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DIRECT FOREIGN INVESTMENT IN THE UNITED STATES

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Abstract: Cross-section analysis of direct foreign investment in the United States provides some support for market structure and transaction cost explanations of DFI. A time series, country-by-country analysis suggests the importance of profitability differences and "animal spirits".

I. Introduction

The last decade has seen a considerable increase in foreign investment in the United States, and with it an increased interest in the determinants and consequences of direct foreign investment coming into the United States. There is a voluminous theoretical literature on the causes of foreign direct investment, but empirical studies of DFI have concentrated on U.S. direct investment in other economies.[1] While this might have been justified at a time when the quantitatively significant investment flows originated in the United States, that is surely no longer the case. Here I offer an empirical evidence on the determinants of direct foreign investment in the United States.

In section II, I review the literature on differences across industries in direct foreign investment. The main hypotheses are tested against a sample of 40 1977 U.S. industries. In section III, I analyze overall and country-by-country time series data for direct foreign investment in the United States. Section IV contains a few final remarks.

1. For references, see Pugel [1981], Lunn [1980, 1983], and Scaperlanda and Balough [1983].

II. Direct Foreign Investment at the Industry Level

Theory

It is useful to think of explanations for differences across industries in direct foreign investment as falling into three broad categories: those common to the theory of investment in general, those rooted in traditional industrial organization models of market structure, and those supplied by the theory of transactions cost. The latter two categories overlap substantially in terms of the factors which they indicate should affect direct foreign investment, but emphasize different aspects of the relationships.

It ought to be expected that investment in general will be greater in growing industries. Direct foreign investment, therefore, ought also to be greater, all else equal, the more rapid the growth of industry sales.[2]

Hymer's [1960] seminal dissertation viewed direct foreign investment through the lens of industrial organization.[3] Hymer's essential insight was that the international firm would arise as a vehicle for the exploitation of some unique, firm-specific asset. Caves [1971] suggests that such firm-specific assets will occur where products are differentiated, and argues that horizontal direct foreign investment will be promoted where products are differentiated either by advertising or research and development. Similarly, where products

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2. Scaperlanda and Mauer [1969, 1972]; Goldberg [1972]. They also suggest that DFI should be greater, all else equal, in larger industries. This hypothesis is not tested here, since I measure DFI as a fraction of industry size.

3. See Dunning and Rugman [1985] and Teece [1985] for assessments of Hymer's contribution.

are not differentiated, firms in concentrated markets may turn to direct foreign investment as a way of fully utilizing management capabilities without expanding output in the home market. High market concentration should also encourage backward vertical integration, as firms seek to secure supplies of essential raw materials. Where the essential raw materials are located abroad, high market concentration will encourage vertical direct foreign investment.

Holding constant the extent of firm-specific assets, economies of scale should encourage the centralization of production in a single location. Economies of large-scale production, therefore, should negatively affect direct foreign investment. The traditional position of industrial economics is that economies of scale constitute a barrier to entry. If this is the case, then imports as well as direct foreign investment should be less, where there are economies of large-scale production.

The transaction cost literature[4] also builds on Hymer's appropriation theory of direct foreign investment. Concentrating on multinational enterprise,[5] its particular contribution is to explain why a firm which wishes to exploit a rent-yielding asset in foreign markets chooses direct foreign investment over exporting or the licensing of agents in the foreign market.

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4. For recent surveys, see Galbraith and Kay [1986] and Teece [1986].

5. See Hennart [1982] and Hertner and Jones [1986] for specific discussions of multinational enterprise.

Thus transaction cost theory predicts that direct foreign investment will take place when a firm possesses some unique rent-yielding asset and problems of bounded rationality, information impactedness, and guile make it more efficient for the firm to exploit this asset through an internal governance structure than across markets.

Direct foreign investment, therefore, should be greater where firms engage in activities which produce firm-specific assets - research and development, advertising. Direct foreign investment should be less, all else equal, where firms engage in activities which produce country-specific assets, such as marketing networks (Galbraith and Kay [1986, p. 12]).

Empirical

Another - and obvious - explanation of foreign direct investment is that it occurs as a reaction to tariff and other barriers to trade. The difficulty is that such barriers are difficult to measure in a satisfactory way.[6] Rather than report results which depend on an inherently imperfect proxy for barriers to trade, I have preferred to make the assumption - perhaps more reasonable here than in other contexts - that it is reasonable to treat tariff and other trade barriers as uncorrelated with remaining explanatory variables.

6. For various proxies, see Scaperlanda and Mauer [1969], Goldberg [1972], Lunn [1980], and Scaperlanda and Balough [1983]. As Lunn [1980, p. 97] notes, none of these proxies are entirely satisfactory.

The Bureau of Economic Analysis [1985] reports information on businesses located in the United States in 1977 in which there is at least 10 per cent foreign ownership. From this data, I have calculated the fraction of sales in the United States resulting from direct foreign investment (DFISHR) for 40 U.S. manufacturing industries.[7] I have combined this information with data taken from the 1977 Input-Output Tables for the United States to estimate the fraction of U.S. output accounted for by imports (IMSHR). The residual USSHR = 1 - DFISHR - IMSHR gives the share of U.S. market output supplied by domestic firms.[8] Using these three dependent variables, it is possible to examine the impact of variables describing market and transactions cost characteristics on the distribution of sales between domestic suppliers, imports, and output from direct foreign investment.

In addition, the ratio DFISHR/(DFISHR + IMSHR) gives the share of output from direct foreign investment in total foreign-supplied output. This allows examination of the breakdown of foreign activities between imports and direct foreign investment.

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7. For the most part, the industries are defined at the 2- or 3-digit SIC level. Similar samples are commonly used to study outgoing U.S. direct foreign investment.

8. An implication is that if any two share equations are estimated, the third can be recovered by subtraction. Estimates obtained do not depend on which two equations are estimated.

Three of the explanatory variables are taken from the 1977 Census of Manufactures.[9] The four-firm seller concentration ratio (CR4) is a measure of domestic sales concentration. It should have a positive effect on direct foreign investment and a negative effect on the share of sales by domestic firms. A common result of empirical studies of profitability and price-cost margins is that such variables are less, holding the level of concentration constant, the greater the share of output supplied by imports. This suggests that imports are attracted to concentrated markets by the possibility of nibbling away at economic profits. If this is the case, one should expect import share to be larger, all else equal, in concentrated markets.

To describe differences across industries in the relative advantage of large-scale operations, I employ a relative productivity index (RP14). This is defined as value-added per worker in the largest four firms in an industry, divided by industry-average value-added per worker.[10] The more is RP14 above one, the greater are the productivity advantages of production in large-scale plants. Larger values of RP14 should increase the share of output supplied by domestic firms, and reduce both categories of foreign supply.

Entry should be easier in rapidly growing markets. From the 1977 Input-Output Tables for the United States, I calculate the real growth rate of sales from 1972 to 1977 (GR). DFISHR and DFISHR/(DFISHR + IMSHR) should be greater, the greater is GR.

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9. The explanatory variables I use are weighted averages of the values calculated for component 4-digit SIC industries, with weights given by sales.

10. For further discussion, see Martin [1988].

As noted by Teece [1986, p. 35], it is difficult to directly measure the importance of the kinds of unique firm-specific assets which are thought to encourage foreign trade. For this reason, empirical studies have employed proxies which can be measured: expenditures on activities thought likely to generate such assets. Three such explanatory variables are taken from the Federal Trade Commission's 1977 Annual Line of Business Report. The advertising-sales ratio, ASR is the industry-average ratio of spending on advertising to sales. Advertising should have a positive impact on DFISHR and a negative impact on USSHR.

OSR is the industry-average ratio of nonadvertising sales efforts to sales.[11] Such investments in marketing and distribution create a country-specific asset. OSR should have a negative impact on DFISHR and on DFISHR/(DFISHR + IMSHR), and a positive impact on USSHR.

RDSR is the industry-average ratio of company-financed spending on research and development to sales. Where RDSR is large, the indication is that firms in the industry invest in activities which produce distinct products or processes - firm specific assets. USSHR should be less, and DFISHR more, the greater RDSR.

Results of the cross-section estimation are shown in Table 1. They are generally as expected. USSHR is clearly less in concentrated industries where firms advertise heavily, and greater if there are economies of large-scale production. The share of output from direct foreign investment is larger in concentrated, growing industries where

11. For further discussion, see Weiss, Pascoe, and Martin [1983].

firms advertise heavily, and less where firms invest in non-advertising sales efforts. Imports are greater in concentrated industries, and less where economies of large scale are important. DFISHR has a larger share of total foreign supply in growing markets where advertising is important, and a smaller share of total foreign supply where firms invest in non-advertising sales efforts.

Table 1: Cross-Section Regressions

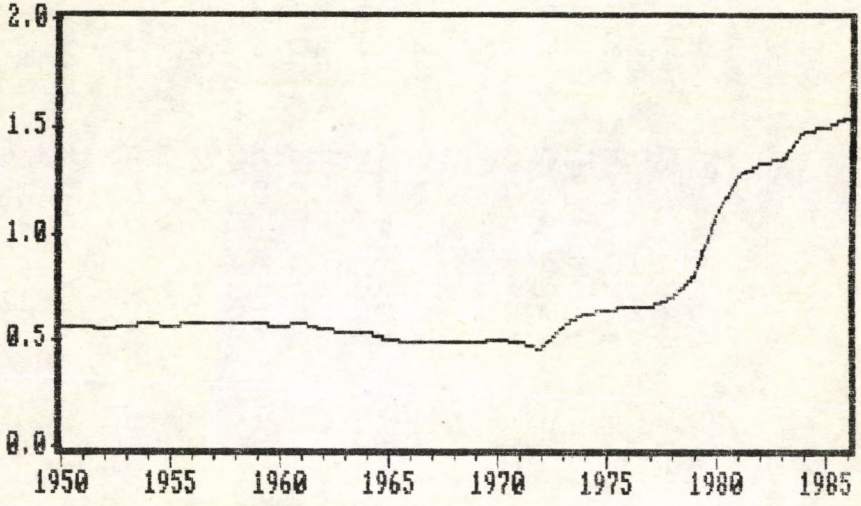
	USSHR	DFISHR	IMSHR	$\frac{\text{DFISHR}}{\text{DFISHR + IMSHR}}$
C	0.7153	0.0477	0.2370	-0.0010
	(5.1109)	(0.6590)	(2.9578)	(0.0039)
CR4	-0.3048	0.1087	0.1962	-0.3059
	(2.2387)	(1.5417)	(2.5166)	(1.1872)
RP14	0.2403	-0.0496	-0.1907	0.3432
	(2.1701)	(0.8661)	(3.0079)	(1.6374)
GR	-0.0932	0.1154	-0.0223	0.4527
	(0.7136)	(1.7082)	(0.2980)	(1.8323)
ASR	-2.0140	1.4582	0.5557	4.3491
	(1.8710)	(2.6170)	(0.9019)	(2.1350)
OSR	0.2714	-0.4003	0.1289	-1.8112
	(0.5851)	(1.6674)	(0.4856)	(2.0634)
RDSR	-0.1354	0.2860	-0.1506	1.5054
	(0.1075)	(0.4389)	(0.2090)	(0.6319)
R^2	0.2909	0.2978	0.3349	0.3087

T-statistics in parentheses.

These results are all as predicted by the investment, industrial organization, and transactions cost theories of direct foreign investment. Equally interesting is the one consistently negative result in Table 1, which hints at a fundamental difference between direct foreign investment in the U.S. and direct foreign investment

originating in the U.S. Spending on research and development has no significant effect on any of the dependent variables examined in Table 1. This result contrasts with those of studies of outgoing U.S. direct foreign investment.[12] Research and development appears to create assets which allow U.S. firms to operate overseas, but the converse is not the case.

Figure 1: DFI Percentage Share of U.S. Corporate Assets



12. See, for example, Pugel [1981], who measures R&D activity by the share of scientists and engineers in industry employment.

Table 2: Time Series Regressions

Dependent Variable: Country's DFI in U.S. as a fraction of corporate assets in all U.S. industries

Variable	Total	Canada	France	Germany	Japan	Netherlands	Switzerland	UK
C	0.0502	0.0530	-0.0234	-0.0829	-0.0503	0.0043	-0.0003	0.0465
	(1.0866)	(1.0387)	(1.9716)	(16.2764)	(3.3370)	(0.2351)	(0.0256)	(1.0064)
D79	0.1654	0.0271	-0.0004	-0.0014	-0.0079	0.0289	0.0137	0.0029
	(3.6697)	(2.3004)	(0.1136)	(0.8194)	(0.9830)	(2.0672)	(3.6360)	(0.2436)
MBS	-0.0105	-0.0554	0.1177	0.0964	-0.0200	0.1095	0.1265	-0.0580
	(0.5805)	(2.4247)	(2.8048)	(11.7282)	(1.5962)	(1.0268)	(2.1058)	(1.3833)
GNPGR	-0.0009	-0.0004	0.0007	0.0016	0.0018	0.0009	-0.0005	-0.0027
	(0.3208)	(0.4101)	(1.4157)	(6.5280)	(3.1472)	(0.9674)	(2.1236)	(3.6392)
RUSI	0.0121	0.0192	0.0026	0.0014	0.0065	0.0177	-0.0017	0.0111
	(1.5502)	(2.3639)	(2.1664)	(1.9333)	(3.9041)	(3.3514)	(1.8161)	(3.6099)
USPI	0.0128	0.0191	0.0046	-0.0004	0.0052	0.0184	-0.0020	0.0110
	(2.1899)	(2.3077)	(3.9062)	(0.9049)	(4.4808)	(3.4625)	(1.9510)	(3.7363)
RFI		-0.0199	0.0019	0.0044	0.0018	-0.0102	0.0039	-0.0085
		(2.7173)	(0.7879)	(3.8411)	(1.1875)	(2.2149)	(2.4306)	(3.4606)
FPI		-0.0196	0.0014	0.0021	0.0017	-0.0102	0.0029	-0.0079
		(2.6350)	(1.7735)	(3.7654)	(1.3534)	(2.2285)	(1.9764)	(3.7791)
Ex Rate		0.0374	-0.0606	0.1456	1.8437	0.0637	0.0192	-0.0042
		(0.7714)	(1.2441)	(19.9801)	(0.5136)	(1.1706)	(1.2107)	(0.4199)
SHR(-1)	0.7948	0.5034	0.5449	0.8656	0.9170	0.4625	0.9096	0.8469
	(12.1834)	(3.6312)	(1.6391)	(17.2966)	(8.3421)	(3.5134)	(5.5216)	(10.8826)
R^2	0.9845	0.8579	0.9988	0.9999	0.9915	0.9836	0.8980	0.9798
Sample	1951-1985	1951-1985	1974-1985	1974-1985	1960-1985	1951-1985	1951-1985	1951-1985

III. Time-series

Figure 1 shows foreign ownership of U.S. equity and debt, as a fraction of all U.S. corporate assets, over the period 1950-1986.[13] I have used a lagged adjustment model to test the impact of various factors on the adjustment of direct foreign investment over time.[14] Table 2 reports analysis of the time series illustrated in Figure 1 and the component time series for six countries.

Examination of Figure 1 suggests discontinuous shifts in roughly 1973 and 1979 - the years of the first and second OPEC oil crises. In preliminary investigations, a dummy variable taking the value one in and after 1973, and zero otherwise, proved to have a statistically insignificant coefficient. These results are not reported here. As shown in Table 2, a dummy variable keyed on 1979 (D79) has a significant effect on overall direct foreign investment and on direct foreign investment from three parent countries.[15]

13. The source for the value of foreign ownership is Bureau of the Census [1975], supplemented by various issues of the Survey of Current Business. The source of corporate assets is the Internal Revenue Service Sourcebook of Statistics of Income, various issues.

14. For an equivalent specification, see Lunn [1980]. Lagged-adjustment models are commonly used to investigate changes in market concentration; for recent discussion, see Geroski, Masson, and Shaanan [1987].

15. In regressions not reported here, I examined the impact of average U.S. tariff rates on DFI flows over time. Tariff rates fell continuously over the time period we examine, while DFI shares increased. The tariff variable acted as an inverse time trend variable, with a negative coefficient.

I measure the overall and country-by-country merchandise trade balance[16] as imports minus exports as a fraction of U.S. gross national product. The greater the merchandise trade deficit, the more likely that imports will evoke political resentment and induce tariffs, quotas, or other trade barriers. Firms which wish to avoid such barriers will have an incentive to engage in direct foreign investment before barriers are imposed, and in this case the coefficient of MBS will be positive.[17] This expectation is confirmed for France, Germany, and Switzerland, but a significant negative sign results for Canada.[18]

The growth rate of gross national product (GNPGR) has no significant effect on overall DFI share. This is not surprising, as GNPGR has a significant positive effect on direct foreign investment from Germany and Japan, and a significant negative effect on direct foreign investment from Switzerland and the United Kingdom.

Direct foreign investment in the United States should be greater, the greater the rate of return available in the United States and the smaller the rate of return available in the home market. I test whether real or nominal rates of return influence international investment flows by including both the real rate of return (RUSI) and

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16. The source for the merchandise trade balance is the Statistical Abstract of the United States.

17. Values of MBS are lagged, one year for Canada and two years for all other regressions.

18. Note that the results for France and Germany reflect only twelve observations.

the rate of inflation (USPI) as explanatory variables. If these variables have the same coefficient, it is nominal interest rates which influence investment.[19]

The real U.S. interest rate and the U.S. rate of inflation have essentially the same coefficient for six of the eight regressions reported in Table 2. Real foreign interest rates (RFI) and rates of inflation (FPI) have essentially the same coefficient for four of the seven regressions in which these variables appear. This is strong evidence that investment flows respond to nominal interest rates.[20]

The real U.S. interest rate has the expected positive coefficient for every regression except Switzerland. Results for the real foreign interest rate are less clear-cut. The coefficient is negative, as expected, for Canada, the Netherlands, and the United Kingdom.

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19. The rate of inflation is computed from annual changes in the consumer price index, taken from the International Monetary Fund's International Financial Statistics, various issues. Nominal interest rates are long-term government or private sector bond rates, and the real rate of interest is computed as the difference between the nominal interest rate and the rate of inflation.

20. This result is not without theoretical foundation. If the alternative to investment is cash, than the difference between the rates of return is the real rate of return less the rate of return to cash. As the rate of return to cash is the negative of the rate of inflation, the difference between the rate of return on investment and the rate of return on cash is the nominal rate of return.

Coefficients of RFI for Germany and Switzerland are unexpectedly positive and statistically significant. An after-the-fact explanation for this result may be that the interest rate series used for Germany and Switzerland reflect the ease with which firms based in those countries can raise funds for investment, rather than the opportunity cost of direct foreign investment.

I also examine the impact of exchange rates - measured in dollars per unit of foreign currency - on direct foreign investment.[21] The more dollars a unit of foreign currency will buy, the better bargain is investment in the United States. The coefficient of Ex Rate in the DFI equations should therefore be positive. In Table 2, Ex Rate has a significant coefficient only for Germany; the coefficient is positive, as expected.

If the lagged adjustment process is stable, the coefficient of lagged share will be less than one in absolute value. The adjustment processes implied by the estimates of Table 2 are stable.

21. The source for exchange rates is the International Monetary Fund's International Financial Statistics, various issues.

IV. Conclusion

The cross-section analysis presented here confirms the importance of market structure (concentration and scale economies) and transaction costs in determining the extent of direct foreign investment in the United States. Research and development, which appears to be an important determinant of outgoing U.S. direct foreign investment, does not seem to significantly affect incoming direct foreign investment.

The time-series analysis presented here suggests the importance of protectionism and profitability differences in explaining changes in direct foreign investment over time. Exchange rate fluctuations do not appear to generally significant, with the exception of West German direct foreign investment in the United States. In addition, there is some evidence of the importance of "animal spirits" (the 1979 dummy variable) as well.

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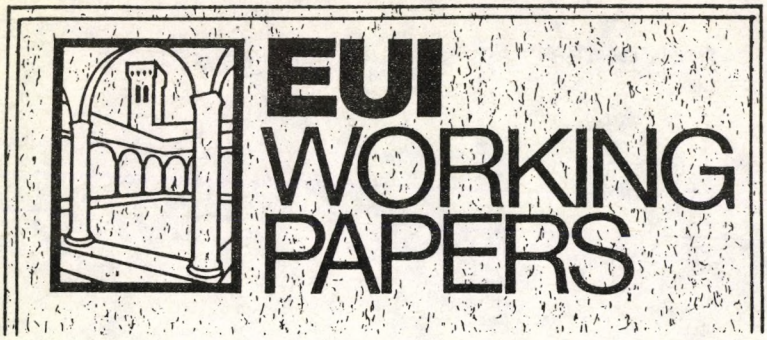

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