Intrafirm Trade of US MNCs: Findings and Implications for Models and Policies Toward Trade and Investment

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A large literature on spillovers from foreign direct investment (FDI) uses aggregate indicators of foreign activity in local markets to evaluate whether FDI is beneficial to host countries. Across many different contexts, researchers have found mixed results on whether FDI generates positive spillovers that improve the efficiency of host country economies. We argue that the inconclusive results of previous econometric studies on FDI spillovers may be due to the significant heterogeneity in MNC affiliate activity, which researchers have largely ignored. Indeed, FDI can take many forms, including passive foreign minority ownership, "screwdriver" plants, or research and development labs. The degree to which FDI benefits a host country should depend critically on the nature of the foreign activity in the local market.

We examine one source of important heterogeneity in foreign affiliate activity—specifically, whether multinational corporations (MNCs) that are organized to trade *intrafirm* in developing countries operate differently from MNCs with little or no intrafirm trade (IFT). In a descriptive analysis of affiliate activity in 49 developing countries from 1983 to 1996, we find that MNC

affiliates that are organized to trade intrafirm experience higher growth in real property, plant, and equipment (PPE) and have higher real wages than affiliates of MNCs with no IFT. From an organizational standpoint, affiliates that trade intrafirm are significantly larger in terms of total sales and come from MNCs with greater foreign activity. Affiliates that trade intrafirm also differ significantly in terms of their labor share from affiliates with no IFT. Thus there appear to be systematic and potentially important differences in the technology and organization of MNC affiliates that trade intrafirm versus affiliates that do not trade intrafirm. These differences may affect the mechanisms through which knowledge is transferred within and between firms. Hence, IFT may be an important characteristic of foreign affiliate activity that influences the magnitude and nature of spillovers from FDI to host-country economies.

The literature on FDI spillovers examines the interesting and important issue of whether activity by foreign-owned firms in the local economy is beneficial. In light of the considerable controversy around MNCs, researchers potentially have a lot to contribute to this debate. However, as other chapters in this volume argue, theoretical and empirical shortcomings in this literature have limited the degree to which researchers can speak to this issue. In particular, most current econometric studies in this area, by ignoring the considerable heterogeneity of MNC activity, obscure the mechanisms through which FDI might benefit host country firms (see Lipsey and Sjöholm in chapter 2 of this volume).

Consider the key assumption in the FDI spillovers literature—the notion that somehow foreign ownership conveys a different "class" status. All sorts of firm-specific properties are assumed to be associated with foreign ownership, especially when foreign firms are operating in developing countries. These include, for example, more advanced technology, better management practices, and better practices transferred through buyer-supplier relations. These properties of foreign ownership are assumed to exist regardless of the nationality of the foreign firms and, in many cases, regardless of the degree to which the host country firm is foreign controlled—e.g., when a foreign firm owns only a relatively small share of the local firm.

We argue that the diversity of MNC activity is too broad for it to be classified into "foreign market share."[1] Since MNC operations can include everything from sweatshops to research and development (R&D) labs, more attention needs to be given to the heterogeneity of MNC operations in econometric studies of FDI spillovers. As a modest first step, researchers using firm-level panel data might first investigate the nature of MNC activity

1. See Lipsey and Sjöholm's thorough review of the literature in this volume. Measures of foreign presence differ across studies. Examples are the ratio of foreign plants' employment to total industry employment (Kokko 1994) and foreign plants' share of total output in a four-digit industry (Kokko, Tansini, and Zejan 1996).

in the local market. For example, MNCs that undertake local R&D, or have higher local value added, might be more likely sources of knowledge transfer to local firms.

In this chapter, we focus on one aspect of MNC heterogeneity that we found associated with important intra-industry variation in MNC technology. Specifically, we examine whether MNCs that are organized to trade intrafirm in developing countries operate differently from MNCs with little or no intrafirm trade. In previous research in industrialized countries (see Feinberg and Keane 2001 and 2005; Feinberg, Keane, and Bognanno 1998), we found that MNCs that are organized to trade intrafirm differ along several important dimensions from MNCs with no IFT.

First, MNCs that are organized to trade intrafirm are considerably more dynamic technologically than MNCs with no IFT. Specifically, we found that in the context of US-Canada trade liberalization, MNCs that were initially organized to trade intrafirm experienced technical change that made it optimal to substantially increase intrafirm flows.[2] In contrast, no significant change in the factor shares of MNCs that were not initially organized to trade intrafirm occurred. These patterns were not industry specific. Indeed, as we point out in our 2001 study, there is substantial within-industry variation in the extent to which MNCs and their foreign affiliates are configured to trade intrafirm.

Second, we found that with increased IFT, the nature of the parent-affiliate relationship evolved. Canadian manufacturing affiliates that trade intrafirm are being transformed into production units that are more fully integrated into the MNCs' overall production process. This "deep" integration is supported by qualitative interviews we conducted with managers of MNC affiliates in Canada. These managers reported that as their affiliates became more connected with both the US parent and other foreign divisions of the MNC, more extensive communication and reporting links were established throughout the MNC. The association between IFT and more extensive communication within the firm is consistent with Moran's (2001) detailed case-based evidence on "parental supervision." For developing countries, this integration has the potential to generate dynamic benefits—namely, the transfer of best practices and greater demand for technological advances in logistics and transportation.

Third, we found that MNCs' discrete decisions to trade intrafirm persist over time, despite large reductions in tariffs and exchange rate movements. The persistence in the IFT decisions of MNCs is consistent with the large literature on firms' export decisions (e.g., Bernard and Jensen 2001; Das, Roberts, and Tybout 2001; Roberts and Tybout 1997). The relative insensitivity of IFT to changes in the economic environment implies that MNCs'

2. For affiliates that traded intrafirm, the production share of bilateral intrafirm shipments of intermediates increased substantially. Simultaneously, the capital share of Canadian affiliates decreased, and the labor share of US parents decreased.

production for IFT in developing countries may be less affected by local demand shocks or exchange rate variability.

Finally, Feinberg and Gupta (2004) found that MNCs with greater IFT linkages have more R&D-intensive US operations and are significantly more likely to locate R&D abroad. This finding is consistent with research on IFT in the international business literature (e.g., Kobrin 1991) that suggests that IFT in goods increases knowledge flows between MNC units. For developing-country affiliates, these relationships offer potentially significant sources of technology transfer. More importantly, affiliates that are the recipients of greater intrafirm knowledge flows may differ in both the amount and type of knowledge they could transfer to local firms.

In this study, we use confidential firm-level panel data from the Bureau of Economic Analysis (BEA) on the operations of US MNC affiliates to look at whether MNCs with and without IFT differ in terms of their employment, wage growth, and growth in capital investment across 48 developing countries during 1983–96. Our study is primarily descriptive. Estimating a model of MNCs' decisions to trade across such diverse countries over time is beyond the scope of this study. However, the rich, descriptive examination we present here provides some useful insights into the characteristics of US MNCs that trade intrafirm with their affiliates in developing countries.

We find that MNC affiliates that are organized to trade intrafirm experience higher growth in real PPE and have higher real wages than affiliates of MNCs with no IFT. From an organizational standpoint, affiliates that trade intrafirm are significantly larger in terms of total sales and come from MNCs with larger networks of foreign affiliates. Affiliates that trade intrafirm also differ significantly in terms of their labor share (defined as the ratio of affiliate employee compensation to affiliate sales). Thus there appear to be systematic and potentially important differences in the technology and organization of MNC affiliates that trade intrafirm versus affiliates that do not trade intrafirm. These differences may affect the mechanisms through which knowledge is transferred within and between firms.

The remainder of this chapter is organized as follows. In the next section, we present descriptive features of the sample and compare the wage, employment, and capital investment growth of developing-country affiliates with high and low IFT. We discuss our results in the fourth section, and we provide a conclusion in the final section.

Data

The Benchmark and Annual Surveys of US Direct Investment Abroad, which are administered by the BEA at the US Department of Commerce, provided the dataset for this study. These surveys provide the most comprehensive data available on the activities of US-based MNCs and their foreign affiliates.

For this study, we use the BEA data disaggregated at the individual foreign affiliate level for each US MNC parent from 1983–96.

The initial universe of affiliate-year observations for this time period contains approximately 256,000 observations on 43,700 affiliates. These affiliates are located in 180 countries, which include many small island nations and "new" countries or countries that changed status from 1983–96 (e.g., Yugoslavia). Several alterations were made to the population of affiliates to construct the sample in this study. First, as we discuss in our 2001 study, reporting requirements for MNC affiliates differ between the Benchmark and Annual Surveys, and the BEA carries forward small affiliates that fill out the Benchmark Surveys but are exempt from filling out Annual Surveys.[3] In the non-Benchmark years, the BEA estimates data for these small affiliates. Since small, poor countries typically attract small affiliates, these countries tend to have higher proportions of estimated-to-reported data. In previous studies, we typically removed most, if not all, estimated data. However, such a screen would be infeasible using developing-country data, since a much larger proportion of the affiliates in developing countries fall below the reporting requirements in non-Benchmark years. Our solution to this problem was to drop countries with less than 80 total affiliate-year observations and to remove affiliates with fewer than $100,000 in total sales. These screens removed 34,000 affiliate-year observations and eliminated 77 countries from the initial population.

Affiliates submit either "short" or "long" forms to the BEA, the latter containing more detailed information. We eliminated observations on affiliates that filled out the "short" form, which removed approximately 14,800 more affiliate-year observations. Similarly, minority-owned affiliates tend to submit less detailed data, so these were also eliminated from the sample (2,000 affiliate-year observations). After these various screens, we again removed countries containing fewer than 80 affiliate-year observations and countries for which we could not obtain World Bank data. This also removed approximately 14,000 affiliate-year observations and eliminated 20 more countries from the initial universe.[4] Finally, we removed 2,500 affiliates classified in "international shipping and drilling" which the BEA defines as a code distinct from country codes. Thus, our final sample contains 186,717 affiliate-year observations on 32,600 affiliates in 78 countries. These countries are listed in the appendix.

Since our aim is to focus on developing countries in this study, we classify countries by their absolute and relative levels of development. We did not

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3. Note that an important feature of the BEA's reporting requirements is total affiliate sales. The cut-off value that defines which affiliates are exempt from filling out the surveys differs not only between Benchmark and Annual Surveys, but also over time.

4. The countries eliminated in this round were primarily tax haven islands such as Bermuda and the Netherlands Antilles.

wish to simply classify a country as "industrialized" or "developing" since the latter group could potentially include countries as diverse as Greece and Haiti. We decided to create five development categories based upon each country's rank in real per capita gross domestic product (GDP) at the beginning and end of the time frame for this study. The categories are not quintiles, in the sense that 80 percent of all affiliate-year observations fall into the two "industrialized" country groups. Most affiliate-year observations in the first industrialized-country group are in Canada, the United Kingdom and EU countries, Japan, and Australia. The second industrialized-country group contains primarily EU countries like Greece, Portugal, Spain, and Ireland that grew quickly during the sample window and narrowed the per capita income gap with the wealthier countries in the first group.

Developing countries were classified into three groups, again based upon real per capita GDP at the beginning and end of the sample window. The wealthiest of the developing-country groups contains lower-income European countries such as Turkey and the former communist countries, as well as more developed Latin American countries such as Chile, Mexico, and Brazil, along with industrializing Asian countries such as Thailand and Malaysia. The second developing-country group includes middle-income South and Central American countries (e.g., Peru and Guatemala), wealthier African countries such as South Africa, Morocco, and Egypt, and lower-income Asian countries such as Indonesia and the Philippines. The poorest countries in South Asia, the Americas, and Africa (e.g., Pakistan, Haiti, and Zambia) are in the third developing-country group.

The BEA collects several different types of trade data: data on trade in goods with the United States (imports and exports, both intrafirm and arm's-length), and data on distribution of affiliate total revenue by type (goods, services, and investment income) and destination (local market, United States, and other countries). The actual countries in the "other country" category are not collected in non-Benchmark years (see Zeile 1997 for a detailed examination of the BEA's intrafirm trade data). The three destinations are further divided into intrafirm versus arm's-length sales.

We construct three IFT flows from the data: affiliate intrafirm sales to US parents, affiliate intrafirm sales to other foreign affiliates of the same MNC, and US parent intrafirm sales to foreign affiliates.[5] Affiliates report cost and revenue data in (thousands of) current US dollars. We deflate this using the 1992 US GDP deflator.

5. We note that parent intrafirm sales to affiliates is explicitly only for sales of goods, whereas affiliate intrafirm sales to parents and other affiliates potentially captures the sales of goods, services, and investment income. In the present study, this distinction does not create serious comparability problems because we primarily examine the IFT of affiliates in manufacturing industries, which is nearly all sales of goods.

Empirical Results

Trends in Intrafirm Trade and Features of the Sample

Figures 10.1a and 10.1b show the trends in the IFT/sales of manufacturing affiliates in developing and industrialized countries, respectively. We define manufacturing as BEA industry codes 200–400. These correspond quite closely to Standard Industrial Classification codes. We define "developing countries" as groups three to five and "industrialized countries" as groups one and two (see appendix 10.1).

As illustrated in figure 10.1a, for affiliates in developing countries, there is an upward trend in all three trade flows. Intrafirm trade from parents to affiliates increases from 11 percent to 17.6 percent of affiliate sales in developing countries. Affiliate sales to parents and affiliate-to-affiliate sales more than double as a percent of total affiliate sales between 1983 and 1996, the former increasing from 9.1 percent to 20.7 percent of affiliate sales, and the latter increasing from 5.1 percent to 10.1 percent of affiliate sales.

In figure 10.1b, the intrafirm trade of affiliates in industrialized countries shows the strongest upward trend for affiliate-to-affiliate trade. This flow increases from approximately 13.5 percent to 18 percent of affiliate sales between 1983 and 1996. In contrast, the flows to and from affiliates and US parents both remain fairly constant at approximately 8 percent of affiliate sales. Note that affiliate-to-affiliate trade is by far the largest of the three trade flows for affiliates in industrialized countries, whereas it is the smallest of the three flows for affiliates in developing countries This is due to the predominance of affiliates in EU countries (where there is large intraregional trade) in the industrialized-country sample.[6]

Table 10.1 gives descriptive statistics for the affiliates in our sample. The first column contains observations on the full sample of affiliates in all industries and development groups. The second and third columns describe affiliates in industrialized countries and the subset of industrialized-country affiliates in manufacturing industries. The fourth and fifth columns give similar breakdowns for affiliates in developing countries.

Note that, in the last row of table 10.1, we can see that approximately 80 percent of all affiliate-year observations (149,524 of the total 186,717) are in

6. Not surprisingly, Canada and Mexico have much larger bilateral affiliate-parent trade flows.

Figure 10.1 Trends in affiliate intrafirm trade/manufacturing sales, 1983–96
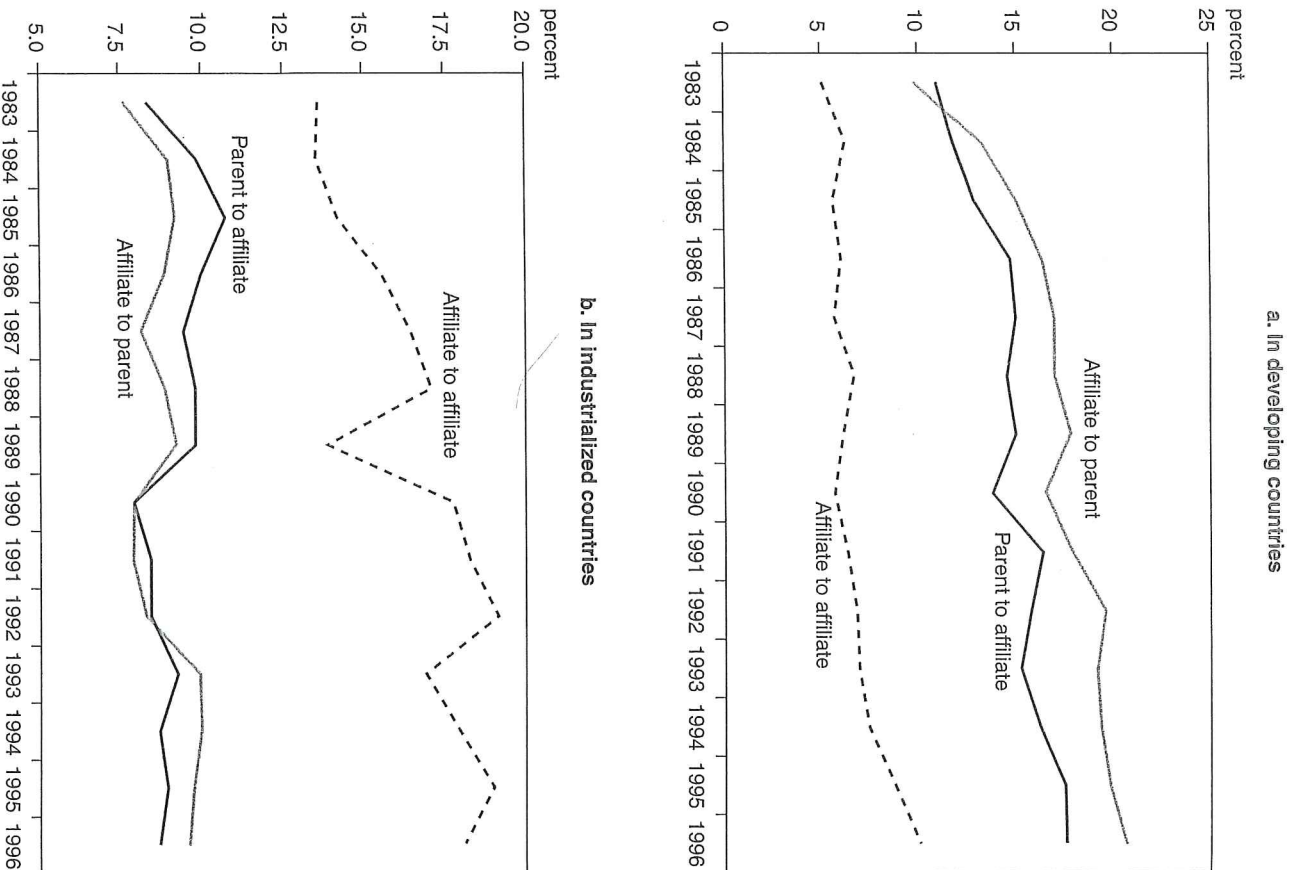
a. In developing countries

b. In industrialized countries

industrialized countries. This is broadly representative of US FDI. Nearly 60 percent of all affiliate-year observations are in Canada and the European Union.

In columns 2 through 5, we can see that the developing- and industrialized-country subsamples differ along several interesting dimensions. First, the average developing-country affiliate is part of an MNC with a significantly larger network of foreign affiliates than the average affiliate in an industrialized country (row 4). Similarly, the average developing-country affiliate's US parent sales (row 2) and total foreign affiliate sales (row 3) are also significantly larger.[7] For US MNCs, FDI in developing countries is still a relatively new and small phenomenon undertaken primarily by the largest, most experienced international firms.

The magnitude and destination of intrafirm trade flows also differs significantly between developing and industrialized countries. As mentioned above, affiliates in the industrialized-country subsample (manufacturing industries) trade intrafirm much more with other affiliates (as a percent of sales) than with US parents. In contrast, affiliates in the developing-country subsample (manufacturing industries) export only 4.5 percent of their total sales intrafirm to other affiliates, but send 7.3 percent of their total sales intrafirm to US parents. US parent sales to foreign affiliates are approximately 8 percent of total affiliate sales in both the developing- and industrialized-country subsamples.[8]

Finally, note that the average annual wage—defined as employee compensation divided by number of employees—is $36,920 in the full sample of industrialized-country affiliates, but is substantially smaller, $32,890 among industrialized-country affiliates in manufacturing industries. Similarly, the average developing-country wage is $15,160 for all affiliates, but at $12,160 the wage is again substantially smaller for manufacturing affiliates in developing countries. At first glance, the developing country wage might seem quite large. However, more than 60 percent of the affiliate-year observations in the developing-country subsample are in the highest income group. Fewer than 10 percent of affiliate-year observations are in the lowest income group. The wage gap between manufacturing affiliates in the highest and lowest income groups is quite large—$12,700 versus $7,800, respectively.

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7. Total foreign affiliate sales is the sum of the sales of all the foreign affiliates of the same US parent.

8. The differences in the means in table 10.1 from the annual means in figures 10.1a and 10.1b result from the method of calculation. In figures 10.1a and 10.1b, means are calculated from the entire set of affiliate-year observations. Since so many affiliates have no trade flows, the means calculated from the micro data are much smaller. In table 10.1, means are calculated from affiliate-year observations, aggregated at the country level.

Table 10.1 Descriptive statistics for sample affiliates

	Full sample	Industrialized countries		Developing countries	
		All	Manufacturing	All	Manufacturing
Affiliate sales	84,597 (432,719)	92,971 (475,357)	124,099 (634,751)	50,931 (173,714)	53,837 (177,575)
Parent sales	7,030,261 (14,300,000)	6,492,353 (13,900,000)	5,165,212 (120,000,000)	9,192,811 (15,800,000)	7,920,680 (15,900,000)
Sales of all affiliates in the MNC network	6,049,347 (16,600,000)	5,280,490 (15,400,000)	4,150,722 (13,000,000)	9,140,319 (20,500,000)	6,724,940 (15,800,000)
Number of affiliates in the MNC network	39 (42)	36 (41)	35 (40)	51 (44)	48 (41)
Affiliate PPE	35,469 (239,202)	36,489 (255,333)	53,152 (318,723)	31,370 (158,508)	27,440 (106,256)
Affiliate labor share (employee compensation/sales)	0.191 (0.152)	0.194 (0.151)	0.204 (0.119)	0.177 (0.157)	0.184 (0.147)
Affiliate employment	372 (1,538)	342 (1,593)	503 (1,884)	495 (1,285)	699 (1,543)
Affiliate wage (employee compensation/employment)	32.54 (19.30)	36.92 (18.18)	32.89 (15.15)	15.16 (12.07)	12.16 (9.42)
Affiliate IFT to affiliates/total affiliate sales	0.060 (0.168)	0.064 (0.171)	0.097 (0.193)	0.042 (0.154)	0.045 (0.147)
Affiliate IFT to parents/total affiliate sales	0.028 (0.119)	0.022 (0.096)	0.041 (0.128)	0.050 (0.183)	0.073 (0.217)
Parent IFT to affiliates/total affiliate sales	0.083 (0.166)	0.088 (0.170)	0.081 (0.143)	0.072 (0.149)	0.078 (0.150)
Affiliate IFT to affiliates	10,461 (120,062)	12,202 (133,141)	20,886 (187,168)	3,462 (32,251)	3,808 (32,825)
Affiliate IFT to parents	5,770 (122,613)	5,489 (133,126)	11,074 (203,098)	6,898 (64,996)	9,535 (77,182)
Parent IFT to affiliates	6,865 (112,012)	7,237 (122,994)	11,244 (185,817)	5,370 (46,564)	8,215 (62,700)
Percent of affiliate-year observations with IFT to affiliates	36.7 (48.2)	38.4 (48.6)	54.7 (49.8)	30.1 (45.9)	40.7 (49.1)
Percent of affiliate-year observations with IFT to parents	21.9 (41.3)	22.8 (42.0)	41.4 (49.3)	17.9 (38.4)	26.8 (44.3)
Percent of affiliate-year observations with parent IFT to affiliates	49.2 (50.0)	49.0 (50.0)	64.5 (47.9)	50.2 (50.0)	62.5 (48.4)
Number of affiliate-year observations	186,717	149,524	62,891	37,193	19,895

IFT = intrafirm trade
MNC = multinational corporation
PPE = property, plant, and equipment

Notes: All sample means in the industrialized- and developing-country subsamples differ at the 1 percent level. Dollar figures are in thousands of 1992 US dollars.

Source: BEA Benchmark and Annual Surveys on US Direct Investment Abroad.

In tables 10.2a through 10.2c, we focus on differences between developing-country manufacturing affiliates with high IFT versus affiliates with no IFT at the 75th percentile of intrafirm trade/sales (IFT/sales) for the 1983–86, 1989–91, and 1993–96 periods. [9] We construct averages by affiliates over 3–4-year time intervals, to smooth the sample, and we include three time periods to examine changes in levels over time. Interesting differences are evident both between high- and low-trade affiliates for a given trade flow and across the three different trade flows.

Affiliate-to-Affiliate IFT

In table 10.2a, we see that developing-country affiliates with high IFT to other MNC affiliates are approximately twice the size of low-trade affiliates in each of the three time periods. Affiliates with high IFT to other affiliates also tend to be part of much larger MNC networks. Indeed, in the 1993–96 time period, the MNCs of high-trade affiliates have 10 more affiliates on average than the MNCs of low-trade affiliates. Interestingly, the network size of the high- and low-trade affiliates is virtually the same in the first time period.

Several other interesting differences between the high- and low-trade affiliates in developing countries can be seen in table 10.2a. First, the labor share (defined as an affiliate's employee compensation to sales) of the low-trade affiliates is higher and increases slightly over time, from 18.4 percent in 1983–86 to 21 percent in 1993–96. In contrast, the high-trade affiliates' labor share decreases slightly from 16.5 percent to 15.8 percent and is considerably lower than the labor share of affiliates with no IFT.

As shown by the percent of affiliate-year observations with IFT, affiliates with high IFT to other affiliates are significantly more likely to have IFT with US parents—in both directions. Affiliates in the high-trade subsample see their sales to other affiliates increase from 11 percent to 25 percent of total sales from the first to the third time periods.

Affiliate-to-Parent IFT

Table 10.2b compares developing-country manufacturing affiliates with high versus low IFT to US parents. Similar to the affiliates with high IFT to

9. We do not contrast the 75th percentile with the 25th percentile of IFT/sales since the median affiliate has no IFT for two of the three trade flows. This is evident in the percent of affiliate-year observations with IFT, reported in tables 10.1 and 10.2a through 10.2c. Although affiliates have non-zero IFT *from* parents at the median, the 25th percentile is zero. Hence, the "high-trade" affiliates in tables 10.2a through 10.2c are defined at the 75th percentile, whereas the "low-trade" affiliates have zero IFT. This explains the much larger *n* in the low-trade subsamples (see bottom row of tables 10.2a through 10.2c).

Table 10.2a Characteristics of developing-country manufacturing affiliates with high intrafirm trade to other affiliates versus developing-country manufacturing affiliates with no intrafirm trade

	1983–86		1989–91		1993–96	
	High	Low	High	Low	High	Low
Affiliate sales	69,115 (179,865)	29,534 (84,212)	85,495 (225,082)	34,183 (116,208)	90,874 (263,962)	44,618 (166,031)
Parent sales	7,052,977 (13,000,000)	8,096,538 (16,600,000)	7,084,218 (11,800,000)	8,799,354 (17,700,000)	8,982,267 (17,400,000)	8,680,828 (18,200,000)
Sales of all affiliates in the MNC network	5,095,551 (12,200,000)	4,838,088 (12,900,000)	6,870,591 (14,900,000)	7,308,478 (16,900,000)	9,742,890 (19,700,000)	8,263,058 (18,100,000)
Number of affiliates in the MNC network	45 (33)	42 (35)	51 (36)	43 (37)	61 (50)	51 (51)
Affiliate PPE	41,024 (149,724)	17,253 (58,220)	46,175 (157,465)	17,336 (63,293)	44,613 (163,704)	22,259 (64,027)
Affiliate PPE growth	0.000 (0.290)	−0.025 (0.446)	0.049 (0.342)	0.048 (0.419)	0.091 (0.358)	0.094 (0.418)
Affiliate labor share	0.165 (0.098)	0.184 (0.151)	0.169 (0.113)	0.198 (0.169)	0.158 (0.116)	0.210 (0.187)
Affiliate employment	940 (2,258)	529 (911)	982 (2,040)	610 (1274)	895 (2,030)	671 (1,695)
Affiliate employment growth	0.007 (0.319)	−0.019 (0.481)	0.041 (0.376)	0.047 (0.386)	0.020 (0.305)	0.025 (0.375)
Affiliate wage	10.36 (7.01)	10.40 (6.71)	12.27 (8.45)	10.53 (8.13)	15.07 (11.89)	13.65 (11.29)

(table continues next page)

Table 10.2a Characteristics of developing-country manufacturing affiliates with high intrafirm trade to other affiliates versus developing-country manufacturing affiliates with no intrafirm trade (continued)

	1983–86		1989–91		1993–96	
	High	Low	High	Low	High	Low
Affiliate IFT to affiliates/total affiliate sales	0.112 (0.187)	0 (0)	0.168 (0.251)	0 (0)	0.252 (0.295)	0 (0)
Affiliate IFT to parents/total affiliate sales	0.072 (0.188)	0.034 (0.161)	0.078 (0.179)	0.118 (0.291)	0.075 (0.183)	0.111 (0.278)
Parent IFT to affiliates/total affiliate sales	0.103 (0.160)	0.064 (0.138)	0.080 (0.135)	0.083 (0.176)	0.087 (0.144)	0.079 (0.169)
Affiliate IFT to affiliates	9,756 (30,620)	0 (0)	12,598 (43,240)	0 (0)	21,721 (95,959)	0 (0)
Affiliate IFT to parents	10,962 (58,060)	5,115 (27,261)	13,254 (72,147)	8,337 (47,856)	8,351 (60,666)	12,819 (90,730)
Parent IFT to affiliates	9,562 (43,759)	4,650 (24,810)	11,728 (80,949)	6,726 (46,527)	9,358 (48,963)	9,995 (69,016)
Percent of affiliate-year observations with IFT to parents	38.6 (48.7)	11.0 (31.3)	44.2 (49.7)	25.3 (43.5)	41.8 (49.3)	23.1 (42.1)
Percent of affiliate-year observations with parent IFT to affiliates	78.3 (41.2)	62.4 (48.5)	71.4 (45.2)	54.2 (49.8)	63.0 (48.3)	45.6 (49.8)

IFT = intrafirm trade
MNC = multinational corporation
PPE = property, plant, and equipment

Notes: All sample means in the industrialized- and developing-country subsamples differ at the 1 percent level. Dollar figures are in thousands of 1992 US dollars.

Source: BEA Benchmark and Annual Surveys on US Direct Investment Abroad.

Table 10.2b Characteristics of developing-country manufacturing affiliates with high intrafirm trade to US parents versus developing-country manufacturing affiliates with no intrafirm trade

	1983–86		1989–91		1993–96	
	High	Low	High	Low	High	Low
Affiliate sales	78,304 (180,576)	30,389 (96,128)	91,852 (264,876)	33,819 (84,717)	109,711 (361,087)	42,901 (96,916)
Parent sales	10,700,000 (21,600,000)	6,256,943 (11,500,000)	12,300,000 (23,800,000)	6,716,153 (11,100,000)	10,400,000 (23,000,000)	7,904,053 (14,800,000)
Sales of all affiliates in the MNC network	5,841,403 (14,200,000)	4,484,997 (12,500,000)	9,979,956 (22,600,000)	6,267,550 (13,700,000)	8,859,554 (21,400,000)	8,444,485 (17,000,000)
Number of affiliates in the MNC network	39 (32)	45 (35)	39 (38)	50 (37)	42 (50)	60 (49)
Affiliate PPE	57,502 (174,032)	13,129 (38,334)	50,872 (158,579)	14,595 (50,899)	49,595 (153,835)	19,927 (68,737)
Affiliate PPE growth	0.046 (0.261)	−0.042 (0.405)	0.072 (0.339)	0.036 (0.441)	0.070 (0.339)	0.104 (0.442)
Affiliate labor share	0.238 (0.173)	0.160 (0.105)	0.266 (0.206)	0.154 (0.107)	0.253 (0.206)	0.165 (0.136)
Affiliate employment	1,419 (2,384)	385 (676)	1,438 (2,341)	399 (757)	1,381 (2,706)	450 (942)
Affiliate employment growth	0.051 (0.485)	−0.024 (0.375)	0.044 (0.426)	0.043 (0.363)	0.011 (0.291)	0.028 (0.381)
Affiliate wage	8.80 (6.31)	10.89 (6.57)	9.61 (7.81)	11.85 (8.36)	12.37 (10.85)	15.34 (11.68)

Table 10.2b Characteristics of developing-country manufacturing affiliates with high intrafirm trade to US parents versus developing-country manufacturing affiliates with no intrafirm trade (continued)

	1983–86		1989–91		1993–96	
	High	Low	High	Low	High	Low
Affiliate IFT to affiliates/total affiliate sales	0.050 (0.132)	0.021 (0.093)	0.041 (0.115)	0.042 (0.152)	0.070 (0.170)	0.061 (0.187)
Affiliate IFT to parents/total affiliate sales	0.188 (0.297)	0 (0)	0.382 (0.378)	0 (0)	0.361 (0.364)	0 (0)
Parent IFT to affiliates/total affiliate sales	0.132 (0.202)	0.057 (0.110)	0.157 (0.237)	0.055 (0.118)	0.135 (0.206)	0.063 (0.133)
Affiliate IFT to affiliates	7,033 (28,469)	908 (7,271)	6,794 (33,913)	1,390 (11,588)	11,123 (83,915)	3,039 (22,814)
Affiliate IFT to parents	22,758 (66,110)	0 (0)	33,312 (101,405)	0 (0)	48,454 (215,148)	0 (0)
Parent IFT to affiliates	17,627 (54,943)	1,158 (4,925)	25,191 (107,244)	1,187 (3,765)	35,291 (164,324)	1,816 (7,053)
Percent of affiliate-year observations with IFT to affiliates	60.4 (48.9)	37.8 (48.5)	39.7 (48.9)	33.0 (47.0)	43.9 (49.6)	35.6 (47.9)
Percent of affiliate-year observations with parent IFT to affiliates	74.2 (43.7)	68.3 (46.5)	62.9 (48.3)	59.3 (49.1)	60.3 (48.9)	50.8 (50.0)

IFT = intrafirm trade
MNC = multinational corporation
PPE = property, plant, and equipment

Notes: All sample means in the industrialized- and developing-country subsamples differ at the 1 percent level. Dollar figures are in thousands of 1992 US dollars.

Source: BEA Benchmark and Annual Surveys on US Direct Investment Abroad.

Table 10.2c Characteristics of developing-country manufacturing affiliates with high intrafirm trade from US parents versus developing-country manufacturing affiliates with no intrafirm trade

	1983–86		1989–91		1993–96	
	High	Low	High	Low	High	Low
Affiliate sales	42,074 (123,054)	33,667 (105,280)	61,900 (231,606)	31,913 (72,892)	84,641 (338,733)	41,528 (89,055)
Parent sales	9,940,715 (20,500,000)	6,809,006 (9,689,754)	11,900,000 (23,400,000)	7,230,282 (11,800,000)	9,627,087 (21,300,000)	9,179,145 (16,300,000)
Sales of all affiliates in the MNC network	6,015,993 (14,900,000)	4,231,254 (10,100,000)	9,836,720 (21,600,000)	6,510,113 (13,800,000)	8,868,892 (20,700,000)	8,900,515 (16,900,000)
Number of affiliates in the MNC network	44 (35)	43 (36)	44 (36)	48 (39)	48 (48)	61 (53)
Affiliate PPE	24,530 (95,105)	17,300 (42,903)	27,899 (96,150)	16,597 (68,546)	32,532 (121,998)	21,485 (70,548)
Affiliate PPE growth	0.012 (0.261)	−0.063 (0.576)	0.036 (0.465)	0.054 (0.409)	0.085 (0.346)	0.103 (0.418)
Affiliate labor share	0.212 (0.163)	0.182 (0.132)	0.214 (0.180)	0.181 (0.158)	0.210 (0.177)	0.191 (0.175)
Affiliate employment	731 (1,432)	585 (1,018)	903 (1,627)	578 (1,178)	984 (2,566)	604 (1,156)
Affiliate employment growth	0.028 (0.349)	0.005 (0.352)	0.043 (0.366)	0.051 (0.450)	0.017 (0.348)	0.033 (0.380)

Table 10.2c   CCharacteristics of developing-country manufacturing affiliates with high intrafirm trade from US parents versus developing-country manufacturing affiliates with no intrafirm trade *(continued)*

	1983–86		1989–91		1993–96	
	High	Low	High	Low	High	Low
Affiliate wage	9.74	9.22	11.20	9.90	16.01	12.65
	(7.12)	(6.68)	(8.40)	(7.91)	(12.35)	(11.16)
Affiliate IFT to affiliates/total affiliate sales	0.041	0.036	0.035	0.060	0.049	0.085
	(0.120)	(0.134)	(0.101)	(0.200)	(0.129)	(0.233)
Affiliate IFT to parents/total affiliate sales	0.109	0.026	0.175	0.108	0.127	0.100
	(0.260)	(0.127)	(0.318)	(0.280)	(0.268)	(0.268)
Parent IFT to affiliate/total affiliate sales	0.248	0	0.289	0	0.292	0
	(0.192)	(0)	(0.217)	(0)	(0.197)	(0)
Affiliate IFT to affiliates	4,778	2,054	5,279	1,730	8,446	3,132
	(24555)	(12488)	(31068)	(7,428)	(81,031)	(17,172)
Affiliate IFT to parents	17,746	1,286	26,585	2,185	37,262	4,092
	(65,097)	(7,189)	(100,794)	(8,793)	(211,867)	(29,981)
Parent IFT to affiliates	17,788	0	27,126	0	38,664	0
	(52,848)	(0)	(106,970)	(0)	(163,610)	(0)
Percent of affiliate-year observations with IFT to affiliates	51.6	32.0	36.5	26.1	42.2	29.0
	(50.0)	(46.6)	(48.2)	(43.9)	(49.4)	(45.4)
Percent of affiliate-year observations with IFT to parents	29.9	10.2	41.7	23.3	39.7	21.3
	(45.8)	(30.3)	(49.3)	(42.3)	(48.9)	(41.0)

IFT = intrafirm trade
MNC = multinational corporation
PPE = property, plant, and equipment

Notes: All sample means in the industrialized- and developing-country subsamples differ at the 1 percent level. Dollar figures are in thousands of 1992 US dollars.

Source: BEA Benchmark and Annual Surveys on US Direct Investment Abroad.

other affiliates, affiliates with high IFT to parents, affiliates with high IFT to parents are between two and three times the size of affiliates with no IFT to parents. However, affiliates with high IFT to parents come from considerably smaller MNCs, in terms of number of affiliates, than the low-trade affiliates. Although the high-trade affiliates come from MNCs with a smaller number of foreign affiliates, these MNCs are typically larger in terms of sales—both parent sales and the total sales of foreign affiliates. MNCs with extensive affiliate-to-parent IFT appear to have fewer, but larger, foreign subsidiaries as compared to MNCs with extensive affiliate-to-affiliate IFT. The high-trade affiliates' labor share is approximately 25 percent versus 16 percent (during 1994–96) for affiliates with no IFT to parents. Note the interesting contrast between high-trade affiliates in this group versus the high-trade affiliates in table 10.2a. Affiliates with high IFT *to other affiliates* have significantly smaller labor share than affiliates that do not trade intrafirm with other affiliates.

In the high affiliate-to-parent IFT subsample, affiliates with high IFT to parents have high *bilateral* trade with parents. They purchase approximately 14 percent of total sales intrafirm from parents versus 6 percent for the low-trade affiliates. Affiliates in the high-trade subsample see their sales to US parents increase from 19 percent to 36 percent of total sales from the first to the third time periods.

Parent-to-Affiliate IFT

Table 10.2c compares developing-country manufacturing affiliates with high IFT *from* US parents and affiliates that purchase no goods from US parents. Similar to the high-trade affiliates in tables 10.2a and 10.2b, affiliates with high intrafirm purchases from US parents are approximately twice the size of affiliates with no IFT from parents (in the second and third periods). The size characteristics of high- and low-trade affiliates in table 10.2c resemble those in table 10.2b in the sense that affiliates with high intrafirm purchases from parents come from MNCs that are larger in terms of parent and total affiliate sales, but smaller in terms of number of foreign affiliates.

Affiliates with high intrafirm purchases from US parents have fairly constant IFT with other MNC affiliates—approximately 4 percent of sales. Affiliates with high intrafirm purchases from parents are about twice as likely to have some intrafirm sales to parents as affiliates that purchase no goods from parents. Interestingly, affiliates that purchase no inputs from US parents have large increases in their sales *to* US parents from the first to the third time periods—from 2.6 percent to 10 percent of sales.

Finally, parent intrafirm trade to affiliates in the high-trade subsample increases from 25 percent to 29 percent of affiliate sales from the first to the second time period, but remains constant at 29 percent of sales in the third time period.

Wage, Employment, and PPE Growth of High- Versus Low-Trade Affiliates

Figures 10.2a through 10.2c show the growth in real wages for the high- and low-trade affiliates in tables 10.2a through 10.2c (i.e., manufacturing affiliates in developing countries). Recall that real wages are measured as real employee compensation/employment. Total employee compensation includes all employment-related expenses, and the resulting wages are measured in thousands of (1992) US dollars.

Figure 10.2a shows the wage growth in affiliates with high and low IFT to other affiliates for the three time periods given in tables 10.2a through 10.2c (i.e., 1983–86, 1989–91, and 1993–96). Note that the real wages of low-trade affiliates remain stagnant at approximately $10,000 in the first and second periods, while the (initially same) real wages of high-trade affiliates grow to more than $12,000 in the second period. The real wages of both groups of affiliates grow from the second to the third period, but the high-trade affiliates' wages grow to $15,070, and the low-trade affiliates' wages reach only $13,650 in the third period.

Figure 10.2b plots the wage growth for affiliates with high and low IFT to US parents. Wages in both groups of affiliates grow approximately 40 percent from the first to the third period. However, the real wages of high-trade affiliates are lower than the wages of affiliates that have low intrafirm sales to parents. The real wages of high-trade affiliates grow from $8,800 to $12,370 but the real wages of low-trade affiliates grow from $10,890 in the first period to $15,340 in the third period.

Finally, figure 10.2c shows the real wages of affiliates with high and low intrafirm purchases from US parents. Again, as in the first chart, the real wages of affiliates with no intrafirm purchases from parents remain nearly constant from the first to the second period. In contrast, the real wages of affiliates with high intrafirm purchases from parents grow 15 percent from the first to the second periods. Of all the groups of affiliates shown in figures 10.2a through 10.2c, those with high intrafirm purchases from US parents have the highest real wage—$16,010 in the third period. This contrasts with the significantly lower third-period real wage of $12,650 for affiliates that purchase no inputs from US parents.

In all, real wage growth is the same or greater for affiliates with high IFT versus low IFT. The levels of real wages are higher for affiliates with high IFT to other affiliates and high intrafirm purchases from US parents. Although affiliates with high sales to US parents experience significant growth in wages over time, the wages of these affiliates are lower, on average, than the wages of affiliates with no intrafirm sales to US parents.

Table 10.3 shows changes in the three intrafirm trade flows as well as average annual changes in employment and real PPE for the full sample of affiliates and grouped by development category. We also examine changes in employment and real PPE for high-trade affiliates, as defined in tables

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Figure 10.2 Real wages of manufacturing affiliates in the top and bottom quartiles of intrafirm sales

a. To other foreign affiliates

b. To US parents

c. From US parents to affiliates
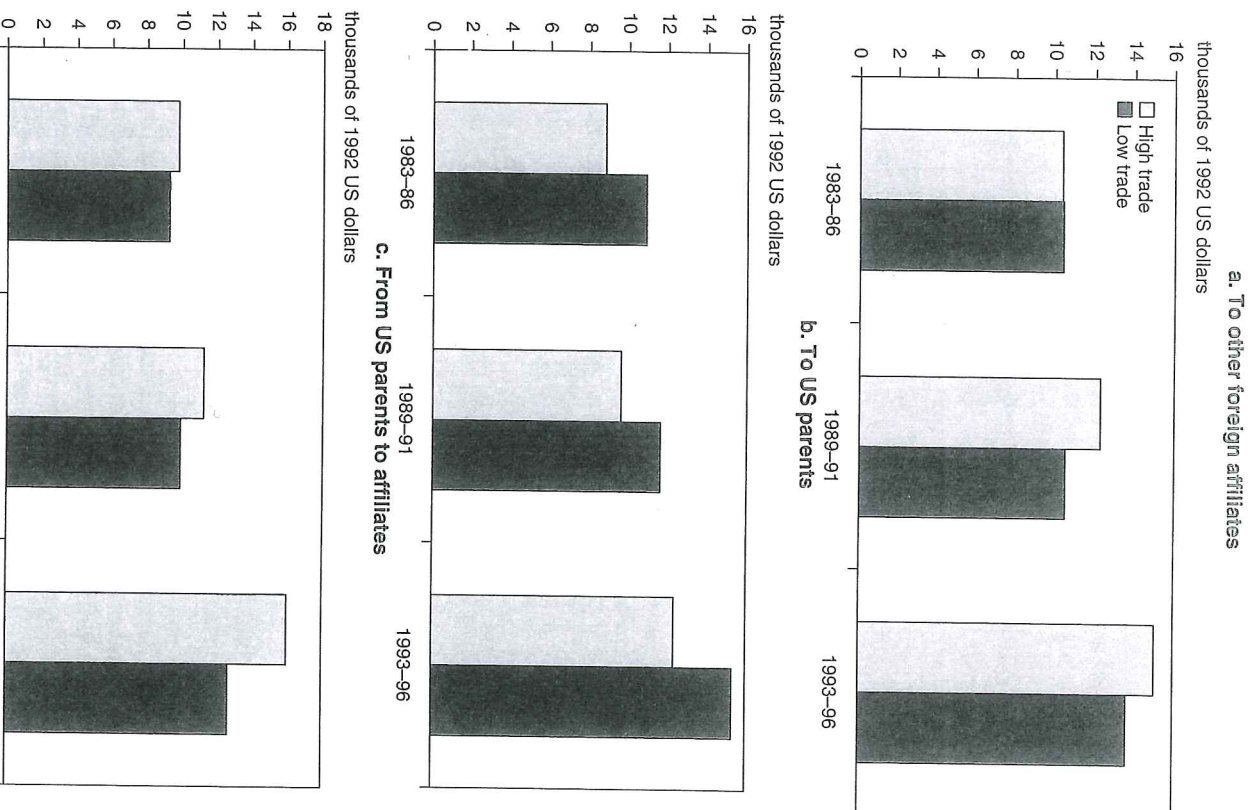
Note: Key is the same for all 3 parts of this figure.
Source: BEA Benchmark and Annual Surveys on US Direct Investment Abroad.

Table 10.3   Average annual changes in intrafirm trade, employment, and PPE of developing-country affiliates

	Changes in intrafirm trade*			Average annual change in affiliate employment**				Average annual change in affiliate real PPE***			
	To parents	To affiliates	From parents	All affiliates	High P sales	High A sales	High P to A sales	All affiliates	High P sales	High A sales	High P to A sales
Full sample	0.072 (0.269)	0.121 (0.543)	0.056 (0.252)	0.010 (0.368)	0.011 (0.383)	0.013 (0.335)	0.011a (0.337)	0.055 (0.489)	0.059b (0.395)	0.069a (0.435)	0.055 (0.418)
Development subsamples											
Most developed											
1	0.024c,d (0.090)	0.025a (0.108)	0.010c (0.089)	0.008b,e (0.354)	0.007 (0.325)	0.010c,f (0.320)	0.011c (0.321)	0.058b (0.492)	0.057 (0.408)	0.073a (0.434)	0.056 (0.425)
2	0.018 (0.317)	0.035c (0.143)	−0.024c (0.151)	0.011 (0.382)	0.024c (0.304)	0.011 (0.332)	0.017 (0.311)	0.060 (0.471)	0.086a (0.357)	0.076b (0.346)	0.073b (0.350)
3	0.049 (0.097)	0.040c (0.136)	0.028 (0.078)	0.022a (0.389)	0.026 (0.388)	0.024 (0.343)	0.022 (0.349)	0.061c (0.447)	0.062 (0.335)	0.071c (0.383)	0.057 (0.391)
4	0.071 (0.144)	0.177 (0.349)	0.059 (0.225)	0.002c (0.396)	0.016 (0.333)	0.017b (0.355)	0.005 (0.304)	0.005a (0.483)	0.018a (0.363)	0.024b (0.391)	0.000 (0.367)
Least developed											
5	0.270 (0.477)	0.428 (1.207)	0.221 (0.510)	0.016a (0.409)	−0.030c (0.422)	0.048b (0.378)	0.046b (0.380)	0.043 (0.511)	0.077c (0.314)	0.075c (0.448)	0.059 (0.559)

A = affiliate; IFT = intrafirm trade; P = parent; PPE = property, plant, and equipment

* Changes in IFT are the average of annual percentage changes in each trade flow/sales in the relevant development subsample.
** Changes in affiliate employment are calculated as the log (annual) change in employment averaged over all affiliates in each development subsample.
*** Changes in affiliate PPE are calculated as the log (annual) change in real PPE averaged over all affiliates in each development subsample.

Differences in means significant (two-tailed tests):
a. At 1 percent.
b. At 5 percent.
c. At 10 percent.

d. T-tests in the "Intrafirm trade" panel compare the mean within each development subsample to the full sample means in row one.
e. T-tests in the "All affiliates" column in panels two and three compare the mean employment change and PPE growth for each development subsample with the overall sample means in row one.
f. T-tests in the "High-trade" columns compare the means for affiliates above the 75th percentile of the relevant trade flow within each development subsample with the development subsample means.

Note: Full sample = 186,717 affiliate-year observations; 1 = 136,227; 2 = 13,297; 3 = 23,658; 4 = 10,015; 5 = 3,520.

10.2a through 10.2c. The first column in panels two and three gives the average change in employment and PPE for all affiliates in the given development group. The next three columns give the average change, within each development group, for affiliates with high IFT to parents, high IFT to other affiliates, and high intrafirm purchases from parents. Year-to-year changes are calculated at the affiliate level.

Focusing on panel two in table 10.3, there are no obvious differences in employment growth between the development categories. Further, we see no systematic differences in employment growth within development categories. Although the point estimates are generally higher for employment growth of affiliates with high intrafirm sales to other affiliates and high intrafirm purchases from US parents, only about half of these are significantly different from the average employment growth for the relevant development group.

In contrast, real PPE growth is consistently higher for affiliates that export goods intrafirm. Note, in particular, that affiliates with high intrafirm sales to parents and sales to other affiliates have significantly higher PPE growth than the average for the relevant development group. Affiliates with high intrafirm sales to US parents have higher real PPE growth in the full sample and in four of the five development groups. Affiliates with high intrafirm sales to other affiliates have higher real PPE growth in all development groups and in the full sample. Only affiliates with high intrafirm purchases from US parents do not differ significantly from their development group in real PPE growth.

Discussion of Results

The descriptive statistics highlight the following interesting characteristics of affiliate activity. Focusing on affiliates in the developing country subsample, IFT is increasing rapidly as a percent of affiliate sales. Affiliates tend to trade more bilaterally with US parents than with other affiliates. However, affiliate-to-affiliate IFT doubled as a percent of affiliate sales between 1983 and 1996.

In the developing-country subsample, affiliates with high IFT flows are quite different from affiliates that do not trade intrafirm. Affiliates with high IFT/sales tend to be larger, and have generally higher real wages and PPE growth than affiliates that have no IFT. Affiliates with high IFT tend to have larger US parents with greater international activity (as measured either by number of affiliates in the network or by total foreign affiliate sales).

We also find evidence that, for high-trade affiliates, the direction of the IFT flow (i.e., to other affiliates, from parents, to parents) seems to have systematic consequences for affiliate organization and technology. For example, affiliates with high IFT to other affiliates have a much smaller labor share (as a percent of sales) than affiliates with high IFT to US parents—approximately

16 percent versus 25 percent, respectively. Similarly, affiliates with high intrafirm sales to US parents (as a percent of total sales) actually have lower real wages on average than affiliates with no IFT to parents. In contrast, affiliates with high intrafirm *purchases* from US parents have the highest real wages of any group of affiliates.

Finally, compared with affiliates with high affiliate-to-affiliate trade, affiliates that trade extensively with US parents (in either direction) come from MNCs with a smaller network of much larger affiliates. Again, the direction of trade flows seems to matter not only to the organization of the affiliate itself, but to the configuration of the MNC.

Conclusion

The descriptive nature of our study raises many questions. Are the observed differences in affiliate and MNC structure explained by industry? In an earlier study (Feinberg and Keane 2001), we find evidence of substantial *within*-industry variation in the degree to which MNCs are organized to trade intrafirm. However, we do not know if this holds in a developing-country context.

What explains the different characteristics of affiliates that have high levels of a particular IFT flow? Are goods traded intrafirm among affiliates more likely to be of the "horizontal" variety (i.e., differentiated products) while the goods traded intrafirm between affiliates and parents are more likely to be "vertical" intermediate goods? What explains the different characteristics of affiliates that have high sales to parents versus high purchases from parents?

It may seem surprising, in light of anecdotes about low-value-added "screwdriver" plants in developing countries, that affiliates that *import* more from US parents have such high real wages. Are these imports technology- or capital-intensive goods?

Clearly, MNC affiliates that trade intrafirm are organized differently from affiliates that produce primarily for sales in the local market. We believe that IFT may be an indicator of a substantively different kind of technological configuration in the local market—one that may be more likely to generate "spillovers." This integration may be even more important than FDI, per se, in the sense that best practices may come from investment in technology within the firm, or from closer vertical linkages between unrelated and geographically distant firms, as has been documented in the auto industry.[10]

10. Moran (2001, 17) studied the effect of Japanese FDI in Thailand's auto industry. He notes that many Thai auto parts manufacturers with no ownership ties to Japanese firms received technical assistance from buyers in the course of achieving original equipment manufacturer certification. This example has two important implications for research on spillovers. First, the industries of the MNCs and the firms benefiting from "spillovers" may differ. In this ex-

In the international business literature, Kobrin (1991) suggests that IFT in goods likely signals the presence of greater knowledge flows within the firm. This is strongly supported by Moran (2001; also see chapter 11 in this volume). It seems reasonable to expect that foreign affiliates engaged in such activities may be better sources of knowledge transfer than foreign-owned firms whose practices are essentially indistinguishable from domestic firms.

IFT is only one source of heterogeneity in MNC activity that seems relevant to the issue of whether FDI is beneficial to host countries. Given how diverse the activities of MNC affiliates are in host countries, we argue that using variables such as "foreign market share" to capture this activity not only results in noisy measures, but obscures the mechanisms through which knowledge is transferred (see Keane, in the commentary for section I in this volume).

To advance the literature on FDI spillovers, the questions "What kind of FDI?" and "What is the nature of MNC activity in the local market?" need to be addressed. Researchers with micro panel data on MNCs and local firms might start by considering a priori important sources of heterogeneity and the mechanisms through which these might affect knowledge transfers. Javorcik's (2004) examination of spillovers between firms with buyer-supplier linkages is an example of such a study. Moreover, Javorcik and Spatareanu's (chapter 3 in this volume) survey on managers' perceptions of the effect of MNC activity (in the same sector) on their firms' performance also sheds light on mechanisms through which knowledge is transferred between MNCs and local firms.

From a policy standpoint, IFT appears to be an important development issue in the sense that affiliates that trade intrafirm are generally growing faster and paying higher real wages than affiliates that do not trade intrafirm. Additionally, MNCs' increasing use of IFT in production implies that the macro effects of changes in exchange rates may be more difficult to predict. If US MNCs are engaging in bilateral IFT to produce finished goods for the US market, it is not clear how their operations would be affected by real appreciations or depreciations of the dollar.

Finally, in a recent working paper (Feinberg and Keane 2004), we find that IFT is relatively insensitive to trade liberalization and other price changes.

ample, autos and auto parts are closely related. However, many other less obvious industries also supply the auto industry (e.g., chemicals, rubber, paints, etc.). Firms in these industries may also receive similar technical assistance from foreign firms. Second, vertical relationships between unaffiliated firms may be more important than FDI for "spillovers" to occur. In the extreme, one could imagine a scenario in which Japanese auto makers give technical assistance to Thai parts suppliers without the former having any physical investment in Thailand. In such a case, close integration between local and foreign firms may transfer more knowledge than foreign presence in the local market.

This is consistent with Das, Roberts, and Tybout's (2001) findings on the relative insensitivity of firm exports to different trade policy regimes. This implies that it would probably not be useful from a policy standpoint to undertake direct measures to try to encourage FDI by MNCs that trade intrafirm. Instead, the optimal policy mix may be a liberal trade and FDI regime in which MNCs could organize production most efficiently.

References

Bernard, Andrew, and J. Bradford Jensen. 2001. *Why Some Firms Export.* NBER Working Paper 8349. Cambridge, MA: National Bureau of Economic Research.

Das, Sanghamitra, Mark Roberts, and James Tybout. 2001. *Market Entry Costs, Producer Heterogeneity, and Export Dynamics.* NBER Working Paper 8629. Cambridge, MA: National Bureau of Economic Research.

Feinberg, Susan E., and Anil K. Gupta. 2004. Knowledge Spillovers and the Assignment of R&D Responsibilities to Foreign Subsidiaries. *Strategic Management Journal* 25: 823–45.

Feinberg, Susan E., and Michael P. Keane. 2001. US-Canada Trade Liberalization and MNC Production Location. *The Review of Economics and Statistics* 83, no. 1 (February): 118–32.

Feinberg, Susan E., and Michael P. Keane. 2004. *Tariff Effects on MNC Organization.* Working Paper.

Feinberg, Susan E., and Michael P. Keane. 2005. *Accounting for the Growth of MNC-based Trade Using a Structural Model of US MNCs.* Working Paper.

Feinberg, Susan E., Michael P. Keane, Mario F. Bognanno. 1998. Trade Liberalization and Delocalization: New Evidence from Firm-Level Panel Data. *Canadian Journal of Economics* 31, no. 4 (October): 749–77.

Javorcik, Beata Smarzynska. 2004. Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages. *American Economic Review* 94 (3): 605–27.

Kobrin, Steven J. 1991. An Empirical Analysis of the Determinants of Global Integration. *Strategic Management Journal* 12 (Summer): 17–32.

Kokko, Ari. 1994. Technology, Market Characteristics and Spillovers. *Journal of Development Economics* 43 no. 2: 279–93.

Kokko, Ari, Ruben Tansini, and Mario C. Zejan. 1996. Local Technology Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector. *Journal of Development Studies* 32, no. 4: 602–11.

Moran, Theodore H. 2001. *Parental Supervision: The New Paradigm for Foreign Direct Investment and Development.* POLICY ANALYSES IN INTERNATIONAL ECONOMICS 64. Washington: Institute for International Economics.

Roberts, Mark J., and James R. Tybout. 1997. The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs. *American Economic Review* 87: no. 4 (September): 545–64.

Zeile, W. J. 1997. US Intrafirm Trade in Goods. *Survey of Current Business* (US Department of Commerce) 77, no. 2 (February): 23–38.

Appendix 10.1   Countries in each development subsample

Country	Development category	Country	Development category
Australia	1	Malaysia	3
Austria	1	Mexico	3
Belgium	1	Oman	3
Brunei	1	Panama	3
Canada	1	Poland	3
Denmark	1	Russian Federation	3
Finland	1	Thailand	3
France	1	Trinidad and Tobago	3
Germany	1	Turkey	3
Hong Kong	1	Uruguay	3
Italy	1	Venezuela	3
Japan	1	Bolivia	4
Luxembourg	1	Colombia	4
Netherlands	1	Côte d'Ivoire	4
New Zealand	1	Dominican Republic	4
Norway	1	Egypt, Arab Republic	4
Singapore	1	El Salvador	4
Sweden	1	Gabon	4
Switzerland	1	Guatemala	4
United Arab Emirates	1	Indonesia	4
United Kingdom	1	Jamaica	4
Bahrain	2	Lebanon	4
Cyprus	2	Morocco	4
Greece	2	Papua New Guinea	4
Ireland	2	Peru	4
Israel	2	Philippines	4
Korea, Republic of	2	South Africa	4
Kuwait	2	Tunisia	4
Portugal	2	Cameroon	5
Saudi Arabia	2	China, People's Republic of	5
Spain	2	Haiti	5
Argentina	3	Honduras	5
Bahamas	3	India	5
Barbados	3	Kenya	5
Brazil	3	Liberia	5
Chile	3	Nicaragua	5
Costa Rica	3	Nigeria	5
Czech Republic	3	Pakistan	5
Ecuador	3	Zambia	5
Hungary	3	Zimbabwe	5

Note: Industrialized countries are development categories 1 and 2; developing countries are development categories 3, 4, and 5.