Expansion Abroad and the Domestic Operations of U.S. Multinational Firms*

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Abstract: A perennial complaint against U.S. multinational firms is one of "exporting jobs": as they expand operations in their affiliates abroad, they simultaneously reduce activities in their parent operations in the United States. The implicit assumption in this charge is that foreign activities substitute for U.S. parent activities, such that going abroad necessarily means contracting at home. Though the claim that multinationals export jobs pervades the policy debate on globalization, there has been little academic research to assess its validity directly. Economic theory suggests that this simple view of multinationals is subject to at least two important caveats. One is a distinction between substitution and scale effects. The second important caveat is a distinction between scale and scope effects. Understanding the links between the foreign and domestic activities of U.S. multinationals is ultimately an empirical task. In this paper, we aim to provide this kind of evidence. Our data are a panel covering all U.S. multinational firms—both U.S. parents and foreign affiliates from 1989 through 1999—as surveyed in legally mandated reports collected by the U.S. Bureau of Economic Analysis (BEA). One important finding is that we do not find strong evidence that foreign and parent labor are substitutes. Another finding is that reductions in host-country corporate tax rates do not reduce parent labor demand; if anything, such tax-rate reductions appear to increase parent labor demand.

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1. Introduction

A perennial complaint against U.S. multinational firms is one of "exporting jobs": as they expand operations in their affiliates abroad, they simultaneously reduce activities in their parent operations in the United States. The implicit assumption in this charge is that foreign activities substitute for U.S. parent activities, such that going abroad necessarily means contracting at home. Though the claim that multinationals export jobs pervades the policy debate on globalization, there has been relatively little academic research to assess its validity.

Economic theory suggests that this simple view of multinationals is subject to at least two important caveats. One is a distinction between substitution and scale effects. For a given level of firm-wide activity, it may be that expansion abroad means less parent activity. But this substitution effect ignores the costs savings and gains in foreign-market access from expanding abroad that may facilitate growth in the scale of firm-wide activities—both in foreign affiliates and in U.S. parents. The total impact of foreign expansion on U.S. parent activity, then, may be positive or negative, depending on the magnitudes of the substitution and scale effects.

The second important caveat is a distinction between scale and scope effects. Independent of the level of parent activity, multinational expansion abroad can also change the mix—or scope—of U.S. parent activities. There is abundant anecdotal evidence that suggests U.S. parents have become more specialized in R&D, management, and other skill-intensive business services, and less specialized in production activities that use less-skilled labor intensively. Even if expanding abroad does reduce the scale of parent activities, it may change the composition of these activities (e.g., more innovation) in a way that benefits the United States.

Understanding the links between the foreign and domestic activities of U.S. multinationals is ultimately an empirical task. In this research project, we aim to provide evidence on these links.

Our data are a panel covering all U.S. multinational firms—both U.S. parents and foreign affiliates from 1989 through 1999—as surveyed in legally mandated reports collected by the U.S. Bureau of Economic Analysis (BEA). Our panel combines both BEA and non-BEA data to measure both the operations of these firms and the factors shaping these operations.

Our research tracks the evolution of these firms over time, with a focus on the relationship between the scale and scope of foreign-affiliate and U.S.-parent activities. We examine how expansion abroad affects the scale and scope of activities performed by U.S. parents. As a U.S. firm increases production in its foreign affiliates, how do the parent's scale of activity and range of activity change? Related to this, we also examine whether how a firm expands abroad affects the impact on the parent. For example, does it matter whether affiliate activity concentrates in low-wage or high-wage host countries?

To answer these questions, we frame our empirical analysis in a standard cost-minimization framework that allows us to estimate the derived demands for parent activities, such as hiring labor in general or R&D labor in particular. Our measure of parent scale is thus parent total employment. These labor demands will depend on the own price of these activities, as well as the prices of other activities the firm chooses among, such as hiring high-skilled or low-skilled labor in its foreign affiliates. We then estimate these demand equations on two different firm-year panels: the 1989-1994 panel and the 1994-1999 panel. The panel nature of our data allows us to address a number of measurement and estimation issues.

Our empirical analysis starts with a particular focus on the substitution between U.S. parent and foreign-affiliate labor in matched manufacturing industries. In addition to simplifying important measurement and estimation issues, this initial focus is important because it encompasses much of the traditional policy and business concerns about multinationals. The extent of within-manufacturing labor substitutability comes closest to much of the "exporting jobs" complaints about multinationals. If evidence in support of this complaint cannot be found with our initial sample of U.S. parents, then we are skeptical of finding it in other contexts.

We have three important initial findings. One is that expansion in the scale of activities by foreign affiliates appears to raise demand for labor in U.S. parents. Higher sales in foreign affiliates appear to raise, not lower, U.S. parent employment. A second finding is that the substitutability or complementarity between parent and foreign labor appears to depend on the skill composition of foreign labor. U.S. labor appears to be a price complement with high-skilled foreign labor and a price substitute with low-skilled foreign labor. A third finding is that reductions in host-country corporate tax rates do not appear to reduce parent labor demand. If anything, reductions in host-country corporate tax rates tend to increase parent labor demand. These results are much stronger in the 1989-1994 panel than in the 1994-1999 panel, which suggests that business cycles may influence how expansion abroad affects U.S. parents.

2. Related Research

Our work is relevant to several bodies of literature on multinational enterprises. One is empirical work on theories of multinational firms. Theory tends to view multinationals as the result of either horizontal expansion (in which firms save on trade costs associated with exporting by setting up foreign facilities whose range of production activities mirrors the operations they perform at home) or vertical expansion (in which firms fragment different production stages across different countries to arbitrage international differences in factor prices).[1] Casual evidence suggests that horizontal FDI is the dominant strategy of U.S. multinationals. In 1998, OECD countries accounted for 76.6% of sales by affiliates of U.S. firms (Hanson, Mataloni, and Slaughter, 2001), giving the impression that market size (and not wage levels) is the host-country feature U.S. multinationals care most about.

Several recent studies test theories of FDI rigorously by using aggregate data on the total sales of U.S. foreign affiliates by country (or by country and industry).[2] Most studies find that affiliate sales are higher in larger countries and in countries with higher tariffs and transport costs on U.S. goods, but not in countries with larger skill differences relative to the United States. These results are interpreted as evidence in favor of horizontal FDI and against vertical FDI.

In our work, we do not treat horizontal and vertical FDI as mutually exclusive options. The same U.S. multinational might choose to operate in France an integrated plant to produce for the domestic market and might also choose to operate in China a specialized factory to assemble components manufactured by the U.S. parent. The French affiliate would be the result of horizontal FDI, the Chinese affiliate vertical FDI. Instead, we are most interested in the implications for the scale and scope of parent activities of the evolving pattern of foreign-affiliate activities—regardless of whether those foreign affiliates would be classified as horizontal, vertical, or some combination. Different models of FDI offer different predictions for whether affiliate and parent labor should be substitutes or complements, and the empirical studies cited above offer no direct evidence on these within-firm linkages.

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[1] On the former, see Markusen (2002) and Markusen and Venables (2000). On the latter, see Helpman (1984), Helpman and Krugman (1985), and Yeaple (2001). Ekholm, Forslid, and Markusen (2003) model "export platform" FDI, in which most affiliate output is exported out of the host country, an affiliate activity that shares both horizontal and vertical features.

[2] See Brainard (1997); Markusen and Maskus (1999); Blonigen, Davies, and Head (2002); and Helpman, Melitz, and Yeaple (2003). Yeaple (2001) finds the impact of host-country education on affiliate sales to be weaker for less-skill-intensive industries, suggesting that multinationals in these industries prefer less-skill-abundant countries.

With horizontal FDI, where it is generally assumed that trade barriers preclude serving the foreign market through exports, there may be no link between production-labor demands of parents and affiliates if production in the two locations serves distinct markets. Alternatively, there may be slight complementarity between affiliate labor demand and parent demand for "headquarter services" labor, e.g., R&D workers, if greater affiliate activity stimulates the need for more firm-wide headquarter services.

With vertical FDI, in the process of establishing a vertical production network across borders by relocating production activities from parents to affiliates, parent and foreign labor may be strong substitutes. As discussed in the introduction, this particular aspect of multinationals receives widespread attention in many policy and business discussions of FDI. But once vertical production networks are established with distinct production activities separated among parents and affiliates, then parent and foreign labor may become complements.

For example, consider two simple production stages: input manufacturing and input processing. Input manufacturing often involves producing sophisticated componentry, and so is likely to be relatively skill and capital intensive. Input processing often is limited to assembly, and so is likely to be relatively labor intensive. With vertical FDI, where the home country is generally assumed to have a relative abundance of skilled labor, parents may well focus on input manufacturing and affiliates on input processing. Positive shocks to final demand (e.g., from lower production costs thanks to lower affiliate wages) may induce the firm to raise labor demand in both locations. As these examples demonstrate, determining the actual linkages between parent and affiliate activities is ultimately an empirical task.

Research that is most closely related to ours includes Brainard and Riker (1997) and Riker and Brainard (1997). Brainard and Riker (1997) examined production linkages for a panel of manufacturing multinationals from 1983 to 1992. They concluded that affiliate and parent employment were weak substitutes, and that stronger substitutability exists among different affiliates within the same firm (though with evidence of complementarity across affiliates if located in hosts at very different levels of development). One important difference with our work is the sample period: as we emphasized in Hanson, et al (2001), many broad patterns in U.S. multinationals looked quite different between the 1980s and 1990s. Another important difference is our interest in previously under-examined aspects of U.S. multinationals, such as those whose main operations lie outside of manufacturing.

Other bodies of literature to which our work relates includes studies on the labor-market consequences of foreign outsourcing (see the survey in Feenstra and Hanson, 2002), empirical studies on the magnitude of spillovers associated with FDI (e.g., Haskel, Pereira, and Slaughter, 2001), and recent theoretical work on how trade costs shape ownership and outsourcing decisions in multinational firms (Grossman and Helpman, 2002a,b).

3. An Empirical Model

In this section, we develop an empirical framework for how U.S.-headquartered multinationals organize their operations worldwide. To start simply, assume that a U.S. multinational has previously chosen in which countries to locate affiliates. The remaining decision is over which production activities the firm should perform where. For a U.S. multinational, these production activities include the following: hiring U.S. labor of various kinds; hiring foreign labor of various kinds; hiring U.S. capital; hiring foreign capital; and purchasing intermediate inputs—either by the parent or by the foreign affiliates, and either arm's length or intra-firm. By assuming that each profit-maximizing firm chooses these activities based on firm and market considerations such as its technology and activity prices, we can derive expressions for activity demand.

A widely used empirical model for estimating activity demands is a log-log framework (see, e.g., Hamermesh's 1993 survey). For each parent firm choosing among *J* different production activities, this model can be written as follows,

$$(1) \qquad \ln L^j = \alpha + \sum_{k=1}^{J} \beta_{jk} \ln W^k + \phi \ln Y$$

The expression in (1) relates the demand for activity j to technology, prices of variable activities, and the level of output. L^j is the parent firm's demand for a particular activity *j*; W^k is the price of activity *k* facing the parent; Y is the parent's level of output; and α proxies for unobservable features such as the parent's technology. Under the assumption that these activity costs W^k are exogenous to each firm, then demand L^j in (1) can be measured simply by observed firm employment.

For each activity *j*, the key parameters to be estimated are the *J* coefficients β_{jk}. Given the log-log structure on equation (1), these correspond to the constant-output own-price and cross-price activity-demand elasticities. The constant-output own-price demand elasticity for each activity should be negative (i.e., $\beta_{jj} < 0$). As the cost of a particular production activity rises, profit-maximizing firms substitute away from that activity towards others. The constant-output cross-price demand elasticities can take any value. $\beta_{jk} < 0$ indicates that activities *j* and *k* are price complements: lower (or higher) costs for activity *k* raise (or lower) demand for activity *j*. Conversely, $\beta_{jk} > 0$ indicates that activities *j* and *k* are price substitutes: lower (or higher) costs for activity *k* lower (or raise) demand for activity *j*.

As stated in the introduction, much discussion about multinationals presumes that for these firms parent and foreign labor are price substitutes—i.e., that for these two production activities $\beta_{jk} > 0$. With appropriate data, the framework of equation (1) should allow us to test this presumption against the data. As discussed in Section 2, recent economic models of multinational firms suggest that the pattern of activity demands within multinationals is *ex ante* uncertain. With generalizations of the basic framework of (1), we aim to examine how U.S. parent demand for labor varies with issues of substitution, scale, and scope.

To estimate a version of equation (1) on the BEA data, it is helpful to introduce some additional notation. Our data cover each U.S. parent firm *p* in year *t*, where each parent's sales can span multiple industries but are largest in industry *i*. Each parent has one or more foreign affiliates *a*, whose primary industry of sales may or may not be the same as that of the parent. Using data from BEA and non-BEA sources, we can construct measures of several activity costs W_h and of parent output Y.

Unfortunately, we do not have reliable direct measures of each parent-year's technology α. Accordingly, to proxy for this we exploit two dimensions of the panel nature of our data. First, we estimate equation (1) on time-differenced data, which controls for any time-invariant, firm-specific elements of α and thus labor demand (e.g., firm business strategy or technology differentials). Second, we include in our time-differenced specifications a full set of industry fixed effects. These control for any changes in α and thus labor demand that are common to all firms in the same industry (e.g., skill-biased technological change). They may also control for activity prices not directly measured in our BEA data (e.g., the price of parent inputs).

The price of foreign labor captures the cost to the U.S. parent of importing labor services from its foreign affiliates. If the parent demands these services to produce intermediate inputs or to process intermediate inputs into final outputs that it brings back to the United States, then the parent will have to pay trade costs on the services provided by its affiliates. For this reason, we include average trade costs (ad valorem import tariffs plus freight rates) between the parent and its foreign affiliates as a determinant of parent labor demand. Similarly, importing services from foreign affiliates generates foreign source income, which is subject to taxation by foreign governments. Foreign corporate income tax rates will accordingly be another factor that affects the willingness of a parent to import services from its affiliates and thereby parent labor demand.

With this notation and discussion of activity demands, we can write the following estimating equation,

$$(2) \qquad \begin{aligned} \Delta \ln L^{j}_{pit} &= \alpha_{it} + \beta_{jj}\Delta \ln W^{j}_{pit} + \beta_{jh}\Delta \ln W^{h}_{pit} + \beta_{jl}\Delta \ln W^{l}_{pit} \\ &+ \beta_{jm}\Delta \ln(1+tc)^{m}_{pit} + \beta_{j\tau}\Delta \ln(1-\tau)_{pit} + \phi_{jy}\Delta \ln Y_{pit} + \gamma \ln X_{pit} + \varepsilon_{pit} \end{aligned}$$

where the operator Δ indicates time differences. Our regressand L^{j}_{pit} represents the demand for labor of type *j* by parent *p* in industry *i* at time *t*. After the fixed effects α_{it}, the next five regressors represent five activity prices of interest: W^{j}_{pit} is the price for labor *j* facing the U.S. parent *p* in industry *i* at time *t*; W^{h}_{pit} is the cost of high-skilled labor facing parent *p*'s affiliates in industry *i* around the world at time *t*; W^{l}_{pit} is the analogous cost of less-skilled labor; $(1+tc)^{m}_{pit}$ is the average trade cost on imported intermediate inputs facing the U.S. parent *p* in industry *i* at time *t*; and $(1-\tau)_{pit}$ is (one minus) the average corporate income tax rate facing parent *p*'s affiliates in industry *i* around the world at time *t*. Y_{pit} represents total sales of U.S. parent *p* in industry *i* at time *t*. Finally, X_{pit} captures other possible determinants of labor demand, such as parent capital stock, affiliate sales, and GDP in the countries of a parent's affiliates.

Using ordinary least squares, we will estimate versions of equation (2) on our two panels: 1989-1994 and 1994-1999. In many countries around the world, the macroeconomic environment was quite different across these two periods. The earlier period saw a business-cycle peak followed by a trough and then initially slow recover; the later period saw sustained growth throughout. There may also have been very different microeconomic-policy regimes across the two periods. For reasons such as these we prefer estimating the two panels separately, to allow potentially different factor-demand patterns across the two.

Before reporting estimation results, we first discuss our BEA and non-BEA data sources and also how we construct our key variables. We then briefly present some summary statistics and figures for our estimation samples.

4. Data Description and Summary Statistics

4.1 Data Sources and Estimating Equation

Much of our data come from BEA's 1989, 1994, and 1999 benchmark surveys of U.S. direct investment abroad, which collect data on the operations of U.S. parent companies and their foreign affiliates. Important non-BEA data sources include the United Nations Industrial Development Organization (UNIDO, 2003) for affiliate wages, the Office of Tax Policy Research (2003) for corporate tax rates, and Feenstra, Romalis, and Schott (2002) for costs facing U.S. parents of imported intermediate inputs.

4.1.1 BEA Data and Variable Construction

A U.S. parent is a U.S. legal entity, such as a corporation, that generally controls a business enterprise located in the United States and that engages in direct investment abroad. A foreign affiliate is a foreign business enterprise (incorporated or unincorporated) in which there is U.S.

direct investment; that is, it is a foreign business enterprise in which the U.S. parent has at least a 10-percent equity stake. The analysis in this paper covers only majority-owned foreign affiliates (MOFA's). Unlike other foreign affiliates, MOFA's are usually under U.S. managerial control and some of the data analyzed are collected only for MOFA's.

Industry of Parent or Affiliate. Each U.S. parent and foreign affiliate is classified in a single industry, even though many parents and affiliates have activities multiple industries. As a result, the distribution of data by industry of U.S. parent or foreign affiliate differs from the distribution that would result if each individual activity of a parent or an affiliate was distributed by industry. In the BEA benchmark surveys, sales by U.S. parents and foreign affiliates and employment by U.S. parents were classified by industry. Because a parent or affiliate that has an establishment in an industry usually also has sales in that industry, the distribution by industry of sales roughly approximates the distribution that would result if the data were reported and classified by industry of establishment. The analysis in this paper is restricted to parent employment by industry of sales in the single most important (i.e., primary) industry of sales, and parent and affiliate wages by the primary industry of classification. The BEA industry classification system is based on the U.S. Standard Industrial Code (SIC) system, with each BEA industry corresponding to some combination of three- or two-digit SIC industries.

Parent Employment. Employment represents the number of full-time and part-time employees on the payroll at the end of the year covered by the survey. We have two possible measures of parent employment, L^j_{pit}. One is total employment of all worker types. The other employment of R&D workers. We think that R&D employment may inform issues of firm scale and scope. For example, even if foreign-affiliate expansion of production-worker employment reduces parent production-worker employment, it might stimulate parent employment in other activities such as R&D (and executive and management jobs). Ideally the BEA data would measure parent (and affiliate) employment for several occupation groups, but for our three years the only consistently measured occupation disaggregation for parents is R&D employment.

Parent Wages. Our measure of parent wages, W_{pit}^{j}, represent average annual compensation paid by the parent per employee; they are derived by dividing total compensation (wages and salaries plus employee benefits) by the number of employees. Compensation data are not reported separately for R&D workers, so we use the same parent-wage measure for both total and R&D employment regressions.

Parent Output and Affiliate Output. Our measure of parent output, Y_{pit}, is the value of all parent final sales. One of our control variables in X_{pit} is the change in affiliate output, measured as the value of all affiliate final sales.

Parent Capital Stock. One of our control variables in X_{pit} is the change in parent capital stock. Following the lead of a large number of studies in industrial organization and labor economics on labor demand, by including the quantity (rather than price) of capital we are thus treating capital as a quasi-fixed (rather than variable) activity choice for multinationals.[3] Capital stock primarily represents the dollar value of land and physical capital (i.e., property, plant, and equipment), at historical cost.

4.1.2 Non-BEA Data and Variable Construction

Affiliate Wages. Our primary data source for affiliate wages is UNIDO (2003)'s *Industrial Statistics Database*. This database is a panel of industry-country-year observations that reports

[3] In future work we plan to relax this assumption, both by including proxies for capital costs as regressors in these labor-demand equations and also by estimating equations with capital rather than labor as the regressand.

both total employment and total compensation and thus can be used to calculate compensation per worker along these dimensions. For our estimation purposes, we first used certain industries to construct a measure of more-skilled and less-skilled wages that varies by country and year. Our more-skilled wage is the average compensation per worker paid in three industries: industrial chemicals, transportation equipment, and scientific/professional equipment (ISIC codes 351, 384, and 385, respectively). In most countries in our sample, these are the highest wage industries and their average wages are a proxy for the price of high-skilled labor. Similarly, our less-skilled wage is the average compensation per worker paid in three industries: textiles, apparel, and footwear (ISIC codes 321, 322, and 324, respectively). In most countries in our sample, these are the lowest wage industries and their average wage is a proxy for the price of low-skilled labor. To smooth out any potential business-cycle impacts, for each of our three years of BEA data we constructed these country-year wages using UNIDO data averaged between that and the previous year.

These raw country-year wages were inputs for constructing our two affiliate wage regressors, $\Delta \ln W^{h}_{pit}$ and $\Delta \ln W^{l}_{pit}$. For each parent *p* in year *t*, we constructed each of its two affiliate wage changes as a weighted average of the changes in UNIDO country-year wages across all the host countries in which that parent has an affiliate in the parent's primary industry *i*, where the weights assigned to each affiliate correspond to that its share of worldwide affiliate sales in the initial year for that parent firm. Conceptually, different parents face different changes in affiliate wages to the extent that they operate different worldwide configurations of affiliates (both in terms of host countries and relative affiliate sizes). We experimented with alternative weighting schemes (e.g., using employment instead of sales, or allowing the weights to vary across the two years) but obtained very similar results to those reported.

Affiliate Corporate Tax Rates. Our primary data source for affiliate corporate tax rates is the *World Tax Database* of the Office of Tax Policy Research at the University of Michigan. This database is a panel of country-year observations that reports statutory corporate income tax rates in terms of maximum marginal tax rates.

With this panel of country-year tax rates, we constructed our affiliate tax-rate regressor, $\Delta\ln(1-\tau)_{pit}$, analogous to the affiliate wage regressors. For each parent *p* in year *t*, we constructed the weighted average of the changes in country-year corporate tax rates across all the host countries in which that parent has an affiliate in the parent's primary industry *i*, where the weights assigned to each affiliate correspond to that its share of worldwide affiliate sales in the initial year for that parent firm. Conceptually, different parents face different changes in corporate tax rates to the extent that they operate different worldwide configurations of affiliates (both in terms of host countries and relative affiliate sizes). As above, different weighting schemes did not materially affect our results. One point to note is that we average the log of one minus the tax rate, which means that positive (or negative) changes in $\Delta\ln(1-\tau)_{pit}$ correspond to reductions (or increases) in the host-country tax rates facing firms.

Parent Costs of Imported Intermediate Inputs. An important issue for multinational-wide costs is whether the firm engages in vertical production networks across borders in which different stages of production occur in different countries. Multinationals may engage in such networks both arm's length and intra-firm. Either way, to understand parent labor demand an important activity cost should be that of imported intermediate inputs.

Unfortunately, the BEA data do not report any transaction prices for U.S. parent imports of intermediates, either arm's length or intra-firm. But we can incorporate data on an important component of these transaction prices: the trade costs of tariffs and transportation costs. Our primary data source for these trade costs is Feenstra, Romalis, and Schott (2002). This database is a panel of industry-country-year observations on the bilateral values of U.S. exports, U.S. imports, and the duties and transportation costs incurred in bringing these imports into America.

We first calculated *ad valorem* tariffs and transportation costs, aggregated the industry-year trade barriers up to the BEA industries (using as weights U.S. exports) country-by-country, and then summed these tariff and transport costs (and also added one) to generate a single trade-cost measure for each BEA industry-country-year.

With this panel of country-industry-year trade costs, we constructed our parent materials-cost regressor, $\Delta \ln(1+\mathrm{tc})^{\mathrm{m}}_{\mathrm{pit}}$, analogous to the affiliate wage and tax regressors. For each parent *p* in year *t*, we constructed the weighted average of the changes in country-year trade costs across all the host countries in which that parent has an affiliate in the parent's primary industry *i*, where the weights assigned to each affiliate correspond to that its share of worldwide affiliate employment in the initial year for that parent firm. Conceptually, different parents face different changes in trade-related materials costs to the extent that they operate different worldwide configurations of affiliates (both in terms of host countries and relative affiliate sizes). As above, different weighting schemes did not materially affect our results.

Affiliate Host-Country GDP. One of our control variables in $\mathrm{X}_{\mathrm{pit}}$ is the change in GDP in the host countries in which multinationals operate. Our primary data source for GDP is the World Bank, which has a panel of country-year observations on purchasing-power-parity measures of total GDP. We transformed this raw country-year GDP data into changes in host-country GDP facing each parent firm analogous to our construction of other non-BEA regressors.

4.2 Summary Statistics

For our two panels used to estimate our initial specifications, 1989-1994 and 1994-1999, Table 1 reports summary statistics for changes in several of the key variables in our analysis, where the changes are full-period percentage changes calculated separately for each of our two panels on the primary regression sample for each.

One notable difference across the two periods is the faster growth in parent activity—total employment, R&D employment, capital stock, and sales—during the second period than the first. The first panel roughly corresponds to the peak-to-trough period in the business cycle of the United States and many other countries. In contrast, the second panel covers a period of ongoing robust expansion in many parts of the world. In addition, this second panel was a period of particularly fast growth in many measures of FDI activity worldwide. The differential growth rates in Table 2 broadly correspond with both the business-cycle and FDI trends. For example, average parent employment actually shrank 1989-1994 by about 5.7%, whereas it expanded 1994-1999 by about 8.2%. But consistent with the idea that R&D is a firm-wide input for multinationals that must invested in throughout the business cycle, note the much-smaller cross-panel variation in growth in R&D employment, which indeed remained positive even in the 1989-1994 period.

Figures 1 through 4 visualize the variation we have in several of our key variables from Table 1. For dozens of the countries in our data analysis, Figure 1 plots the 1989 relative wage (defined as the ratio of high-skilled to low-skilled wages) against its 1999 counterpart. Most countries lie above the imaginary 45-degree line, which means that they experienced rising returns to skills: the high-skilled wage relative to the low-skilled wage was higher in 1999 than in 1989. That said, there is substantial heterogeneity in country wage developments. Our regression analysis exploits this variation to examine changes in parent labor demand.

Figure 2 plots each country's 1989 average tariff (averaged across all industries in that country) against its 1999 counterpart. This figure shows much less variation than does Figure 1: many low-tariff countries are clustered around the origin, with slightly lower 1999 tariffs than 1989 tariffs consistent with ongoing trade liberalization during the 1990s (e.g., implementation of the Uruguay Round of the GATT/WTO). Figure 3 plots an analogous figure for average freight rates. Here there is more cross-country spread than in Figure 2, with less of a concentration near the origin. But there is very little within-country variation in transportation costs over time, as evidenced by most countries lying near or on the imaginary 45-degree line. That changes in trade barriers appear to be quite small is also reflected in Table 1, where the mean changes in trade costs are closer to zero than any other changes.

Finally, Figure 4 plots each country's corporate income tax rate in 1989 and 1999. The worldwide trend over the 1990s towards lower corporate tax rates is apparent in most countries lying below an imaginary 45-degree line. But as with Figures 2 and 3, here too we worry about the relatively small magnitude of the changes. Accordingly, in some specifications of equation (2) we include in X_{pit} the initial levels of trade costs and tax rates.

5. Estimation Results

Tables 2 through 5 report the estimation results for equation (2). We have four sets of results: two each for the two separate panels, and for each panel one using parent total employment as the regressand and one using parent R&D employment as the regressand. In each table two different specifications of equation (2) are reported, the second of which includes a larger set of regressors in the X_{pit} controls.

For all specifications, it is important to note the nature of the estimation sample: each observation corresponds to a multinational firm with affiliate activity in both years covered by the panel. Thus, by construction each estimation sample contains only "ongoing" multinationals to the exclusion of any multinational births or deaths. The nature and importance of these births and deaths is an important issue, but one that we leave for subsequent work.[4]

We begin with Table 2, which shows results for total U.S. parent employment in the 1989-1994 panel. As a preliminary check as to whether this specification is sensible, we note that the coefficient on the parent wage is about -0.30. This suggests that a 10% rise in parent wages would reduce parent employment by 3%. These estimates of the own-price elasticity of labor demand are quite in line with similar estimates reported in the literature. Our estimates fall squarely within the [-0.15, -0.85] range found by Hamermesh (1993) in his literature survey, "with 0.30 being a good 'best guess' (p. 135). Also, the coefficients on parent capital stock and parent sales are both positive and precisely estimated, as expected and consistent with previous work on the output elasticity of labor demand.

Turning to the parameters of interest, the coefficient on affiliate sales is positive and statistically significant. This suggests that, holding parent sales constant, an increase in sales by affiliates is associated with an increase in employment by U.S. parents. Thus, expansion abroad appears to make U.S. parents more intensive in their use of labor. However, the quantitative

[4] Some parents that leave the sample between benchmark years do so because they go out of business, while others leave the sample because they are acquired by other firms. The first type of parents represents true firm deaths, but the second type clearly does not. Fortunately, the BEA contains some information on M&A activities by parents, which we will exploit in future research.

effect is small. The coefficient of 0.03 suggests that a 10% increase in affiliate sales increases parent employment by only 0.3%. Still, this positive coefficient differs sharply from what one would expect under the multinationals-export-jobs hypothesis.

The coefficient on affiliates wages for more-skilled labor is negative and the coefficient on affiliate wages for less-skilled labor is positive, with both statistically significantly different from zero. A negative coefficient suggests that more-skilled affiliate labor is a price complement to parent labor. As more-skilled affiliate labor becomes less expensive, parents demand more U.S. labor, with the coefficient estimates of about –0.3 indicating that a 10% fall in affiliate more-skilled wages raises parent labor demand by about 3%. What this result may indicate is that more-skilled employees in foreign affiliates are primarily dedicated to tasks that increase overall firm sales, both in the affiliate and in the parent.

The positive coefficient on less-skilled affiliate labor indicates that this factor is a price substitute for U.S. parent labor. As less-skilled labor becomes cheaper in countries that host its foreign affiliates, parent demand for U.S. labor declines, with the coefficient estimates of about 0.3 indicating that a 10% fall in affiliate more-skilled wages reduces parent labor demand by 3%. This finding is consistent with the idea that expansion abroad exposes workers in U.S. parents to competition from foreign labor. That price substitutability holds for less-skilled but not more-skilled labor may suggest that this competition is most intense in low-end factory jobs.

Consistent with our finding on less-skilled labor, the coefficient on trade costs is positive. This suggests that decreases in trade costs between parents and their affiliates, which would make it less costly for parents to import labor services from affiliates, are associated with decreases in demand for parent labor. In column (1), the coefficient on the change in trade costs is statistically insignificant. In column (2), we add trade costs in the initial period as a regressor.

This controls for the possibility that expansion abroad may be a dynamic process subject to adjustment costs, in which case parent employment may depend on not just changes in trade costs but also their initial level. With the initial trade cost included, the change in trade cost becomes statistically significant. The coefficient on initial trade costs is also positive, consistent with the coefficient on the change in the variable, though it is not precisely estimated.

The results on corporate income tax rates in affiliate host countries are perhaps harder to interpret. In column (1), the coefficient on this variable (which, again, is constructed as one minus tax rates) is positive. This indicates that decreases in tax rates in host countries for affiliates are associated with increases in parent U.S. employment. However, the variable is not precisely estimated. Whether this coefficient is positive or zero, our findings are inconsistent with the common perception that reductions in tax rates abroad induce U.S. multinationals to contract their operations at home and lower U.S. employment. Similar to our treatment of trade costs, we also add tax rates in the initial period as a regressor. Again, this accounts for possible transitional dynamics in how multinationals respond to changes in the costs of doing business abroad. The coefficient on the change in tax rates remains positively and statistically insignificant. However, the coefficient on the initial tax rate is negative. This suggests that U.S. parents that began with affiliates in lower-tax host countries had slower employment growth.

In Table 3, we perform this same regressions as in Table 2 but now use as the dependent variable U.S. parent R&D employment. The number of observations declines because some parents do not report employment in R&D in the BEA benchmark survey. The results are qualitatively similar to those in Table 3, as the signs on all coefficient estimates in the two tables are the same. However, the coefficient estimates in Table 3 are estimated with much less precision that those in Table 2. Only the coefficient estimate on parent sales is statistically significant. The loss of precision may reflect variation in across parents in how R&D activities are defined, producing more statistical noise in measured R&D employment. It may also reflect the fact that because R&D activity generates firm-wide competitive benefits, its employment is less sensitive to cost considerations such as various wages facing the firm.

In Table 4, we present results on total U.S. parent employment for the later time period, 1994-1999. The results on the parent wage, parent sales, and the parent capital stock are quite similar to those in Table 2. The estimates of the coefficients on these variables are again sensible and in line with previous literature. However, the coefficients on affiliate wages, sales, trade costs, and tax rates are now all imprecisely estimated.

Several factors may account for the deterioration in the statistical performance of equation (2) between the two time periods. One is that the late 1990s was an exception time in the global economy. There were unprecedented booms in certain industries, such as electronics and information technology. During this period, firms may have been more concerned with getting goods to market quickly and trying to establish and preserve market share than with the short-run cost-minimizing behavior that our specification imposes on the data. In light of these pronounced cross-industry differences in business cycles, our full set of industry effects α_{it} may be absorbing much of the variation in parent employment changes, with little residual variation to be explained by our regressors of interest. Volatility in emerging economies during this period, such as the Asian financial crisis, currency crises in Mexico and Brazil, and turbulence in transition economies, would only compound these problems.

A second factor is that the late 1990s also saw a major wave of cross-border mergers and acquisitions (M&As). Our BEA data do contain some information on M&A activity, but we have yet to incorporate this information into our empirical analysis. Again, by construction the framework in equation (2) limits our analysis to ongoing multinational firms to the exclusion of sample entry and/or exit. Failure to account for M&As could lead to measurement problems.

In Table 5, we present results on U.S. parent R&D employment for the later time period, 1994-1999. In future work, we plan to investigate issues such as business cycles and M&As to better understand the 1994-1999 period than our initial results in Tables 4 and 5.

6. Conclusions

A perennial complaint against U.S. multinational firms is one of "exporting jobs": as they expand operations in their affiliates abroad, they simultaneously reduce activities in their parent operations in the United States. The implicit assumption in this charge is that foreign activities substitute for U.S. parent activities, such that going abroad necessarily means contracting at home. Though the claim that multinationals export jobs pervades the policy debate on globalization, there has been little academic research to directly assess its validity by using firm-level data for U.S. parents and foreign affiliates.

To provide some empirical evidence on these issues, in this paper we have used a standard cost-minimization framework that allows us to derive the demand for parent activities, such as hiring labor in general or R&D labor in particular. These demands will depend on the own price of these activities, as well as the prices of other activities the firm chooses among, such as hiring labor in affiliates. We then estimated these demand equations on two different firm-year panels, 1989-1994 and 1994-1999, where the panel nature of our data allows us to address a number of measurement and estimation issues.

Our empirical analysis has focused on the degree of substitution between U.S. parent and foreign-affiliate labor in matching manufacturing industries. In addition to simplifying important measurement and estimation issues, this initial focus on manufacturing and on parents and affiliates in the same lines of business is important because it encompasses much of the traditional concerns about multinationals. The multinationals-export-jobs hypothesis suggests several strong predictions about the coefficient estimates for our activity-demand equations.

Our single overarching result is that the global operations of U.S. multinationals are far more complicated than suggested by the multinationals-export-jobs hypothesis. More specifically, our analysis yields three main results. One is that expansion in the scale of activities by foreign affiliates appears to raise demand for labor in U.S. parents. Higher sales in foreign affiliates appear to raise, not lower, U.S. parent employment. A second finding is that the substitutability or complementarity between parent and foreign labor appears to depend on the skill composition of foreign labor. U.S. labor appears to be a price complement with high-skilled foreign labor and a price substitute with low-skilled foreign labor. A third finding is that reductions in host-country corporate tax rates do not appear to reduce parent labor demand. If anything, reductions in host-country corporate tax rates tend to increase parent labor demand. These results are much stronger in the 1989-1994 panel than in the 1994-1999 panel, which suggests that business cycles may influence how expansion abroad affects U.S. parents.

In future research we plan to extend our estimation framework to consider more completely issues of firm scale and scope. For example, we plan to account for the fact that parents and affiliates can span multiple and different lines of business. We expect that this future research will paint a picture of the global operations of U.S. multinational firms that is even more complex and farther-removed from that of the multinationals-export-jobs idea.

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Figure 1: Country-Level Relative Wages

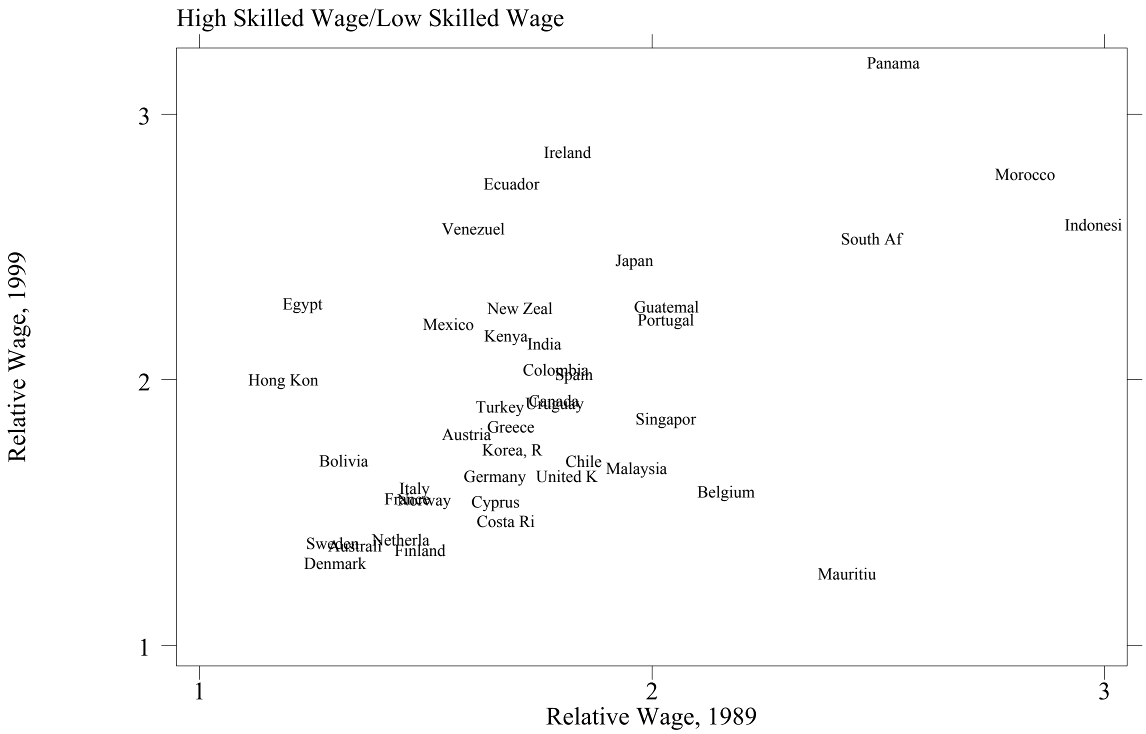

Figure 2: Country-Level Tariff Barriers

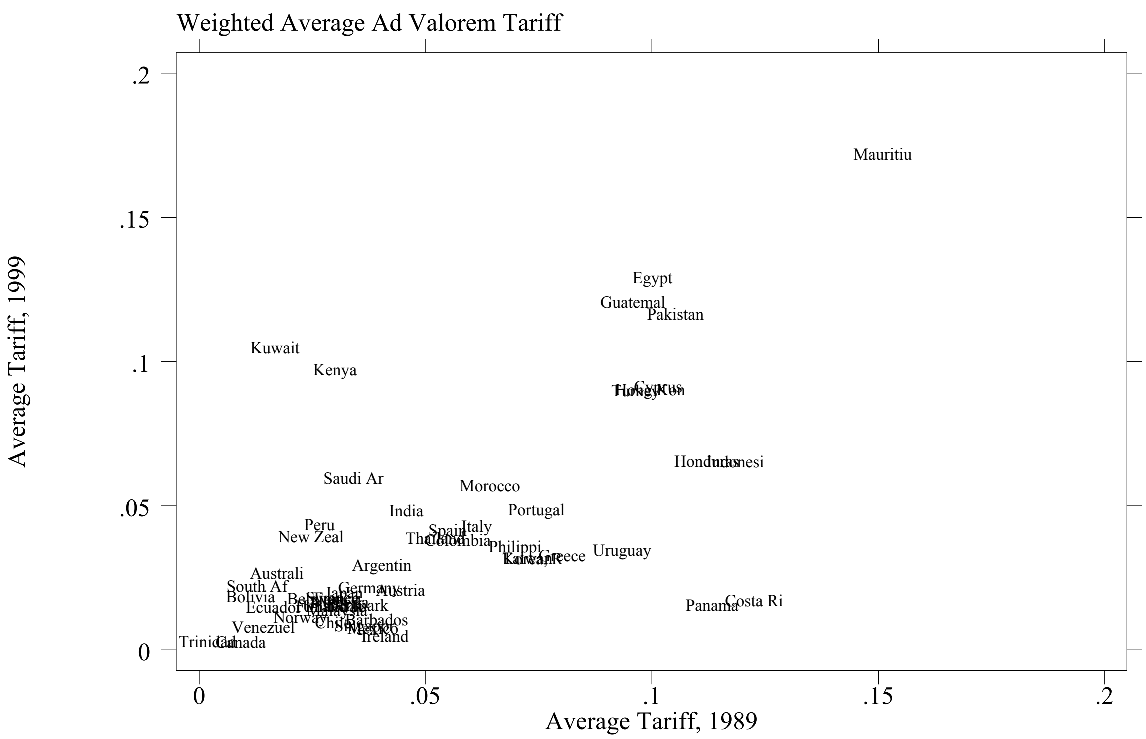

Figure 3: Country-Level Transportation Costs

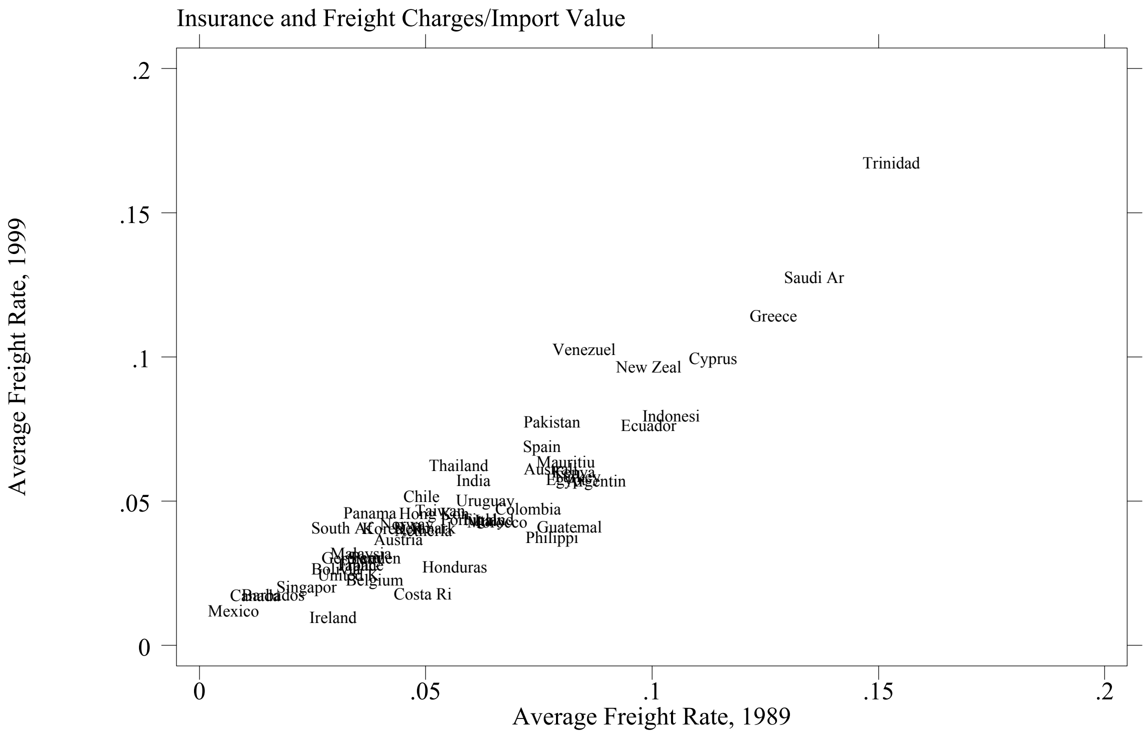

Figure 4: Country-Level Corporate Tax Rates

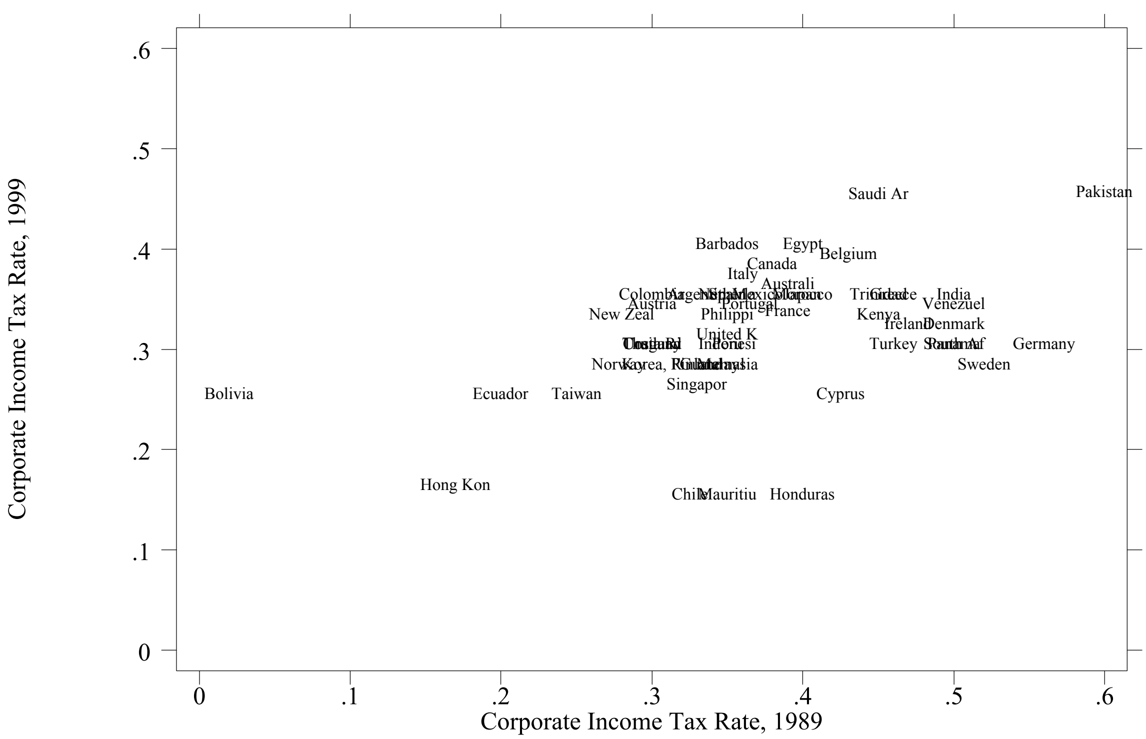

Table 1: Summary Statistics

Variable	Mean %Δ 89-94 (s.d.)	Mean %Δ 94-99 (s.d.)
Parent Total Employment	-0.057	0.082
	(0.416)	(0.552)
Parent R&D Employment	0.077	0.085
	(1.163)	(1.216)
Parent Wage	0.233	0.171
	(0.361)	(0.494)
Affiliate More-Skilled Wage	0.154	0.050
	(0.177)	(0.143)
Affiliate Less-Skilled Wage	0.121	0.041
	(0.160)	(0.198)
Parent Trade Costs	-0.004	-0.011
	(0.021)	(0.013)
(1- Host Country Tax Rate)	0.015	0.023
	(0.028)	(0.049)
Host-Country GDP	0.138	0.141
	(0.100)	(0.107)
Affiliate Sales	0.235	0.589
	(0.802)	(0.808)
Parent Capital Stock	0.249	0.382
	(0.582)	(0.691)
Parent Sales	0.212	0.305
	(0.382)	(0.470)
No. Observations	571	476

Notes: Percent changes are calculated as changes in logs. For all variables but *Parent R&D Employment* in columns 1 and 2, the number of observations corresponds to the size of the regression samples in Tables 2 and 4, respectively. For the R&D variables in columns 1 and 2, the number of observations is smaller than that reported and instead corresponds to the size of the regression samples in Tables 3 and 5, respectively.

Table 2: Factors Related to 1989-94 Change in U.S. Parent Total Employment
(Affiliate Regressors Cover All Manufacturing Affiliates Combined)

Regressor	(1)	(2)
Δ Parent Wage	-0.330	-0.328
	(0.030)**	(0.030)**
Δ Affiliate More-Skilled Wage	-0.385	-0.303
	(0.141)**	(0.144)*
Δ Affiliate Less-Skilled Wage	0.300	0.269
	(0.140)*	(0.139)*
Δ Parent Trade Costs	0.703	1.400
	(0.592)	(0.708)*
Initial Parent Trade Costs		0.793
		(0.435)
Δ (1- Host Country Tax Rate)	0.571	0.471
	(0.472)	(0.470)
Initial (1- Host Country Tax Rate)		-0.247
		(0.108)*
Δ Host-Country GDP	0.184	-0.315
	(0.171)	(0.239)
Δ Affiliate Sales	0.029	0.033
	(0.014)*	(0.015)*
Δ Parent Capital Stock	0.101	0.101
	(0.022)**	(0.022)**
Δ Parent Sales	0.712	0.712
	(0.035)**	(0.035)**
Controls	Parent-Ind.	Parent-Ind.
No. Observations	571	571
Adjusted R-Squared	0.652	0.658

Notes: Cell entries are OLS parameter estimates (and standard errors that allow for both arbitrary forms of heteroskedasticity and correlations in disturbances within industry groups). * indicates that a parameter estimate is different from zero at the 5% significance level; ** at the 1% level. All variables are in logarithms.

Table 3: Factors Related to 1989-94 Change in U.S. Parent R&D Employment

(Affiliate Regressors Cover All Manufacturing Affiliates Combined)

Regressor	(1)	(2)
Δ Parent Wage	-0.158	-0.156
	(0.146)	(0.146)
Δ Affiliate More-Skilled Wage	-0.735	-0.754
	(0.671)	(0.686)
Δ Affiliate Less-Skilled Wage	0.735	0.803
	(0.653)	(0.657)
Δ Parent Trade Costs	5.349	7.596
	(5.166)	(5.346)
Initial Parent Trade Costs		3.709
		(2.337)
Δ (1- Host Country Tax Rate)	3.155	3.021
	(2.523)	(2.529)
Initial (1- Host Country Tax Rate)		-0.054
		(0.535)
Δ Host-Country GDP	0.341	-0.331
	(0.853)	(1.164)
Δ Affiliate Sales	0.051	0.057
	(0.078)	(0.078)
Δ Parent Capital Stock	0.169	0.170
	(0.106)	(0.106)
Δ Parent Sales	0.879	0.872
	(0.175)**	(0.175)**
Controls	Parent-Ind.	Parent-Ind.
No. Observations	477	477
Adjusted R-Squared	0.122	0.123

Notes: Cell entries are OLS parameter estimates (and standard errors that allow for both arbitrary forms of heteroskedasticity and correlations in disturbances within industry groups). * indicates that a parameter estimate is different from zero at the 5% significance level; ** at the 1% level. All variables are in logarithms.

Table 4: Factors Related to 1994-99 Change in U.S. Parent Total Employment
(Affiliate Regressors Cover All Manufacturing Affiliates Combined)

Regressor	(1)	(2)
Δ Parent Wage	-0.304	-0.304
	(0.030)**	(0.031)**
Δ Affiliate More-Skilled Wage	0.247	0.220
	(0.277)	(0.335)
Δ Affiliate Less-Skilled Wage	-0.081	-0.070
	(0.198)	(0.225)
Δ Parent Trade Costs	0.003	0.282
	(1.538)	(1.957)
Initial Parent Trade Costs		0.187
		(0.764)
Δ (1- Host Country Tax Rate)	-0.113	-0.099
	(0.336)	(0.385)
Initial (1- Host Country Tax Rate)		0.021
		(0.192)
Δ Host-Country GDP	0.069	0.090
	(0.194)	(0.315)
Δ Affiliate Sales	0.021	0.021
	(0.019)	(0.020)
Δ Parent Capital Stock	0.082	0.082
	(0.029)**	(0.029)**
Δ Parent Sales	0.848	0.849
	(0.042)**	(0.042)**
Controls	Parent-Ind.	Parent-Ind.
No. Observations	476	476
Adjusted R-Squared	0.680	0.678

Notes: Cell entries are OLS parameter estimates (and standard errors that allow for both arbitrary forms of heteroskedasticity and correlations in disturbances within industry groups). * indicates that a parameter estimate is different from zero at the 5% significance level; ** at the 1% level. All variables are in logarithms.

Table 5: Factors Related to 1994-99 Change in U.S. Parent R&D Employment
(Affiliate Regressors Cover All Manufacturing Affiliates Combined)

Regressor	(1)	(2)
Δ Parent Wage	-0.236	-0.253
	(0.129)	(0.131)*
Δ Affiliate More-Skilled Wage	-3.569	-3.564
	(1.185)**	(0.686)**
Δ Affiliate Less-Skilled Wage	2.963	2.780
	(0.871)**	(0.960)**
Δ Parent Trade Costs	12.056	16.058
	(7.454)	(8.679)
Initial Parent Trade Costs		3.949
		(4.507)
Δ (1- Host Country Tax Rate)	-0.027	-0.272
	(1.409)	(1.631)
Initial (1- Host Country Tax Rate)		0.001
		(0.786)
Δ Host-Country GDP	1.336	1.051
	(0.839)	(1.321)
Δ Affiliate Sales	0.128	0.134
	(0.078)	(0.078)
Δ Parent Capital Stock	0.110	0.112
	(0.120)	(0.120)
Δ Parent Sales	0.665	0.660
	(0.174)**	(0.175)**
Controls	Parent-Ind.	Parent-Ind.
No. Observations	379	379
Adjusted R-Squared	0.165	0.162

Notes: Cell entries are OLS parameter estimates (and standard errors that allow for both arbitrary forms of heteroskedasticity and correlations in disturbances within industry groups). * indicates that a parameter estimate is different from zero at the 5% significance level; ** at the 1% level. All variables are in logarithms.