s created trade barriers to U.S. exports to Europe that could be circumvented by the creation of U.S. production subsidiaries in Europe. On the other hand, it was argued that foreign direct investment might be one method by which producers in oligopolistic industries could maintain their market positions abroad as their exports became less competitive. This defensive investment hypothesis is most congenially identified with industries that are dominated by a few relatively large producers of differentiated consumer products.

The regressions reported in table 2.5 are intended to provide crude evidence on the applicability of the defensive investment hypothesis as an explanation of recent foreign direct investment in the United States. As indicated, neither the likelihood nor the value of foreign direct investments in the United States by industry was found to be positively related to market concentration (except the value of foreign direct investment for Japan) or the production of consumer goods.[7] That evidence does not exclude the possibility that a more complicated version of the defensive investment hypothesis can be sustained but it does shift the burden of proof to those who would argue that defensive investment strategies might explain foreign direct investment in U.S. manufacturing industries.

The argument that foreign direct investment can be viewed as a tariff-jumping technique has current appeal given the rise in protectionist sentiments in the United States since the early 1970s. Furthermore, a literature has developed that suggests the use of foreign direct investment to establish a market presence within a country to prevent future trade restrictions from being implemented (see Wong 1987, and the references cited therein).

Tables 2.6 and 2.7 report efforts to estimate the relation between tariff and nontariff trade barriers in the United States and decisions to undertake foreign direct investments in the United States. Recent studies suggest that the most highly protected industries in the United States enjoy both tariff and nontariff trade barrier protection (e.g., Marvel and Ray 1983; Ray and Marvel 1984; and the references cited in both). The interactive terms in tables 2.6 and 2.7 reflect industries with high overall protection. The issue is whether foreign direct investment has been induced by protectionist measures. The results presented in table 2.6 rely on the use of post–Tokyo Round nominal tariff rates for 1986, while the estimates in table 2.7 are generated using post–Kennedy Round effective protective rates. The results in table 2.6, which are sustained in table 2.7, suggest that investments in the United States from abroad have not been stimulated by U.S. protectionism. It is hoped that these preliminary results will inspire those who believe in the importance of strategic foreign direct investment to influence trade policy to attempt more systematic efforts in this direction.

Recent theoretical and empirical work has suggested that foreign direct investment may either cause or be caused by intraindustry trade (see, e.g.,

Table 2.5 **Foreign Direct Investment in the United States: Defensive Investment**

Dependent Variable	Independent Variables								
	Constant	Consumer Goods	Market Concentration	Within Parent Industry	Industry Size	U.S. Growth Trend	Exchange Rate	R^2	No. of Observations
Industry-level FDI:									
All countries	−5.47	−.15	−.001	1.25	.40	.03	3.42		
	(7.01)	(1.64)	(.52)	(12.35)	(14.88)	(2.47)	(2.00)	0.098	1,806
Japan	−3.69	.05	.006	2.08	.38	.22	−3.23		
	(2.99)	(.36)	(2.60)	(14.30)	(9.26)	(2.83)	(1.18)	0.290	1,806
EC	−4.82	−.24	−.001	1.21	.43	.01	.01		
	(14.48)	(2.18)	(.41)	(9.98)	(14.32)	(1.74)	(2.21)	0.092	1,806
Canada	−6.29	−.30	−.004	1.34	.28	.11	.03		
	(4.59)	(1.65)	(1.62)	(5.05)	(6.53)	(.61)	(2.01)	0.003	1,806
Probability of industry-level FDI:									
All countries	−7.39	−.27	−.003	56.80	.45	.008	7.60		
	(7.97)	(2.46)	(1.65)	(.003)	(12.95)	(.54)	(3.80)	0.389	1,806
Japan	−3.94	−.07	.001	63.82	.30	.11	−.40		
	(2.97)	(.48)	(.27)	(.01)	(6.49)	(1.27)	(.14)	0.472	1,806
EC	−5.34	−.27	−.003	40.37	.45	.01	.02		
	(13.28)	(2.23)	(1.55)	(.003)	(12.18)	(1.57)	(4.55)	0.378	1,806
Canada	−6.78	−.25	−.005	12.91	.30	.24	.03		
	(4.82)	(1.42)	(1.67)	(.04)	(6.68)	(1.30)	(2.19)	0.207	1,806

Note: See notes to table 2.4.

Table 2.6 **Foreign Direct Investment in the United States: Nominal Tariff and Nontariff Barrier (NTB) Jumping**

Dependent Variable	Independent Variables									
	Constant	Nominal Tariff[a]	NTBs[b]	Nominal Tariff-NTB Interaction[c]	Within Parent Industry	Industry Size	U.S. Growth Trend	Exchange Rate	R^2	No. of Observations
Industry-level FDI:										
All countries	−5.54	−.01	−.12	.01	1.24	.41	.03	3.45		
	(7.12)	(.90)	(1.16)	(.94)	(12.36)	(14.92)	(2.43)	(2.02)	.100	1,806
Japan	−3.31	−.01	−.64	.03	2.07	.40	.23	−3.55		
	(2.65)	(.74)	(3.49)	(1.18)	(14.18)	(9.24)	(2.87)	(1.28)	.268	1,806
EC	−5.07	−.01	−.22	.01	1.21	.46	.01	.01		
	(15.49)	(.54)	(1.96)	(1.08)	(9.98)	(14.81)	(1.73)	(2.27)	.092	1,806
Canada	−6.32	−.06	−.08	−.06	1.43	.27	.13	.03		
	(4.61)	(2.27)	(.49)	(1.98)	(5.38)	(6.37)	(.68)	(2.02)	.002	1,806
Probability of industry-level FDI:										
All countries	−7.75	−.01	−.32	.02	56.25	.49	.01	7.66		
	(8.38)	(.78)	(2.74)	(.97)	(.003)	(13.75)	(.45)	(3.83)	.385	1,806
Japan	−3.87	−.01	−.55	.03	62.01	.32	.12	−.61		
	(2.89)	(.77)	(2.86)	(1.17)	(.01)	(6.74)	(1.34)	(.20)	.479	1,806
EC	−5.84	.01	−.33	.02	41.13	.49	.01	.02		
	(14.88)	(.64)	(2.60)	(1.01)	(.002)	(13.14)	(1.54)	(4.67)	.376	1,806
Canada	−6.84	−.06	−.05	.05	12.88	.29	.25	.03		
	(4.86)	(2.22)	(.30)	(1.59)	(.06)	(6.55)	(1.34)	(2.22)	.203	1,806

Note: See notes to table 2.4.

[a]This measure equals post–Tokyo Round, 1986, nominal tariff rates.

[b]NTBs are measured by a dummy variable that takes on a value of 1.0 if nontariff trade restrictions are present in an industry in the post–Kennedy Round period and 0.0 otherwise.

[c]This is an interactive term reflecting the presence of both nominal tariff and NTB protection across industries in the post–Kennedy Round period. While the interactive term uses post–Kennedy Round NTB protection out of necessity, the term would accurately reflect high tariff and NTB-protected industries in the post-Tokyo Round period too except for those cases of high tariff industries that would have received NTB protection for the first time after 1975. There are few if any likely cases among the 327 four-digit SIC industries.

Table 2.7 **Foreign Direct Investment in the United States: Effective Tariff and Nontariff Barrier (NTB) Jumping**

	Independent Variables									
Dependent Variable	Constant	Effective Tariff[a]	NTBs	Effective Tariff-NTB Interaction[b]	Within Parent Industry	Industry Size	U.S. Growth Trend	Exchange Rate	R^2	No. of Observations
Industry level FDI:										
All countries	−5.63	.003	.003	−.01	1.25	.41	.03	3.46		
	(7.18)	(.52)	(.03)	(.74)	(12.40)	(14.58)	(2.42)	(2.03)	.100	1,806
Japan	−3.50	.01	−.40	−.01	2.07	.41	.23	−3.50		
	(2.78)	(.63)	(2.10)	(.65)	(14.21)	(9.17)	(2.88)	(1.26)	.264	1,806
EC	−5.30	.01	−.15	−.002	1.21	.47	.01	.01		
	(15.38)	(2.21)	(1.28)	(.26)	(10.01)	(14.76)	(1.74)	(2.29)	.103	1,806
Canada	−6.30	−.01	.19	−.0003	1.43	.26	.12	.03		
	(4.59)	(1.05)	(1.14)	(.02)	(5.35)	(6.07)	(.63)	(1.98)	.002	1,806
Probability of industry-level FDI:										
All countries:	−7.89	.01	−.13	−.01	56.15	.49	.01	7.67		
	(8.46)	(1.06)	(1.03)	(1.32)	(.003)	(13.38)	(.45)	(3.84)	.387	1,806
Japan	−4.14	.01	−.29	−.01	62.49	.34	.12	−.54		
	(3.07)	(1.13)	(1.46)	(.86)	(.01)	(6.79)	(1.32)	(.18)	.479	1,806
EC	−6.09	.01	−.15	−.01	40.88	.51	.01	.02		
	(14.66)	(2.50)	(1.07)	(1.24)	(.002)	(12.92)	(1.56)	(4.68)	.379	1,806
Canada	−6.83	−.01	.19	−.003	12.75	.28	.25	.03		
	(4.85)	(1.00)	(1.09)	(.20)	(.06)	(6.31)	(1.31)	(2.17)	.201	1,806

Notes: See notes to tables 2.4 and 2.6.

[a]Effective protection is measured by U.S. post–Kennedy Round effective protection rates at the four-digit level.

[b]This is an interactive term that reflects the presence of both effective protection and NTBs in an industry.

Ethier 1986; Helpman 1984; and Marvel and Ray 1987). Table 2.8 contains estimated relations that treat intraindustry trade in 1972 as a determinant of foreign direct investment in the United States between 1979 and 1985. In brief, there is no evidence that the existence of intraindustry trade within a manufacturing sector serves as an inducement for future foreign direct investment in that industry.

2.4 Conclusions

The evidence presented in this study makes it clear that foreign direct investments in the United States in recent years have been much less concentrated in the manufacturing sector than was true of U.S. foreign direct investments in the rest of the world during the first three decades after World War II. Investments in manufacturing in the United States have been predominantly from Canada, Europe, and Japan. Those industries that have attracted the most interest and investment inflows from foreign firms were both consumer and producer goods manufacturers. Neither scale economies nor market concentration is significant in general in investment target industries. But affiliate production is intensive in the use of firm-specific human and physical capital, reflecting the difficulties of contracting for the use of such factors through arm's-length licensing contracts. Parent and subsidiary firms tend to produce similar products, reflecting the tendency to create subsidiaries abroad to produce goods with which the parent firms are already most familiar.

Relative gains in real economic growth in the United States as well as industry-specific growth appear to have had some positive effect on decisions to invest in the United States by foreign firms, and investments appear to have been timed to take advantage of a relatively cheap U.S. dollar when possible. There is no clear evidence in this study to support either the defensive investment hypothesis or the tariff-jumping argument.

This last observation is consistent with the view that foreign investors were no more interested than domestic investors were in putting money into declining industries in the United States, which traditionally have been the major beneficiaries of protectionist measures. The much-needed structural shifts in manufacturing in the United States that began in the late 1970s were reenforced by a massive inflow of capital from abroad. The structural unemployment problems that developed as a by-product of market shifts during the early 1980s were not offset by an inflow of direct investment funds from abroad into declining industries. Rather, foreign direct investments in the United States appear to have contributed to the expansion of existing industries and the creation of newer ones that have provided new jobs.

Table 2.8 **Foreign Direct Investment in the United States: Intraindustry Trade Effects**

Dependent Variable	Independent Variables: Constant	Intraindustry Trade[a]	Within Parent Industry	Industry Size	U.S. Growth Trend	Exchange Rate	R^2	No. of Observations
Industry-level FDI:								
All countries	−5.56	-4.0×10^{-4}	1.25	.40	.03	3.44		
	(7.18)	(.38)	(12.40)	(15.30)	(2.43)	(2.02)	.102	1,806
Japan	−3.31	− .001	2.09	.36	.22	−3.13		
	(2.69)	(.38)	(14.35)	(8.96)	(2.84)	(1.14)	.238	1,806
EC	−4.86	− .001	1.20	.44	.01	.01		
	(15.23)	(1.18)	(9.97)	(14.74)	(1.73)	(2.23)	.099	1,806
Canada	−6.67	.002	1.40	.30	.11	.03		
	(4.88)	(.95)	(5.29)	(6.95)	(.61)	(1.99)	.001	1,806
Probability of Industry-level FDI:								
All countries	−7.80	.002	56.89	.47	.01	7.60		
	(8.48)	(1.47)	(.003)	(13.70)	(.49)	(3.81)	.383	1,806
Japan	−3.86	− .0003	64.04	.29	.11	− .37		
	(2.92)	(.16)	(.01)	(6.52)	(1.27)	(1.27)	.473	1,806
EC	−5.71	.001	40.38	.47	.01	.02		
	(14.80)	(.76)	(.003)	(12.85)	(1.53)	(4.61)	.372	1,806
Canada	−7.25	.003	12.55	.31	.24	.03		
	(5.17)	(1.49)	(.06)	(7.17)	(1.28)	(2.18)	.200	1,806

Note: See notes to table 2.4.

[a]Intraindustry trade is measured using 1972 four-digit SIC data and consists of an index scaled from 0.0 to 100 percent with higher values corresponding to greater trade overlap. The precise measure used equals:

$$2 \min \frac{(\text{IMPORTS, EXPORTS})}{\text{IMPORTS} + \text{EXPORTS}} \times 100.$$

Appendix
Variable Sources and Definitions

Dependent Variable Name	**Description**
Industry-level foreign direct investment	Foreign direct investment into the United States by industry in millions of U.S. dollars. (Unless otherwise specified, the observations include those from the 469 Manufacturing four-digit SIC codes.) *Source:* "Foreign Direct Investment in the United States: Completed Transactions, 1974–1983 Volume II: Industry Sector" (Washington, D.C.: U.S. Department of Commerce, International Trade Administration [ITA], June 1985). (Two additional years from the ITA on tape were also used.)
Probability of industry foreign direct investment	A dummy variable that takes on the value one if the value of the transactions by industry is greater than zero and zero otherwise. *Source:* "Foreign Direct Investment in the United States."
Independent Variable Name	**Description**
U.S. growth trend:	
All country regressions	Annual real percentage change in the U.S. GNP from 1979 to 1985. *Source: 1987 Economic Report of the President* (Washington, D.C.: U.S. Government Printing Office, 1987), table B-5, col. 2, p. 251.
Japan regressions	Ratio of real U.S. GNP growth to Japanese real GNP growth from 1979 to 1985. *Source: European Economy* (Committee of European Communities), no. 29, table 8, p. 144.

EC regressions	Ratio of real U.S. GNP growth to an average of EC member countries' real GNP growth from 1979 to 1985. *Source: 1987 Economic Report of the President,* table B-106, p. 366; and *1981 Economic Report of the President* (Washington, D.C.: U.S. Government Printing Office, 1981), table B-107, p. 353.
Canada regressions	Ratio of real U.S. GNP growth to the Canadian real GNP growth from 1979 to 1985. *Source:* Same as EC regressions.
All country regressions	Annual rate of exchange between the U.S. dollar and the Japanese yen ($/yen) from 1979 to 1985. *Source: 1987 Economic Report of the President,* table B-105, p. 365.
Japan regressions	Annual rate of exchange between the U.S. dollar and the Japanese yen ($/yen) from 1979 to 1985. *Source: 1987 Economic Report of the President,* table B-105, p. 365.
EC regressions	Annual rate of exchange between the U.S. dollar and the West German mark ($/DM) from 1979 to 1985. *Source: 1987 Economic Report of the President,* table B-105, p. 365.
Canada regressions	Annual rate of exchange between the U.S. dollar and the Canadian dollar ($US/$CAN) from 1979 to 1985. *Source: 1987 Economic Report of the President,* table B-105, p. 365.
Consumer goods	Output attributed to personal consumption expenditures divided by total output. *Source: USITC's Industrial Characteristics and Trade Performance Data Bank* (Washington, D.C.: U.S. International Trade Commission [USITC], Office of Economic Research, June, 1975).
Market concentration	The percentage of sales accounted for by the four largest firms in an industry. *Source: 1982 Census of Manufactures.*

Within parent industry	This is a dummy variable that takes on a value from 0 to 100 percent, reflecting the extent to which parent and affiliate firms have the same four-digit SIC code for transactions in an industry. *Source:* "Foreign Direct Investment in the United States."
Industry size	Natural log of the value of shipments by industry in 1982. *Source: 1982 Census of Manufactures.*
Nominal tariff	Post–Tokyo Round, 1986, nominal U.S. tariff rates. *Source:* Computer tape (Washington, D.C.: USITC, Office of Economic Research, May 1988).
Nontariff barrier dummy	A dummy variable that takes on the value of one if there exists a nontariff barrier for that industry and zero otherwise. *Source: USITC's Industrial Characteristics and Trade Performance Data Bank.*
Nominal tariff–nontariff barrier interaction	Nontariff barrier dummy × Post–Tokyo Round tariffs in the United States *Source:* See individual variables listed.
Effective protection	The effective protection rates were estimated by the USITC assuming fixed intermediate input-output coefficients. *Source:* USITC, *Protection in Major Trading Countries,* Publication no. 737 (Washington, D.C.: USITC, August 1975).
Effective protection–nontariff barrier interaction	Nontariff barrier dummy × U.S. effective tariff protection. *Source:* See individual variables listed.
Agriculture industry dummy	This is a dummy variable that takes on a value of one for four-digit SIC industries 2000–2199 and zero otherwise.
Textiles industry dummy	This is a dummy variable that takes on a value of one for four-digit SIC industries 2200–2399 and zero otherwise.
Intraindustry trade measure for 1972	A measure equal to: $(\{2 \cdot [\text{Min}(\text{IMPORT72}, \text{EXPORT72})]\}/(\text{IMPORT72} + \text{EXPORT72})) \cdot 100$. *Source:* Data tape (Washington, D.C.:

	USITC, Office of Economic Research, 1972).
Midpoint plant size	This variable is constructed from data reported in the *1972 Census of Manufactures*. (A detailed description is available from the author on request.)
Research and development intensity	Percentage of scientists and engineers in the work force of an industry. *Source: 1972 Census of Manufactures.*
Capital-labor ratio	Gross book value 1972 divided by labor employment 1972. *Source:* U.S. Bureau of the Census, *Annual Survey of Manufactures, 1974*, M74(A5)-1 (Washington, D.C.: U.S. Government Printing Office, 1977).

Notes

1. Recent empirical work on outbound U.S. foreign direct investment includes Baldwin (1979), Grubaugh (1987), Kravis and Lipsey (1982), Lipsey and Weiss (1981), and Williamson (1986). Recent theoretical pieces more appropriately applied to outbound investments include Batra (1986), Chen (1985), Krugman (1979), and Wong (1987).

2. Earlier work focusing on the use of foreign direct investment to extract rents that would be difficult to capture through licenses includes Aliber (1970), Caves (1971), McGee (1966), and Vernon (1966). More recent work on contracting costs and the appropriability of rents includes Brecher (1982), Ethier (1986), Grossman and Hart (1986), Helpman (1984), Horstmann and Markusen (1987), Rugman (1980), and Williamson (1981).

3. The possibility that trade restrictions may induce foreign direct investments is explored more fully in recent papers by Brander and Spencer (1987), Chen (1985), Williamson (1986), and Wong (1987).

4. The mean values of ownership control associated with foreign direct investments in manufacturing in the United States for the regions considered here throughout the sample period were as follows: all countries, 86.34 percent; Japan, 86.57 percent; the EC, 87.85 percent; and Canada, 80.49 percent.

5. In effect, I assume that M_F reflects additional costs to the parent firm of selling its product in a distant market that is less well known to the parent firm than its domestic market. Foreign license candidates are presumed to have idiosyncratic information about their own markets.

6. Early work that focused on the tariff-jumping aspects of foreign direct investment included Horst (1971, 1972a, 1972b). Papers that raised the possibility of defensive investment included Aliber (1970), Caves (1971), Gruber, Mehta, and Vernon (1967), Hymer (1976), Ray (1977), and Vernon (1966).

7. Monopoly and oligopoly models are embodied in papers dealing with foreign direct investment by Brander and Spencer (1987), Horstmann and Markusen (1987), and Levinsohn (1987), among others.

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Comment

Keith E. Maskus

This paper on foreign investment in the United States is ambitious in what it tries to do and in what it succeeds in doing. Ray has assembled a huge data base on individual foreign firms' investment decisions in the United States over the period 1979–85 and related those decisions, aggregated to the industry level, to a large set of U.S. industry characteristics, many of which will be familiar to those who have read his papers on protection and intraindustry trade. Ray's intent is to characterize the various motives for foreign direct investment in the United States across a broad range of manufacturing and nonmanufacturing industries, though his focus is clearly on manufacturing. He has unearthed some interesting regularities in the data set, the most striking of which are that foreign direct investment (FDI) is concentrated in U.S. industries with a high research and development content and evidently is unrelated to heavy industry concentration. Further, more FDI is induced by a cheap dollar. These findings are useful and will help shape our understanding of motivations for FDI coming into the United States.

I wish to raise several questions about the analysis in the paper. The first issue is Ray's motivation in undertaking this research. What might be

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different about FDI in the United States that would distinguish this paper from the enormous volume of literature on other FDI flows, mainly those flowing out of this country? To the extent that investment flows into the United States come from other developed countries (and clearly the overwhelmingly majority do), it is difficult to see what might be expected to characterize incentives for them distinctly from those driving investment in other directions. A related issue is whether the situation in the United States has really changed in the 1980s in such a way as to attract not only more FDI but also a distinctive pattern of FDI, which, after all, has been coming into the United States in various degrees for a long time.

These points do not suggest that an analysis of FDI entering the United States is unimportant. There is much valuable information to be learned from such an exercise. It seems, though, that the paper would be strengthened by some consideration of what might be unique about the current U.S. market for absorbing FDI. The paper hints at a proximate answer by pointing out that FDI in the United States is diversified across several sectors and is certainly not dominated by manufactures. This fact is especially true of Japanese FDI, which is predominantly in wholesale trade or distribution and banking and finance. Are we to conclude from this that the U.S. service sector is peculiarly open to FDI? If so, perhaps foreign investors are positioning themselves to exploit a clear U.S.-based comparative advantage in supplying U.S. and foreign markets? But I suppose one might as easily ask whether manufacturing is peculiarly closed to FDI in comparison with other countries. And, more generally, some reference could be made to specific characteristics of the U.S. economy in the aggregate—its large size and proximity to another major market, Canada, come to mind, along with putatively more flexible approaches to labor-market adjustments, environmental regulation, and the like—that might attract or repel FDI in the United States differently from FDI elsewhere. A final intriguing possibility might be that burgeoning FDI in the United States in the 1980s may reflect not only exchange rate changes and growth rates, as indicated in the paper, but also a readjustment to the postwar disequilibrium distribution of the global capital stock. The view that international firms are accumulating their desired capital distributions in the United States, if accurate, would have rather distinctive implications for the ongoing, somewhat paranoid debate about the future status of this country as a net debtor.

A second issue concerns aspects of the model that Ray puts forward to explain the investment/licensing decision. All economists have their favored arguments to insert into objective functions or optimization problems, and so it is perhaps unfair to complain about any particular omission here. However, I was surprised to see essentially no discussion of FDI as a risk-management technique, something that is presumably central to the investment decision. We know, for example, that currency risks can either expand or curtail FDI. Increases in such risks might well underlie some of the greater FDI flows in

the 1980s. It would be difficult to measure industry-specific currency risks (let alone other international risks) for the empirical work, so this exclusion is understandable. However, it is feasible to develop some aggregate measures of risk to use in conjunction with the other variables of an aggregate nature, such as economic growth. Several measures of bilateral real and nominal exchange-rate volatility have been established in the literature.

A further modeling issue relates to the assumption of monopolistic competition, implying a high degree of competition and reasonably free entry. This is done essentially for convenience, forgoing the need to worry about strategic interactions among domestic and foreign competitors. But strategic rivalry may be precisely the issue in explaining much FDI. What prior evidence we have is that firms that become multinational tend to be large firms at home and abroad. It can be argued that FDI may require significant departures from competition to generate sufficient profits to overcome the disadvantages of operating a subsidiary in a foreign market. The issue then becomes an empirical one. Ray finds that the consumer-goods nature of an industry is unrelated to FDI. Perhaps more significant is his discovery that industry concentration within the United States apparently provides no independent motivation for FDI, or perhaps even a negative one, arguing against the strategic-rivalry hypothesis. These results are sufficiently strong as to give pause to enthusiasts of oligopoly-based theories of FDI. However, I doubt their conclusiveness. For example, concentration is a barrier to all entry, including FDI, so it is unsurprising to find no relation between them. Such a finding does not necessarily mean that there are no subtle strategic interactions surrounding the entry decision itself or even that industry concentration within the United States is the best way to approach that question empirically. Further work might consider this issue more completely.

I turn finally to some of the empirical issues in the paper. First, because all the industry-specific explanatory variables are measured with U.S. data, FDI is related to U.S. industry characteristics alone. This effort is important because we are interested in the particulars of local competition that may attract or repel foreign investment. But, by not considering also the characteristics of the home-country environment, we may be missing a substantial part of the description of determinants of FDI. Of course, this latter approach would require the assembly of industry characteristics in other countries as well, an enormous task that might be feasible only on a much more limited set of data. Furthermore, I note the significant finding in the paper that FDI is stronger within industries than across industries, so the omission of foreign data may not be serious to the extent that parent-country characteristics mirror those in the United States.

A second empirical question relates to Ray's efforts to investigate the links between FDI and trade barriers in order to examine the various hypotheses surrounding those links: tariff jumping and quid pro quo investment, for example. I doubt that these questions have been given a fair hearing here,

simply because the timing of the data used is suspect. Though tariff rates are from 1986, the effective protection rates and nontariff barriers are taken from the International Trade Commission's data bank, which lists trade barriers from 1970 or the post–Kennedy Round era. The FDI flows, however, are for a much more recent period, meaning that more recent measures of effective protection and nontariff trade barriers (abstracting from the prior issue of how even to measure such barriers) would be more appropriate. It strains things somewhat to claim that the obvious rise in nontariff trade barriers in the 1980s is unrelated to FDI when the data on trade barriers are so old. The difficulty is perhaps especially relevant for assessing the extent of quid pro quo investment, in which FDI is supposed to come before policy decisions regarding trade interventions (and to deter such interventions), so that the timing is, in a crucial sense, just opposite that in the empirical work. And, evidently, issues of simultaneity would arise as well in considering more fully the link between trade barriers and investment flows.

Finally, I conclude with two observations about empirical results that I find intriguing. First, there appears to be some difference between the manufacturing industries in which Japanese FDI is concentrated and other countries' FDI. The Japanese are less interested in capital-intensive industries (suggesting, under Ray's conception, that Japanese FDI embodies lower amounts of specialized physical-capital assets, though, strictly from an empirical view, I wonder how well proxied that variable is by a simple capital-labor ratio) and are insensitive to exchange-rate changes in pursuing FDI (though in that regard there may well be lags that might usefully be identified in a time-series analysis). This unique Japanese performance seems potentially interesting in the face of widespread concern in the United States over incoming investment and might usefully be explored further.

Second, I note that Ray finds no relation between intraindustry trade and incoming FDI. Still open, however, is the question of intraindustry investment. Are there any unique determinants of such investment (which cannot be explored with this data set) that have not been captured in existing models of FDI, and how can they be pursued empirically?

Comment James Levinsohn

The paper is a much-needed attempt to get some empirical handle on just what causes inward foreign direct investment (FDI). The author has used a rich data source—FDI by firms at the four-digit SIC level to address an important and current real-world policy concern. This sort of work is often time consuming,

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and it is nice to see someone dig in and search for what answers may lie out there in the data. In preparing my comments, I have tried to keep in mind what I think is the primary goal of the paper—to shed some light on what is behind inward FDI. My comments, then, are primarily directed at what the *results* of the paper may or may not tell us.

The comments on the paper fall into three categories. I will first briefly discuss the theory presented in the paper. Second, I will raise some concerns about the data used for the estimation section of the paper. Third, I will mention a few issues related to the estimation procedure itself.

The paper begins with a model of FDI in manufacturing. I have two fairly broad comments on this section of the paper. The first may just be a matter of semantics. I think of an economic model as an analytic setup in which, in this case, firms maximize profits subject to various constraints imposed by the economic environment in which they operate. Standard operating procedure is to characterize the optimum and then perform some sort of comparative statics exercises to see how firms adapt to a small change in their economic environment. With luck, one can sign these changes—which are frequently the net effect of many interacting variables—and derive predictions about the signs of coefficients in an estimating equation. An example along these lines with respect to FDI in a very different and much simpler context is a paper eleven years ago by Ray in the *Journal of Political Economy* (Ray 1977).

The model in the paper is not like this. There is no explicit optimization, nor is the interaction of myriad economic influences on FDI explicitly laid out. Rather, the reader is presented with what amounts to reduced-form equations in which the expected signs on various arguments are stated as intuition. That intuition, I want to stress, usually seems right to me. One issue raised by formalizing intuition about *net* results rather than laying out the structure behind the intuition is that it is hard to know what the policy implications of the results actually are. On occasion, though, the author's intuition is not obvious to me. An example here is the assumption that specialized capital and labor are more easily appropriable by the owner over time through licenses than if they are embodied in physical capital (i.e., FDI). Maybe, and maybe not. It is not obvious to me and would seem to depend on agency issues.

My other comment about the model concerns its relevance to the empirical work that is intended to motivate. The discussion in this section of the paper is directed at whether a foreign firm decides to compete in the home market via FDI or via a licensing arrangement. It is assumed that for some reason the foreign firm cannot compete in the home market by just exporting. My hunch is that this is indeed how most international competition takes place. Still, the assumption may be right if there are prohibitive trade taxes. Yet, although such taxes show up in the estimating equation, they are assumed away in the model itself. Other potentially key variables that show up in estimated equations but that are absent from the discussion of the model are proxies for

market structure. Another variable that is in the estimating equation but not in the model is the exchange rate. The intuition expressed here is that the foreign firm will be more likely to take the plunge and invest via FDI when there is a known to be temporary decline in the domestic exchange rate. The only role exchange rates play in the discussion is that they act like a large sign reading "bargain days this month." It may be that exchange rates should enter a model of FDI, but it is not clear that this is the only way. If firms know that an exchange rate is temporarily undervalued, it would seem that they could gain from this information by buying the cheap currency and later selling it for a higher price, and this story is independent of FDI. (Indeed, with well-functioning financial futures and options markets in foreign exchange, it is unclear what FDI can accomplish that arbitrage cannot.) The point of this is that *how* exchange rates enter the picture depends on the structure of the problem, and this is not presented in the paper.

The punchline here is that I think most readers, as the author does, believe that variables such as market structure and exchange rates matter, but, without some sort of economic model of how they matter, it is difficult to interpret the results.

I would like next to raise a few questions about how to interpret the results, given the data used.

I have one fairly minor and one less minor qualm about the relation between the data set used and the economic questions addressed. To raise the less major point first, the discussion in the modeling section of the paper clearly implies that the transactions that did not occur (which are represented by zeros in the probit regressions) were instead licensing arrangements. Is this the case? If not (as one might suspect), perhaps either the modeling section of the paper should be amended or more appropriate data should be utilized.

More important, the variables for research and development, nontariff trade barriers, effective rates of protection, plant size, and capital-to-labor ratios play a key role in the story that the author discusses. It is only natural, then, that they should be in an estimated equation investigating foreign direct investment from 1979 to 1985. Yet the variables for research and development intensity, the capital-to-labor ratio, and plant size are from 1972, according to table notes. The nontariff trade barrier variable is from 1975. Explaining a firm's investment decision by the economic environment it in part faced four to thirteen years ago, if the firm was even in business then, creates some problems when we try to interpret the results.

If these variables do not change over time or change proportionately across industries and over time, then this is not likely to be a problem. But implicit in using a time-series cross section is that the variables do vary over time. How important is this issue likely to be?

For the case of nontariff trade barriers, using the correct data would, I

suspect, perhaps make a big difference. Use of nontariff trade barriers is widely thought to have increased dramatically over the last fifteen years. It also seems that, while aggregate capital-to-labor ratios may not have moved a lot, at the four-digit level they probably did. The same story applies to the research and development variable.

I am left wondering how to interpret the results of equations that examine how today's investment decision is affected by economic conditions of, on the average, a decade earlier.

The last set of issues that I want to raise has to do with how some econometric concerns may affect our interpretation of the paper.

Let us assume that the data set is a panel and that therefore there is variation over time in addition to variation over firms. It seems reasonable that some of the variables that are not in the estimating equation may be quite correlated with time. This would argue for inclusion of fixed effects in the model. This could be done by just including year dummies in the estimated equations when Tobit was used. It is a simple procedure and would use only five degrees of freedom. It may, though, change the results. It seems worth trying. This simple procedure is not going to work for the probit regressions, though, as the estimates would be inconsistent.

Another point concerns sensitivity analysis. There is none. Especially since the functional form and choice of which variables to include are fairly ad hoc, it would be nice to convince the reader that the results are robust to the choices actually made. There is a side benefit to this that relates to the interpretation of results. The paper does not attempt to say anything about the *magnitude* of the results. The reader is left wondering whether the effects of various influences on the FDI decision are quantitatively important and how they compare with one another. If the Tobit regressions were estimated without using the zero observations using a log-linear functional form, we could interpret the coefficients as elasticities and would avoid the problem of not being able to compare effects measured in different units. This might help our interpretation of the results.

To summarize, the paper addresses an important policy issue. It is heartening to see empirical research on this timely topic. In the end, though, I was left wondering about the interpretation of some of the results.

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