The regional clustering of foreign direct investment and trade

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Are intense trade partners also intense partners in foreign direct investment? This article shows that foreign direct investment clusters, like international trade clusters, are regionally based. But investment is less strongly clustered than trade: intense regional ties (e.g., within North America or Europe) tend to be spearheaded by trade, and more distant relationships by investment. This finding is consistent with several theoretical explanations; but on the whole it suggests that foreign direct investment is an especially important channel for bridging regional blocs.

Introduction

The recent surge of interest in regional economic integration has focused considerable attention on geographical trade patterns. Trade linkages in the western hemisphere, Pacific rim and Western Europe have come under particular scrutiny, as indicators of possible natural blocs (Frankel, 1993; Petri, 1993; Kreinin and Plummer, 1992). Since integration is most likely to be welfare-creating among countries that are close trading partners even without preferential agreements (Krugman, 1991), the literature has focused on the historical intensity of intraregional (relative to extraregional) trade relationships.

Surprisingly, foreign direct investment (FDI) has been largely ignored in the literature. Yet, linkages through FDI are important: the sales of foreign-owned firms exceed the sales of internationally traded products. In East Asia, investment linkages are playing a central role in the development of regionally integrated production systems (Petri, 1994). Investment-facilitating measures are often prominent in regional integration schemes; for example, FDI was a key issue in the North American Free Trade Agreement

(NAFTA) and is also likely to be the first issue addressed by the Asia Pacific Economic Cooperation (APEC) forum.

Economic integration through FDI involves various benefits and risks, as does integration through trade. In areas in which technology or other firm-specific advantages are difficult to sell through markets, FDI helps to diffuse the most productive technologies throughout a region. Indeed, there may be no feasible alternatives to integration through investment in the case of goods and (especially) services unless subject to large transport costs. Even if trade is an alternative, investment could reduce the welfare cost of both natural and policy barriers on trade and offer a more efficient vehicle for integration.

However, the preferential liberalization of investment barriers (towards regional partners), similarly to preferential trade liberalization, can distort patterns of efficient exchange and specialization. A regional investment agreement could induce investments to be diverted from extraregional companies to less efficient regional companies. It could even induce extraregional trade to be diverted into intraregional investment. These possibilities will vary with the potential regional grouping and will depend in part on how important investment relations among the regional partners were before the preferential agreements.

Thus, in judging the implications of a possible regional grouping, it is important to know to what extent the countries included are close investment, as well as trade, partners. If investment and trade relationships overlap, then both types of linkages will suggest the same regional alignment and make economic integration more desirable. If they do not, then conflicting investment and trade linkages will favour different regional alignments and raise doubts about the benefits of any particular bloc. Since the theoretical relationship between FDI and international trade is ambiguous, the question whether investment and trade patterns overlap needs to be answered empirically. The improved availability of FDI data is now making such answers possible. For example, it has been recently demonstrated that FDI patterns exhibit considerable geographical clustering (UNCTC, 1991; UN-TCMD, 1992). Foreign direct investment from regional source countries tends to account for a larger share of regional FDI than outside investors and, in many cases, dominates investment inflows of host countries within a region. Few countries have relatively equal investments from more than one triad member (the United States, the European Union and Japan), or substantial investment from non-triad countries. Further, the host countries grouped around

each triad investor also tend to be linked to the same triad partner through trade (Gold, Economou and Tolentino, 1991).

This article specifically examines the similarities and differences of FDI and trade clusters. It compares the concentrations of FDI outflows and inflows and trade. It also compares the geographical distributions of FDI and trade relationships. The questions asked include: are FDI and trade transactions especially intense among geographical neighbours? For any given country, are the relative intensities of investment and trading relationships correlated across different foreign partners? Is FDI more likely to be intraregional than trade, or vice versa? The answers reveal clear similarities between FDI and trade, as well as intriguing differences.

Theoretical linkages between foreign direct investment and trade

Several factors account for differences and similarities in the international patterns of FDI and trade. Differences in the underlying logic of FDI and trade flows, as reflected in the structures of the theories used to explain them, suggest ways in which investment and trade patterns are likely to differ. But other factors suggest similarities: both flows are sensitive to common determinants, such as international transactions costs. Finally, investment and trade may be structurally related, leading to either differences or similarities. Some of these theoretical possibilities are examined below.

Contemporary theory suggests clear differences in patterns of FDI and trade flows. The theory of trade (principally comparative advantage, extended to include conditions of economies of scale) predicts that nearly all countries will have (relatively) significant exports and imports, since every country has a comparative advantage in something, and since smaller countries are especially likely to be specialized. This general conclusion holds whether a country's advantage is endowment based (as in the Heckscher-Ohlin theory) or results from concentrating on the large-scale production of specific varieties of products (as in the so-called "new" theories).

By contrast, theories of FDI predict more concentration in the distribution of FDI across countries and less symmetry between FDI inflows and outflows. Foreign direct investment is a marriage of an investor's firm-specific advantages with a host country's site-specific advantages (Hymer, 1960; Agarwal, 1980; Dunning, 1988) and occurs when these advantages cannot be transferred to other firms through market mechanisms (that is,

when they have to be internalized, perhaps because of market failure). Since firm-specific advantages often depend on technology or experience, investing firms most likely originate in advanced or large economies. Although site-specific advantages (ranging from low-wage labour to lucrative markets) are probably more widely distributed, there is no theory that guarantees an advantage (such as the theory of comparative advantage in the case of trade) for every potential investment site.

An important factor pulling in the opposite direction—towards greater similarity in the distribution of investment and trade—is that both flows are affected by international transaction costs. Since there are substantial additional costs involved in managing an affiliate abroad, investments tend to favour locations where these costs are relatively low. Although transaction costs have been largely ignored in trade theory,[1] the great stability of regional trade patterns suggests that transaction costs also play an important role in determining the direction (and probably also commodity composition) of trade.

To be sure, investment and trade flows may involve different types of transaction costs. Trade requires cheap transport; investment requires relative ease of operation in a foreign environment. But some of the most important costs facing investors and traders are similar: both transactions require familiarity with foreign economic institutions, business practices, firms' reputations and competitive conditions. The costs of assembling and maintaining this knowledge base on specific partners probably dominate other types of transaction costs.

Empirical studies have typically proxied transaction costs with indicators of physical distance (Linneman, 1966) and cultural distance (Kogut and Singh, 1988). Physical distance has proved to be an especially powerful explanatory factor of bilateral trade patterns. This is somewhat puzzling, since transportation costs are small compared with international cost differentials, and they are only marginally affected by distance. It is therefore likely that physical distance is at least partly a proxy for the information costs of doing business abroad, including knowledge of the partner's culture and economy.

The similarity of investment and trade distributions could be also the result of direct connections between them. The causation may run from in-

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[1] Because transport costs are assumed to be negligible, the international pattern of trade is indeterminate in the Heckscher-Ohlin model in the standard case with more products than factors (Leontief, 1973).

vestment to trade, when a foreign project gives rise to new exports from the home economy, or from trade to investment, when exports require the establishment of related services or other facilities abroad (Katseli, 1992). Investment and trade may be also substitutes for each other, since they are alternative ways for selling products based on firm-specific advantages to a foreign customer.

The sign of the trade-investment relationship thus varies with the objective motivating the investment:

- *Market-oriented* investments are attracted by the site-specific advantages of a market that may derive from buyer characteristics (such as wealth), or from natural or policy barriers that protect local producers.

- *Production-oriented* investments are attracted to low-cost production sites. A site's advantage may be due to a plentiful resource, low wages or incentives, among other things.

- *Trade-facilitating* investments are motivated by the need to provide services (after-sales service, finance etc.) to exporting activities. While market-oriented FDI tends to substitute for trade, production-oriented and trade-facilitating FDI tend to increase trade.

In sum, theories of FDI and trade offer varied predictions for the empirical relationship between these flows. The next sections examine those relationships with some discussion of possible theoretical causes.

Concentration of world foreign direct investment and trade

As with most economic variables, world trade and FDI are dominated by the large industrial economies of Europe, North America and Japan. A closer analysis, however, reveals that other economies often rely more intensively on FDI and trade than the world's largest economies and that there are substantial differences in the ranking of key world players in terms of FDI compared with trade.

Table 1 shows the ten top-ranking countries in world trade and FDI, in terms of both the overall volume and relative intensity of flows. While investment outflows and inflows are separately shown, trade is treated as a single variable (the sum of imports and exports) because there are only minor differences between the geographical distributions of total import and export flows. When ranked by volume, both the investment and trade lists are dominated by the world's largest economies. Thus, all of the Group of Seven

Table 1. Top-ranking investing and trading countries, 1990

(Billions of dollars and percentage)

Volume rank		Intensity/gross domestic product rank	
Economy	Billion dollars	Economy	World average
FDI outflows			
Japan	172.8	Netherlands	3.37
United Kingdom	162	Sweden	3.24
United States	159.2	United Kingdom	2.89
France	87.7	Switzerland	2.42
Germany	76.6	Belgium	2.03
Netherlands	54.1	Finland	1.54
Sweden	42.5	Norway	1.31
Switzerland	31.3	Australia	1.29
Canada	30.1	France	1.28
Italy	23.4	Kuwait	1.11
Number of G7:	7	Number of G7:	2
FDI inflows			
United States	371.8	Singapore	14.86
United Kingdom	132.2	Egypt	6.09
France	54	Malaysia	6.04
Spain	47.7	Hong Kong	4.13
Australia	40.6	Guatemala	3.45
Netherlands	37.9	Belgium	3.3
Belgium	31.1	Tunisia	2.99
Italy	25.5	Costa Rica	2.9
Singapore	25.2	Nigeria	2.86
Mexico	21	Australia	2.79
Number of G7:	4	Number of G7:	0
Trade flows (imports plus exports)			
United States	887.1	Singapore	11.75
Germany	739.2	Hong Kong	6.71
Japan	518	Malaysia	4.96
France	442	Belgium	4.43
United Kingdom	410.8	Ireland	3.76
Italy	344.7	Netherlands	3.31
Netherlands	257.4	former Czechoslovakia	3.05
Canada	240.9	Tunisia	2.9
Belgium	237.7	Portugal	2.64
Spain	143.1	Thailand	2.51
Number of G7:	7	Number of G7:	0

Source: UNCTAD-DTCI, 1993.

countries appear among the ten largest outward investors and the ten largest traders. The Group of Seven group is less prominent as a destination for FDI, but even here the top-ten list includes four Group of Seven countries.

The list of investors ranked by intensity (that is, ratios of investment and trade to gross domestic product) is dominated by the richest countries. In figure 1, the horizontal axis measures percentiles of world population by gross domestic product per capita. The individual curves of figure 1 show the percentage of several economic measures controlled by various population percentiles. The top 15 per cent of the world's population (ranked by income) accounted for approximately 75 per cent of world gross domestic product and 80 per cent of FDI outflows.

But the most striking common characteristic of the world's most intense investors (table 1) is a long colonial history (Belgium, France, Netherlands and the United Kingdom). The United States and Japan are not among the top ten when ranked by investment intensity; evidently, firm-specific advantages derive as much from an accumulated knowledge of foreign business opportunities and practices as technology (Davidson, 1980; Dunning, 1981).

The wealthiest 15 per cent of the world's population accounted for 65 per cent of trade and 60 per cent of FDI inflows—both well below their share of gross domestic product. The most intense investment and trade destinations tend to be small, medium-income open economies such as Hong Kong, Malaysia and Singapore. This is consistent with trade theory; small economies benefit especially from specialization.

But why are these small economies top investment destinations? Their domestic markets and resource base—except for labour—are too limited to provide significant site-specific advantages. These must derive, at least partly, from historical and political factors. Long experience with FDI may have lowered the cost of operating businesses in these economies. Also, their commitment to policies favourable to foreign investors may be unusually credible given their investment and trade dependence.

The asymmetry between FDI outflows and inflows is consistent with the theoretical expectations outlined earlier. Since FDI requires firm- and site-specific advantages, it is undertaken by home economies with unique strengths, including state-of-the-art technology and/or extensive FDI experience. Foreign-direct-investment inflows are not confined to advanced countries and show greater variability worldwide. Some developing countries are

Figure 1. Distribution of foreign-direct-investment flows and trade
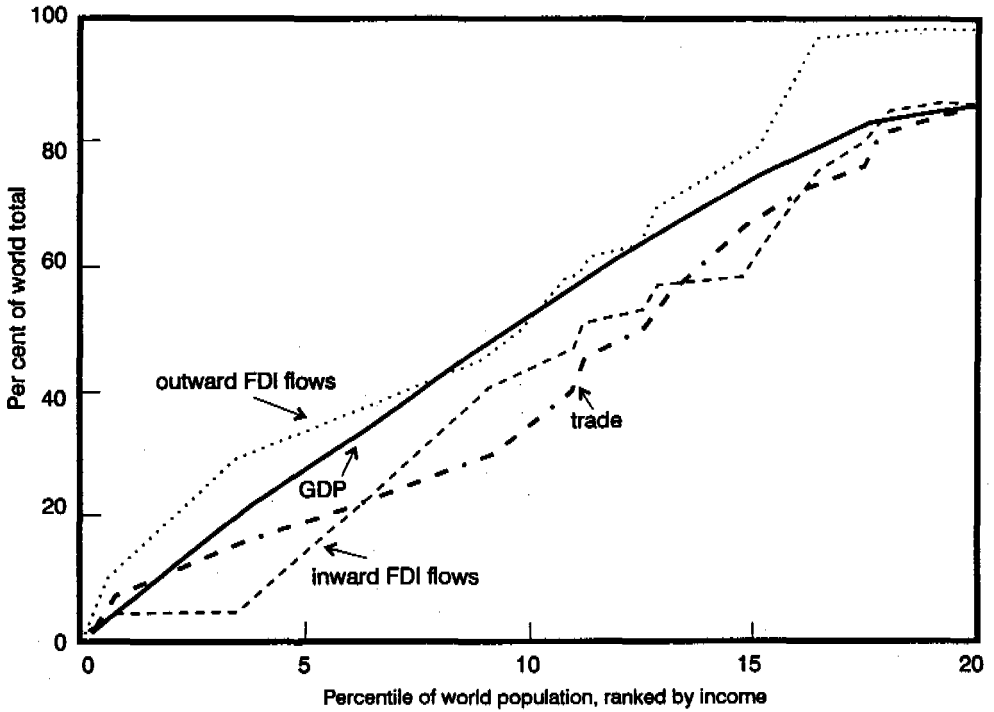
surprisingly attractive investment destinations despite limited resources and markets, while other countries, potentially more promising, do not receive significant inflows.

Regional patterns of foreign direct investment and trade

The distribution of investment and trade flows across partners is dominated by geography: countries undertake a disproportionate share of their investment and trading relationships with their regional partners (tables 2 and 3).[2] Canada, for example, conducted most of its FDI (71 per cent) and trade (73 per cent) with the western hemisphere (North America and Latin America). Similarly, Italy's FDI (74 per cent) and trade (85 per cent) went primarily to Europe's sphere of influence (Europe, Africa and West Asia). Intraregional shares of FDI and trade are not quite as high in East Asia as in Europe and North America, but they are still a significant share of the region's overall investment and trade.

All ten countries examined in this study have a larger share of their FDI and trade with regional partners compared with the overall share of these partners in world FDI and trade. This type of comparison is formalized by the *intensity index* of a particular investment or trade relationship. This measure (also called the gravity index) is defined as the ratio of the share of partner b in the investment of country a or trade to the share of b in all world investment or trade, excluding country a.[3] Algebraically:

(1) $q_{ab} = (I_{ab}/I_{a*})/[I_{*b}/(I_{**}-I_{*a})]$

where q_{ab} = intensity of a's investment in, or trade with b

I_{ab} = investment by a (home) in partner b (host), or trade between a and b

* = summation across all partners (world).

Such indexes can be calculated for inward or outward FDI, as well as exports or imports.

Intensity measures for both investment and trade demonstrate the regional clustering of these linkages (tables 4 and 5). For example, Canada's

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Table 2. Shares of outward foreign-direct-investment stock of 10 major investor countries, by host region, 1990

(Percentage)

Investor country/region	North America	Latin America	Europe	Africa	West Asia	South Asia	East Asia[a]	World[b]
Canada	61	10	21	0	0	0	7	100
United States	17	18	48	1	1	0	15	100
North America	24	16	44	1	1	0	14	100
France	33	3	59	1	2	0	2	100
Germany	28	6	59	2	0	0	5	100
Italy	11	12	69	1	4	0	3	100
Netherlands	29	6	53	1	0	4	7	100
Sweden	20	3	77	0	0	0	0	100
United Kingdom	47	7	27	4	0	0	15	100
Europe	34	6	49	2	1	1	8	100
Australia	23	8	39	0	0	0	29	100
Japan	44	13	19	2	1	0	21	100
East Asia	42	13	21	2	1	0	22	100
Ten-country total	32	11	41	2	1	0	13	100

Source: UNCTAD-DTCI, 1993.   [a] Including, also, South-East Asia and the Pacific.   [b] Including only the 10 countries shown.

Table 3. Shares of two-way trade (exports plus imports) of 10 major investor countries, by partner region, 1990

(Percentage)

Investor country/region	North America	Latin America	Europe	Africa	West Asia	South Asia	East Asia[a]	World[b]
Canada	70	3	12	1	1	0	12	100
United States	19	13	25	3	4	1	35	100
North America	30	11	22	2	3	1	30	100
France	8	3	71	6	3	1	8	100
Germany	8	2	74	3	3	1	10	100
Italy	7	2	75	6	4	1	7	100
Netherlands	6	2	76	2	3	0	5	100
Sweden	10	2	76	1	2	1	9	100
United Kingdom	14	2	64	3	4	1	11	100
Europe	9	2	72	4	3	1	9	100
Australia	20	1	22	1	4	1	49	100
Japan	31	4	21	2	8	1	33	100
East Asia	29	3	21	2	7	1	35	100
Ten-country total	18	5	51	3	4	1	19	100

Source: UNCTAD-DTCI, 1993. [a] Including, also, South-East Asia and the Pacific. [b] Including only the 10 countries shown.

Table 4. Intensity ratios for foreign direct investment of 10 major investor countries, by host region, 1990

(Percentage)

	Host region[a]						
	North America	Latin America	Europe	Africa	West Asia	South Asia	East Asia[b]
Canada	2.23	0.8	0.49	0.13	0.14	0.2	0.33
United States	1.99	1.15	0.88	0.53	0.94	0.32	0.84
North America	1.97	1.12	0.84	0.49	0.85	0.32	0.80
France	1	0.23	1.56	0.33	2.55	0	0.14
Germany	0.82	0.52	1.55	1	0.16	0.46	0.38
Italy	0.33	1.04	1.76	0.66	4.11	0	0.26
Netherlands	0.86	0.54	1.42	0.54	0	7.97	0.48
Sweden	0.61	0.31	1.9	0	0	0	0.00
United Kingdom	1.32	0.56	0.79	2.11	0.31	0.72	1.01
Europe	0.98	0.53	1.32	1.16	0.79	1.77	0.56
Australia	0.7	0.68	0.93	0.17	0	0	3.06
Japan	1.34	1.13	0.46	1.2	1.23	0.31	1.83
East Asia	1.28	1.09	0.5	1.1	1.12	0.28	1.94

Source: UNCTAD-DTCI, 1993.

[a] Intensity ratio: the share of the host region in outward-investment stock of a given country, divided by the share of the host region in worldwide FDI stock excluding the FDI stock in the investor country.

[b] Including South-East Asia and the Pacific.

Table 5. Intensity ratios for two-way trade (exports plus imports) of 10 major investor countries, by partner country/region, 1990

(Percentage)

Investor country/region	Partner region[a]						
	North America	Latin America	Europe	Africa	West Asia	South Asia	East Asia[b]
Canada	4.90	0.78	0.23	0.35	0.38	0.31	0.54
United States	4.43	3.64	0.41	1.07	1.59	0.89	1.38
North America	5.52	3.08	0.38	0.93	1.35	0.78	1.22
France	0.42	0.76	1.46	2.57	1.4	0.53	0.33
Germany	0.39	0.64	1.6	1.06	1.2	0.58	0.40
Italy	0.4	0.71	1.52	2.61	1.85	0.56	0.30
Netherlands	0.33	0.52	1.51	1	1.44	0.36	0.24
Sweden	0.54	0.59	1.48	0.46	0.86	0.54	0.40
United Kingdom	0.73	0.51	1.31	1.21	1.68	1.16	0.49
Europe	0.46	0.63	1.49	1.56	1.43	0.65	0.37
Australia	1.15	0.37	0.42	0.42	1.76	1.34	2.36
Japan	1.6	1.08	0.38	0.72	3.54	1.13	2.25
East Asia	1.55	0.99	0.38	0.68	3.32	1.16	2.26

Source: UNCTAD-DTCI, 1993.

[a] Intensity ratio: the share of the partner region in the total of a given country, divided by the share of the partner region in worldwide trade, excluding trade with the given country.

[b] Including, also, South-East Asia and the Pacific.

close investment relations with North America are highlighted by an intensity coefficient of 2.23 (the ratio of the share of Canada's FDI in North America to North America's share of global FDI; table 4).[4] Intraregional investment intensities are generally high: 1.97 for North America and 1.94 for East Asia. Europe's most intense relations are with South Asia (probably because that region has received little FDI from elsewhere), but Europe's intraregional investment intensity of 1.32 is not far behind. Similarly, intraregional trade intensities also tend to be high for every region (table 5).[5]

The relationship between investment and trade intensities (across various pairs of regions) is plotted in figure 2. Here, a logarithmic transformation of intensity is used:

(2) $$q_{ab}' = \log(q_{ab})$$

where q_{ab}' = logarithmic measure of intensity of a's
investment in, or trade with, b.

This measure is distributed around zero: average intensity (the case when a partner's share in a country's investment or trade equals the partner's global share) appears as 0; above- (below-) average intensity appears as a positive (negative) value.
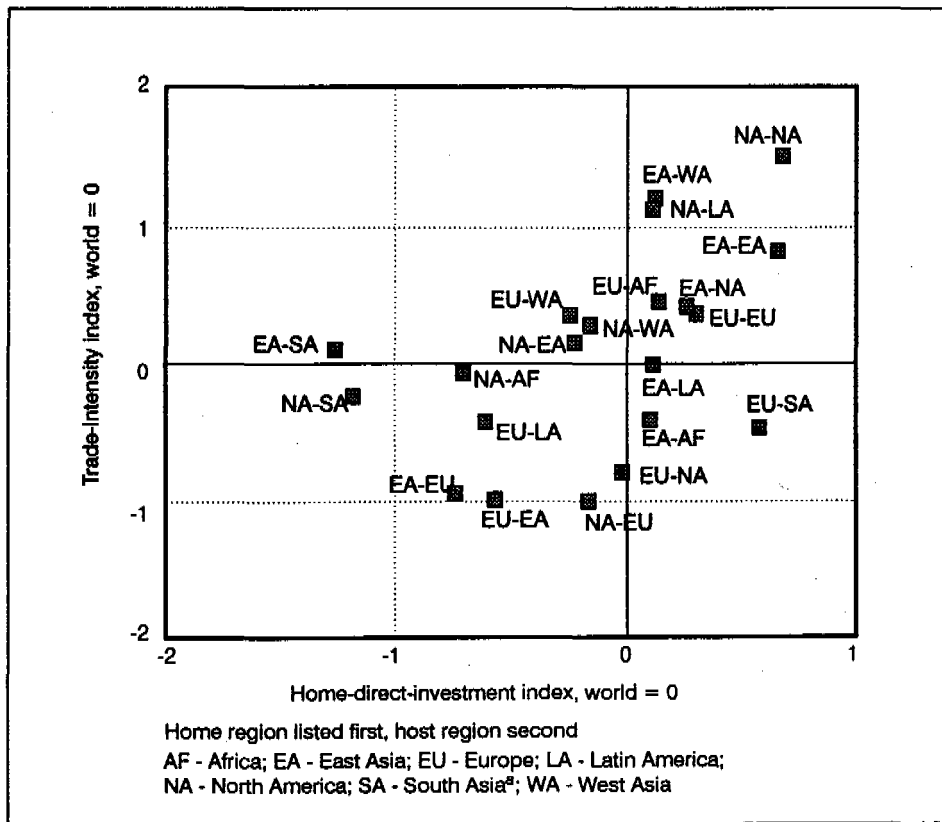
Investment and trade intensities are positively associated (figure 2). As already noted, the highest intensities—those that appear in the north-east quadrant of the diagram—are generally intraregional. In addition to these intraregional linkages, North America has a relatively strong relationship with Latin America and, to a lesser extent, South and East Asia (figure 3). Europe is closely linked to Africa, and somewhat to West Asia (through oil trade) and South and East Asia (through FDI; figure 4). Finally, South and East Asia have above-average linkages with North America and West Asia through trade (figure 5).

An intriguing pattern emerges from figures 3-5: a region's strongest (and typically intraregional) linkages tend to be led by *trade* rather than FDI. In other words, the difference between the intensities of intraregional and extraregional trade is usually greater than the difference between the intensities of intraregional and extraregional FDI. Trade linkages are more intense than FDI linkages, not just for intraregional relationships, but also for close inter-

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[4] "Worldwide" here means merely the sum of the 10 most prominent investing countries. As noted earlier, these countries account for 88 per cent of global FDI.

[5] The analysis is conducted for two-way trade (exports plus imports) because regional patterns of export and import intensities tend to be similar.

Figure 2. The relationship between foreign-direct-investment and trade intensity

Figure 3. Foreign-direct-investment and trade intensities, logarithmic measures, North America, Europe and East Asia[a]

North American foreign-direct-investment and trade intensities

European foreign-direct-investment and trade intensities

East-Asian foreign-direct-investment and trade intensities

FDI intensity   Trade intensity
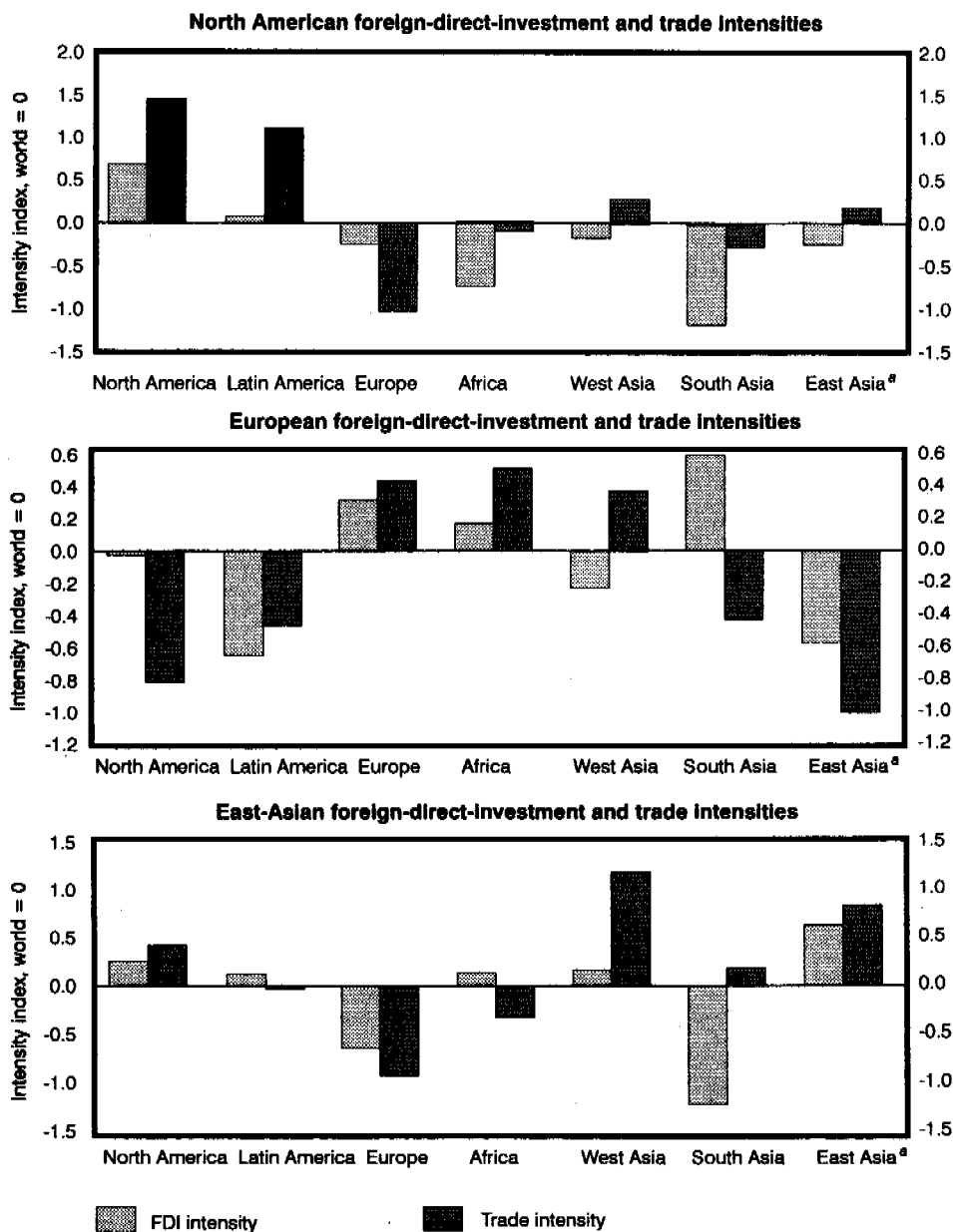
Source: UNCTAD-DTCI, 1993.
[a] Including, also, South-East Asia and the Pacific.

regional relationships, such as those between North America and Latin America; Europe and Africa; and East Asia and North America. More distant economic relationships, on the other hand, tend to be associated with smaller (or more negative) trade than FDI intensities.

There are several possible explanations for this pattern. It may be that FDI is less inhibited by transaction costs than trade, or at least that the transaction costs associated with FDI are less closely linked to distance than those associated with trade. Other factors could also selectively inhibit trade at longer distances—for example, trade barriers could be systematically higher against extraregional partners (as in the case of the European Union), making it more likely that extraregional relationships will be based on "tariff-jumping" investments rather than trade.

Overall, the regional data provide evidence of strong similarities in the clustering of investment and trade: both kinds of ties are stronger within regions and between geographically, politically or historically related regions. But there are also interesting differences in the variations of FDI and trade intensities across partners. While close relations are typically cemented by especially strong trade ties, more distant relationships seem to be more easily spanned by investment ties. Two regions, West Asia and South Asia, appear to be relatively isolated from global investment and trade networks, except for energy trade and historical FDI relationships.

Testing empirically foreign direct investment and trade intensities

These patterns can be analysed more rigorously for the FDI and trade relationships of the four largest investors, the United States, United Kingdom, Japan and Germany. Using the full partner detail of these countries' FDI and trade relationships, estimates of the extent of regional investment and trade biases, as well as the correlation of investment and trade intensities (across partners), are provided for each of these home countries.

Three regression models are used. The first relates the intensity of trade with a partner (as defined in equation 2) to the partner's region, population and gross domestic product. The second relates the intensity of FDI in the partner (the outward stock of FDI as measured by the investing country) to the same set of explanatory variables. The third model re-estimates the investment relationship with trade intensity included as an additional explanatory factor. Results are reported in tables 6 and 9.

Table 6. Trade and foreign-direct-investment intensity regressions: United States

	Dependent variable		
	Trade intensity	Outward FDI stock intensity	Outward FDI stock intensity
Constant[a,b]	1.504*	0.489	-0.099
	(2.261)	(0.753)	(-0.157)
Europe dummy	-1.459***	-0.622***	-0.05
	(-6.408)	(-2.792)	(-0.182)
Asia dummy	-0.823***	-0.663***	-0.341
	(-2.988)	(-2.462)	(-1.262)
Log population	0.136*	-0.111	-0.164*
	(-1.691)	(-1.409)	(-2.193)
Log gross domestic product	-0.085	0.041	0.074
	(-1.251)	(0.621)	(1.193)
Trade intensity			0.391*
			(-3.089)
Adjusted R^2 F-statistic	0.466	0.125	0.319
	13.009	2.966	18.25

Source: UNCTAD-DTCI, 1993.
[a] t-statistics in parentheses.
[b] Significance level: * = 10 per cent, ** = 5 per cent, *** = 1 per cent.

Two interesting conclusions emerge from the first two types of regressions. Trade-intensity measures are much more accurately explained by the simple determinants included in the regressions than FDI-intensity measures, confirming the greater variability of these investments suggested by theory. The intraregional concentration of both investment and trade intensities is also confirmed. Each equation includes dummy variables for regions other than the country's own region, and these dummy variables are typically negative and statistically significant. This applies to FDI as well as trade equations for all four investors and for all non-home regions.

The third regression (tables 6 and 9) expands the explanation of FDI intensity by adding trade intensity as an independent variable. This formulation cannot be used to determine the direction of the relationship captured by this variable—that is, whether trade intensity leads to investment intensity or vice versa—but its sign and statistical significance can be established. Any relationship found could be consistent with various explanations, including

Table 7. Trade and foreign-direct-investment intensity regressions: United Kingdom

	Dependent variable		
	Trade intensity	Outward FDI stock intensity	Outward FDI stock intensity
Constant[a, b]	0.093	−0.481	−0.568
	(0.128)	(−0.393)	(−0.550)
Americas dummy	−0.949***	−0.854*	0.031
	(−3.781)	(−2.018)	(0.074)
Asia dummy	−0.635***	−0.244	0.348
	(−2.748)	(−0.626)	(0.971)
Log population	−0.076	0.027	0.098
	(−0.913)	(0.190)	(0.815)
Log gross domestic product	0.035	0.019	−0.013
	(0.507)	(0.165)	(−0.136)
Trade intensity			0.932*
			(−4.146)
Adjusted R² F-statistic	0.284	0.003	0.29
	5.365	1.036	4.602

Source: UNCTAD-DTCI, 1993.
[a] t-statistics in parentheses.
[b] Significance level: * = 10 per cent, ** = 5 per cent, *** = 1 per cent.

causation from one variable to another, or by common third factors such as variations in transaction costs.

The results show that FDI intensity and trade intensity are indeed strongly positively associated in all FDI equations, even in addition to regional dummy variables. Indeed, once the trade-intensity measure is introduced as an explanatory variable in the investment equation, the significance of the regional dummy variables disappears. In other words, the regional concentration of FDI is either directly associated with the regional concentration of trade, or both are driven by common factors.

The coefficient of the trade-intensity variable is smaller than the one in the equations applied to Japan and the United States, indicating that a given difference in trade intensity (between partners) is associated with a smaller difference in FDI intensity. In the United Kingdom and Germany, the coefficient is close to one, indicating a roughly proportional relationship.

Table 8. Trade and foreign-direct-investment intensity regressions: Japan

	Dependent variable		
	Trade intensity	Outward FDI stock intensity	Outward FDI stock intensity
Constant[a,b]	-0.543	+1.31	-0.928
	(-0.845)	(-1.244)	(-0.958)
American dummy	-1.084***	-1.020**	-0.257
	(-4.562)	(-2.619)	(-0.604)
Europe dummy	-1.746***	-1.910***	-0.681
	(-8.039)	(-5.364)	(-1.368)
Log population	0.013	0.132	0.123
	(0.174)	(1.117)	(1.142)
Log gross domestic product	0.113*	0.109	0.03
	(1.791)	(1.058)	(0.307)
Trade intensity			0.704*
			(-3.26)
Adjusted R² F-statistic	0.619	0.422	0.565
	19.474	10.503	36.768

Source: UNCTAD-DTCI, 1993.
[a] *t*-statistics in parentheses.
[b] Significance level: * = 10 per cent, ** = 5 per cent, *** = 1 per cent.

These results are consistent with the picture derived from the global data. Foreign direct investment and trade are significantly positively related and each is intensively clustered by region. The variability of FDI across partners is proportional, or less than proportional, to the variability of trade intensity across partners. This provides mild support for the observation that strong relationships tend to be led by trade rather than FDI. Roughly 30 to 60 per cent of the variation in FDI and trade intensities is explained by the variables in the regressions; history, the extent of political contact and other country-specific economic characteristics are obvious candidates for additional analysis.

Conclusions

Foreign direct investment is an increasingly important component of international economic linkages and a factor in many regional economic integration schemes. Are the geographical ties through FDI similar to, or differ-

Table 9. Trade and foreign-direct-investment intensity regressions: Germany

	Dependent variable		
	Trade intensity	Outward FDI stock intensity	Outward FDI stock intensity
Constant[a,b]	−0.354	−1.211	−0.751
	(−0.783)	(−1.201)	(−0.902)
Americas dummy	−0.776***	−1.651***	0.359
	(−5.396)	(−2.027)	(1.074)
Asia dummy	−1.093***	−1.593***	−0.172
	(−7.292)	(−4.764)	(−0.431)
Log population	0.001	0.012	0.01
	(0.029)	(0.102)	(0.104)
Log gross domestic product	0.055	0.125	0.054
	(1.247)	(1.276)	(0.659)
Trade intensity			1.301*
			(−4.917)
Adjusted R^2 F-statistic	0.596	0.356	0.575
	8.438	42.04	27.759

Source: UNCTAD-DTCI, 1993.

[a] t-statistics in parentheses.

[b] Significance level: * = 10 per cent, ** = 5 per cent, *** = 1 per cent.

ent from, ties through trade? This article has shown that there are significant differences between FDI and trade patterns, but also important similarities.

Foreign-direct-investment outflows are more concentrated than international-trade flows, and are largely undertaken by the world's wealthiest economies. Recently, a few newly industrializing economies have also joined the ranks of the top investors, but the number of important home countries still remains small. Unlike trade relationships, which connect *many-to-many*, FDI flows are primarily from *few-to-many*.

Since the few are typically the most advanced countries within an economic grouping, FDI flows suggest a more uni-directional, *centre-to-periphery* pattern than trade flows. An important exception to this pattern may be the recent emergence of Hong Kong, Taiwan Province of China and other newly industrializing economies in East Asia. It is still difficult to tell whether this represents a new trend in FDI patterns, an application of a

centre-to-periphery pattern, but with these economies serving as a centre, or a temporary advantage that family-based business networks enjoy in the region's legal and economic environment.

Foreign-direct-investment inflows are much less concentrated than outflows. They are distributed across countries with different income levels roughly in the same way as international trade. However, FDI inflows are more erratically distributed than trade; while some countries attract substantial inward investment, others receive little. The large residual variation in inflows is probably due to historical, policy-related and endowment-determined factors.

There are important similarities between the distributions of FDI and trade of a given country across partners. A disproportionate share of each country's FDI and trade is conducted intraregionally. Strong extraregional ties also reflect geographical proximity, or cultural and political ties. Examples of such linkages include North America and Latin America, and Europe and Africa.

The positive correlation between a partner's distributions of FDI and trade holds for all investing regions and for each of the four largest home countries. There are several explanations. Variations in FDI and trade could be driven by similar determinants, such as variations in know-how about partner economies. Or, FDI and trade could be causally related as complementary (rather than substitute) activities. While there is no theoretical necessity for the observed relationship, it applies to most regions and, at the country level, to the partner patterns of the four largest home countries.

Although FDI and trade distributions are significantly correlated, investment is less bound to an investor's home region than international trade. The most intense regional ties, such as those within North America or Europe, are spearheaded by trade rather than FDI, and FDI becomes relatively more important in more distant relationships.

From a policy perspective, the similarity of FDI and trade clusters suggests that the evaluation of a potential regional grouping will be similar whether approached from the perspective of trade or FDI. If the countries in a regional group trade intensely with each other before joining a free trade area, then the area is more likely to involve trade creation than trade diversion. Similarly, if the same countries invest in each other before joining the area, then the investment-facilitating aspects of the agreement are also likely to create rather than divert FDI.

If the overlap between investment and trade clusters reflects causal, complementary relationships between these flows, then policy measures that stimulate one or the other will be especially successful. For example, if investment and trade are complements, then the benefits associated with trade liberalization may be amplified by benefits derived from additional FDI induced by trade.

The subtle difference between the distributions of FDI and trade found in this article—that close economic relationships tend to involve more intense trade linkages than investment linkages—also has intriguing policy implications. If countries pursue economic integration by reducing intraregional barriers, including especially to trade, then FDI may become a critical mechanism for linking regional blocs. Policies that encourage FDI may therefore be particularly important in a world that is fragmenting into regional blocs. ■

References

Agarwal, J. P. (1980). "The determinants of foreign direct investment: a survey", *Weltwirtschaftliches Archiv*, 4, pp. 733-739.

Davidson, William H. (1980). "The location of foreign direct investment activity: country characteristics and experience effects", *Journal of International Business Studies*, 11, 2, pp. 9-22.

Dunning, John H. (1981). "Explaining the international direct investment position of countries: towards a dynamic or developmental approach", *Weltwirtschaftliches Archiv*, 117, pp. 30-64.

————— (1988). *Explaining International Production* (London: Unwin Hyman).

Frankel, Jeffrey (1993). "Is Japan creating a trade bloc in East Asia and the Pacific?", in Jeffrey Frankel and Miles Kahler, eds., *Regionalism and Rivalry: Japan and the U.S. in Pacific Asia* (Chicago: University of Chicago Press), pp. 53-88.

Gold, David, Persa Economou and Telly Tolentino (1991). "Trade blocs and investment blocs: the triad in foreign direct investment and international trade" (New York: United Nations Centre on Transnational Corporations), mimeo.

Hymer, Stephen H. (1976). *The International Operations of National Firms: A Study of Direct Foreign Investment* (Cambridge, Massachusetts: MIT Press).

Katseli, Louka T. (1992). "Foreign direct investment and trade interlinkages in the 1990s: experience and prospects of developing countries" (New York: United Nations Centre on Transnational Corporations), mimeo.

Kogut, Bruce and Harbir Singh (1988). "The effect of national culture on the choice of entry mode", *Journal of International Business Studies*, 19, 3, pp. 411-432.

Kreinin, Mordechai E. and Michael G. Plummer (1992). "Regional integration in East Asia: issues and prospects", mimeo.

Krugman, Paul (1991). "The movement toward free trade zones", in Federal Reserve Bank of Kansas City, ed., *Policy Implications of Trade and Currency Zones* (Kansas City: Federal Reserve Bank).

Leontief, Wassily (1973). "Explanatory power of the comparative cost theory of international trade and its limits", in H. C. Bos, ed., *Economic Structure and Development: Lectures in Honor of Jan Tinbergen* (Amsterdam: North Holland).

Linneman, Hans (1966). *An Econometric Study of International Trade Flows* (Amsterdam: North Holland).

Petri, Peter A. (1993). "The East Asian trading bloc: an analytical history", in Jeffrey Frankel and Miles Kahler, eds., *Regionalism and Rivalry: Japan and the U.S. in Pacific Asia* (Chicago: University of Chicago Press), pp. 21-52.

————— (1994). "Trade and investment interdependence in the Pacific". Paper presented at the 21st Pacific Trade and Development Conference, Hong Kong, 1-3 June.

United Nations Centre on Transnational Corporations (UNCTC) (1991). *World Investment Report 1991: The Triad in Foreign Direct Investment* (New York: United Nations), United Nations publication, Sales No. E.91.II.A.12.

United Nations Conference on Trade and Development, Division on Transnational Corporations and Investment (UNCTAD-DTCI) (1993). *World Investment Report 1993: Transnational Corporations and Integrated International Production* (New York: United Nations), United Nations publication, Sales No. E.93.II.A.14.

United Nations, Transnational Corporations and Management Division (UN-TCMD) (1992). *World Investment Report 1992: Transnational Corporations as Engines of Growth* (New York: United Nations), United Nations publication, Sales No. E.92.II.A.19.