

Growth, Capital Market Development and Competition for Resources within MNCs

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ABSTRACT

We study the resource allocation decisions of U.S. multinational corporations (MNCs). We examine how established MNCs grow across countries and how firm-specific resources and host-country capital market development influence MNC growth. We find no evidence of resource constraints in MNCs with greater knowledge and access to capital. However, when these resources are in scarce supply, our evidence suggests MNC growth involves tradeoffs between divisions. These tradeoffs to growth vary with host-country capital market development and restrictions on foreign direct investment (FDI). In countries with restrictions on FDI and less developed capital markets, we find significant within-MNC resource constraints. Dynamically, in countries with low initial capital market development but high growth in capital markets, we find that affiliates grow with no apparent resource constraints and their growth becomes more closely related to own efficiency and demand growth. This result is stronger after countries undergo financial market liberalizations.

Comments Welcome

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ABSTRACT

We study the resource allocation decisions of U.S. multinational corporations (MNCs). We examine how established MNCs grow across countries and how firm-specific resources and host-country capital market development influence MNC growth. We find no evidence of resource constraints in MNCs with greater knowledge and access to capital. However, when these resources are in scarce supply, our evidence suggests MNC growth involves tradeoffs between divisions. These tradeoffs to growth vary with host-country capital market development and restrictions on foreign direct investment (FDI). In countries with restrictions on FDI and less developed capital markets, we find significant within-MNC resource constraints. Dynamically, in countries with low initial capital market development but high growth in capital markets, we find that affiliates grow with no apparent resource constraints and their growth becomes more closely related to own efficiency and demand growth. This result is stronger after countries undergo financial market liberalizations.

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Multinational corporations are an increasingly important source of production and employment in industrialized countries (OECD [1999]). Further, a growing proportion of U.S. international trade is carried out between divisions of multinational firms (Zeile [1997]). Existing research shows that multinational corporations (MNCs) have higher accounting profits and higher stock market valuations, higher advertising and R&D, and higher Tobin's q s than do firms that only produce and sell domestically.¹ Despite the importance of MNCs in production, employment and trade, we know little about how MNCs grow. In particular, given the recent policy debate on the "off-shoring" of MNC employment,² it is important to understand whether MNCs systematically grow by reallocating resources away from divisions in some countries to expand in others.

In this research, we examine three questions related to MNC growth and resource allocation. First, do MNC affiliates within a network grow together or compete for scarce resources from their U.S. parents? When there is competition for resources among divisions of the MNC, growth in one market affects, or is affected by, growth prospects elsewhere within the MNC. We refer to this as resource-constrained growth. To study MNC growth across networks of foreign affiliates, we draw upon the literature on the growth of domestic multi-segment diversified firms and their resource allocation decisions across industries.³

Second, does resource-constrained growth vary systematically with certain MNC characteristics and resources? In this paper, we look at whether greater MNC R&D intensity and financial resources allow for growth with fewer constraints.

Third, does resource-constrained growth vary systematically based on characteristics of the countries in which the MNC affiliates are located? We examine the extent to which host country capital market development, capital market integration and restrictions on foreign direct investment (FDI) are associated with greater constraints to growth within MNCs.

To address these three questions, we draw upon the model in Maksimovic and Phillips [2002] on the inter-industry resource allocation decisions of domestic conglomerate firms. The

¹See Vernon [1971], Dunning [1973], Kim and Lin [1986], and Morck and Yeung [1991]. Errunza and Senbet [1981, 1984] show that the value of multinationality increases with the extent an MNC sells overseas.

²Policy initiatives designed to prevent MNCs from moving jobs abroad are currently pending at the federal level and in more than twenty states (Financial Times [2004]; Washington Post [2004]).

³See Lamont [1997], Rajan, Servaes and Zingales [2000], Scharfstein and Stein [2000], Shin and Stulz, [1998] for early evidence. See Khanna and Tice [2001] and Maksimovic and Phillips [2002] for evidence of efficient allocation of resources across segments.

central idea is as follows: Across multiple countries, following a positive change in demand, a profit-maximizing MNC will grow its affiliates (or U.S. operations) until the value of a marginal investment is equalized across the countries in which it operates. This change in demand can come from either an increase in real GDP or a beneficial change in exchange rates. More efficient affiliates (parents) will be better positioned to grow in response to positive demand growth in their local markets.

As in Lucas [1978], we assume that MNC growth requires heterogeneous firm-specific resources such as organizational ability, knowledge resources from research and development, and financial resources. The extent to which a given affiliate's (parent's) growth is affected by demand growth in the countries of the MNC's other affiliates will depend on whether the MNC's resources face constant or decreasing returns to scale. If the MNC can exploit its firm-specific resources with constant or locally constant returns to scale, a positive change in demand in one market should have no effect on the growth of efficient affiliates in other markets. However, when the firm-specific resources face decreasing returns to scale, the MNC will reallocate resources out of less efficient affiliates in slow-growth markets to efficient affiliates in countries with relatively higher growth.

For example, if MNCs face an increasing cost of accessing external finance, a relatively efficient MNC affiliate will use internal and external financial resources until the marginal cost of financial resources equals the marginal return of growing in that market. However, with a decrease in growth in the affiliate's market, financial capital would be directed elsewhere, to other efficient divisions with more attractive growth opportunities. We expect that when the MNC shifts any important firm-specific resource such as knowledge, capital or managerial attention out of a particular affiliate, the affiliate will grow more slowly. The extent to which we observe such a pattern of growth in MNCs will depend upon whether the MNCs' firm-specific resources face constant or decreasing returns to scale. In the above example, if financial capital could be accessed and directed throughout the MNC with constant returns to scale, affiliates in slow growth markets would not have to compete for resources with other units of the MNC.

Our tests of MNC resource allocation thus focus on the relative efficiency and demand growth of MNC units. Empirically, this implies testing for internal constraints to growth using interactions between relative efficiency and demand growth. We predict that an MNC

will grow less in an affiliate when the opportunity cost of allocating its scarce resources to a different affiliate is higher. To address the first question, we examine whether the growth of a particular affiliate (or parent) is affected by growth opportunities in other markets where the MNC has efficient divisions.

Our second question seeks to identify specific MNC characteristics we expect should be associated with resource-constrained growth. First, we investigate whether MNC growth differs based upon MNC R&D intensity. Since knowledge and “headquarters services” are resources that can theoretically be exploited throughout the MNC with constant or increasing returns to scale (Helpman [1984]), we expect relatively high-R&D MNCs should grow with fewer constraints. Second, we look at how growth differs between MNCs based upon internal financial resources, as measured by their cash-to-investment ratio as in Kaplan and Zingales [1997].⁴ We expect constraints to growth to be greater among MNCs that are relatively cash-poor.

Finally, we address our third question by investigating whether resource-constrained growth varies systematically with country characteristics. Specifically, we examine whether affiliate growth in countries with less developed capital markets and restrictions on foreign direct investment is associated with greater resource constraints within the MNC. We also examine whether MNC growth may be less affected by resource constraints after capital market liberalizations using the endogenous dates of capital market integration from Bekaert, Harvey and Lumsdaine [2002]. Since MNCs obtain most of their external financing in the host countries of their affiliates, under-developed local capital markets imply that MNCs may either need to finance growth through limited internal funds or face more uncertain or higher-cost financing in local markets.

Our research makes several contributions. First, while growth with resource reallocation across industries has been documented in the literature on domestic diversified firms, this study systematically examines growth with resource reallocation across geographic markets. We also examine firm- and country-specific characteristics associated with resource-constrained growth. Second, we extend recent research on the impact of capital market development on macroeconomic growth and the growth of domestic firms,⁵ by examining

⁴We discuss additional measures of access to external capital in the Robustness section.

⁵See for example, King and Levine [1993], LaPorta, Lopez de-Silanes, Shleifer, and Vishny [1997], and Demirguc-Kunt and Maksimovic [1998].

how host-country capital market development affects the growth of established MNC affiliates.

We test our predictions using panel data from the U.S. Department of Commerce on 8,428 foreign affiliates of 864 U.S. MNC parent companies. The affiliates are located in 41 countries. Our sample is drawn from a data set containing a long time-series on the entire population of U.S. MNCs - disaggregated at the individual foreign affiliate level for each MNC parent. An important feature of this unique data set is that it contains detailed financial and operating data on MNC parents and their foreign affiliates. Thus, we can directly examine how internal product and capital markets affect MNC growth.

Our empirical analyses demonstrate that after controlling for firm and country heterogeneity and the industry of the MNC unit, MNC affiliates grow with resource constraints. In the full sample of firms, affiliates grow more slowly when their U.S. parents are relatively efficient and the U.S. economy is growing relatively quickly. In contrast, U.S. MNC parents actually grow more when they have efficient affiliates in high-growth markets.

We find that the degree to which MNCs grow with constraints varies with MNC R&D intensity and financial resources. Affiliates of relatively R&D-intensive parents and parents with greater cash holdings grow with no apparent competition for resources. In contrast, the resource constraints we observe in the full sample of affiliates are only evident among affiliates of low-R&D parents and affiliates of parents with limited cash holdings.

In addition to firm-specific resources, country characteristics also matter to the growth of MNC affiliates. We find that affiliate growth in countries with less developed capital markets and in countries with restrictions on inward and outward foreign direct investment (FDI) is negatively related to the efficiency and demand growth of U.S. parents. This result complements Desai, Foley and Hines [2004] who find that borrowing by MNC affiliates is more costly in countries with underdeveloped capital markets and those providing weak legal protections for creditors. We find that affiliates in countries with fewer FDI restrictions grow with no apparent competition for resources.

To investigate these results further, we examine whether affiliates grow with fewer resource constraints after their host countries' capital markets are liberalized. We find that, first, resource-constrained growth in countries with less developed capital markets occurs only in countries where there is little change in capital market development over our four-

teen year time window. Second, using the endogenous dates of capital market integration from Bekaert, Harvey and Lumsdaine [2002], we find that after host country capital markets become more integrated with world capital markets, MNC affiliate growth becomes more strongly related to affiliate efficiency and demand growth in the host country. Affiliates in countries in which capital markets undergo liberalization grow with no apparent resource constraints.

The paper proceeds as follows. Section I discusses the models of resource allocation that provide the framework for our empirical analysis and describes the data and econometrics. Section II presents the empirical results and discussion. Section III concludes.

I. Methodology and Data

Drawing upon the model of conglomerate firm growth in Maksimovic and Phillips [2002], our analysis of MNC growth focuses on the relation between the relative efficiency and growth of MNC divisions (affiliates or parents). The model relates the growth of an MNC unit to the interaction of its own efficiency and the demand growth in its host country.

The research question we test is whether the growth of an affiliate of an MNC is resource constrained. Our central hypothesis is that an affiliate of an MNC will grow with greater constraints if the MNC faces an increasing marginal cost of accessing and deploying firm-specific resources throughout its network of foreign affiliates. When the growth of an MNC unit is resource-constrained, there will be a negative association between its growth and the interaction of the efficiency and demand growth of other MNC units. The negative relation arises because the MNC reallocates firm-specific resources away from affiliate (parent) i when its other units have more attractive growth opportunities.

We examine this central hypothesis for the full sample of MNC affiliates and for subsamples of MNC affiliates based on MNC and country characteristics. If access to firm specific resources and local capital markets are important for MNC affiliate growth, we expect to find stronger evidence of resource constrained growth in sub-samples of MNC affiliates of parents with low R&D and limited cash resources, and affiliates in countries with less developed capital markets and restrictions on FDI.

Although our estimates focus primarily on the growth of MNC affiliates, we also estimate a basic model of U.S. MNC parent growth that relates parent growth to the interaction of

parent efficiency and U.S. demand growth. Again, parent growth is resource-constrained if there is a negative association between parent growth and the interaction of the efficiency and demand growth of the parent’s foreign affiliates.

Our discussion below proceeds as follows. We first briefly describe our data. Next, we define the dependent variable then discuss the efficiency and efficiency*demand growth interaction variables. We then describe our measures of MNC firm-specific resources (R&D and access to capital). Finally, we discuss our measures of capital market development and FDI restrictions. We conclude with a description of the control variables in our model.

A. Data

Our dataset is from the Benchmark and Annual Surveys of U.S. Direct Investment Abroad, administered by the Bureau of Economic Analysis (BEA), United States Department of Commerce. Containing detailed income statement, balance sheet, and employment data, these surveys are the most comprehensive data available on the activities of U.S.-based MNCs and their foreign affiliates. For this study, we use the BEA data disaggregated at the individual foreign affiliate level for each MNC from 1983-1996. The BEA data includes foreign affiliates in more than one hundred countries that report sales at the two- to-three digit industry level. The affiliate data can also be linked to data on U.S. parents.

We use data on both affiliates and parents in this study, and include only wholly-owned affiliates. This last criterion affects only 3,620 observations in our data set and does not affect our results. Our final regression sample includes 36,147 affiliate-year observations on 8,428 affiliates of 864 U.S. parents. The affiliates are located in 41 different countries. We present more specific details of the BEA data and how we construct the sample in the data appendix to this paper.

B. MNC-Specific Variables⁶

B1. Dependent Variable:

Our dependent variable, $Empchg_{ijcp_{t-(t-1)}}$ is the log change in employment of affiliate i in industry j in country c of U.S. MNC parent, p , from time $(t-1)$ to t . We use a log change to mitigate heteroskedasticity., because the number of employees (and change in employment) varies considerably in the sample of affiliates. We use employment change as a measure of

⁶All independent MNC-specific variables in our regression are lagged. All dollar variables are expressed in 1982 U.S. dollars, using industry-specific price deflators from the BLS. All foreign affiliate data reported to the BEA is already expressed in current U.S. dollars.

growth since it is the only local quantity-based input variable we can observe directly, and, unlike variables such as assets or sales, it is not directly affected by exchange rates. We use the same dependent variable, the log change in employment, to measure the growth of U.S. MNC parents.

We also estimate the model using change in affiliate real assets as a robustness test. We find similar results and discuss these results along with other robustness tests in the results section.

B2. Efficiency of Foreign Affiliates and MNC Parents:

We expect that the growth of affiliate (parent) i (as measured by the log change in employment), will depend on the interaction between its own relative efficiency and the GDP growth in its local market. We calculate four measures of efficiency, two for the focal affiliate, a third for the other “sibling” affiliates of the MNC and the fourth for the U.S. MNC parent. All four efficiency measures use the same basic definition of efficiency (real value added / labor), and all are industry and year adjusted. We discuss these measures in detail in the data appendix.

We calculate two direct measures of efficiency for affiliate i . First, we calculate affiliate i 's within-MNC (industry and year adjusted) efficiency. This variable captures affiliate i 's efficiency relative to other same-industry affiliates within affiliate i 's MNC. We calculate our second measure of affiliate i 's efficiency relative to other MNC affiliates in the same industry in the same country-year. Our third measure of affiliate efficiency is a weighted average of the efficiency of all the affiliates of a given MNC parent (excluding affiliate i). Our final measure of efficiency is the industry-year-adjusted efficiency of affiliate i 's U.S. parent. We note that we expect both measures of affiliate i 's efficiency to be positively associated with affiliate i 's growth. Our main predictions for other affiliate and U.S. parent efficiency center around the interactions between these efficiency variables and the other affiliates' and the parent's relative demand growth.

Interaction Variables:

We use three key interaction variables to capture resource-constrained growth. First, we multiply affiliate i 's within-MNC efficiency by local demand growth, which we measure as the log change in country c 's real GDP from time $(t-1)$ to t . We use the change in GDP (rather than changes in real exchange rates) to measure local demand growth, since the

average proportion of affiliate sales in the local market is over 75 percent.⁷

As a robustness test, we also report results in which we multiply the log change in country c 's real GDP by affiliate i 's percent sales in the local market, measured by affiliate i 's local/total sales. Affiliates that sell less in the local market should be less affected by local GDP growth. We then interact this variable with affiliate i 's efficiency.

Second, we multiply *other affiliates' relative efficiency* by their relative demand growth. We measure other affiliates' relative demand growth by taking the sales-weighted average of the one-period real GDP changes for all affiliates (other than affiliate i) of a given parent, less affiliate i 's own demand change. Finally, we multiply the U.S. parent's efficiency by the parent's relative demand growth. The parent's relative demand growth is calculated as the U.S. parent's one-period real GDP change (change in U.S. real GDP from $(t-1)$ to t) less affiliate i 's one-period real GDP change.

Given that relative size may impact an MNC's allocation decisions, we also weight all efficiency and demand variables by the affiliates' and parent's sales. This includes size weighting all of our interaction variables. For the *other affiliate* variables, the weights are the other affiliates' sales.

B3. Types of MNC Firm-Specific Resources:

We examine two different firm-specific resources we expect will be associated with constraints to growth within the MNC: R&D-intensity and access to capital. We expect that if these resources are scarce and face decreasing returns to scale, MNCs will grow with greater internal constraints.

1. Research and Development Intensity

We use MNC R&D-intensity to indicate the presence of knowledge assets. We classify MNCs into high and low R&D firms based on whether the U.S. parents' industry-adjusted R&D-to-sales ratio for the years 1989-1996 is above or below the median parent R&D-to-sales ratio for the same period of time.⁸ Note that the number of affiliates in each of these sub-samples will be different, because we calculate the median parent R&D/sales measures using the parent data set.

⁷The change in real exchange rates was used in the interaction variables in an earlier version of this paper. It is still included as an independent variable.

⁸We use the years 1989-1996 because annual parent R&D data is not available for previous years. Note the R&D data is not reported for some parents and we exclude these MNCs and their affiliates from the regressions based on R&D.

2. Access to Financial Resources

The primary measure we use to capture the MNC's access to capital, is the U.S. Parent's lagged Cash-to-Investment Ratio. The cash-to-investment ratio is used by Kaplan and Zingales [1997] as one of their measures of financial constraints. Additionally, the relationship of cash to investments has been recently studied by Opler, Pinkowitz, Stulz and Williamson [2001] and Almeida, Campello and Weisbach [2004]. We obtain this measure by linking up the BEA data to COMPUSTAT data. We were able to link up U.S. parents for 17,098 affiliate years which is 47 percent of our sample. We split the sample at the upper and lower 50th percentile of cash/investments for all COMPUSTAT firms, and assign parents into these two groups.

We used several alternative measures of access to capital, which we discuss in the robustness section. In results reported in an earlier version of the paper, we use the affiliate's total borrowing from the parent and from local markets. This measure captures access to financing at the affiliate level.⁹ We obtain similar results to those reported here.

C. Country-Specific Variables

In our analysis of MNC growth, we examine whether host country capital market development, capital market liberalization and FDI restrictions affect the degree to which affiliates grow with resource constraints. Because of limited access to capital in less developed capital markets, we expect to see affiliates in these countries grow with greater constraints. Similarly, restrictions on inward and outward FDI put direct limits on the operating decisions of MNCs viz. their foreign affiliates. As with less developed capital markets, FDI restrictions likely proxy for many under-developed institutional and financial characteristics of host countries - some of which are measurable and others are not - that make these environments more risky places to do business.

We use several variables as proxies for the level of a country's capital market and institutional development. We construct these variables using data from the IMF International Financial Statistics Yearbook and the Annual IFC Emerging Stock Markets Fact Book. We

⁹We recognize that both of these measures of access to capital may suffer from endogeneity problems. We do two things to mitigate this problem. First, we include direct measures of affiliate and parent productivity in all regressions. Second, we use lagged values of these measures, and we separate firms into two categories using last period's values.

use the (real) per-capita size of capital markets (stock market capitalization plus private bank claims to firms) at the end of each year.

For capital-market integration we examine whether MNC resource allocation differs in pre- and post-capital market liberalization periods - using liberalization dates from Bekaert, Harvey and Lumsdaine [2002] for emerging market economies. To measure FDI restrictions, we use data on inward and outward FDI restrictions reported in the IMF’s Annual Report on Exchange Rate Arrangements and Exchange Restrictions, and compiled for more than 100 countries over a very long time panel by Brune, et al., 2001. This data is discussed at length in Brune, et al. [2001].¹⁰ Here, we use a variable that ranges from 0 to 2, 0 indicating the most restrictive environment and 2 indicating the least restrictive environment. In estimations we do not report here, we also used the overall Capital Account Openness Index (CAOI), which is a sum of nine component dummy variables, two of which are dummies for inward and outward FDI restrictions. Not surprisingly, given that correlations between the CAOI and its component variables is approximately 0.8 (Brune, et al. [2001]), we obtained very similar results using the overall CAOI.

D. Control Variables

We control for affiliate size by using the log sales of affiliate i at $(t-1)$. Our other control variables include main effects for all interaction terms in our estimates. Unless otherwise indicated, all our regressions also include country-specific time trends and industry fixed effects.

In addition to the one-period real GDP change, we use the following additional country control variables in our model:

(1.) *Change in real exchange rate:* We measure the change in the exchange rate in country c as the log change in the real trade-weighted CPI-based exchange rate from time $(t-1)$ to t .¹¹ Given negative changes represent real depreciations and thus positive exchange rate changes, a negative sign on this variable indicates a “positive” relation.

(2.) *Long run GDP growth:* We measure long-run GDP growth as the log change in real

¹⁰We would like to thank Fritz Foley for providing this data in electronic form.

¹¹We are grateful to Anthony Turner of the IMF for providing us with real exchange rate data. More information on the construction of the real exchange rate series used here can be found in Turner and Golub [1997]. We also ran the regressions using a real unit-labor based real exchange rate series also from Turner and Golub. The results (not reported here) did not differ from those obtained using the CPI-based real rate, and the CPI-based rate is a longer series.

GDP from time $(t-5)$ to time t . Holding affiliate efficiency constant, we expect that long-run growth in country c will be positively associated with affiliate growth.

(3.) *Taxes:* We also control for country-level tax effects by including an effective tax variable that varies by country and year. Our effective tax rate is the median value, for each country and year, of affiliate taxes paid divided by taxable income. See Desai [1999] for more detail on effective tax rates.

E. Estimation

We estimate the following panel regression model:

$$Y_{i(t-(t-1))} = \beta_0 + \beta_1 X_{i(t-1)} + \beta_2 Z_{i(t-(t-1))} + C_i * \tau_t + I + \eta_{it} \quad i=1,2,\dots,N; \quad t = 1,2,\dots,14 \quad (1)$$

where $Y_{i(t-(t-1))}$ is the log change in employment of affiliate i . $X_{i(t-1)}$ is a matrix of lagged firm-specific variables and interactions including two measures of affiliate i 's efficiency (one relative to affiliate i 's MNC-industry, the other relative to affiliate i 's country-industry), the efficiency of other affiliates in affiliate i 's network, the efficiency of affiliate i 's U.S. parent. $X_{i(t-1)}$ also includes the key interaction variables: affiliate i 's efficiency interacted with its demand growth and other affiliates' efficiency and U.S. parent efficiency interacted with their relative demand growth, and affiliate i 's log sales. $Z_{i(t-(t-1))}$ is a matrix of country variables including a one- and five-year GDP change, a country-year tax rate and the change in the exchange rate. $C_i * \tau_t$ are country-specific time trends and I are industry fixed effects.

η_{it} is the error term, which consists of two components: $\eta_{it} = u_i + \varepsilon_{it}$, where $u_i \sim N(0, \sigma_u^2)$ is a vector of unobserved time-invariant affiliate-specific characteristics (affiliate random effects) which are i.i.d. over time and across firms. ε_{it} is assumed to vary over time and across firms.

We estimate Eq. (1) by using a maximum likelihood GLS random effects estimator on an unbalanced panel. We use GLS rather than fixed effects because a random effects estimator may be more efficient than fixed effects when some variables are at the country (industry) level with firm-level panel units (Moulton [1986]). We perform many robustness checks on regression analyses, both in terms of specification and variable measurement. We discuss these in section II.F of the paper.

II. Results

We describe our results in five sections. First, in Section A, we report descriptive statistics on our sample. In Section B, we present our base specifications for affiliate and parent growth. In Section C, we examine whether affiliate growth varies with MNC characteristics, specifically R&D and access to capital. In Section D, we examine whether characteristics of the affiliates' host countries (capital market development and FDI restrictions) affect the degree to which affiliates growth with resource constraints. Section E presents the economic significance of our results and Section F discusses the robustness of our results to alternative measures and interpretations.

A. Sample Summary Characteristics

Table I summarizes our sample at both the affiliate and parent level. Column 1 reports summary statistics for the whole sample of affiliates and parents; columns 2 and 3 split the samples by high and low U.S. parent R&D/sales. In panel A, we see that the average affiliate has approximately \$100 million in sales, and earns more than 78% of its sales revenue in the local market. Over the sample period, annual affiliate employment growth averaged 1.6%. Affiliates of high R&D parents are significantly larger and are part of MNCs with larger networks of foreign affiliates.

Insert Table 1 Here

Panel B describes the U.S. parents in our sample. In contrast to affiliates, U.S. parents' average annual employment growth is negative during the sample window. On average, the parents have operations in 11 different countries and earn nearly 90% of their sales revenues in the U.S. Comparing parents with high versus low R&D/sales, the latter have larger U.S. operations but smaller foreign operations. R&D-intensive MNCs earn a significantly smaller percent of total revenues from sales in the local market (83% versus 95% for low-R&D MNCs) and operate in significantly more countries.

Figure 1 shows affiliate employment growth by the affiliates' initial efficiency, using affiliate efficiency relative to other MNC affiliates in the same country-industry-year. Efficiency quartiles are determined by the median of the affiliates' initial efficiency for the first three years the affiliates appear in the sample. We then track the affiliates' employment growth

for the next eight years until 1996, or until they drop out of the sample. Affiliate growth is country-industry-period adjusted in each subsample.

Insert Figure 1 Here

Comparing affiliates in the highest and lowest initial efficiency quartiles in Figure 1a, affiliates with the highest initial efficiency had considerably higher average employment growth over all subsequent periods. The strong positive relation between affiliate efficiency and growth, and the differences in growth between the most and least efficient affiliates gives some face validity to our efficiency measures.

Figure 1b reveals more interesting differences by country capital market development quantiles. It shows that the differences between growth of high- and low-efficiency affiliates is more pronounced in countries with lower capital market development. The affiliates in efficiency quartile four (the highest efficiency quartile) in countries with low capital market development grew 12.01 percent over an eight-year period while declining by 5.80 percent in quartile one, compared to 4.80 percent growth in efficiency quartile four and .99 percent in efficiency quartile one for the high capital market development countries over the same period. This differences and also the differences over the five-year period are statistically significantly different from zero at the five percent level (shown earlier in a table format of these figures). These large differences in affiliate growth may represent greater potential opportunities for efficient affiliates in less developed countries, and a greater incentive to allocate resources to efficient affiliates in these countries where other firms may be less competitive and have limited access to capital.

B. Growth of U.S. MNC affiliates and parents

Table 2 presents our base specification for the full sample of affiliates and Table 3 presents a similar specification for the U.S. parents of the affiliates included in the sample. Note that our tables indicate the main variables of interest in our estimations. The first two variables are the (non-interacted) affiliate efficiency measures, i.e., affiliate i 's efficiency relative to other same-industry affiliates in the same MNC, and affiliate i 's efficiency relative to other same industry affiliates of other MNCs in the same host country. Next, we show the three interaction variables of interest, specifically: (1) affiliate i 's within-MNC efficiency*real GDP growth in affiliate i 's host country; (2) the relative efficiency of other affiliates of the same

MNC*real GDP growth in other affiliates' host countries; and (3) the efficiency of affiliate i 's U.S. parent*U.S. real GDP growth. Below the interactions, we report results for the MNC and country control variables.

Our strong expectation is that affiliate i 's growth will be positively related to its own efficiency and to the interaction of its own efficiency and the real GDP growth in its market. From our central hypothesis, if affiliate i 's growth is resource- constrained, there will be a significant negative relationship between affiliate i 's growth and either the efficiency*GDP growth of other affiliates, and/or the efficiency*GDP growth of affiliate i 's U.S. parent. The negative sign indicates that when either the other affiliates or U.S. parent are relatively efficient and are in fast-growing markets, the MNC will shift resources out of affiliate i , to other parts of the MNC with more attractive growth opportunities.

Columns 1-3 in Table 2 present the following: First, column 1 shows the basic specification for the log change in affiliate employment. Column 2 presents the same specification, but size-weights all the efficiency variables (i.e., for affiliate i , U.S. parents and other affiliates) and all efficiency*GDP growth interactions. Clearly, affiliate i 's relative size should matter in terms of both the attractiveness of its growth opportunities and the amount of MNC resources it consumes.

In column 3, we use the size-weighted results as the base specification. Next, we multiply all the GDP changes (affiliate i 's, other affiliates', and U.S. parents') by each unit's percent sales in the local market and interact the GDP variables by the relevant size-weighted efficiency measures. The extent to which local GDP growth will affect the growth of affiliate i , the U.S. parent or other affiliates will depend upon how much the respective MNC unit produces to sell in the local market versus exporting to other markets. On average, affiliates in our sample earn 79% of their sales revenues in the local market. Unless otherwise indicated, we use the specification in column 3 in the rest of the analyses presented in this paper.

As we can see in Tables 2 and 3, the transformations in columns 2 and 3 do not substantially change the basic regression results presented in column 1. As a rule, the size weighting in column 2 reduces the size of the coefficients and standard errors by approximately a factor of 10. The estimates in columns 2 and 3 are quite similar, reflecting the fact that the scaling factor in column 3 is a number close to one.

Insert Table 2: The growth of MNC affiliates

Turning to the substance of the results in Table 2, the estimates in columns 1-3 show that more efficient affiliates grow more in response to demand growth. This result is indicated by the significant coefficient on affiliate i 's relative efficiency*GDP growth interaction. This result is significant at the 1% level in the three specifications in columns 1-3.¹²

To the extent that affiliate growth is resource-constrained, it appears that more attractive opportunities in the U.S., rather than in other foreign affiliates, tend to reduce the growth of affiliate i . We find a strong negative association between the interaction of U.S. parents' efficiency*GDP growth and the growth of affiliate i in the estimates in columns 1-3.¹³

We also find a strong positive association between affiliate growth and affiliate i 's (non-interacted) within country-industry efficiency. Affiliate i 's growth is also positively related to the efficiency of other affiliates in the MNC. Affiliates of MNCs with more efficient networks of affiliates have significantly higher growth.

Turning briefly to the control variables, even though we include country-specific time trends in all of our estimates, one-year GDP growth and 5-year GDP growth are quite significant in all three estimates. In contrast, the real exchange rate change and local effective tax rate are not consistently significant.

Insert Table 3: The growth of MNC parents

Table 3 shows the results for US parent employment growth. Only parents with affiliates in the final sample are included in the estimates shown here. The four columns in Table 3 are organized similarly to the affiliate specifications in the previous table. Column 1 shows the unweighted parent results. Column 2 size-weights the efficiency variables and efficiency*GDP growth interactions, and column 3 extends the results in column 2 by scaling all the GDP change and interactions (for both parents and affiliates) by the percent of sales in the local market. The fourth column includes parent R&D/sales in the base specification.

Similar to affiliate growth, U.S. parent growth is strongly related to parent efficiency. However, the relationship between parent growth and parent efficiency*GDP growth is insignificant. Interestingly, parent growth is positively related to the efficiency*GDP growth

¹²A likelihood ratio test for inclusion of affiliate i 's efficiency and its efficiency*GDP growth interaction was significant at the 1% level. A likelihood ratio test for the inclusion of the parent's and other affiliates' efficiency was significant at the 10% level.

¹³This result is interesting, in light of the considerable evidence on the high positive correlation between U.S. real rates of return and net financial flows into the U.S. (See Calvo, et al., [1996]).

of the parent’s affiliates. This result implies that the employment of U.S. parents increases when the parent has efficient foreign affiliates with attractive growth opportunities. This result seems quite contrary to the conventional view that when MNCs grow abroad they reduce U.S. employment. It is consistent with a recent *Wall Street Journal* article that predicts that U.S. employment will increase when companies are able to save on production costs by growing internationally.¹⁴ This positive coefficient does not necessarily imply that parents grow without resource constraints. Since parent employment also consists of headquarters and administrative employment, the effect of affiliate demand growth on parent employment may be positive when affiliates grow, even with resource constraints.

In column 4, we examine the association between U.S. parent R&D intensity and parent growth and the extent to which parents grow with resource constraints. Since knowledge assets can theoretically be used throughout the MNC with constant or increasing returns to scale (Helpman [1984]), we expect relatively R&D-intensive MNCs should be able to grow with fewer resource constraints. In column 4, parents that are R&D intensive (relative to other U.S. parents in the same industry) have significantly higher domestic employment growth. Indeed, a one standard deviation change in parent R&D/sales is associated with a 0.65 percentage point increase in the annual employment growth of U.S. parents. In the next section, we examine whether the affiliates of R&D-intensive parents grow with fewer resource constraints.

C. MNC Firm-Specific Resources and Affiliate Growth

In this section, we investigate whether the resource-constrained growth of MNC affiliates shown in Table 2 varies systematically with MNC R&D intensity and access to capital. We look at these specific MNC characteristics, as they are considered to be important advantages of multinational firms. Indeed, a central proposition in the theory of the MNC (e.g., Helpman [1984]) is that firms go abroad to exploit knowledge-based resources that can be used throughout the MNC’s network of affiliates with increasing returns to scale.

Insert Table 4: The growth of MNC affiliates and firm-specific resources

In Table 4 we show the results for the growth of affiliates of high versus low R&D parents and parents with high versus low cash-to-investments. We use the specification from Table 2,

¹⁴Wall Street Journal, May 11, 2004, B2

column 3 (size-weighted and adjusted for percent sales in the local market) in the estimates in this table. In columns 1-2, we split the sample at the median of parent (industry-adjusted) R&D/sales. We calculate the median R&D intensity in the parent database, so the number of affiliates differs in the high and low MNC R&D sub-samples.

As we can see in columns 1-2, the significant negative association between affiliate growth and parent efficiency*GDP growth exists only among affiliates of low R&D parents. This result suggests that for MNCs that compete on the basis of knowledge assets, affiliate growth is subject to fewer resource constraints. Note also that in contrast to the results for the full sample of affiliates in Table 2 and for affiliates of low R&D parents, in high R&D MNCs, affiliate growth is strongly related to the affiliate's within-MNC efficiency.

In columns 3-4 we split the sample at the median of parents' lagged cash/investment ratio to investigate whether resource-constrained growth varies according to parents' cash holdings. The sample in columns 3-4 is the subset of the full sample that we were able to match with Compustat data. Again, the cash/investment ratio was calculated in the parent data set, so the number of affiliate-year observations in the low and high cash sub-samples is different.

Similar to the results for the growth of affiliates of high R&D parents, the growth of affiliates of relatively cash-rich parents shows no evidence of resource constraints. The negative association between affiliate growth and U.S. parent efficiency*GDP growth exists only in the low-cash sub-sample.

In analyses not reported here, we explored the robustness of this result using different variables to capture access to capital. Specifically, we examined whether resource-constrained growth varies systematically with *affiliates'* total borrowing (both from U.S. parents and local banks).¹⁵ We find that affiliates with low levels of financing grow with greater resource constraints. Taken together, these results suggest that MNC's with less financial resources grow with greater resource constraints. In the next section, we examine a related issue—whether characteristics of the host country in which the affiliates are located affects the extent to which affiliate growth is resource constrained.

¹⁵These results are available from the authors.

D. Market-Specific Factors: FDI Restrictions and Capital Market Development

In Table 5, we report results for affiliate growth in countries that differ in capital market development and policy restrictions on inward and outward FDI. We measure capital market development as the real per-capita stock market capitalization plus private bank claims to firms. Our measure of FDI restrictions is derived from the IMF data and compiled by Brune, et al. [2001] It is an indicator variable ranging from 0-2 indicating the presence of restrictions on inward and outward FDI.

Since less developed capital markets limit local access to financing and FDI restrictions impose direct constraints on MNCs' operating decisions, we expect affiliates will grow with greater resource constraints in these environments. More generally, less developed capital markets and FDI restrictions doubtless proxy for a variety of host country institutional and financial characteristics that make affiliate growth potentially riskier.

Insert Table 5: Affiliate growth and country characteristics

Columns 1-2 in Table 5 report results for affiliate growth in countries with high versus low FDI restrictions. We can see that in column 1, affiliates in countries with high FDI restrictions grow with significant resource constraints. In particular, the association between affiliate growth and U.S. parent efficiency*GDP growth is negative and significant for affiliates in this group of countries. Similar to our main results, affiliate growth is strongly related to affiliate efficiency and efficiency*GDP growth in the local market. In column 2, we see that the negative association between affiliate growth and parent efficiency*GDP growth is insignificant, and the coefficients are significantly different at the 1% level.

In columns 3-4, we extend the results in columns 1-2 by examining whether a country's level of capital market development moderates the negative effect of FDI restrictions. We split the high-FDI restrictions sub-sample in column 1 at the 50th percentile of capital market development. Column 3 gives results for countries with high FDI restrictions and low capital market development, and column 4 gives results for countries with high FDI restrictions and high capital market development.

In column 3, we can see that in countries with high FDI restrictions and low capital market development, the association between affiliate growth and parent efficiency*GDP

growth is negative and significant. However, in the high capital market sub-sample in column 4, affiliates appear to grow with no significant resource constraints. It may be the case that countries in the high capital market sub-sample have a generally better institutional environment (apart from the FDI restrictions), as proxied by the level of capital market development. It also may be easier for MNC affiliates to obtain local financing in these countries. Hence, they may generally be less risky places to operate.

Finally, we further expand the results in Table 5 by considering the effects of changes in capital market development over time. We examine whether, as capital markets develop, MNC affiliates grow with fewer resource constraints. Given that local borrowing is an important source of affiliate financing, development of local capital markets should enable affiliates to grow more in response to demand growth. As mentioned above, capital market development also proxies for broader institutional changes that make host countries more attractive environments for MNC growth.

To explore these ideas, we examine affiliate growth in developing countries using the recent endogenous dates of capital market integration from Bekaert, Harvey, and Lumsdaine (BHL) [2002]. Given that capital market liberalization is a gradual process and official liberalization dates may not correspond with actual liberalization, BHL econometrically identify the date of capital market integration in a large group of countries. They use a series of financial and macroeconomic variables including returns, dividend yield, market capitalization to GDP and holdings to market capitalization, to identify when changes to integration occur. For each country, we use the median date that BHL report in column three of their Table II as our date of capital market integration.

Insert Table 6: Affiliate growth and capital market development

In Table 6, we examine affiliate growth in countries with low initial capital market development, using the median level of per-capita capital market size from 1983-1985. Columns 1-4 in Table 6 include only affiliates in countries with low initial levels of capital market development. We then calculate capital market growth over the sample window 1983-1985 to 1994-1996. Column 1 reports results for affiliates in countries with low initial capital market development and low capital market growth over the sample window. Column 2 reports results for affiliates in countries with high capital market growth. In columns 3-4, we

split the “high capital market growth” sub-sample into pre- and post- integration periods, using BHL’s dates as described above. So column 3 examines affiliate activity in countries with rapidly growing stock markets in the pre-liberalization period, and column 4 examines the post-liberalization period.

In column 1, we can see that the negative association between affiliate growth and parent efficiency*GDP growth is significant in the low-capital market growth sub-sample. Affiliates appear to grow with greater constraints in countries where local capital markets are less developed, generally, and undergo relatively little change in the level of capital market development. In contrast, affiliates in the high-capital market growth sub-sample appear to grow with fewer constraints.

Comparing affiliate growth in the pre-and post- capital market integration periods in columns 3 and 4, some interesting differences emerge. In the pre-liberalization period, affiliate growth is not related to the affiliate’s own efficiency or its efficiency*local market growth. However, affiliates grow more in response to their own efficiency and to demand growth in their local markets after these countries undergo capital market liberalization. In other words, in the post-liberalization period, affiliate growth in countries with initially low levels of capital market development is influenced by the same factors as affiliate growth in countries with highly developed capital markets. Specifically, affiliates grow more when they are efficient and their local markets have robust economic growth.

E. Economic Significance of the Results

In Table 7, we present a summary of the economic significance of the main results in Tables 2-6 using the regression coefficients from the respective tables. First, for the relevant regression, we vary the affiliate’s (parent’s) own efficiency and the interaction of efficiency*GDP growth from the 10th to the 90th percentile (holding all other variables constant at their sample medians). Second, we vary from the 10th to the 90th percentile the parent efficiency*GDP growth interaction (for the affiliate regressions) and the affiliate efficiency*GDP growth interaction (for the parent regression), again holding constant all other variables at their respective sample medians.

Insert Table 7: Economic Significance of Our Results

Table 7 shows that our results have economic importance, as well as statistical significance. Panel A shows the economic significance of affiliate efficiency and affiliate effi-

ciency*GDP growth. Higher affiliate efficiency is associated with considerably higher affiliate employment growth for all specifications. For the base affiliate specification from Table 2, column 3, annual affiliate growth increases 2.4 percentage points as own efficiency and demand growth increase from the 10th to the 90th percentile. Turning to the parent regression, and using the fourth specification from Table 3, as we go from the 10th to the 90th percentile of parent efficiency and demand growth, annual parent employment growth increases by 2.8 percentage points. This potentially represents a considerable gain in employment, given that the median parent in our sample has over 7200 employees.

The economic effects from Table 4 for MNC R&D intensity show a similar sensitivity to own efficiency. In both high and low R&D MNCs, affiliate employment growth increases by more than 2.5 percentage points from the 10th to the 90th percentile of affiliate efficiency and demand growth.

Turning to the economic effect of efficiency for countries with low initial capital market development but rapid capital market growth (columns 3 and 4 in Table 6) affiliate own efficiency is associated with considerably higher affiliate employment growth in the post-liberalization period. In the pre-liberalization period, annual affiliate growth increases by 3.3 percentage points as own efficiency and demand increase from the 10th to the 90th percentile, and increases to an effect of 4.3 percentage points in the post-liberalization period.

Panel B shows the economic significance of the interaction variables. For the affiliates in the base specification (column 3) from Table 2, annual affiliate growth decreases by 0.2 percentage points as we go from the 10th to the 90th percentile of parent efficiency*GDP growth. Panel B also shows that as we go from the 10th to the 90th percentile of affiliate efficiency*GDP growth, parent employment growth increases by 0.52 percentage points - showing that U.S. parents grow faster when they have more efficient affiliate networks in growing economies.

Turning to the economic effects of R&D from Table 4, the growth of affiliates of low R&D parents is reduced by 0.6 percentage points going from the 10th to the 90th percentile of parent efficiency*GDP growth. This contrasts with a reduction in affiliate growth of 0.1 percentage points for affiliates of efficient, high R&D parents.

Finally, Panel B shows the economic significance of the results in Table 6. Affiliates in countries with low initial capital market development and little capital market growth

over the sample period (Column 1 in Table 6) see the strongest negative effect of U.S. parent efficiency and demand growth. Annual affiliate growth is reduced by 1.25 percentage points from the 10th to the 90th percentile of U.S. parent efficiency*GDP growth. Note also, that in countries with rapid capital market development, the negative effect of parent efficiency*GDP growth on affiliate growth is considerably smaller (post-liberalization) and non-existent (pre-liberalization), as compared to the 1.25 percentage point decline in affiliate growth in countries with little change in capital market development. These results support the notion that affiliates grow with greater constraints in countries with limited local sources of financing and slow capital market growth. Affiliates in these countries are particularly vulnerable to resource reallocation within the MNC when parents are efficient and the U.S. economy has robust growth.

F. Robustness of our Results

We check to see if our results are robust to alternate measures of affiliate growth and affiliate efficiency. We examine whether the growth in real affiliate assets responds to the same efficiency and interaction variables as the growth in employment. Overall, we find similar results, despite affiliate assets potentially suffering from country differences in accounting rules and exchange rate movements. These differences may be mitigated to the extent foreign affiliates of U.S. MNCs follow U.S. accounting procedures (as is required by the BEA). We do find stronger significance for the change in exchange rates in these regressions. This finding is perhaps not surprising, given that assets are translated back into U.S. dollars at end-of-year exchange rates. Using employment growth avoids this problem. As we discuss in the data appendix, we also explore several alternative measures of affiliate efficiency, using simpler cash flow based measures of efficiency, and find similar results.

Second, we examine the possible effect of measurement error in the efficiency and relative GDP growth variables. We wish to be sure that there is no systematic bias in efficiency measures when there are either very few or very many affiliates within the MNC. In the former case, our main concern is that there would be no “comparison” affiliates within the MNC in the same industry-year as the focal affiliate. In the latter case, our concern is that by pooling either efficiency or demand growth across multiple affiliates - some of which had positive efficiency (or demand growth) and some of which had negative efficiency (or demand growth)-we would create “noisy” measures of efficiency and/or demand growth.

On the first issue of too few affiliates, fewer than one tenth of one percent of MNCs in our sample do not have multiple affiliates in the same industry, and our results are robust to the exclusion of these firms.¹⁶ Second, for MNCs with many affiliates, we estimated the regressions using discrete variables (-1,0,1) that indicate whether the other affiliates' efficiency is lower, equal to, or greater than, the focal affiliate. We also use only the largest other affiliate's efficiency as a measure of alternative opportunities available to the MNC. In both cases we obtain similar results to those reported here.

Third, we use different measures of access to capital. Specifically, as an alternative test of the association between MNC access to capital and growth, we use a measure of lagged affiliate borrowing from the parent and local financing. This measure captures access to financing at the affiliate level. Similar to the results reported in Table 4, we find affiliates with less total financing grow with resource constraints. We find no evidence that affiliates with greater parent and local financing compete for resources with other units of the MNC.

Fourth, we explore the robustness of our results to possible alternative explanations. We consider the fact that the observed "resource constraints" within MNCs might be optimizing behavior, in the sense that MNCs can shift production in and out of different countries as cost or demand conditions change throughout the global network of affiliates. If our results are picking up "optimizing" production shifts, we would expect to find the following patterns. First, there should be considerably less shifting of production among diversified MNCs, as these are less likely to have plants in different countries that can easily manufacture the same products. Second, we should find more production shifting in larger MNCs, as these are more likely to have multiple plants that can produce the same things. We should also observe considerably more production shifting among MNCs that trade extensively intra-firm, as these MNCs have established the mechanisms to shift production and transfer the output from different plants throughout the network.

To explore these ideas, we create measures of both MNC intra-firm trade and diversification. (The diversification measure is based the BEA's 2-3 digit industry codes, which

¹⁶To some extent, this is because smaller MNCs are more likely to have estimated data, and we removed all estimated observations from our sample. Specifically, since we use only reported data, and all our affiliate and MNC variables are lagged, we are conditioning on an affiliate appearing at least twice consecutively, with no estimated data. These tend to be the larger affiliates from relatively larger MNCs (as compared to the entire population of affiliates in the BEA data). However, we still have a wide range in the number of affiliates per MNC.

correspond to 2-3 digit SIC codes). We run the basic specification from Table 2 column 1 and split affiliates into high and low categories of intra-MNC trade and also into high and low categories based on parent diversification. The benefit of using actual intra-MNC trade is that this measure can directly capture whether firms are truly diversified and potentially have no product-market connections between MNC divisions. Using industry classification codes alone does not capture vertical integration or other forms of trade within firms.

We examine whether less diversified MNCs (and MNCs that operate in related industries) face larger or smaller resource constraints. We find evidence of greater resource reallocation in MNCs that operate in more related industries and trade more intra-firm. This result appears to be consistent with “optimizing” production shifting.

However, when we examine the high and low intra-MNC trade and diversification samples by the size of the MNC network (as measured by the number of foreign affiliates), we find that MNC size has an important influence on the effects of relatedness. We find evidence of resource-constrained growth for affiliates of small MNC networks with highly diversified parents. This finding is opposite to the expected pattern under the production-shifting scenario. We also find no significant resource constraints for affiliates of large-network MNCs, regardless of the MNCs’ level of intra-firm trade.

Another possible explanation is that the resource constraints we find may be driven by diversified firms misallocating resources - although the results suggest that efficient affiliates in countries with positive changes in demand receive more, not less resources. However, our results are unaffected by product-line diversification, measured by either industry codes or by identifying MNCs that do not trade much within the firm. We find no resource constraints for affiliates of highly diversified MNCs with large affiliate networks.

Overall, our results are robust to different measures of financial resources, the extent of intra-MNC trade and diversification. Thus, we conclude that our results support the existence of competition for resources within the MNC.

III. Conclusions

In this paper, we examine MNC growth across networks of affiliates. Our primary research question is whether MNC affiliates and MNC parent operations within a network grow together or compete for scarce resources within the MNC. In our full sample of firms,

we find that affiliates grow less when their U.S. parents are efficient and the U.S. economy is growing relatively quickly. In other words, we find overall evidence that the foreign affiliates of U.S. MNCs grow with resource constraints. In contrast, we find that the employment growth of U.S. parents is greater when the parents have an efficient network of foreign affiliates with attractive growth opportunities in their local markets. This result seems to contradict many of the current assumptions about “off-shoring” and domestic job loss.

The second research question we examine is whether affiliates’ resource-constrained growth varies systematically with MNC R&D intensity and access to financial resources. Our findings regarding these firm-specific resources are:

1. Affiliates of low-R&D MNCs, and MNCs with relatively limited financial resources grow with significant resource constraints.
2. Affiliates of high-R&D MNCs and MNCs with greater financial resources grow with no apparent constraints.

These results provide evidence that financial and knowledge-based resources are important to an MNC’s ability to grow with minimal resource competition between divisions. Relating our results to Helpman’s [1984] theory of the MNC, given we find no resource constraints in high-R&D MNCs, it may be the case that knowledge assets and “headquarters services” face constant or increasing returns to scale. Similarly, affiliates of MNCs with greater financial resources appear to grow with no resource constraints.

Our third research question examines whether resource-constrained growth varies with characteristics of the host countries in which the affiliates operate. Our findings regarding host country characteristics are:

1. Affiliates in countries with restrictive FDI policies grow with greater resource constraints. These constraints are most pronounced in countries with low-capital market development. Affiliates in countries with less restrictive policies toward FDI grow with no evident resource constraints.
2. Affiliates’ resource-constrained growth in countries with low capital market development occurs primarily in countries that do not experience much growth in their capital

markets over time. Affiliates grow with no apparent resource constraints in countries with initially low capital market development, but high capital market *growth*.

3. In countries with high capital market growth, affiliate growth becomes more closely related to own efficiency and local market demand growth after capital market liberalization.

These results are consistent with the findings of Desai, Foley and Hines [2004] that borrowing is costly in countries with underdeveloped capital markets and weak legal protection. These country conditions seem to generate greater within-MNC constraints to growth for affiliates. However, we find that as countries undergo capital market liberalization, affiliates face fewer internal constraints to growth, and their growth becomes more closely related to their own efficiency. With greater local access to capital and improved local institutions, affiliate growth appears to consume fewer resources from other MNC divisions.

For MNC affiliates, there may be a downside to host-country capital market development if the affiliates face greater competition from local firms. In future research, we hope to examine how capital market development in the affiliates' host countries affects competition between affiliates and local firms, and potentially, resource constraints within the MNC.

Our results point to the importance of understanding how MNCs grow as networks and the conditions under which growth in one market may affect growth in other markets in which the MNC has efficient operations. Overall, we find that U.S. parents grow more when they have efficient networks of foreign affiliates in high-growth markets, but foreign affiliates grow less when their U.S. parents are efficient and the U.S. economy is growing rapidly. This resource-constrained growth only exists for affiliates of relatively low-R&D parents and parents with limited access to capital. Resource-constrained growth is also evident for affiliates in countries with restrictive policies toward FDI and low capital market development. Although MNC affiliates do appear to compete for resources with other divisions of the MNC, this competition depends on the firm-specific resources of the MNC parent and the financial and institutional environments of the affiliates' host countries.

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Data Appendix

This appendix contains the details on how we constructed the sample used in our study and how we measured MNC affiliate and parent efficiency.

We used the BEA data over the 14-year window from 1983-1996. We made several alterations to the BEA population to construct the panel used in this research. First, because the BEA conducts two different surveys (the Benchmark and Annual Surveys) with different reporting requirements in terms of affiliate size, reported data were not available for all the affiliates throughout the 14-year period. The Benchmark Surveys, conducted in 1977, 1982, and again in 1989 and 1994, included the whole population of MNCs and their foreign affiliates, and smaller affiliates were required to report data. But in the Annual Surveys, many of the small affiliates that reported data in the 1989 and 1994 Benchmark Surveys were exempt from filing. In cases in which affiliates reported data in a Benchmark Survey but were exempt from the Annual Surveys, the BEA carried them forward by estimating data.¹⁷

As a result of this sampling procedure, many of the observations for smaller affiliates were estimated for most of the 14-year period. In an initial screen, we removed all estimated data from our sample. (See Feinberg and Keane, 2001, for a detailed discussion of the BEA panel.) After this screen, our panel contained approximately 155,000 affiliate-year observations out of a population of 256,000.

In our second screen, we kept only affiliates in countries for which we had real exchange rate data. Approximately 18,800 observations were dropped in this screen, but our remaining sample of 137,000 affiliate-year observations accounted for 95 percent of total affiliate sales (among affiliates that reported data). In other words, the number of affiliates that reported data in countries dropped from our sample in this step was relatively small. For the regressions reported, we also excluded data for which we were not able to calculate affiliate efficiency, as described later in this section. We did calculate efficiency for approximately 109,600 affiliate-year observations. For these affiliate observations, we were able to calculate a measure of parent efficiency for 92,200 affiliate-year observations.

Because we specified our dependent variable (affiliate employment growth) as a change,

¹⁷These individual affiliates which are carried forward are small and are thus not likely to have a significant impact on the BEA's published data at the industry or country level.

and because we used lagged independent variables, we removed affiliates with missing data and/or non-consecutive observations from our sample. This screen resulted in the removal of a large number of affiliate-year observations, because many affiliates only had only one or two non-consecutive reported data points (typically, one for each Benchmark year, 1989 and 1994).

We also excluded affiliates in which the parent had only a partial ownership stake. This criterion affected only 3,620 affiliate-year observations and did not change significantly any of our reported results.

Finally, we excluded the bottom and top one percent of observations for each of the growth and efficiency variables. Given the high correlation in outliers across these variables based on this outlier screen, we excluded approximately three percent of the data. Our final regression sample includes 36,147 affiliate-year observations on 8,428 affiliates of 864 U.S. parents producing in 41 countries.

We measured affiliate efficiency as $[(\text{Real affiliate gross product})/\text{affiliate employment}]$ at time $(t-1)$, where gross product was an economic accounting measure of an affiliate's value-added constructed by the BEA (see Mataloni and Goldberg, [1994]). This measure of gross product is the sum of local affiliate costs plus affiliate profits in production. The advantage of this measure over a cash-flow accounting measure is that it is not as subject to potential accounting allocation of non-production and overhead costs across countries by the parent. We deflated this measure by industry-level price deflators to get a real dollar measure and then divided by affiliate employment. We used this basic measure of efficiency to calculate three measures of affiliate efficiency, two relative efficiency measures for affiliate i , and an efficiency measure for the other affiliates in affiliate i 's network.

For robustness, we also explored several alternative measures of affiliate efficiency in addition to the ones discussed here. (We do not report results using the other measures, but they are available on request.) The alternative measures showed no systematic differences from the measure we use here. The other measures were closer to cash flow measures of efficiency $[(\text{affiliate sales} - \text{cost of goods sold})/\text{affiliate employment}]$ and $[(\text{affiliate sales} - \text{employee compensation})/\text{affiliate employment}]$. Both these measures were also divided by sales, rather than employment, as the third and fourth measures.

Our first measure of affiliate efficiency was within-MNC (industry and year adjusted)

efficiency. Because we predicted that MNCs will allocate resources to affiliates with a comparative advantage within the MNC, this variable measures affiliate i 's efficiency in a given year relative to other affiliates in the same MNC in the same industry as affiliate i . We calculated affiliate i 's within-MNC efficiency by subtracting from affiliate i 's efficiency the average efficiency of other same-industry affiliates of the same parent as affiliate i . We expected that affiliates that were relatively more efficient within the MNC would have higher growth. We note that in addition to predicting absolutely higher growth for affiliates with higher within-MNC efficiency, our hypotheses predicted that MNCs will allocate resources to affiliates that were relatively more efficient and have positive changes in demand. Accordingly, we calculated an interaction between affiliate i 's within-MNC efficiency and its demand change.

Our second measure of affiliate efficiency is the efficiency of affiliate i relative to other MNC affiliates in the same industry in the same country-year. We constructed this measure by subtracting from affiliate i 's efficiency the average efficiency of unrelated MNC affiliates in the same country, year, and industry as affiliate i . We expected that MNCs would allocate more resources to affiliates which were relatively efficient (compared with other same-industry affiliates) within a given host country.

The third measure of affiliate efficiency is a weighted average of the efficiency of all the affiliates of a given MNC parent (excluding affiliate i). To construct this measure, we summed together (efficiency*sales) for all affiliates (other than affiliate i) of a given parent, p , and divided by the total sales of all the affiliates of parent p (other than affiliate i). Our main predictions for other affiliate efficiency center around the interaction between other affiliate efficiency and the other affiliates' demand changes.

Our final measure of efficiency is for the U.S. parent. We measured parent p 's efficiency by $(\text{sales} - \text{employee compensation})/\text{employment}$ (at time $(t-1)$),¹⁸ and we industry- and year- adjusted this measure by subtracting from parent p 's efficiency the mean efficiency of all U.S. parents in the same industry-year. Again, our main prediction for this variable focuses on the interaction between parent p 's efficiency and its relative change in demand.

¹⁸We use this measure of parent efficiency rather than real gross product because we do not have a full series of gross product data for U.S. parents. We do not expect this should bias our results for parent efficiency given that similar measures of affiliate efficiency used in earlier specifications yielded the same results as the gross product-based measures.

Figure 1a: Affiliate Efficiency and Growth

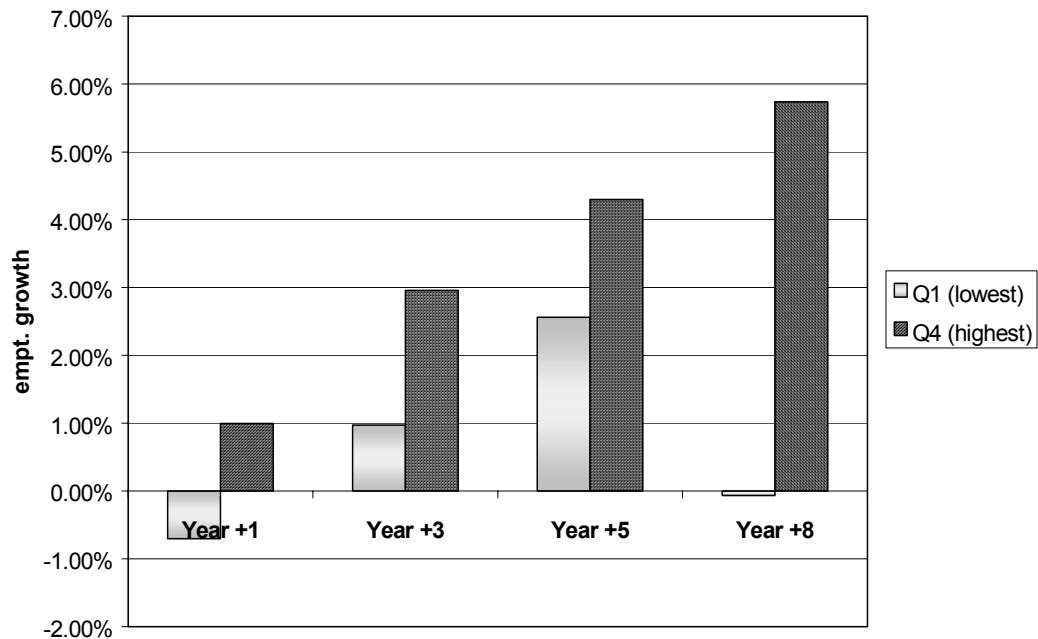


Figure 1b: Affiliate Efficiency and Growth in Countries with Low Capital Market Development

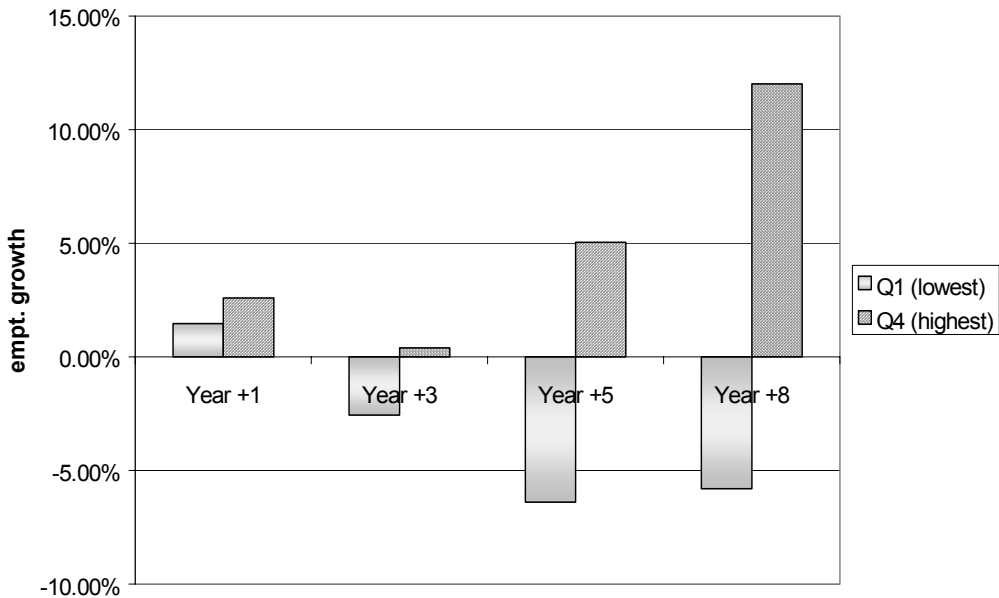


Figure 1c: Affiliate Efficiency and Growth in Countries with High Capital Market Development

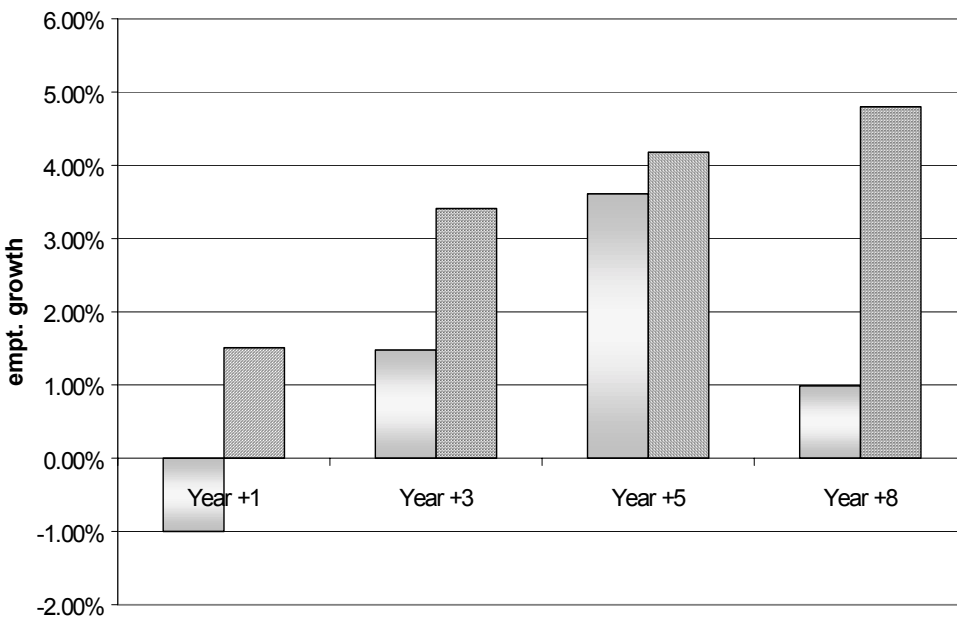


Table 1
Sample Characteristics of U.S. MNC Foreign Affiliates, 1983-1996

	<u>All</u> <u>Affiliates</u>	Affiliates of MNCs with Low R&D	Affiliates of MNCs with High R&D
Panel A: Affiliate Characteristics by U.S. Parent R&D Intensity			
Affiliate employment growth (average %)	1.6% (0.23)	1.7% (0.24)	1.6% (0.23)
Affiliate size (average, 1982 \$000)	103,503 (350295)	59,504 (100139)	117,951 ^a (431452)
Debt to asset ratio for affiliates (average)	54.3% (0.30)	53.5% (0.30)	54.7% ^a (0.30)
% debt from parent (average)	16.2% (0.23)	16.1% (0.23)	16.3% (0.24)
% debt from local borrowing (average)	65.6% (0.30)	66.3% (0.30)	64.8% ^a (0.30)
% Sales in local country (Average)	78.7% (0.31)	79.3% (0.30)	78.5% ^b (0.31)
Median number of affiliates in MNC network	23	19	25
Affiliate-year Observations	36,147	12,047	22,924

Panel B: Parent Characteristics by R&D Quartile

	<u>All</u> <u>Parents</u>	MNCs with Low R&D	MNCs with High R&D
U.S. employment growth	-0.5% (0.16)	-0.5% (0.16)	-0.6% (0.16)
U.S. parent size (average, 1982 \$000)	2,694,058 (7190013)	3,023,903 (6976119)	2,364,040 (7384923)
U.S. R&D / Sales	3.7% (0.06)	0.4% (0.00)	7.0% ^a (0.07)
U.S. Cash to Investments	1.97 (6.84)	2.61 (9.99)	1.35 ^a (2.13)
Average number of countries in which MNC operates	11.2 (12.1)	8.9 (11.5)	13.5 ^a (12.3)
Foreign / total employment	30.6% (0.20)	25.7% (0.21)	35.5% ^a (0.19)
Sales in U.S. / total sales	88.7% (0.14)	94.6% (0.10)	82.8% ^a (0.16)
Parent-year Observations	3,822	1,911	1,911

Notes: a,b = Difference in means between high- and low-R&D groups is significantly different from zero at the 1, 5 percent level. (Standard deviations in parentheses.)

Countries in the sample include: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, U.K., Venezuela.

Table 2
Growth of MNC Affiliates

	All Affiliates	Parent and Affiliate Size Weighted	Size and Percent Local Sales Weighted
<u>Affiliate Efficiency Variables</u>			
Efficiency - relative MNC-industry-year	0.068 ^c (.040)	0.051 (.036)	0.066 ^c (.035)
Efficiency - relative country-industry-year	0.117 ^a (.026)	0.113 ^a (.023)	0.123 ^a (.024)
<u>Key Intra-MNC Interaction and Trade-off Variables</u>			
Relative efficiency (MNC-Ind-Year)*GDP change	6.111 ^a (1.27)	5.015 ^a (1.17)	4.780 ^a (1.34)
Efficiency of U.S. parent * relative GDP change of U.S. parent	-0.754 ^c (.417)	-0.582 ^b (.269)	-0.520 ^b (.235)
Efficiency of other affiliates * relative GDP change of of other affiliates	-2.515 (1.57)	0.019 (0.084)	0.152 (0.138)
<u>MNC and Country Control Variables</u>			
Efficiency of US parent	-0.009 (.017)	-0.008 (.011)	-0.013 (.012)
Efficiency of other affiliates in the MNC (weighted average)	0.238 ^a (.046)	0.013 ^a (.004)	0.015 ^a (.004)
Log sales	-0.0015 (.001)	-0.0013 (.001)	-0.0008 (.001)
Exchange rate change	-0.009 (.018)	-0.010 (.018)	-0.013 (.018)
GDP change	0.607 ^a (.144)	0.613 ^a (.144)	0.776 ^a (.213)
Long-run (5-year) GDP growth	0.130 ^a (.034)	0.129 ^a (.034)	0.140 ^a (.034)
Relative GDP change of Other Affiliates (weighted average)	0.261 ^b (.108)	0.269 ^b (.108)	0.428 ^a (.150)
Relative GDP change of U.S. parent	0.184 (.112)	0.189 ^c (.112)	0.074 (.095)
Local effective tax rate	-0.050 (.034)	-0.052 (.034)	-0.070 ^b (.033)
Constant	0.037 (.069)	0.035 (.069)	0.039 (.069)
X^2 statistic (p-value) for joint significance test of variables	678.9 (0.0)	654.3 (0.0)	680.7 (0.0)
Number of observations	36147	36147	36147
Number of affiliates	8428	8428	8428

All MNC-specific variables are lagged. See data appendix for details of efficiency calculations. All regressions are estimated with random firm effects, industry dummy variables, and country-specific time trends.

In column 1 (columns 2-3) all coefficients and standard errors for efficiency variables are multiplied by 1,000 (10,000).

^{a,b,c} significantly different from 0 at the 1%, 5%, and 10% levels, respectively. (Standard errors in parentheses).

Table 3
Growth of MNC U.S. Parents

	All Parents	Parent and Affiliate Size Weighted	Size and Percent Local Sales Weighted
<u>Parent Efficiency Variables</u>			
Efficiency - U.S. Parent (relative industry-year)	0.110 ^b (.049)	0.063 ^c (.034)	0.088 ^a (.034)
<u>Key Intra-MNC Interaction and Trade-off Variables</u>			
Efficiency of U.S. parent * relative GDP change of U.S. parent	0.352 (1.71)	0.370 (1.19)	-0.239 (1.26)
Relative Affiliate efficiency * Affiliate Country GDP change	5.322 ^b (2.15)	4.960 ^a (1.88)	5.263 ^b (2.07)
<u>MNC and Country Control Variables</u>			
Parent R&D / Sales			0.083 ^c (.049)
Efficiency of Affiliates (weighted average)	-0.019 (.065)	-0.022 (.053)	-0.020 (.054)
Log parent sales	-0.007 ^a (.002)	-0.005 (.007)	-0.009 (.007)
Exchange rate change	-0.117 ^b (.052)	-0.104 ^b (.051)	-0.115 ^b (.052)
GDP change of U.S. parent	0.054 (.042)	-0.009 (.014)	-0.007 (.015)
Long-run (5-year) U.S. GDP growth	-0.140 (.157)	-0.019 ^a (.068)	0.019 (.070)
GDP change of Affiliates (weighted average)	0.054 (.042)	-0.009 (.014)	-0.007 (.015)
Constant	0.039 ^a (.005)	0.036 (.048)	0.038 (.047)
Test (<i>p</i> -value) for X^2 test of joint significance of variables	147.8 (0.00)	147.1 (0.00)	145.7 (0.00)
Number of observations	3822	3822	3822
Number of parents	1136	1136	1136

All MNC-specific variables are lagged. See data appendix for details of efficiency calculations. All regressions are estimated with random firm effects, industry and year fixed effects.

In column 1 (columns 2-4) all coefficients and standard errors for efficiency variables are multiplied by 1,000 (10,000).

^{a,b,c} significantly different from 0 at the 1%, 5%, and 10% levels, respectively. (Standard errors in parentheses).

Table 4
Growth of MNC affiliates by Parent R&D and Parent Cash

	Parent R&D/Sales		Parent Cash / Investment	
	Low R&D	High R&D	Low Cash	High Cash
<u>Affiliate Efficiency Variables</u>				
Efficiency - relative MNC-industry-year	0.001 (.008)	0.008 ^b (.004)	0.004 (.006)	-0.010 (.009)
Efficiency - relative country-industry-year	0.020 ^a (.005)	0.010 ^a (.003)	0.010 ^b (.004)	0.028 ^a (.008)
<u>Key Intra-MNC Interaction and Trade-off Variables</u>				
Relative efficiency (MNC-Ind-Year)*GDP change	0.714 ^a (.261)	0.415 ^a (.158)	0.250 (.241)	1.088 ^a (.333)
Efficiency of U.S. parent * relative GDP change of U.S. parent	-0.099 ^b (.048)	-0.031 (.028)	-0.077 ^c (.045)	0.064 (.075)
Efficiency of other affiliates * relative GDP change of other affiliates	0.006 (.024)	0.011 (.017)	0.010 (.021)	-0.007 (.033)
<u>MNC and Country Control Variables</u>				
Efficiency of US parent	-0.001 (.002)	-0.001 (.002)	-0.004 ^c (.002)	-0.002 (.005)
Efficiency of other affiliates in the MNC (weighted average)	0.0018 ^a (.0007)	0.0011 ^b (.0005)	0.0006 (.0006)	0.0019 ^c (.0010)
Log sales	-0.005 ^c (.003)	-0.001 (.002)	-0.008 ^a (.003)	-0.010 ^b (.005)
Exchange rate change	-0.037 (.031)	-0.007 (.022)	-0.030 (.033)	-0.008 (.035)
GDP change	1.570 ^a (.367)	0.340 (.278)	-0.077 (.426)	1.366 ^a (.536)
Long-run (5-year) GDP growth	0.145 ^b (.059)	0.132 ^a (.042)	0.120 ^b (.061)	0.087 (.069)
Relative GDP change of Other Affiliates (weighted average)	0.820 ^a (.252)	0.198 (.199)	0.251 (.330)	0.321 (.427)
Relative GDP change of U.S. parent	0.334 ^b (.163)	-0.060 (.120)	-0.203 (.173)	0.358 ^c (.209)
Local effective tax rate	-0.092 (.057)	-0.050 (.042)	-0.003 (.062)	-0.043 (.073)
Constant	0.023 (.039)	-0.036 (.026)	-0.785 ^a (.296)	0.129 (.301)
χ^2 statistic (p-value) of joint significance of variables	425.4 (0.0)	426.4 (0.0)	214.5 (0.0)	254.1 (0.0)
Number of observations	11709	22369	10915	6183
Number of affiliates	2816	4918	3036	1913

The low (high) R&D sub-samples are split at the median of industry-adjusted parent R&D/sales. Similar split is for beginning-of-year parent cash to lagged investment based on firms that matched to Compustat. All MNC-specific variables are lagged. See data appendix for details of efficiency calculations. All regressions are estimated with random firm effects, industry dummy variables, and country-specific time trends. All coefficients and standard errors for efficiency variables are multiplied by 1,000.

^{a,b,c} significantly different from 0 at the 1%, 5%, and 10% levels, respectively. (Standard errors in parentheses).

Table 5
Growth of MNC affiliates by Country Characteristics

FDI Restrictions: Financial Market Capitalization:	High	Low	High Low	High High
<u>Affiliate Efficiency Variables</u>				
Efficiency - relative MNC-industry-year	-0.005 (.007)	0.010 ^b (.004)	0.007 (.008)	-0.017 (.017)
Efficiency - relative country-industry-year	0.015 ^b (.006)	0.012 ^a (.003)	0.010 (.009)	0.027 ^a (.010)
<u>Key Intra-MNC Interaction and Trade-off Variables</u>				
Relative efficiency (MNC-Ind-Year)*GDP change	0.749 ^a (.222)	0.333 ^b (.166)	0.784 ^a (.251)	1.085 ^c (.628)
Efficiency of U.S. parent * relative GDP change of U.S. parent	-0.065 ^c (.035)	-0.046 (.031)	-0.073 ^c (.039)	-0.046 (.113)
Efficiency of other affiliates * relative GDP change of other affiliates	0.020 (.019)	0.012 (.019)	0.028 (.021)	-0.008 (.076)
<u>MNC and Country Control Variables</u>				
Efficiency of US parent	-0.005 (.003)	-0.001 (.001)	-0.003 (.003)	-0.002 (.004)
Efficiency of other affiliates in the MNC (weighted average)	0.0012 ^c (.0007)	0.0017 ^a (.0005)	0.0017 ^c (.0009)	0.000 (.0014)
Log sales	-0.010 ^a (.003)	0.001 (.002)	-0.011 ^a (.004)	-0.004 (.005)
Exchange rate change	-0.024 (.021)	0.001 (.031)	-0.046 ^b (.022)	-0.146 (.094)
GDP change	1.260 ^a (.448)	0.739 ^a (.245)	2.142 ^a (.559)	1.083 (.886)
Long-run (5-year) GDP growth	0.309 ^a (.054)	0.093 ^b (.038)	0.374 ^a (.060)	0.389 (.289)
Relative GDP change of Other Affiliates (weighted average)	0.525 ^c (.314)	0.443 ^a (.171)	0.700 ^c (.400)	0.269 (.587)
Relative GDP change of U.S. parent	0.259 (.204)	0.033 (.108)	0.597 ^b (.245)	0.178 (.452)
Local effective tax rate	-0.122 ^b (.054)	-0.044 (.037)	-0.094 (.079)	-0.227 ^b (.105)
Constant	-0.392 ^b (.174)	0.043 (.081)	0.072 (.142)	0.018 (.267)
X^2 statistic (p-value) of joint significance of variables	388.6 (0.0)	377.8 (0.0)	345.6 (0.0)	139.1 (0.0)
Number of observations	8316	26908	4984	2776
Number of affiliates	2242	6615	1259	947

All MNC-specific variables are lagged. See data appendix for details of efficiency calculations. All regressions are estimated with random firm effects, industry dummy variables, and country-specific time trends.

The low and high splits for foreign direct investment (FDI) restrictions are at the country-year level. The low (high) sub-samples for market capitalization are below (above) the median country-year stock market plus private bank claims to GDP. All coefficients and standard errors for efficiency variables are multiplied by 1,000.

^{a,b,c} significantly different from 0 at the 1%, 5%, and 10% levels, respectively. (Standard errors in parentheses).

Table 6
Affiliate Growth for Countries with Low Initial Capital Market Development

	<u>Low Initial Capital Market Development Countries</u>			
	<u>Low Change</u> <u>in Capital Mkt. Devel.</u>	<u>High Change in Capital Market Development</u> <u>Full Period</u>	<u>Pre-Liberalization</u>	<u>Post-Liberalization</u>
<u>Affiliate Efficiency Variables</u>				
Efficiency - relative MNC-industry-year	0.006 (.010)	-0.010 (.009)	0.008 (.016)	-0.015 (.014)
Efficiency - relative country-industry-year	0.021 ^c (.012)	0.018 ^b (.008)	0.013 (.018)	0.024 ^b (.011)
<u>Key Intra-MNC Interaction and Trade-off Variables</u>				
Relative efficiency (MNC-Ind-Year)*GDP change	0.943 ^b (.424)	0.773 ^a (.263)	0.916 ^b (.411)	1.311 ^a (.393)
Efficiency of U.S. parent * relative GDP change of U.S. parent	-0.135 ^c (.071)	-0.041 (.041)	-0.013 (.077)	-0.059 (.056)
Efficiency of other affiliates * relative GDP change of other affiliates	0.000 (.030)	0.006 (.022)	0.016 (.039)	-0.001 (.031)
<u>MNC and Country Control Variables</u>				
Efficiency of US parent	-0.003 (.004)	-0.007 ^b (.003)	-0.001 (.007)	-0.008 ^c (.005)
Efficiency of other affiliates in the MNC (weighted average)	0.000 (.001)	0.001 (.001)	0.002 (.002)	0.001 (.001)
Log sales	-0.007 (.006)	-0.010 ^b (.004)	-0.004 (.007)	-0.012 ^b (.006)
Exchange rate change	-0.032 (.039)	-0.019 (.026)	-0.028 (.040)	-0.074 ^c (.045)
GDP change	-0.229 (.818)	2.087 ^a (.577)	1.855 ^c (.988)	3.714 ^a (.866)
Long-run (5-year) GDP growth	0.198 ^b (.084)	0.318 ^a (.064)	0.395 ^a (.104)	0.233 ^b (.112)
Relative GDP change of Other Affiliates (weighted average)	0.333 (.581)	1.070 ^a (.406)	1.591 ^b (.670)	1.259 ^b (.577)
Relative GDP change of U.S. parent	-0.262 (.355)	0.392 (.251)	-0.011 (.484)	1.043 ^a (.378)
Local effective tax rate	0.025 (.099)	-0.216 ^b (.092)	-0.401 ^b (.193)	-0.006 (.151)
Constant	0.034 (.180)	0.199 (.158)	0.017 (.243)	0.028 (.177)
χ^2 statistic (p-value) of joint significance of variables	37.9 (0.03)	331.6 (0.0)	135.6 (0.0)	222.9 (0.0)
Number of observations	2615	4932	1663	2523
Number of affiliates	597	1108	522	698

The low (high) sub-samples are splits at the country-year level for stock market plus private bank claims to GDP. All MNC-specific variables are lagged. See data appendix for details of efficiency calculations. All regressions are estimated with random firm effects, industry and country fixed effects and a time trend.

All coefficients and standard errors for efficiency variables are multiplied by 1,000.

^{a,b,c} significantly different from 0 at the 1%, 5%, and 10% levels, respectively. (Standard errors in parentheses).

Table 7
Economic Significance of Regression Results

Panel A: Varying Own Efficiency & Own Efficiency*Demand Interaction Variables

Own Efficiency & Demand Interaction at the:	10th	25th	Median	75th	90th	range
	Percentile	Percentile	Level	Percentile	Percentile	90th-10th
Affiliates: Table 2, specification 3	-2.02%	-1.08%	-0.62%	-0.36%	0.41%	2.44%
Parents: Table 3, specification 4	-1.08%	-0.06%	0.48%	0.97%	1.82%	2.90%
R&D: Table 4						
Low R&D: Table 4, specification 1	-2.39%	-1.38%	-0.86%	-0.55%	0.32%	2.70%
High R&D: Table 4, specification 2	-1.95%	-0.97%	-0.52%	-0.25%	0.52%	2.47%
Capital Market Development: Table 6						
Low development - remains low	-3.19%	-1.86%	-1.14%	-0.78%	0.18%	3.37%
Low, develops: pre-liberalization	-2.34%	-1.11%	-0.45%	0.00%	1.09%	3.43%
Low, develops: post-liberalization	-2.12%	-0.28%	0.71%	1.01%	2.17%	4.28%

Panel B: Varying Parent Interaction Tradeoff Variable

Parent Interaction Tradeoff Variable at the:	10th	25th	Median	75th	90th	range
	Percentile	Percentile	Level	Percentile	Percentile	90th-10th
Affiliates: Table 2, specification 3	-0.52%	-0.59%	-0.62%	-0.65%	-0.71%	-0.19%
Parents: Table 3, specification 4 (varying affiliate interaction variable)	0.15%	0.37%	0.48%	0.51%	0.67%	0.52%
R&D: Table 4						
Low R&D: Table 4, specification 1	-0.53%	-0.77%	-0.86%	-0.95%	-1.15%	-0.62%
High R&D: Table 4, specification 2	-0.46%	-0.51%	-0.52%	-0.54%	-0.58%	-0.12%
Capital Market Development: Table 6						
Low development - remains low	-0.49%	-0.95%	-1.14%	-1.32%	-1.74%	-1.26%
Low, develops: pre-liberalization	-0.63%	-0.49%	-0.45%	-0.42%	-0.32%	0.32%
Low, develops: post-liberalization	1.00%	0.87%	0.71%	0.57%	0.40%	-0.60%

Predicted annual employee growth rate using the coefficient estimates from respective tables as indicated.

We vary productivity and demand interaction variables from the 10th to the 90th percentiles.

All other variables (except random affiliate, country and industry fixed effects) are held at the medians for the respective samples.