

# COUNTRY AND INDUSTRY DETERMINANTS OF UNITED STATES FOREIGN DIRECT INVESTMENT

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## 摘要

本研究探討了地主國因素，產業因素及產業經驗對美國對外直接投資的影響。本研究之假說係由「折中理論」和「內部化理論」所推導而得，而假說之驗證係根據美國在開發中國家和已開發國家之投資資料。本研究發現，若將開發中國家視為一群，將已開發國家視為另一群，則各種因素對美國對外直接投資的影響在這兩群中並不相同。

## ABSTRACT

This study examines the impact of host country characteristics, industry characteristics, and industry experience on U.S. foreign direct investment. The hypotheses are derived mainly from the eclectic theory of international production and the theory of internalization. The hypothesized model is tested for developed countries as a group and less developed countries as another group. The results suggest that the impact of some characteristics is different for investments in these two groups.

The environmental determinants of foreign direct investment (FDI) have constituted an important research topic in international business for over 20 years. Many studies have attempted to identify the locational characteristics of a country which attract or discourage foreign investment. Both the eclectic theory of international production and the theory of internalization have addressed the impact of host country characteristics on FDI (Buckley and Casson 1976, Dunning 1979).<sup>1</sup> The results of empirical studies of this topic suggest that some characteristics have a significant impact on FDI, but others do not (Dunning 1973; Agarwal 1980).

A casual inspection of U.S. industries' FDI in terms of total amount of money invested abroad (U.S. Department of Commerce 1982) or in terms of number of foreign subsidiaries established (Curhan, Davidson, and Suri 1977) reveals differences

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<sup>1</sup> See Rugman (1980, 1986) for the argument of the theory of internalization as a general theory of FDI or multinational enterprise.

in their levels of investment. These differences have also been shown in several statistical analyses, such as those conducted by Buckley and Casson (1976) and Kumar (1984). Furthermore, differences in level of FDI are not country-specific but industry-specific; studies have shown that FDI is associated with the same industries throughout the world (Hirsch 1976; Hymer 1976). Studies have suggested that these differences are attributed to some industry characteristics (e.g., Caves 1971).

Another factor influencing FDI is experience. Researchers have long studied the impact of learning or experience on decisions in general (Simon 1984), and a number of studies have recently addressed the impact of experience on FDI decisions in particular (Kobrin 1976; Johanson and Vahlne 1979; Davidson 1980; Ball and Tschoegl 1982; Terpstra and Yu 1988).

This study investigates the impact of certain host country characteristics, industry characteristics, and the industry experience on U.S. FDI. The paper is divided into four parts. Section I presents the research hypotheses. Sections II and III consist of a report of research findings and their discussion. Section IV provides a conclusion and includes suggestions for future research.

## I. RESEARCH HYPOTHESIS

### *Host Country Characteristics*

We examine the impact of the following five host country characteristics on U.S. FDI:<sup>2</sup> market size, political instability, geographic proximity, membership of regional groupings, and the restrictions of investing in Japan. The arguments for each hypothesis are discussed below.

Large market size of the host country should have a positive impact on the inflow of FDI. Market-seeking behavior can be observed in firms' domestic as well as international expansion activities. Because FDI represents the commitment of more resources to operations in unfamiliar environments and thus higher risks, firms tend to invest in countries with larger markets for compensation. Empirical studies do reveal a positive relationship between market size and FDI (Scaperlanda and Mauer 1969; Kobrin 1976; Davidson 1980; Nigh 1985).

Political instability in a host country seems likely to have a negative impact

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<sup>2</sup> The labor cost may have some impact on FDI (Dunning 1975; Agarwal 1980; Schneider and Fry 1985). We did not examine this factor because the data were not available.

on the inflow of FDI. However, empirical studies yield mixed results (Kobrin 1979; Agarwal 1980; Schneider and Frey 1985). The conflicting results may be attributed in part to the different measures of political instability used in different studies (Green & Korth 1974). However, the fundamental reason for this inconsistency, as pointed out by Kobrin (1976), may be that political factors are not a major determinant of FDI. Brewer's (1985) study also supports this view. Thus, we hypothesize that political instability of a host country has no significant impact on FDI.

Geographic proximity of the home country and the host country reduces the cost of managing foreign subsidiaries, and should exert a positive impact on the inflow of FDI. Related to geographic proximity is psychic distance. It has been shown that psychic distance has a significant impact on the chronological order in which a firm establishes foreign operations in new host countries (Johanson and Wiedersheim-Paul 1975; Johanson and Vahlne 1977). Empirical findings on the impact of geographic proximity on FDI also suggest a positive relationship (Davidson and McFetridge 1985; Yu and Ito 1988). Therefore, we hypothesize a significant impact of geographic proximity on FDI.

By offering an enlarged market, customs unions become attractive to foreign investors. Thus, the existence of the European Economic Community (EEC) should have a positive impact on the inflow of FDI into member countries. Empirical evidence seems to support this hypothesis (Scaperlander & Mauer 1969; Schmitz and Bieri 1972; Scaperlanda and Balough 1983). By the same token, the existence of the Andean Common Market (ANCOM) should attract foreign investors. This impact, however, may be weaker because of the restrictions in the Andean Foreign Investment Code (Decision 24). Empirical evidence is mixed. While Grosse (1983) found evidence supporting the negative impact of the Code on U.S. FDI to ANCOM countries, Moxon (n.d.) concluded that the Code has had little noticeable effect on the amount of U.S. foreign investment in ANCOM. Moxon's view is in line with the argument that the officials in ANCOM countries were prepared to compromise to lure foreign investors (Hojman 1981). Thus, we hypothesize that the existence of ANCOM restrictions has no negative impact on U.S. FDI.

Japan is known for its restrictions on inflow of foreign investment. For the period examined in this study, four industries were closed to foreign investors (Centre on Transnational Corporations 1978): primary industries related to agriculture, forestry, and fisheries; mining; the oil industry; and leather and leather products manufacturing. We create a dummy variable (JAP) to represent the restrictions on two manufacturing industries, namely, petroleum and coal products (SIC 29) and leathers and leather products (SIC 31). We hypothesize a negative impact of JAP

on FDI.

### *Industry Characteristics*

When Hymer (1976) examined the advantages of firms which enable them to go abroad, he observed the close relationship between these advantages and the barriers to entry to industries suggested by Bain (1956). This relationship, though not perfect, has been demonstrated to be high (Bergsten, Horst and Moran 1978). Furthermore, because barriers to entry in most cases give rise to benefits of internalization, their impact on industries' FDI activities has been hypothesized by the theory of internalization and the eclectic theory of international production (Buckley and Casson 1976; Dunning 1977; McCulloch 1985).

It seems that industries with a high level of FDI activities do have some characteristics relevant to barriers to entry. Studies have pointed out some of the characteristics which might be associated with FDI (Gruber, Metha, and Vernon 1967; Caves 1971; Caves 1974). These industry characteristics are:

- High technological intensity (or high research and development intensity)
- High product differentiation (or high advertising intensity)
- High concentration
- Greater need of securing inputs
- Large average size of firms
- Large economies of scale

In order to survive, foreign firms must have some ownership-specific advantages over existing or potentially competitive firms in the host country. These advantages, measured by research and development intensity, advertising intensity, or average industry size, should have a significant impact on industries' FDI activities. Other industry characteristics also affect FDI. Large economies of scale may discourage FDI because of the reduced economic efficiency which results from fragmentation of production. Certain resource-intensive industries invest in foreign countries to secure their inputs. Firms in oligopolistic industries tend to follow their competitors abroad to maintain competitive balance. Thus, FDI is expected to be associated with industries with relatively high concentration.

The empirical findings on the impact of these six characteristics on industries' FDI activities may be summarized as follows:

- (1) Technological intensity and product differentiation have a positive impact on industries' FDI activities (Horst 1972; Caves 1974; Wolf 1977; Lall 1980; Owen 1981; Pugel 1981; Sleuwagen 1985).

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- (2) The impact of concentration on FDI receives mixed results. While rejected by Horst (1972) and Owen (1981), the importance of concentration on industries' FDI activities is confirmed by Knickerbocker (1973), and Pugel (1981). These conflicting results may be caused by different measures of concentration used by them.
- (3) The impact of an industry's sourcing needs on its FDI activities is not clear (Horst 1972; Buckley and Dunning 1976; Juhl 1979; Owen 1981).
- (4) Though average firm size in an industry has a significant impact on FDI activities, its impact turns out to be both positive (Wolf 1977; Bergsten, Horst and Moran 1978; Juhl 1979; Owen 1981) and negative (Horst 1972; Baumann 1973). The confusion may be attributed to their model specifications. The impact of average firm size on FDI was assessed after deducting the advantage conferred by larger size in some studies (Horst 1972; Baumann 1973), but it was not in other studies (Wolf 1977; Owen 1981). Thus, in the first case, average size stands for economies of scale whereas in the second case it stands for the advantages of an industry.
- (5) The impact of economies of scale on industries' FDI activities is both positive and negative (Caves 1974; Buckley and Dunning 1976; Lall 1980; Pugel 1981). This contradiction is related to the measure of economies of scale used by researchers. Most studies used measures such as value-added per establishment as indicators of economies of scale. Without controlling the impact of average size, these measures are really proxies of average size. Thus, they tend to exert a positive impact on industries' FDI activities. If the impact of economies of scale and average size are assessed together, the former is probably negatively related to FDI.

In addition to these six industry characteristics, we examine four other factors: advantages conferred by human resources, intensity of mergers and acquisitions, the reluctance of the tobacco industry to go abroad, and labor intensity.

Researchers have examined the advantage conferred by human resources. According to the transferability across national borders, there are three types of human resources: non-transferable, partially transferable, and fully transferable. We expect them to produce mixed effects on FDI, because it is difficult to differentiate them (Lall 1980), and this assumption

is borne out by empirical studies, which all use the number of non-production workers relative to total number of employees as a proxy for human resources (Caves 1974; Buckley and Dunning 1976; Lall 1980).

Mergers and acquisition can yield scale economies in production, marketing, research and development, management, etc. (Scherer 1980). They not only bring gains in operation efficiency to firms, but may also enable them to undertake investments abroad by increasing their size (Singh 1975). In addition, Dunning (1977) argued that, firms must be of sufficient size to take advantage of certain market imperfections through internalization. Therefore, mergers and acquisitions are usually concentrated in areas where the advantages of internalization are most pronounced. These arguments suggest a positive relationship between the intensity of mergers and acquisitions in an industry and its FDI activities.

The tobacco industry presents a special case in assessing the impact of industry characteristics on FDI. We would expect tobacco manufacturers to be active foreign investors because of the characteristics of their industry. For example, among the industries examined in this study, the tobacco industry ranks first in average size and advertising intensity. However, it has only limited foreign investments. According to Knickerbocker (1973), firms in the U.S. tobacco industry are less inclined to go abroad because of their relatively weak competitive position in countries where government monopolies exist. Thus, if we construct a dummy variable for the tobacco industry, the relationship between this variable and FDI should be negative.

The relationship between the labor intensity of an industry and its FDI activities should be positive. As domestic labor-intensive production became less and less economical, U.S. firms began looking to other countries where wages are low. This tendency should be stronger in industries with high labor intensity.

### *Industry Experience*

For firms engaging in international business, there are two types of experience: country-specific experience and general international operations experience.<sup>3</sup> Both types of experience should have a positive impact on FDI activities (Dunning, 1979).

Country-specific experience is gained through operation in a specific country. At the beginning of international expansion, a firm has limited knowledge about

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<sup>3</sup> A distinction between international experience and international expertise is made by Kobrin (1984). Most respondents in his study acquired international expertise through business experience.

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the host country even though it may have invested there. As time goes by, its knowledge about the local environment increases. Because the firm more fully understands the local environment, the tendency to engage in further investments is higher. Studies confirm this observation (Kobrin 1976; Davidson and Harrigan 1977; Davidson 1980; Ball and Tschoegl 1982; Yu 1990). Thus, we hypothesize that the country-specific experience of an industry has a positive impact on its activities.

General international operations experience is gained through operation in the international environment, without reference to any specific country. Because of exposure to international operations, a firm's basic organizational structure and its information gathering and assessing systems are likely to be changed to adapt to this new challenge. These changes may be caused by operations in particular countries but will have a positive impact on the firm's operation in other countries as well. Studies by Ahroni (1966), Johanson and Wiedersham-Paul (1978), Johanson and Vahlne (1977), Davidson (1980), Yu and Ito (1988), and Yu (1990) confirm this observation. Thus, we hypothesize that the general international operations experience of an industry has a positive impact on its FDI activities.

Table 1 summarizes the hypotheses to be tested by this study. We expect a positive relationship between the following characteristics and industries' FDI activities: market size, geographic proximity, membership in EEC, average size, advertising intensity, technology intensity, concentration ratio, intensity of mergers and acquisitions, labor intensity, general international operations experience, and country-specific experience. On the contrary, we expect a negative relationship between the following characteristics and industries' FDI: restrictions in Japan, economies of scale, and the dummy variable for the tobacco industry. We also expect no significant impact of political instability and membership in ANCOM on industries' FDI activities. We have not hypothesized the impact on FDI of human resources or of resource-intensive industries' need to secure inputs.

The hypotheses in Table 1 are derived under the assumption that the impact of these characteristics is the same for investments in developed countries (DCs) as for those in less developed countries (LDCs). This implies that we pool the countries together and estimate a model for all of them simultaneously. However, some researchers have followed a different approach. Recognizing the difference between DCs and LDCs, they have built this into their models. They typically have estimated two models, one for DCs and one for LDCs. Their analyses show that, even though the same factors were examined, the impact of some factors on FDI is not the same for the two groups (Bennett and Green 1972; Kobrin 1976;

**Table 1**

Hypothesized Direction of Impact of Host Country Characteristics,  
Industry Characteristics, and Industry Experience on FDI

Characteristics	Variable	Direction of effect
<i>Host Country Characteristics</i>		
Market size	MKT•.SIZ	+
Political instability	POL•INS	0
Geographical proximity	GEO•PRO	+
EEC	EEC	+
Restrictions in Japan	JAP	-
ANCOM	ANCOM	0
<i>Industry Characteristics</i>		
Average size	SIZE	+
Advertising intensity	ADV	+
Technology intensity	R&D	+
Concentration ratio	CON•RAO	+
Human resources	HUM•RES	?
Natural resources intensive	NAT•INT.	?
Mergers and acquisitions	M&A	+
Economies of scale	ECO•SCA	-
Tobacco	TOBA	-
Labor intensity	LAB•INT	+
<i>Industry Experience</i>		
Experience (general)	EXP•GEN	+
Experience (country specific)	EXP•CON	+



Schollhammer and Nigh 1984; Nigh 1985). Based on these results, this study first examines the appropriateness of pooling the two groups of countries together. If it is appropriate to pool them, we will estimate one model, but if the nature of the two groups of countries is demonstrated to be different, we will estimate a model for each group. Then we will apply the hypotheses in Table 1 to DCs and LDCs.

## II. RESEARCH FINDINGS

We examine FDI activities of seventeen U.S. industries in seventeen developed countries and forty-four less developed countries. The appendix provides the list of variables and data sources. We test our hypotheses by estimating two model, one with the measure of technology intensity and one with the measure of general international operations experience. This is because, as several studies have shown (e.g., Gruber, Metha, and Vernon 1967; Hirsch and Bijaoui 1985), there is a strong correlation between our measures of technology intensity and general international operations experience, that is, between research and development expenses as a percentage of industry net sales (R&D) and the ratio of export to total industry shipments (EXP•GEN). This may cause estimation problems if we include them in the same model. Because commonly used approaches to solving problems of multicollinearity are not applicable here (Kennedy 1979, pp. 131-134), we estimate models with technology intensity and general international operations experience separately. The high correlation coefficients between R&D and EXP•GEN in our data (0.82) supports this approach.

We apply ordinary least squares (OLS) to test the hypotheses.<sup>4</sup> We denote the matrix of independent variables by  $X$ , vectors of parameters by  $\beta$  and  $\gamma$ , and a vector of stochastic error terms by  $\epsilon$ , which we assume meets the classical assumptions. Then the OLS model has the form:

$$\ln Y' = X\beta + \epsilon$$

where  $Y' = Y + 0.5$ . As we are taking the natural log of  $Y$ , we first add 0.5 to all elements of the vector rather than omit zero cells from the estimations. This

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<sup>4</sup> We tested the hypotheses by two more sophisticated techniques as well. Both Tobit (Tobin 1958) and nonlinear weighted least squares (Marlow, Link and Trost 1984) reveal similar results.

approach is theoretically preferable to the common but unsound practice of replacing only the zero values with the constant "1" (Young and Young 1975). We can look at  $\ln Y'$  as a Box-Cox (1964) transformation of  $Y$ , with parameters  $\lambda_1 = 0$  and  $\lambda_2 = 0.5$ . A check at values of  $\lambda_2$  of 0.1 and 0.3 indicates that the results are not very sensitive to the location shift.

### *Appropriateness of Pooling*

To examine the appropriateness of pooling all the data together, we use three statistical tests. These tests, all based on the F-distribution, are the test of homogeneity, the test of differential slopes, and the test of differential intercepts (Johnston 1962, pp. 192-199). The test results indicate that the impact of various characteristics on FDI is different for investments in developed countries than for those in less developed countries. We reject the null hypotheses of overall homogeneity and equality of slopes in the model with R&D as well as with EXP•GEN because the F-values are statistically significant at the 1 percent level. These results support the classification of observations in our study into two groups and also suggest that pooling the observations together might lead to unreliable estimates and incorrect conclusions.

Based on these results, we have classified the observations into two groups. The first group is composed of investments in seventeen developed countries and has 289 observations (seventeen industries and seventeen countries). The second group is composed of investments in the remaining forty-four less developed countries and has 748 observations (seventeen industries and forty-four countries). Because we analyze the data with two specifications (one with R&D and one with EXP•GEN), we have estimated four models.

### *Results for the Developed Countries*

The results revealed by the two specifications are quite similar, and most of the significant variables have the expected signs (Table 2). Industries with extensive FDI activities are characterized by large average size, high product differentiation, high concentration ratio, high intensity of mergers and acquisitions, lower economies of scale, high labor intensity, and extensive country-specific experience. The impact of technology intensity on FDI is positive, though it does not reach a statistically significant level. Apparently, the existence of abundant human resources does not have a significant impact on FDI. The dummy variable representing the lower

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propensity of the tobacco industry to go abroad also demonstrates its explanatory power. Another industry dummy variable, representing an industry's reliance on natural resources, does not have a significant impact on FDI. The impact of general international operations experience on FDI is positive. Countries near the U.S., with large market size and membership in the EEC, are the preferred recipients of FDI. The restrictions of Japan in limiting FDI are effective. Surprisingly, political instability has a positive and significant impact on FDI.

### *Results for Less Developed Countries*

Table 2 reveals the results for LDCs. Except the variables ANCOM and political instability, all variables with significant impact on FDI have the expected signs. The  $R^2$  is 0.37 in both estimations. In the model with R&D, the following characteristics seem to differentiate the degree of industries' FDI activities: product differentiation, technology intensity, intensity of mergers and acquisitions, and dependency on natural resources. In the model with EXP•GEN, industries which have a high degree of product differentiation, a high concentration ratio, high intensity of mergers and acquisitions, low level of economies of scale, and which are dependent on natural resources are found to have more FDI activities. Country-specific experience demonstrates its significant impact on FDI in all estimations. The existence of abundant human resources, labor intensity, and general international operations experience do not exert a strong impact on FDI. The tobacco industry's reluctance to invest abroad is not statistically strong.

For both models, with R&D and EXP•GEN, large market size of the host country and membership in ANCOM increase the possibility for foreign investment. Previous studies had concluded that membership in ANCOM decreased or did not affect the inflow of FDI (Moxon n.d.; Grosse 1983). The different results obtained here may be attributed to the sample as well as to the research methodology used. Unlike other studies, we compare the inflow of investment to countries in ANCOM with that of other less developed countries.

## III. DISCUSSION

Our analysis suggests that the impact of various determinants on FDI activities at the industry level is not the same for investments in developed countries and in less developed countries. Their differences will be addressed after a discussion of

**Table 2**

**Results of Ordinary Least Squares**  
(t-statistics in parentheses)

Variable	Developed Countries		Less Developed Countries	
	With R&D	With EXP•GEN	With R&D	With EXP•GEN
Constant	-2.299 (-3.014)**	-2.400 (-3.088)**	-1.098 (-3.253)**	-1.229 (-3.545)**
<i>Country characteristics</i>				
MKT•SIZ	.003 (8.370)**	.003 (8.346)**	.010 (11.577)**	.010 (11.585)**
POL•INS	.007 (1.936)*	.007 (1.927)*	-.001 (-1.680)*	-.000 (-1.684)*
GEO•PRO	.009 (2.950)**	.009 (2.930)**	-.000 (-.323)	-.000 (-.316)
EEC	.181 (1.832)*	.181 (1.833)*	—	—
JAP	-1.321 (-2.414)**	-1.326 (-2.417)**	—	—
ANCOM	—	—	.163 (2.606)**	.163 (2.603)**
<i>Industry characteristics</i>				
SIZE	.013 (2.174)**	.013 (2.097)**	.001 (.482)	.001 (.442)
ADV	.590 (3.716)**	.577 (3.600)**	.205 (2.837)**	.202 (2.760)**
R&D	.042 (1.150)	—	.029 (1.743)*	—
CON•RAO	1.472 (2.188)**	1.877 (3.104)**	.137 (.447)	.513 (1.860)*
HUM•RES	-.007 (-.959)	-.005 (-.639)	-.003 (-.783)	-.000 (-.152)
NAT•INT	.160 (1.134)	.119 (.874)	.138 (2.141)**	.105 (1.698)*
M&A	.125 (8.182)**	.122 (7.275)**	.041 (5.836)**	.041 (5.332)**
ECO•SCA	-.020 (-3.054)**	-.021 (-3.190)**	-.005 (-1.583)	-.006 (-1.932)*
TOBA	-6.614 (-2.727)**	-6.656 (-2.730)**	-1.102 (-.997)	-1.187 (-1.069)
LAB•INT	.058 (1.820)*	.058 (1.803)*	-.001 (-.038)	.002 (.129)
<i>Industry experience</i>				
EXP•GEN	—	.005 (.379)	—	.000 (.005)
EXP•CON	2.013 (2.283)**	2.028 (2.295)**	8.313 (5.284)**	8.201 (5.201)**
F	23.385	23.210	28.683	28.363
R <sup>2</sup>	.579	.577	.370	.368

\* Significant at 2.5 percent (one-tailed test).

\*\* Significant at 5 percent (one-tailed test).

the impact of sample sizes on statistical tests.

### *Sample Size Difference*

Statistical significance for a given type I error rate is a function of the sample size, other conditions being equal. The effect of even a very small size difference will almost certainly be statistically significant when the sample is sufficiently large, but a relatively large effect may not be judged statistically significant with a small sample. In our study, we analyze two and a half times as many less developed countries as developed countries. Thus, the differences revealed by the statistical tests may simply be a consequence of the sample size differences. Examination of the results in Table 2 suggests that this is not the case. For all the models we estimated, the impact of a characteristic is nearly always statistically significant in the smaller group when it is significant in the larger group. On the contrary, the impact of a characteristic is not necessarily significant in the larger group when it is significant in the smaller group. Therefore, the different impacts of various characteristics on investments in the DCs and LDCs are meaningful and cannot be attributed to sample size differences.

### *Impact Difference*

The impact of average industry size on FDI is not significant in less developed countries, but it is significant in the case of developed countries. Size served as a general proxy for the advantages and resources which can accrue to large firms. The larger the size, the greater the capability of firms to compete domestically and internationally. The insignificance of average industry size in influencing foreign investment in less developed countries may reflect the fact that the local competition in these countries is not as strong as in developed countries. Our finding with respect to less developed countries is inconsistent with Juhl (1979). However, the home country examined in his study, i.e., West Germany, is different from that of ours.

The relationship between research and development intensity and FDI activities has been shown to be significant in some studies (e.g., Baumann 1977; Sleuwagen 1985) and insignificant in other studies (e.g., Buckley and Pearce 1979). Our results indicate that this relationship is positive for investments both in less developed countries and in developed countries, though it is statistically stronger for the former.

Concentrated industries tend to invest more in developed countries. Oligopolistic reaction research shows that once the leader invests in a foreign country, other firms

in the industry will follow suit, in an attempt to maintain competitive balance (Knickerbocker 1973). Our findings suggest that the bunching effect is more evident for FDI in developed countries.

The tendency of certain industries to invest abroad to secure natural resources receives mixed evaluations in empirical studies (Horst 1972; Owen 1981). Our results suggest that the tendency is statistically significant for investments in less developed countries, but not for investments in developed countries. This indicates that U.S. firms are able to invest in LDCs with abundant natural resources.

We hypothesized that, after controlling for industry size, the impact of economies of scale on FDI would be negative (Horst 1972; Buckley and Casson 1976), and our study does show a significantly negative impact for investments in developed countries. Our results further suggest that concern about reduced economic efficiency due to fragmentation of plants exists for investments in less developed countries as well. But the magnitude of the impact suggests a stronger effect for investments in developed countries, which may be due to the nature of the competition in the host country. Foreign firms with reduced efficiency are more capable of competing with local firms in less developed countries than with firms in developed countries.

Consistent with our hypothesis, our results reveal that the tobacco industry invests abroad less extensively than do other industries. However, this phenomenon is significant only for developed countries. For investments in less developed countries, the tobacco industry exhibits statistically the same intensity of FDI as for other industries. We suggest three possible reasons. First, the tobacco industry may be less willing to go abroad, but the binding level has not been achieved yet. In other words, the investments of other industries in less developed countries are still in the early stages. At a later stage, when other industries have a greater tendency to invest abroad, the constraining force in the tobacco industry will be apparent. Second, the local competition in less developed countries may not be strong as in developed countries. Third, the tobacco sectors in less developed countries may be more open to foreign investors than they are in developed countries (Centre on Transportation Corporations 1978; Safarian 1983).

We hypothesized that labor-intensive industries have a greater tendency to invest abroad to take advantage of cheap labor in foreign countries. We further speculated that this kind of relationship would be stronger for investments in less developed countries. To our surprise, we find a significant relationship only in the case of developed countries. There are two possible reasons to explain this phenomenon. The first is that our measure of labor intensity may not be appropriate. The second

may be our classification of developed and less developed countries. Because labor-intensive industries tend to invest in less developed countries, our grouping of these countries together reduces the differentiating power of labor intensity.

Our findings suggest that American firms tend to invest in developed countries which are close to the U.S. Geographic proximity does not have a positive and significant impact on firms' investments in less developed countries. The less developed countries are probably just too far from the home country. Firms may treat geographical distance as a constant factor for less developed countries and may therefore emphasize other factors when making investment decisions regarding LDCs.

Political stability has a significantly negative impact on FDI in LDCs, and is in line with the finding of Chatterjee (1982). This is in contradiction with the finding for the group of developed countries, which shows a positive impact of political instability of FDI. We suspect that this difference may be attributed to the countries examined. Chatterjee's measure of political instability, which is also used in this study, has been developed and tested for developing countries. Therefore, this measure may be more applicable to the group of developing countries.

The above discussion highlights the different impact that certain industry and host country characteristics have on FDI in less developed and in developed countries. However, our study finds that there are some characteristics which promote FDI in both groups of countries. These characteristics are the following: (a) advertising intensity; (b) intensity of mergers and acquisitions; (c) country-specific experience; and (d) market size of the host country. Because most studies do not classify their observations into two groups, we have no prior empirical work to compare. However, Schollhammer and Nigh (1984) and Nigh (1985) pointed out the significant impact of market size of the host country on investments in developed countries as well as in less developed countries.

#### IV. CONCLUSION

This study investigated the impact of host country characteristics and industry characteristics on FDI activities of U.S. industries. In addition to the industry characteristics usually studied, we also included two types of industry experience: country-specific experience and general international operations experience.

We first demonstrated that in assessing the impact of various characteristics on FDI, it is not appropriate to pool all of the observations together. We found that the impact of various characteristics on FDI is different for investments in

developed countries than to those in less developed countries. Our statistical analyses suggest that:

- (1) For investments in developed countries, U.S. industries with large average size, high product differentiation, high concentration ratio, high intensity of mergers and acquisitions, lower economies of scale, high labor intensity, and greater country-specific experience tend to invest abroad more extensively. Technology intensity, general international operations experience and the reliance on natural resources tend to have a positive correlation with FDI, though these relationships are not statistically significant. In comparison with other industries, the tobacco industry exhibits less extensive FDI activities. Developed countries which are near the U.S., which have large market size, and which are members of EEC are the preferred hosts of FDI. Among developed countries, Japan has noticeably less inflow of FDI.
  
- (2) For investments in less developed countries, U.S. industries with high product differentiation, high technology intensity, high intensity of mergers and acquisitions, and greater country-specific experience have a greater tendency to go abroad. Natural resources-intensive industries invest comparatively more in LDCs than other industries. The higher economies of scale tends to have a negative impact on FDI, while general international operations experience and high concentration ratio tend to exert a positive impact. Less developed countries which have a large market, which are politically stable, and which are members of ANCOM receive more FDI.

Our study suggests three possible areas of future research. First, the commonly used approach of pooling all observations to estimate a single model needs further study. We have shown that the impact of a characteristic on FDI may be different for investments in developed countries and in less developed countries. The impact of average industry size is a case in point. Second, the impact of various characteristics on FDI should be studied from the perspectives of different home countries (Nigh 1985). Our study and Juhl's (1982) study demonstrate the different impact of average industry size on investments from the U.S. and West Germany in less developed countries. Third, the impact of industry experience on FDI should be examined further. To strengthen the results of future studies, efforts should be devoted to the development of better measurements of country-specific experience and general international operations experience.



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## APPENDIX DATA SOURCES

This study examines FDI activities of seventeen U.S. industries in sixty-one countries. In terms of two-digit SIC code, the seventeen industries are: 20, 21, 22 and 23, 24 and 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, and 38. Besides commonly used measures, such as using research and development expenses as a percentage of total sales to measure technology intensity, we construct correlates or indicators of some other characteristics, such as using total industry export as a percentage of its total output to measure general international operations experience.

In this study, I examine the data constructed by the Harvard Multinational Enterprises Project, which has data up to 1975. These data seem to be outdated. However, the availability of industry-wide data on manufacturing FDI has long been a problem for researchers. For example, the most and comprehensive study on U.S. industrial FDI is done by Pugel (1981), with data up to 1970. The data sources for industry FDI, host country characteristics, industry characteristics, and industry experience are discussed below. Besides concentration ratio and intensity of mergers and acquisitions, for which data are not available for the year examined, all data are for 1975.

(1) An industry's FDI is the number of manufacturing subsidiaries belonging to that industry, established in a host country between 1973-1975. The data are obtained from: Curhan, John P., Davidson, Williamson, and Suri, Rajan, *Tracing*

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*the Multinationals*, Cambridge, MA: Ballinger Publishing Company, 1977.

(2) Host country characteristics include market size, political instability, geographical proximity, regional groupings, and a dummy variable for Japan.

- Market size is measured by Gross National Product (GNP). Data are from: World Bank, *World Development Report*, London, Oxford University Press, 1977.

- Political instability is indicated by index of performance gap (Chatterjee 1982). Data are from: UNESCO, *Statistical Yearbook*, Paris, 1977.

- Geographic proximity is measured by the air travel distance to the capital city of the host country from New York, San Francisco, or Houston, whichever is closest. We reversed the coding in the analysis. Data are from: IATA and International Aeradia, Ltd., *Air Distance Manual*, 6th ed., Switzerland, 1979.

- Regional groupings are two dummy variables for countries in the EEC (Belgium and Luxembourg, Denmark, France, Germany, Italy, United Kingdom, Ireland and the Netherlands) and ANCOM (Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela).

- JAP is a dummy variable, which represents the restrictions on foreign investment in two manufacturing industries: petroleum and coal products, and leather and leather products.

(3) Industry characteristics include average industry size, advertising intensity, technology intensity, concentration ratio, human resources, economies of scale, intensity of mergers and acquisitions, dummy variables for the tobacco industry and for natural resource-intensive industries, and labor intensity.

- Average industry size is the total industry assets divided by the number of firms in an industry. Data are from: Internal Revenue Service, *Statistics of Income 1975: Corporation Income Tax Returns*, Washington, D.C., 1979.

- Advertising intensity is the ratio of advertising expenses to total revenue. Data are from: *Statistics of Income 1975: Corporate Income Tax Returns*.

- Technology intensity is measured by research and development expenses as a percentage of net sales. Data are from: National Science Foundation, *Research and Development in Industry 1975*, Washington, D.C., 1977.

- Concentration ratio is the weighted average (weighted by shipments) of four-firm concentration ratio. Data are from: Bureau of the Census, *Concentration Ratio in Manufacturing Industries 1977*, Washington, D.C., 1981.

- Human resources are measured by the ratio of nonproduction workers to total workers. Data are from: Bureau of the Census, *Annual Survey of Manufactures 1975-1976*, Washington, D.C., 1979.

- Economies of scale is the size of a plant whose production level is at the

fiftieth percentile of industry output, as estimated from the employment size classes in the *Census of Manufactures*. This measure is similar to proxies used by Kwoka (1979). Data are from: Bureau of the Census, *1977 Census of Manufacturer*, Vol. 1, Washington, D.C., 1981.

- Intensity of mergers and acquisitions is the number of large manufacturing companies acquired as a percentage of total mergers and acquisitions between 1948-1978. Data are from: Bureau of Economics, *Statistical Report on Mergers and Acquisitions*, Washington, D.C., 1981.

- There is a dummy variable for five natural resource intensive industries: wood, paper, petroleum, non-metallic mineral products and basic metals.

- Labor intensity is measured by the ratio of labor cost to total revenue. Data are from: *Statistics of Income 1975: Corporation Income Tax Returns*.

(4) Industry experience includes country-specific experience and general international operations experience.

- Country-specific experience is the ratio of export to a country divided by total industry export. Because the U.S. government does not publish this data at the two-digit SIC level, data are estimated from United Nations publications. Data are from: United Nations, *1975 World Trade Annual*, N.Y.: Walker and Company, 1977.

- General international operations experience is total industry export as a percentage of its total output. Data are from: *Annual Survey of Manufactures 1975-1976*.