

# Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela

By BRIAN J. AITKEN AND ANN E. HARRISON\*

*Governments often promote inward foreign investment to encourage technology “spillovers” from foreign to domestic firms. Using panel data on Venezuelan plants, we find that foreign equity participation is positively correlated with plant productivity (the “own-plant” effect), but this relationship is only robust for small enterprises. We then test for spillovers from joint ventures to plants with no foreign investment. Foreign investment negatively affects the productivity of domestically owned plants. The net impact of foreign investment, taking into account these two offsetting effects, is quite small. The gains from foreign investment appear to be entirely captured by joint ventures. (JEL F2, O1, O3).*

In the 1990's, direct foreign investment (DFI) became the largest single source of external finance for developing countries. In 1997, DFI accounted for about half of all private capital and 40 percent of total capital flows to developing countries. Following the virtual disappearance of commercial bank lending in the 1980's, policy makers in emerging markets eased restrictions on incoming foreign investment. Many countries even tilted the balance by offering special incentives to foreign enterprises—including lower income taxes or income tax holidays, import duty exemptions, and subsidies for infrastructure. The rationale for this special treatment often stems from the belief that foreign investment generates externalities in the form of technology transfer.

Can these subsidies be justified? Apart from the employment and capital inflows which ac-

company foreign investment, multinational activity may lead to technology transfer for domestic firms.<sup>1</sup> If foreign firms introduce new products or processes to the domestic market, domestic firms may benefit from the accelerated diffusion of new technology (David J. Teece, 1977). In some cases, domestic firms may increase productivity simply by observing nearby foreign firms. In other cases, diffusion may occur from labor turnover as domestic employees move from foreign to domestic firms. Several studies have shown that foreign firms initiate more on-the-job training programs than their domestic counterparts (Ralph B. Edfelt, 1975; Reinaldo Gonclaves, 1986). If these benefits from foreign investment are not completely internalized by the incoming firm, some type of subsidy could be justified.

Case studies present mixed evidence on the role of foreign investment in generating technology transfer to domestic firms. In Mauritius and Bangladesh, studies suggest that the entry of several foreign firms led to the creation of a booming, domestically owned export industry for textiles (Jong Wong Rhee and Therese Belot, 1989). Edwin Mansfield and Anthony Romeo (1980), however, found that only a few of the 15 multinationals in their survey helped

\* Aitken: International Monetary Fund, 700 19th Street, NW, Washington, DC 20431; Harrison: Graduate School of Business, 615 Uris Hall, Columbia University, New York, NY 10027. The authors would like to thank three anonymous referees for very useful suggestions, as well as Susan Collins, John DiNardo, Rudi Dornbusch, Stan Fischer, David Genesove, Charles Himmelberg, Rob Porter, Ed Wolff, Mayra Zermeno, and seminar participants at Boston University, Brandeis University, Columbia University, Tufts University, MIT, Princeton University, the NBER International and Productivity Lunches, and the NBER Summer Institute participants for useful comments and discussion. We would also like to thank Esther Jones for wonderful administrative assistance.

<sup>1</sup> See Richard E. Caves (1982) and Gerald K. Helleiner (1989) for surveys of technology transfer and foreign direct investment.

domestic firms acquire new technology. In a study of 65 subsidiaries in 12 developing countries, Dimitri Germidis (1977) found almost no evidence of technology transfer to local competitors. The lack of spillovers to domestic firms was attributed to a number of factors, including limited hiring of domestic employees in higher-level positions, very little labor mobility between domestic firms and foreign subsidiaries, limited subcontracting to local firms, no research and development by the subsidiaries, and few incentives by multinationals to diffuse their knowledge to local competitors.

Few researchers have attempted to go beyond qualitative case study evidence.<sup>2</sup> In this paper, we focus on two questions. First, to what extent do joint ventures or wholly owned foreign subsidiaries (hereafter referred to as “foreign” or “foreign-owned” firms) exhibit higher levels of productivity than their domestic counterparts? Second, is there any evidence of technology “spillovers” to domestically owned (“domestic”) firms from these foreign entrants?

Using a richer data set, we are able to overcome important data restrictions faced by earlier researchers. In this paper, we use annual census data on over 4,000 Venezuelan firms, allowing us to measure the productivity effects of foreign ownership. Previous attempts to measure spillover effects from foreign investment faced a critical identification problem: if foreign invest-

ment gravitates towards more productive industries, then the observed correlation between the presence of foreign firms and the productivity of domestically owned firms will overstate the positive impact of foreign investment. As a result, one could find evidence of positive spillovers from foreign investment where no spillover occurs. Since we observe the behavior of each plant over time, we can control for fixed differences in productivity levels across industries which might affect the level of foreign investment. Our research confirms that these differences are in fact correlated with the pattern of foreign investment, biasing previous results.

We present two results. First, we find a positive relationship between increased foreign equity participation and plant performance, suggesting that individual plants do benefit from foreign investment. However, the positive own-plant effect is only robust for smaller plants, defined as plants with less than 50 employees. For large enterprises, the positive effects of foreign investment disappear when plant-specific differences are taken into account. This suggests that foreign investors are investing in the more productive plants. Second, productivity in domestically owned plants declines when foreign investment increases. This suggests a negative spillover from foreign to domestic enterprises, which we interpret as a market-stealing effect. If we add up the positive own-plant effect and the negative spillovers, on balance the impact of foreign investment on domestic plant productivity is quite small.

In Section I, we begin with a general discussion of the possible benefits as well as the costs of foreign investment. Section II discusses the Venezuelan data. Section III presents the estimation results and Section IV concludes the paper.

### I. Foreign Investment, Competition, and Technology Spillovers: The Framework

The so-called “industrial organization” approach to foreign investment in manufacturing suggests that multinationals can compete locally with more informed domestic firms because multinationals possess nontangible productive assets, such as technological

<sup>2</sup> There are several exceptions, however. In a pioneering paper, Caves (1974) tested for the impact of foreign presence on value added per worker in Australian domestically owned manufacturing sectors. Caves found that the positive disparity between foreign and domestic value added per worker disappears as foreign firms employed an increasing share of the labor in the sector, which is consistent with the spillover hypothesis. Steven Globerman (1979) replicated Caves (1974) using sectoral, cross-section data for Canadian manufacturing industries in 1972. The results are consistent with a weak spillover effect. Magnus Blomstrom and Hakan Persson (1983), Blomstrom (1986), and Blomstrom and Edward W. Wolff (1989) focus on Mexico where—as a developing country—the gap between domestic and foreign productivity and the scope for spillovers may be larger. They generally find that sectors with higher foreign ownership exhibited higher levels of productivity, faster productivity growth, and faster convergence of productivity levels to U.S. norms. Blomstrom (1989) provides a synthesis of his previous work on the impact of foreign investment in Mexico.

know-how, marketing and managing skills, export contacts, coordinated relationships with suppliers and customers, and reputation.<sup>3</sup> Since the assets are almost always gained through experience, they cannot be easily licensed to host country firms, but can be transferred at a reasonable cost to subsidiaries who locate in the host country (Teece, 1977). If multinationals do indeed possess such nontangible assets, then we would expect foreign ownership to increase a firm's productivity.

In addition, domestically owned firms might benefit from the presence of foreign firms. Workers employed by foreign firms or participating in joint ventures may accumulate knowledge which is valued outside the firm. As experienced workers leave the foreign firms, this human capital becomes available to domestic firms, raising their measured productivity. Likewise, some firm-specific knowledge of the foreign owners might "spill over" to domestic industry as domestic firms are exposed to new products, production and marketing techniques, or receive technical support from upstream or downstream foreign firms. Foreign firms may also act as a stable source of demand for inputs in an industry, which can benefit upstream domestic firms by allowing them to train and maintain relationships with experienced employees. In all these cases, foreign presence would raise the productivity of domestically owned firms.

But foreign presence can also *reduce* productivity of domestically owned firms, particularly in the short run. If imperfectly competitive firms face fixed costs of production, a foreign firm with lower marginal costs will have an incentive to increase production relative to its domestic competitor. In this environment, entering foreign firms producing for the local market can draw demand from domestic firms, causing them to cut production. The productivity of domestic firms would fall as they spread their fixed costs over a smaller market, forcing them back up their average cost curves. If the productivity decline from this demand effect is

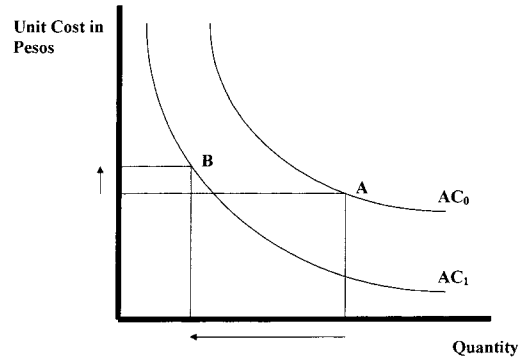


FIGURE 1. OUTPUT RESPONSE OF DOMESTIC FIRMS TO FOREIGN ENTRANTS

large enough, net domestic productivity can decline even if the multinational transfers technology or its firm-specific asset to domestic firms. These two offsetting effects were formally modelled by Aitken and Harrison (1997) and are depicted in Figure 1. Positive spillovers cause the domestic plant's average cost curve to fall from  $AC_0$  to  $AC_1$ . However, the additional competition forces the plant to reduce output and move back up its new  $AC_1$  curve. The net effect in Figure 1 is to increase overall costs of production.

In this paper, we estimate log-linear production functions at the plant level to answer two basic questions: (1) whether foreign equity participation is associated with an increase in the plant's productivity, and (2) whether foreign ownership in an industry affects the productivity of domestically owned firms in the same industry—i.e., whether there are positive or negative "spillovers" to domestic enterprises. Both hypotheses (1) and (2) can be nested in the same general specification:

$$\begin{aligned}
 (1) \quad Y_{ijt} = & C + \beta_1 DFI\_Plant_{ijt} \\
 & + \beta_2 DFI\_Sector_{jt} \\
 & + \beta_3 DFI\_Plant_{ijt} * DFI\_Sector_{jt} \\
 & + \beta_4 X_{ijt} + \epsilon_{ijt}.
 \end{aligned}$$

Log output  $Y_{ijt}$  for plant  $i$  in sector  $j$  at time  $t$  is regressed on a vector of inputs  $X_{ijt}$  and two

<sup>3</sup> See Stephen Hymer (1960), Caves (1971) and, more recently, Elhanan Helpman (1984) and Ignatius J. Horstmann and James R. Markusen (1989). For surveys, see Joseph M. Grieco (1986); Alan M. Rugman (1986).

measures of foreign ownership.  $DFI\_Plant$  is the share of foreign equity participation at the plant level, which varies between 0 and 100 percent. If foreign ownership in a plant increases that plant's productivity, we should observe a positive coefficient on  $DFI\_Plant_{ijt}$ .  $DFI\_Sector_{jt}$  is a measure of the presence of foreign ownership in the industry, defined in more detail below. To the extent that the productivity advantages of foreign firms spill over to domestic firms, the coefficient on  $DFI\_Sector_{jt}$  should be positive. The coefficient on the interaction between plant-level and sector-level foreign investment ( $DFI\_Plant_{ijt} * DFI\_Sector_{jt}$ ) allows us to determine if the effects of foreign presence on other foreign firms differ from the effects on domestic firms. To the extent that plants with foreign investment benefit from the presence of other foreign plants, the coefficient should be positive. If joint ventures are negatively affected by the activities of other foreign plants, the coefficient should be negative.

## II. Data Description

The data set employed in this paper was obtained directly from Venezuela's National Statistical Bureau, the Oficina Central de Estadística e Informática (OCEI). OCEI conducts an annual survey of industrial plants, known as the *Encuesta Industrial*. The years covered include 1976 through 1989, with the exception of 1980 (the industrial survey is not taken in census years). The industrial survey covers all plants in the formal sector with more than 50 workers, as well as a large sample of smaller plants. For the smaller plants, OCEI calculates the sample weights, permitting aggregation of output and other variables to estimate the importance of foreign investment in the local economy. The number of plants surveyed ranged from a low of 3,955 plants in 1982 to a high of 6,044 plants in 1978. The data set is not a balanced panel; the total number of plants varies across each year of the sample.

The original data set included 69,037 observations. To maintain confidentiality, the data set was released without plant identifiers. Consequently, we created a series of programs to relink the plants over time. In particular, we were able to use data collected on end-of-year

capital stock and beginning-of-year capital stock to link many plants. Details on the birth of the plant, its location, ownership, number of employees, and other information were available to ensure that the linking process was not spurious. Nevertheless, we were unable to link 15,569 observations, which were omitted from the sample. A number of other observations were deleted because there were too few plants in the sector, because the plant had zero sales, employment, material inputs or investment, or because the data failed to satisfy other basic error checks. All these deletions reduced the sample size to 43,010.

The data set contains information on foreign ownership, assets, output, employment, input costs, location, and product destination.  $DFI\_Plant$  is defined as the percentage of subscribed capital (equity) owned by foreign investors.  $DFI\_Sector$  is defined as foreign equity participation averaged over all plants in the sector, weighted by each plant's share in sectoral employment. In particular, foreign investment at the sectoral level is defined as:

$$(2) \quad FS_{jt} = \frac{\sum_i FS_{ijt} * Emp_{ijt}}{\sum_i Employment_{ijt}}$$

Since foreign firms tend to be more capital intensive than domestic firms, the share of foreign firms is significantly higher if weighted by physical capital. However, redoing the empirical analysis which follows using physical capital weights instead of employment weights leads to similar results.<sup>4</sup>

Output is defined as total output at the plant level, deflated by an annual producer price deflator which varies across four-digit industries. Skilled and unskilled labor is defined in terms of numbers of workers, rather than

<sup>4</sup> Foreign investment shares were computed using the original sample (prior to dropping any observations). In particular, OCEI's weights were used to reflate data which had been sampled, such as the smaller plants. This procedure was adopted in order to create a measure of foreign investment which corresponds as closely as possible to its overall sectoral share. Sector refers to the ISIC four-digit classification, which varies from 3111 to 3999.

worker hours, which were not available over the entire sample.

The importance of foreign equity participation during 1976 through 1988 varied significantly across sectors (see Appendix Table A1, available upon request from the authors). The share of foreign equity was particularly high in scientific equipment (35 percent in 1988), tobacco (32 percent in 1988), and confectionery (25 percent). In other sectors, foreign investment was very small or zero (petroleum refining, textiles and apparel, fish canning, wood-working machinery). Some sectors, such as petroleum refining, were closed to foreign investment during the sample period. In addition to the cross-section variation, there were also large changes in the share of foreign investment over the sample period. Reforms initiated in 1986 and extended in 1990 are likely to increase even further the importance of foreign investment in the domestic economy.<sup>5</sup>

<sup>5</sup> Venezuelan firms are classified by degree of foreign ownership into three types: national, with less than 20-percent foreign ownership; mixed with 20- to 49.9-percent foreign ownership; and foreign firms, with majority foreign control. Until 1989, the Superintendencia de Inversiones Extranjeras (SIEEX) exercised substantial discretion in regulating the inflow of foreign investment. Profit remittances were limited to 20 percent (plus LIBOR) of the investment (based on book value). Since purchasing equity in existing firms was prohibited, foreign investment could only be in the form of direct investment registered with SIEEX. Payments by a firm for its foreign partner's technology were prohibited, and contracts that called for royalty or patent payments needed SIEEX approval.

During the period from 1975 to 1989, foreign firms were discriminated against in a number of ways. First, they faced higher tax rates on corporate income—50 percent versus 35 percent for domestic firms. They were also restricted from imposing confidentiality and exclusive use of trade secrets in joint ventures. Finally, foreign firms were obliged to buy bolivares at the official exchange rate rather than the free-market rate. In 1989, the restriction on profit repatriation was eliminated. Bureaucratic discretion was eliminated and SIEEX was authorized to reject foreign investment applications only if they did not comply with the sectoral restrictions discussed above. When exchange rates were unified following reforms, the discrepancy between official and free-market exchange rates was eliminated. The restrictions on use of confidentiality and trade secret requirements are currently being negotiated as part of agreements on property rights, and the differential tax rates between foreign and domestic firms are addressed in pending tax legislation.

### III. Effects of Foreign Investment on Productivity

#### A. Baseline Specification

Table 1 reports the results for equation (1). The dependent variable, the log of real output for plant  $i$  in sector  $j$  at time  $t$ , is regressed on its inputs and on foreign equity participation. Plant-level inputs (expressed in logarithms) include unskilled labor ( $UNSKL_{it}$ ), skilled labor ( $SKL_{it}$ ), materials ( $M_{it}$ ), and capital ( $K_{it}$ ).<sup>6</sup> In addition to a random component which varies across plants  $\varepsilon_{it}$ , we allow for a time-varying component  $D_t$  and control for productivity differences across industries by including four-digit level ISIC dummies. All reported estimates include corrections for heteroskedasticity. As reported in the first column of Table 1, the coefficient on foreign ownership within the plant ( $Plant\_DFI$ ) is positive and statistically significant, suggesting that there are large productivity gains associated with foreign equity participation. The point estimate, 0.105, suggests that output in plants which increased foreign equity participation from zero to 100 percent would be 10.5 percentage points higher than for comparable domestic plants. Since we already control for differences in inputs, this 10.5-percent increment is a pure total factor productivity gain.

<sup>6</sup> Output is calculated as the value of sales less the change in inventories, deflated by a four-digit level production (output) price deflator. Skilled and unskilled labor are measured as the number of skilled and unskilled employees. Although an ideal measure of labor input would be the number of hours worked, this information is only available for selected years. Material costs are adjusted for changes in inventories, then deflated by a production price deflator. Capital stock is the stock of capital reported by each firm at the beginning of the year, deflated by the GDP deflator. Due to space constraints, we do not report the coefficients on the inputs here. However, those are available from the authors upon request.

The producer price deflator that we use is an index for the using, not the supplying, industries. Ideally, we would want to calculate a material price deflator for each industry by using input-output tables to identify inputs, and take a weighted average of the price indices for those inputs. Unfortunately, no reliable input-output table for Venezuela was available. To the extent that output prices reflect underlying movements in the prices of material inputs, this approach is preferable to using an economywide price deflator.

TABLE 1—IMPACT OF FOREIGN OWNERSHIP ON TOTAL FACTOR PRODUCTIVITY:  
REGRESSING LOG OUTPUT AT THE PLANT LEVEL ON INPUTS AND THE SHARE OF FOREIGN OWNERSHIP  
AT THE PLANT AND SECTOR LEVELS<sup>a</sup>

	Impact of direct foreign investment (DFI) on productivity		Impact of DFI on output		Impact of DFI on change in productivity			
	OLS with industry dummies <sup>b</sup>	OLS without industry dummies	Weighted least squares <sup>c</sup>	OLS with industry dummies and no factor inputs <sup>d</sup>	First differences <sup>e</sup> ( $Y_t - Y_{t-1}$ )	Second differences <sup>e</sup> ( $Y_t - Y_{t-2}$ )	Third differences <sup>e</sup> ( $Y_t - Y_{t-3}$ )	Fourth differences <sup>e</sup> ( $Y_t - Y_{t-4}$ )
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreign ownership in the plant ( <i>Plant_DFI</i> )	0.105 (0.027)	0.158 (0.028)	0.142 (0.039)	2.176 (0.124)	0.003 (0.037)	0.018 (0.039)	0.042 (0.043)	-0.011 (0.049)
Foreign ownership in the sector ( <i>Sector_DFI</i> )	-0.267 (0.061)	0.058 (0.030)	-0.206 (0.155)	-1.258 (0.232)	-0.238 (0.067)	-0.302 (0.065)	-0.248 (0.071)	-0.320 (0.083)
<i>Plant_DFI</i> * <i>Sector_DFI</i>	0.356 (0.181)	-0.212 (0.189)	0.314 (0.226)	5.003 (0.810)	0.262 (0.223)	0.420 (0.246)	0.384 (0.252)	0.658 (0.288)
Number of plants	10,257	10,257	10,257	10,372	9,489	7,158	5,132	3,607
Number of observations	43,010	43,010	43,010	46,947	32,521	23,136	16,100	11,045
Hausman test <sup>f</sup>	38.4	—	82.9	—	—	—	—	—
$R^2$	0.96	0.95	0.96	0.32	0.53	0.60	0.64	0.65

<sup>a</sup> All specifications include annual time dummies. All standard errors (denoted in parentheses) are corrected for heteroskedasticity. Unless otherwise specified, other independent variables (not reported here) include log materials, log skilled labor, log unskilled labor, and log capital stock. *Plant\_DFI* is percentage of equity capital owned by foreigners. *Sector\_DFI* is employment-weighted percentage of equity which is foreign owned at the four-digit ISIC level.

<sup>b</sup> Industry dummies defined at the four-digit ISIC level.

<sup>c</sup> Weights are the share of each plant in total annual industry output. Industry dummies are also included.

<sup>d</sup> Excludes the other independent variables described in note a above.

<sup>e</sup> Coefficients are estimated from a regression of changes in (log) output regressed on changes in (log) materials, skilled labor, unskilled labor, capital stock, changes in foreign investment at the plant and sector level, and annual time dummies.

<sup>f</sup> In column (2), tests for equality of coefficients between ordinary least squares (OLS) and OLS with industry dummies. In column (3), tests for equality of coefficients (excluding the time dummies) between specifications in columns (2) and (3). Bootstrapping routine used to calculate variance-covariance matrix difference for test of OLS versus weighted least squares (WLS). For details, see John Dinardo et al. (1996). In column (2), the critical 5-percent value for the  $\chi^2(19) = 30.1$ . In column (3), the critical 5-percent value for the  $\chi^2(7) = 14.1$ . A higher value indicates rejection of the test.

In contrast, we find that domestic plants in sectors with more foreign ownership are significantly less productive than those in sectors with a smaller foreign presence. The point estimate for *Sector\_DFI* in the second row of Table 1 is large in magnitude, significant, and negative.<sup>7</sup>

<sup>7</sup> While expressing foreign presence as a *share* (of labor or of sales) facilitates comparisons between large and small industries, the share's behavior over time is influenced both by changes in foreign investment (the numerator) and changes in the size of the industry (the denominator). For example, if foreign plants do not adjust quickly to economic downturns, while domestic firms react immediately, this would lead us to observe a rising foreign share during periods of economic decline. If productivity is procyclical, we would wrongly infer that foreign investment has a negative impact on domestic productivity. Therefore, we also tried splitting foreign share into its numerator and denominator and including each as individual regressors. The results, reported in an earlier version of the paper, are consistent with the estimates presented in Tables 1 through

The results imply that an increase in the share of foreign investment from 0 to 10 percent leads to as much as a 2.67-percentage-point decline in domestic productivity.

The coefficient on the interaction term, *Plant\_DFI* \* *Sector\_DFI*, is positive and statistically significant. The positive coefficient suggests that for plants with foreign equity participation, there are positive spillovers from foreign investment—in contrast to domestic firms. Joint ventures benefit from foreign investment in the plant as well as from foreign investment in other plants within the same sector.

Our finding of large, negative spillovers from foreign investment to domestic firms is in sharp

3. The coefficient on foreign investment—measured as the number of employees in foreign enterprises—is negative and significant.

contrast with previous econometric studies, which generally found positive spillovers. Previous researchers typically estimated some variant of equation (1) using a cross section of industries (rather than plants), where the coefficient on foreign share was interpreted as a measure of spillovers from foreign presence to domestic firms. Using data aggregated at the sectoral level, these studies were unable to control for differences in productivity across sectors which might be correlated with, but not caused by, foreign presence. If foreign investors gravitate towards more productive industries, then a specification which fails to control for differences across industries is likely to find a positive association between the share of DFI and the productivity of domestic plants even if no spillovers take place.

Evidence from Venezuela suggests this to be the case. We reestimate equation (1) without controlling for industry-specific productivity differences, a specification which is closest in spirit to earlier cross-section studies. The coefficient on *Sector\_DFI* is now positive and statistically significant, which is consistent with the results of previous research (second column of Table 1). The point estimate suggests that the productivity of domestic firms is higher by 0.58 percent in industries with 10 percentage points more foreign share of employment. The coefficient on *Plant\_DFI* is also larger in magnitude, rising to 0.158 from 0.105, while the interaction term is insignificant. A chi-square (Hausman) test for equality of coefficients across the two specifications in columns (1) and (2) is rejected, confirming that the differences are statistically significant.

The very different message suggested by the results in columns (1) and (2) provides an excellent example of the problems associated with cross-section estimation. If we fail to control for the fact that foreign investment is attracted to more productive sectors, we conclude that spillovers from foreign ownership are positive; once we introduce controls for industry-specific differences, however, we find evidence of negative spillovers on domestic productivity.

In column (3), we reestimate equation (1) using weighted least squares (WLS). The weights are given by each plant's share in employment. WLS allows us to attach greater importance to large plants in determining the

overall impact of foreign investment. If we find significant differences between the coefficient estimates presented in columns (1) and (3), this would imply that foreign investment has different effects across small and large plants.

Under WLS, the results are qualitatively similar, with positive own-plant effects and negative spillovers. However, the positive impact of plant-level equity participation increases and the negative spillovers to domestically owned enterprises are smaller than reported in column (1). The results of the chi-square test suggest that these differences between OLS and WLS are statistically significant. In particular, it is likely that both the own-plant effect and the magnitude of negative spillovers vary systematically with plant size. We focus explicitly on the differences across small and large plants later in the paper.

Interpreted in the context of the framework discussed in Section II, the negative coefficient on *Sector\_DFI* is consistent with a large detrimental impact of foreign investment on the scale of domestically owned production. We can test the implications of Figure 1 directly by observing whether the output of domestically owned firms contracts in response to a rise in foreign share. To do this, we simply reestimate equation (1), excluding plant-level inputs, which measures the relationship between domestic output levels and foreign presence. In the fourth column of Table 1, the coefficient on foreign share is large, negative, and statistically significant. The point estimate,  $-1.258$ , suggests that an increase in the share of foreign investment would lead to more than an equal and opposite decline in domestic output. If foreign investors increased their share of total sales in an industry by 10 percentage points, output produced by plants without foreign investment in that industry would decline by 12.58 percentage points. These results suggest that foreign investment reduces domestic plant productivity in the short run by forcing domestic firms to contract, thereby increasing their average costs.

As a further test for the robustness of the estimates, we reestimate equation (1) taking first-difference and long-difference transformations of the data (last four columns of Table 1). We begin with a first-difference transformation

of the data and then move to a maximum of four-year differences.<sup>8</sup> Transforming the data into differences allows us to control for any fixed effects which could be present at the plant, instead of the industry, level. For example, the positive coefficient on *Plant\_DFI* could arise from the fact that foreigners purchase shares in only the most productive domestic firms.

In the long-difference specifications, the coefficient on *Sector\_DFI* remains negative and significant. It also increases in magnitude as we move from first to fourth differences, suggesting that the negative impact of foreign investment on domestic competitors does not quickly disappear but actually rises over time. The coefficient on *Plant\_DFI* becomes small in sign and statistically insignificant, suggesting that the positive own-plant effects could arise from the fact that foreign investors are simply investing in the most productive firms. However, the coefficient on the interaction term remains positive and is significant at the 5-percent level. These results suggest that joint ventures do benefit from direct investment, but that the benefits are concentrated in sectors with a high share of foreign investment.

Overall, the evidence in Table 1 suggests that the positive impact of foreign investment on the productivity of domestically owned firms reported in some earlier studies is not robust when we control for differences in industry productivity. Foreign investors in Venezuela tend to locate in more productive industries, and increases in foreign investment lead to a decline in the productivity of domestic firms.

### B. *Could Spillovers Be "Local"?*

One possible source of misspecification is that foreign investors generate positive technology spillovers, but only for plants located nearby. We might not observe these "local" benefits when we measure the impact of foreign investment for domestic firms in all regions if the benefits are too small to offset the overall negative impact across all regions.

There are reasons to expect that any benefits

to domestic firms from foreign investment would be received first by their neighbors before they diffuse to other domestic firms. Whether trained workers leave the joint venture to work at nearby domestic firms, or whether the joint venture demonstrates a product, process, or market previously unknown to domestic owners, the benefits are likely to be captured first by neighboring domestic firms, and perhaps gradually spread to other, more distant domestic firms. If the positive benefits from foreign investment are received mainly by local firms, while the negative impact on market share is more widespread due to the importance of national instead of local markets, it should be possible to use the regional distribution of foreign investment to disentangle these offsetting effects.

To test for the possibility that technology is transferred at the local level, we broaden the analysis to include both regional and sectoral foreign share variables in the same regression. We measure regional foreign presence in the same way as national foreign presence; that is, we include in our estimation the share of employment in industry *j* in location *s* employed by foreign firms, denoted *Local\_Sector\_DFI<sub>jsr</sub>*.<sup>9</sup>

If foreign firms are attracted to regions which benefit from agglomeration economies or better infrastructure, then the coefficient on *Local\_Sector\_DFI* could overestimate the positive impact of location-specific foreign investment on productivity. We address the possibility of an unobserved location fixed effect in two ways. First, we introduce proxy variables which reflect regional productivity differences. One such variable is the real wage of skilled workers, measured over all

<sup>8</sup> Since the panel is unbalanced, the number of observations declines as we take differences over a longer time horizon.

<sup>9</sup> We determine the location based on the Venezuelan Manufacturing Census. The census divides Venezuela into 23 regions, which in turn are subdivided into districts. Regions may have several or as many as 20 districts. In all, the total number of districts adds up to 220 separate locations, the level at which we conduct our estimation. In a country one-third larger than the state of Texas, this indicates that the average district size is 40 miles wide by 40 miles long (1,600 square miles). We calculated the average share of labor employed at foreign-owned firms for each industry and the standard deviation of this measure across districts. The size of the standard deviations indicates that foreign presence is quite unevenly distributed both across industries and across regions. In addition, most of the foreign investment is located in regions other than Caracas.



TABLE 2—EFFECTS OF FOREIGN OWNERSHIP IN THE REGION ON TOTAL FACTOR PRODUCTIVITY:  
REGRESSING LOG OUTPUT AT THE PLANT LEVEL ON INPUTS AND THE SHARE OF FOREIGN OWNERSHIP  
AT THE PLANT LEVEL, THE SECTOR LEVEL, AND THE LOCAL LEVEL<sup>a</sup>

	OLS with industry dummies <sup>b</sup>		Within estimates <sup>c</sup>	
	(1) No regional controls	(2) With regional controls <sup>d</sup>	(3) No regional controls	(4) With regional controls <sup>d</sup>
Foreign ownership in the plant ( <i>Plant_DFI</i> )	0.161 (0.030)	0.154 (0.031)	0.063 (0.039)	0.067 (0.040)
Foreign ownership in the sector and region ( <i>Local_Sector_DFI</i> )	0.068 (0.023)	0.015 (0.024)	0.035 (0.032)	0.040 (0.034)
<i>Plant_DFI</i> * <i>Local_Sector_DFI</i>	-0.357 (0.066)	-0.271 (0.068)	-0.165 (0.077)	-0.189 (0.080)
Foreign ownership in the sector over all regions ( <i>Sector_DFI</i> )	-0.290 (0.062)	-0.289 (0.063)	-0.317 (0.055)	-0.304 (0.057)
<i>Plant_DFI</i> * <i>Sector_DFI</i>	0.694 (0.190)	0.685 (0.197)	0.418 (0.206)	0.415 (0.215)
Number of observations	43,010	41,333	43,010	41,333
Number of plants	10,257	10,190	10,257	10,190
R <sup>2</sup>	0.96	0.96	0.98	0.98

<sup>a</sup> All specifications include annual time dummies. All standard errors (denoted in parentheses) are corrected for heteroskedasticity. Unless otherwise specified, other independent variables (not reported here) include log materials, log skilled labor, log unskilled labor, and log capital stock. *Plant\_DFI* is percentage of equity owned by foreigners. *Sector\_DFI* is employment-weighted percentage of equity which is foreign owned at the four-digit ISIC level.

<sup>b</sup> Industry dummies defined at the four-digit ISIC level.

<sup>c</sup> Estimated by subtracting from each variable its plant specific mean over all years.

<sup>d</sup> Regional controls include the real skilled wage and energy prices.

industries in the region. Variations in the real wage for skilled workers across regions could reflect locational advantages such as infrastructural differences, local agglomeration economies, or unobserved differences in the quality of labor. James E. Rauch (1991), for example, provides empirical evidence for the United States that variations in human capital accumulation across cities are reflected in higher wages for individuals. Since foreign investment in any one four-digit industry is unlikely to affect significantly the skilled wage for all industries in the region, the skilled wage across all industries should capture regional rather than industry-specific factors. Another factor which can be used to capture exogenous differences in productivity across regions in Venezuela is the price of energy. The Venezuelan government encouraged relocation to some regions by implementing uneven energy subsidies across regions, which could lead to apparent differences in productivity.

Second, we estimate plant-level “within” estimates by subtracting from each variable its

plant-specific mean over time. To the extent that those regional differences in productivity which might be correlated with foreign investment are relatively fixed over the sample period, this specification will produce unbiased estimates of the impact of regional foreign investment on productivity.

Using both estimation methods, we find little evidence for spillovers from local foreign investment (Table 2). The coefficients on countrywide foreign investment are negative and significant as before. If proxies for regional productivity are excluded, the coefficient on regional foreign investment is positive, albeit only marginally statistically significant [column (1)]. When wages for skilled workers and electricity prices are included, however, the coefficient on regional foreign investment becomes small in magnitude and insignificant [column (2)]. Individual firm productivity is consistently positively correlated with the real skilled wage and negatively correlated with electricity prices, as expected. This suggests that foreign investment is likely to locate in areas with highly

productive skilled workers and lower energy prices, biasing the unadjusted estimates of the impact of regional foreign share upwards.

Despite the addition of regional foreign investment, the coefficients on *Sector\_DFI* (country-wide, sectoral DFI) remain negative and significant in all specifications, with magnitudes similar to those reported in Table 1. The coefficient on *Plant\_DFI \* All\_DFI* also remains positive and significant, indicating positive spillovers from sector-level DFI to plants with foreign equity. However, the interaction between *Plant\_DFI* and *Local\_Sector\_DFI* is negative, suggesting that foreign plants do not benefit from foreign investors located nearby. Foreign plants benefit from a high overall level of DFI in the sector but may be hurt by foreign competitors in the same sector and geographic area.

The within estimates, reported in columns (3) and (4), yield similar results. There is no statistically significant impact of region-specific foreign investment on domestic firm productivity. The positive coefficient on foreign investment at the plant level (*Plant\_DFI*) becomes small in magnitude and insignificant, which is consistent with the long-difference results in Table 1. As before, the positive coefficient on *Plant\_DFI \* All\_DFI* indicates that the beneficial impact of DFI is restricted to foreign plants located in sectors with high levels of DFI.

The results in Tables 1 and 2 are robust over a variety of alternative specifications. In addition to experimenting with other measures which might reflect location-specific productivity differences, such as the number of firms in each location, we tested several variations on the definition of foreign share.<sup>10</sup> These alternative specifications yielded no significant differences. Alternatively, we explored the possibility

<sup>10</sup> We reestimated equation (1) using two alternative definitions for foreign share. First, foreign share was redefined as the total number of employees in plants where at least 5 percent of assets are foreign owned, divided by the total number of employees in all plants in that sector. Second, foreign share was redefined as a zero-one variable, equal to one if there is any foreign investment at all in a region. The rationale for this specification is that the impact of foreign investment may be nonlinear, with one foreign plant in a sector potentially having as much impact on technology transfer as several foreign firms. These definitions, however, produce results similar to those in Tables 1 and 2.

that technology transfer from foreign firms takes place slowly, and that the positive impact of foreign on domestic productivity is observed only after several years. To examine the impact of foreign investment on domestic firm productivity growth over a longer time horizon, we estimated the same specification in equation (1) but substituted lagged values for the shares of both national and regional foreign ownership. We allowed lags of up to eight years.<sup>11</sup> Our previous results remain unchanged. We continue to see a strong, negative impact of sectoral foreign share and a generally insignificant impact of local (regional) foreign share on productivity.

We conclude that there is no empirical support for the hypothesis that technology is transferred locally from joint ventures to domestically owned firms. Our empirical results confirm case study evidence for Venezuela, which claims few cases of technology transfer from multinationals to domestically owned firms (see, for example, Luis Matos, 1977).

### C. Small versus Large Plants

The differences between the OLS and WLS results presented in Table 1 imply systematic differences across small and large plants. In Table 3, we report the coefficients from OLS and within estimation separately for small and large plants. Large plants are defined as plants with a mean of at least 50 employees over the entire sample period.

Although the results are consistent with those reported in Tables 1 and 2, some interesting differences appear. In particular, the positive own-plant effect is only robust for small plants. For small plants, the coefficient on *Plant\_DFI* varies between 0.104 and 0.182, indicating that a 10-percentage-point increase in foreign equity participation would

<sup>11</sup> Similarly, we estimated the same specification as equation (1), but instead regressed the difference between current and lagged output as a function of the difference between each independent variable and its lag. We allowed differences of up to seven years. The results were similar to those we obtained by simply including lagged values of the foreign share variables.

TABLE 3—IMPACT OF FOREIGN OWNERSHIP BY PLANT SIZE:  
REGRESSING LOG OUTPUT AT THE PLANT LEVEL ON INPUTS AND THE SHARE OF FOREIGN OWNERSHIP  
AT THE PLANT LEVEL, THE SECTOR LEVEL, AND THE LOCAL LEVEL<sup>a</sup>

	Small plants (less than or equal to 49 employees)				Large plant (greater than 49 employees)			
	(1) OLS	(2) Within <sup>b</sup>	(3) OLS	(4) Within <sup>b</sup>	(5) OLS <sup>c</sup>	(6) Within <sup>b,c</sup>	(7) OLS <sup>c</sup>	(8) Within <sup>b,c</sup>
Foreign ownership in the plant ( <i>Plant_DFI</i> )	0.104 (0.052)	0.100 (0.055)	0.167 (0.065)	0.182 (0.084)	0.121 (0.031)	-0.018 (0.049)	0.174 (0.036)	-0.123 (0.073)
Foreign ownership in the sector and region ( <i>Local_Sector_DFI</i> )	—	—	0.061 (0.035)	0.072 (0.058)	—	—	-0.020 (0.032)	0.196 (0.218)
<i>Plant_DFI</i> * <i>Local_Sector_DFI</i>	—	—	-0.395 (0.138)	-0.359 (0.170)	—	—	-0.203 (0.080)	-0.285 (0.247)
Foreign ownership in the sector over all regions ( <i>Sector_DFI</i> )	-0.349 (0.074)	-0.340 (0.074)	-0.366 (0.076)	-0.363 (0.093)	-0.127 (0.105)	-0.214 (0.111)	-0.128 (0.113)	-0.180 (0.173)
<i>Plant_DFI</i> * <i>Sector_DFI</i>	1.184 (0.595)	0.046 (0.564)	1.475 (0.584)	0.559 (0.837)	0.351 (0.205)	0.411 (0.279)	0.590 (0.225)	1.033 (0.372)
Number of observations	29,179	29,179	28,069	28,069	13,831	13,831	13,264	13,264
Number of plants	7,620	7,620	7,563	7,563	2,637	2,637	2,627	2,627
R <sup>2</sup>	0.90	0.96	0.90	0.94	0.90	0.94	0.90	0.96

<sup>a</sup> Industry dummies included in all OLS specifications. All standard errors (denoted in parentheses) are corrected for heteroskedasticity. Unless otherwise specified, other independent variables (not reported here) include log materials, log skilled labor, log unskilled labor, and log capital stock. *Plant\_DFI* is percentage of equity owned by foreigners. *Sector\_DFI* is employment-weighted percentage of equity which is foreign owned at the four-digit ISIC level.

<sup>b</sup> Estimated by subtracting from each variable its plant-specific mean over all years.

<sup>c</sup> Regional controls include the real skilled wage and energy prices.

be associated with an increase in productivity of between 0.1 and 0.2 percentage points. For large plants, however, the coefficient on *Plant\_DFI* is not robust across specifications, becoming insignificantly different from zero when we take into account plant-specific effects. The results suggest that the lack of robustness in the own-plant effect identified in Tables 1 and 2 are due entirely to large plants. Across these plants, foreign investors apparently target the more productive enterprises. For small plants, however, there appears to be a strong, independent positive effect of foreign equity participation on productivity levels.

The spillover effects of DFI, captured by *Sector\_DFI*, also vary across plant size. The point estimates are negative for both small and large plants, but the magnitudes are double or triple in size for small plants, suggesting a much larger market-stealing effect. In addition, the coefficients are only significant for small plants, suggesting that (negative) spillovers are concentrated on smaller enterprises who cannot compete as effectively with foreign entrants as their larger domestic competitors.

#### D. Overall Effects of Foreign Investment

The results point to two quite different conclusions about the impact of foreign investment on productivity in Venezuela's manufacturing sector. On the one hand, plants with higher foreign participation exhibit positive productivity gains—although these results are only robust for smaller plants. On the other hand, plants which do not receive foreign investment exhibit productivity declines as a result of increasing foreign activity. We now measure the net impact of these two offsetting forces.

We use the following approach to determine the overall effect of foreign investment on the productivity of the manufacturing sector. Using the coefficient estimates reported in Tables 1 through 3 and the actual values of *Plant\_DFI*, *Sector\_DFI*, and *Local\_Sector\_DFI*, we get a net effect of DFI for each plant. We then sum this effect across all firms, weighted by the value of the firm's production, to derive the net effect on Venezuelan manufacturing for each year. In Table 4, we report the average effect over all years.

The net impact of DFI is small in magnitude and positive if we use WLS, but negative

TABLE 4—NET IMPACT OF FOREIGN OWNERSHIP ON TOTAL FACTOR PRODUCTIVITY IN THE ECONOMY:  
WEIGHTED REGRESSION OF OUTPUT AT THE PLANT LEVEL ON INPUTS AND THE SHARE OF FOREIGN OWNERSHIP  
AT THE PLANT AND SECTOR LEVELS<sup>a</sup>

	National effects only		National and regional effects		
	OLS <sup>b</sup> (1)	Weighted least squares <sup>c</sup> (2)	OLS <sup>d</sup> (3)	Within: Small plants <sup>e</sup> (4)	Within: Large plants <sup>f</sup> (5)
Foreign ownership in the plant ( <i>Plant_DFI</i> )	0.105 (0.027)	0.142 (0.039)	0.154 (0.031)	0.182 (0.084)	-0.123 (0.073)
Foreign ownership in the sector and region ( <i>Local_Sector_DFI</i> )	—	—	0.015 (0.024)	0.072 (0.058)	0.196 (0.218)
<i>Plant_DFI</i> * <i>Local_Sector_DFI</i>	—	—	-0.271 (0.068)	-0.359 (0.170)	-0.295 (0.247)
Foreign ownership in the sector over all regions ( <i>Sector_DFI</i> )	-0.267 (0.061)	-0.206 (0.155)	-0.289 (0.063)	-0.363 (0.093)	-0.180 (0.173)
<i>Plant_DFI</i> * <i>Sector_DFI</i>	0.356 (0.181)	0.314 (0.226)	0.685 (0.197)	0.559 (0.837)	1.033 (0.372)
Net impact of DFI <sup>g</sup>	-0.0068	0.0004	-0.0072	-0.0100	-0.0043
Number of observations	43,010	43,010	41,333	28,069	13,264

<sup>a</sup> All specifications include annual time dummies. All standard errors (denoted in parentheses) are corrected for heteroskedasticity. Unless otherwise specified, other independent variables (not reported here) include log materials, log skilled labor, log unskilled labor, and log capital stock. *Plant\_DFI* is percent of equity owned by foreigners. *Sector\_DFI* is employment-weighted percent of equity which is foreign owned at the four-digit ISIC level.

<sup>b</sup> Coefficients are taken from the first column of Table 1.

<sup>c</sup> Coefficients are taken from the third column of Table 1. Weighted by the plant's share of total employment.

<sup>d</sup> Coefficients are taken from the second column of Table 2.

<sup>e</sup> Coefficients are taken from the fourth column of Table 3.

<sup>f</sup> Coefficients are taken from the eighth column of Table 3.

<sup>g</sup> The net impact of DFI is calculated by multiplying the coefficients in the first five rows by their actual values and then adding them together for each plant. We then sum this net effect across all plants, weighted by each plant's share of employment. The reported net effect is the average across all years.

overall using OLS or plant-level within estimates. The point estimates using unweighted OLS suggest that the net impact of foreign investment is to reduce total factor productivity levels by 0.7 percentage points annually. The weighted estimates, however, suggest a very small overall net gain: DFI raises plant total factor productivity by 0.04 percentage points a year. The within estimates, which lead to negative own-plant effects for large enterprises, suggest a negative overall impact of DFI of 1 percentage point a year for small plants and 0.4 percentage points a year for large plants, adding up to a 1.4-percentage-point decline annually. Even if we focus only on the WLS estimates, which assign a greater weight to large enterprises, the evidence suggests that the plant-level gains only slightly outweigh the negative spillover effects.

#### IV. Conclusion

Using a panel of more than 4,000 Venezuelan plants between 1976 and 1989, we identify two effects of foreign direct investment on domestic enterprises. First, we find that increases in foreign equity participation are correlated with increases in productivity for recipient plants with less than 50 employees, suggesting that these plants benefit from the productive advantages of foreign owners. Second, we find that increases in foreign ownership negatively affect the productivity of wholly domestically owned firms in the same industry. These negative effects are large and robust to alternative model specifications. Although previous studies generally found positive effects, we show that these results can be explained by the tendency for multinationals

to locate in more productive sectors and to invest in more productive plants.

On balance, our evidence suggests that the net effect of foreign ownership on the economy is quite small. Weighted least-squares estimates suggest that the positive effects for recipient firms slightly outweigh the negative effects on firms that remain domestically owned; other approaches yield a net negative impact of DFI. We conclude that there are benefits from foreign investment, but that such benefits appear to be internalized by joint ventures. We find no evidence supporting the existence of technology "spillovers" from foreign firms to domestically owned firms.

Our results raise several issues for further research. To what extent can the results for Venezuela be extended to other developing countries? The level of foreign investment in Venezuela might be too low, or the economy not sufficiently developed or diversified, to receive large benefits from foreign presence. The scope for spillovers might be greater in the export-oriented economies in East Asia.<sup>12</sup> We also ignore other potential gains from foreign investment, such as increased employment and inflows of capital. Finally, we may fail to capture the long-run effects of DFI. If positive effects are permanent, while the negative effects are transitory, then as unprofitable firms exit, the negative productivity effects could decline. The productive advantage of foreign ownership might increase the stock of human capital if domestic workers absorb this advantage through training and learning-by-doing. Over long periods of time, this advantage might eventually spill over through labor mobility. However, we found little evidence that such spillovers occur within our sample.

<sup>12</sup> However, results for Indonesia suggest this is not the case. Estimating production functions on data from a census of Indonesian manufacturing firms for 1975–1989, we find results similar to those for Venezuela: productivity is higher in plants which receive foreign investment, but there is a negative spillover effect for domestically owned plants in the same industry. An interesting difference is that the positive effect is much larger than that estimated for Venezuela, and the negative effect is much smaller. We also find that the positive plant-level effect of foreign investment is quite large, but becomes insignificant in a first-difference or within specification, as reported in Table 1 for Venezuela.

## REFERENCES

- Aitken, Brian J. and Harrison, Ann E.** "Do Domestic Firms Benefit from Foreign Direct Investment? Evidence from Panel Data." Mimeo, Columbia University, 1997.
- Blomstrom, Magnus.** "Foreign Investment and Productive Efficiency: The Case of Mexico." *Journal of Industrial Economics*, September 1986, 35(1), pp. 97–110.
- \_\_\_\_\_. *Foreign investment and spillovers*. London: Routledge, 1989.
- Blomstrom, Magnus and Persson, Hakan.** "Foreign Investment and Spillover Efficiency in an Underdeveloped Economy: Evidence from the Mexican Manufacturing Industry." *World Development*, June 1983, 11(6), pp. 493–501.
- Blomstrom, Magnus and Wolff, Edward W.** "Multinational Corporations and Productivity Convergence in Mexico." Mimeo, New York University, 1989.
- Caves, Richard E.** "International Corporations: The Industrial Economics of Foreign Investment." *Economica*, February 1971, 38(149), pp. 1–27.
- \_\_\_\_\_. "Multinational Firms, Competition, and Productivity in Host-Country Markets." *Economica*, May 1974, 41(162), pp. 176–93.
- \_\_\_\_\_. *Multinational enterprise and economic analysis*. Cambridge: Cambridge University Press, 1982.
- Dinardo, John; Johnston, Jack and Johnston, John.** *Econometric methods*. New York: McGraw-Hill, October 1996.
- Edfelt, Ralph B.** "Direct Investment in a Developing Economy: Towards Evaluating the Human Resource Development Impact in Brazil." Ph.D. dissertation, University of California, Los Angeles, 1975.
- Germidis, Dimitri.** *Transfer of technology by multinational corporations*. Paris: Development Centre of the Organization for Economic Cooperation and Development, 1977.
- Globerman, Steven.** "Foreign Direct Investment and 'Spillover' Efficiency Benefits in Canadian Manufacturing Industries." *Canadian Journal of Economics*, February 1979, 12(1), pp. 42–56.
- Goncalves, Reinaldo.** "Technological Spillovers and Manpower Training: A Comparative Analysis of Multinational and National Enterprises in Brazilian Manufacturing." *Jour-*

- nal of Development Economics*, July 1986, 11(1), pp. 119–32.
- Grieco, Joseph M.** “Foreign Investment and Development: Theories and Evidence,” in Thodore H. Moran, ed., *Investing in development: New roles for private capital?* New Brunswick, NJ: Transaction Books, 1986, pp. 35–60.
- Helleiner, Gerald K.** “Transnational Corporations and Direct Foreign Investment,” in Hollis Chenery and T. N. Srinivasan, eds., *Handbook of development economics*. Amsterdam: North-Holland, 1989.
- Helpman, Elhanan.** “A Simple Theory of International Trade with Multinational Corporations.” *Journal of Political Economy*, June 1984, 92(3), pp. 451–71.
- Horstmann, Ignatius J. and Markusen, James R.** “Firm-Specific Assets and the Gains from Direct Foreign Investment.” *Economica*, February 1989, 56(221), pp. 41–48.
- Hymer, Stephen.** “The International Operations of National Firms: A Study of Direct Investment.” Ph.D. dissertation, Massachusetts Institute of Technology, 1960.
- Mansfield, Edwin and Romeo, Anthony.** “Technology Transfer to Overseas Subsidiaries by U.S.-Based Firms.” *Quarterly Journal of Economics*, December 1980, 95(4), pp. 737–50.
- Matos, Luis.** “Multinational Corporations and Transfer of Technology: The Case of Venezuela,” in Dimitri Germidis, ed., *Transfer of technology by multinational corporations*. Paris: Development Centre of the Organization for Economic Cooperation and Development, 1977.
- Rauch, James E.** “Productivity Gains From Geographic Concentration of Human Capital: Evidence from the Cities.” Mimeo, University of California, San Diego, 1991.
- Rhee, Jong Wong and Belot, Therese.** “Export Catalysts in Low-Income Countries.” Working paper, World Bank, 1989.
- Rugman, Alan M.** “New Theories of the Multinational Enterprise: An Assessment of Internalization Theory.” *Bulletin of Economic Research*, May 1986, 38(2), pp. 101–18.
- Teece, David J.** “Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-how.” *Economic Journal*, June 1977, 87(346), pp. 242–61.