

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: NBER International Seminar on Macroeconomics 2004

Volume Author/Editor: Richard H. Clarida, Jeffrey Frankel, Francesco Giavazzi and Kenneth D. West, editors

Volume Publisher: The MIT Press

Volume ISBN: 0-262-03360-7

Volume URL: <http://www.nber.org/books/clar06-1>

Conference Date: June 13-14, 2003; June 18-19, 2004

Publication Date: September 2006

Chapter Title: The Comovement of Returns and Investment within the Multinational Firm

Chapter Author: Mihir A. Desai, C. Fritz Foley

Chapter URL: <http://www.nber.org/chapters/c0080>

Chapter pages in book: (p. 197 - 240)

The Comovement of Returns and Investment within the Multinational Firm

Mihir A. Desai, *Harvard University and NBER*

C. Fritz Foley, *Harvard University and NBER*

1. Introduction

To what degree do increasing levels of financial integration among the world's major economies lead to changes in the synchronization of business cycles? In particular, what role could the dramatic increases in foreign direct investment play in explaining the comovement of aggregate measures of economic activity? This paper sheds light on these questions by providing facts about the scope of foreign direct investment in different countries and the correlations in investment and returns of distinct U.S. multinational operations around the world.

The relevance of a world factor in explaining movements in economic aggregates appears to be uncontroversial. What is less well understood is what factors might account for the high degrees of correlation in macroeconomic variables. High levels of financial and trade integration, as pointed out by Frankel and Rose (1998) and Heathcote and Perri (2002), can theoretically lead to either increasingly idiosyncratic or correlated movements in economic aggregates. The link between financial and trade integration and the synchronization of business cycles remains an open question, with somewhat contradictory evidence emerging from econometric analysis of aggregate data.

Rather than filter the economy-wide data in a distinctive way, we approach this question with micro data on the behavior of U.S. multinational companies (MNCs) and emphasize the role that linkages within these firms may play in creating global linkages. In order to explore this channel, we pose a series of questions about the patterns of U.S. multinational activity around the world. First, are the activities of multinational firms sufficiently important to local economies to create these linkages? Second, is there any evidence that aggregate measures of multinational activity comove in a manner that is distinctive

from the behavior of local firms around the world? Finally, is there evidence that activities of U.S. multinationals in the U.S. or in other host countries help explain affiliate investment plans and rates of returns after controlling for conditions in the affiliate host country and industry? Put differently, is multinational affiliate performance around the world a function of parent shocks or shocks affecting other affiliates within the same firm after controlling for national, industry and world factors?

The analysis makes use of measures of the gross product, or value added, of multinational activity and micro data that capture the inner workings of multinational firms. The Bureau of Economic Analysis (BEA) provides national income accounting analogs for the activities of U.S. multinationals around the world. These allow for the comparison of economic output by multinational firms and the size of the local economy. Additionally, these data allow for the calculation of rates of return that are a staple of macroeconomic analysis, as in Poterba (1998). Affiliate-level data on investment and returns are employed to determine the degree to which returns and investments by multinational affiliates around the world comove with returns and investments of the same firm outside of the host country controlling for local returns and investment rates.

The results indicate that U.S. multinationals constitute a significant fraction of output and investment for many major economies and their significance has grown over the last two decades. Averaged across the G-6 countries, U.S. multinational affiliates alone comprised more than 4 percent of output and capital expenditures in their host countries in 1999 with levels as high as 10 percent in several countries.¹ These ratios indicate the potential for multinationals to act as a channel of economic shocks. A descriptive look at the correlation coefficients of rates of return for multinational activity across countries indicates that such correlations are high and in most cases exceed correlations of returns based on economy wide measures. Similar patterns exist for correlations of rates of investment of multinational firms relative to local economy aggregates.

These high correlations of country-wide returns and investment within multinational firms suggest that shocks that occur in one part of the world may be transmitted across borders as a consequence of a multinational firm's worldwide network of subsidiaries. In order to test this more rigorously, affiliate-level regressions attempt to identify how affiliate returns comove with local firm returns, the returns of other

foreign affiliates of the same parent, and the returns on U.S. operations of the affiliate's parents. Both within-MNC measures of returns—the returns on U.S. operations and returns on other foreign operations of the parent—are significant in explaining the return of affiliates controlling for local returns. In a similar vein, parent and other foreign affiliate investment rates retain explanatory power in explaining affiliate investment rates after controlling for local economy investment rates. These results are robust to the inclusion of country/year and industry/year fixed effects that control for the country and industry shocks that have been emphasized in the macroeconomics literature, as in Stockman (1988) and Glick and Rogoff (1995). These results hold for the overall sample of affiliates and the sample of affiliates in G-6 countries. These results suggest that the economic linkages created by intrafirm dynamics, emphasized by Peek and Rosengreen (1997, 2000) for the case of Japanese bank lending and California real estate activity, may be considerably more widespread.

While the various fixed effects employed in the analysis control for a variety of alternative explanations, it is possible that the results reflect an important industry with its own dynamics, the petroleum industry, or linkages created by intrafirm trade. In order to consider these alternatives, further regression analysis tests if observed correlations differ for affiliates in manufacturing relative to non-manufacturing and for affiliates that serve the local market relative to exporting affiliates. Robustness checks indicate that the dynamics of the petroleum industry are not driving the results, that the patterns hold for manufacturing affiliates and that results are similar for affiliates that do and do not sell goods outside of their host country.

Taken together, the evidence provided in the paper suggests that the scope and dynamics of multinational firm activity are consistent with these firms serving as a meaningful channel for the transmission of economic shocks. Investment and returns are linked across parts of the same firm located in different countries, and these linkages cannot be explained by patterns in aggregate investment and returns at the country or industry level. This analysis raises several questions for future research. What aspects of firm internal markets—internal capital markets, transfers of technology—might create these linkages? How much of these linkages can be explained by shocks to input costs faced by multinationals or by international rent sharing by workers across borders within multinationals? To what degree are multinational firms contributing to the synchronization of business cycles relative to trade

linkages, bank lending and other factors? Given the exploratory nature of the analysis in this paper, we believe the results suggest that further work on how multinational firms create global economic linkages is merited.

The rest of the paper is organized as follows. The second section describes the related literature on international business cycles and the internal capital markets of firms and outlines the empirical methodology. The third section provides an overview of the growth of U.S. multinational activity, the changing industrial composition of investment, the relative importance of U.S. multinational activity to local economies around the world, and the changing geographic concentration of U.S. multinational activity. The fourth section provides evidence on the correlation of returns and investment rates to understand the economic linkages created by multinational firms. The fifth section discusses results from the firm-level regressions and the sixth section provides robustness checks for the basic results. A concluding section suggests extensions of this work.

2. Related Literature and Empirical Methodology

This investigation of the correlation of returns and investment plans within multinational firms is related to the growing literature on the synchronization of business cycles and asset returns and some recent literature on multinational and multidivision firms that points out potential sources of synchronicity with firms.

2.1. International Business Cycles

Studies of the synchronization of business cycles typically rely on econometric tests employing macroeconomic aggregates, as in Baxter and Stockman (1989), Backus, Kehoe, and Kydland (1992, 1995), Doyle and Faust (2002), Kose, Otrok, and Whiteman (2003), and Stock and Watson (2003). These studies typically find evidence of a world factor in dictating output variability with somewhat contradictory results on the trend in degrees of comovement among major economies. Heathcote and Perri (2002) find reduced correlations in output and tie these reduced correlations to increased financial integration. Bordo and Helbling (2003) suggest that synchronization levels have increased over a longer historical period and across a variety of exchange rate regimes. These studies typically conclude, as in Kose, Otrok, and Whiteman

(2003) and Stock and Watson (2003), with calls for further investigation of the sources, rather than the degree, of these global correlations. One such investigation of the sources of these correlations is provided by Frankel and Rose (1998) who provide evidence of a correlation between trade linkages and output correlations.²

Linkages between economic aggregates can be particularly trenchant in an emerging market setting where output fluctuations can be large and appear, to some observers, to be contagious. Examinations of these linkages of output and stock market movements in emerging markets have emphasized trade linkages (as in Eichengreen and Rose (1999)), financial flows (as in Kaminsky, Lyons, and Schmukler (2001)), or combinations of these factors.³ Studies of the comovement of returns in emerging markets are part of the larger literature on the degree to which stock markets comove (pioneered in King and Wadhvani (1990) and surveyed recently in Goetzmann, Li, and Rouwenhorst (2005)) and if assets are priced locally or globally, as reviewed in Karolyi and Stulz (2002).

As detailed below, the considerable scope of multinational activity around the world suggests that multinational firms may be a channel for the transmission of economic shocks around the world. There is limited evidence on this channel with contradictory conclusions. Forbes and Chinn (2003) indicate that bilateral FDI flows do not explain global linkages in financial markets while Jansen and Stokman (2004) indicated that international business cycle comovements are more pronounced for countries with large amounts of bilateral foreign direct investment flows. An investigation of the degree to which returns and investment plans comove within firms using micro data affords the opportunity to isolate more precisely the scope of this transmission channel. Such an examination also affords the opportunity to incorporate a rich set of industry and country controls given the interest in the literature, as in Stockman (1988) and Glick and Rogoff (1995), in the relative importance of industry and country specific shocks factors in explaining investment and current account behavior.

2.2. The Internal Linkages of Multinational and Multidivisional Firms

The literature of the internal markets of firms indicates some potential reasons for why returns and investment comove within a firm. Finance scholars have recently turned their attention to the efficiency of the

allocation of capital within firms.⁴ Both Rajan, Servaes, and Zingales (2000) and Scharfstein and Stein (2000) propose rationales for how investment becomes “socialized” through a multi-divisional enterprise leading to inefficient allocation of capital within conglomerates. Such a socialization of investment or cross-subsidization would appear as correlated investment and performance across countries in a multinational setting. In the multinational setting, firms appear to use internal capital markets opportunistically to overcome local rigidities—including costly external finance and capital controls—as in Desai, Foley, and Hines (2004a, 2004b). Given that these internal capital markets appear to be so active, it is conceivable that shocks to geographically disparate operations could be transmitted around the world through multinationals.

Underlying trends in the patterns of real activity by multinationals might also give rise to global linkages. As described by Feenstra (1998), production processes within these firms have increasingly become fragmented around the world. As a consequence, multinational activity within these economies is more likely to be tied to non-local factors providing another channel for the transmission of shocks and the comovement of returns within firms. Desai, Foley, and Hines (2004c) demonstrate how these patterns of the internalization of activity have also changed the ownership preferences of multinational firms.

It is also possible that changes in input costs for multinationals give rise to comovement of returns and investment within firms. Budd, Konings, and Slaughter (2002) consider the process by which wages are set within multinationals and raise the possibility that this process affects the transmission of shocks across borders. This work finds evidence that wages in one location depend on the performance of the firm in other locations. Therefore, international rent sharing across workers of multinational firms might also induce the comovement of returns within firms.

There has been limited empirical evidence on the interrelationship of investment plans within firms that span national boundaries. Peek and Rosengreen (1997, 2000) find that Japanese bank lending decisions in California reflect changes in the value of their Japanese loan portfolios and that these changed lending decisions had real consequences. More widespread evidence of linkages created by multinational firms has not been provided. The one exception to this that we know of is the study by Stevens and Lipsey (1992) of seven multinational firms over 20 years. This study, despite its limited sample, finds evidence of significant interdependence in investment plans between foreign

and domestic operations. If, indeed, investment plans and returns are highly correlated around the world within a multinational firm, this may help explain why investors place a limited value on multinationality, as examined in Errunza and Senbet (1984) and Morck and Yeung (1991), or even a discount on global diversification as in Denis, Denis, and Yost (2002).

2.3. *Data and Empirical Methodology*

In order to isolate the scope and dynamics of U.S. multinational activity, we employ detailed data collected by the U.S. government. We use the 1982 through 1999 results of the Bureau of Economic Analysis (BEA) annual survey of U.S. Direct Investment Abroad to create a panel of data on the gross product, returns and investment of U.S. multinational affiliates and parents. These surveys ask reporters to file detailed survey forms for each affiliate, as well as information on the domestic activities of U.S. parents. The International Investment and Trade in Services Survey Act governs the collection of the data. The Act ensures that "use of an individual company's data for tax, investigative, or regulatory purposes is prohibited." Willful noncompliance with the Act can result in penalties of up to \$10,000 or a prison term of one year. As a result of these assurances and penalties, BEA believes that coverage is close to complete and levels of accuracy are high.

U.S. direct investment abroad is defined as the direct or indirect ownership or control by a single U.S. legal entity of at least 10 percent of the voting securities of an incorporated foreign business enterprise, or the equivalent interest in an unincorporated foreign business enterprise.⁵ The survey forms that U.S. multinational firms are required to complete vary depending on the year and the size of the entity surveyed. Although the most extensive data are available for 1982, 1989, 1994 and 1999, when BEA conducted Benchmark Surveys, we use data from the intervening years as well.⁶ Since many of the variables of interest are not collected for minority owned affiliates, we restrict our sample to include affiliates in which the combined direct and indirect ownership claim by a U.S. parent exceeds 50 percent. BEA collects identifiers linking affiliates through time, thereby permitting the creation of a panel.⁷

The BEA data include national income accounting analogs for the activities of multinational affiliates in countries around the world. Affiliate gross product, a measure of value-added that is computed by BEA from data reported in the survey, was developed in order to

measure the extent of multinational activities in a way that is free from double counting, unlike sales data that reflect value-added within an affiliate and the value of intermediate inputs purchased by an affiliate. As in national income accounting, this measure is decomposed into employee compensation, profit-type return (a measure of profits from current production), net interest paid, indirect business taxes, and a capital consumption allowance.

The analysis that follows begins by employing the BEA measure of gross product in order to characterize the distribution of U.S. multinational firms across countries and industries. Values of aggregate affiliate data within a host country are compared to host country GDP, as measured by the World Bank (2003), to indicate the prevalence of multinational activity. We also compute measures of the importance of affiliate investment in host countries by scaling aggregate affiliate investment by gross fixed capital formation, taken from the World Bank (2003).

In order to consider the comovement of returns of the aggregate activities of U.S. multinationals in distinct host countries, we employ a variety of measures. Using the gross product data, we define the rate of return as the ratio of the sum of the profit-type return, net interest paid, indirect business taxes and the capital consumption allowance to total assets. We also employ two financial accounting based measures of returns; return on equity is the ratio of net income to owners' equity and return on assets is the ratio of net income to assets. In order to compute correlations in economy wide returns, we rely on data in Poterba (1998) and data from Ken French's website for information on rates of return and return on equity.⁸ The Ken French data cover a large sample of publicly traded firms and include information on the dollar stock return in local markets also. In studying the comovement of investment, we analyze correlations of aggregate affiliate capital expenditures across countries as well as these expenditures scaled by aggregate affiliate gross product and affiliate assets. Economy-wide investment is measured as the value of gross fixed capital formation, and we analyze correlations of this measure and this measure scaled by GDP.

In order to analyze the comovement of returns and investment within the firm more rigorously, we employ a specification where the dependent variable is a measure of returns or investment at the affiliate-year level. In order to trace through effects of a multinational parent's activity elsewhere in the world, we include independent variables that measure returns or investment for the affiliate's parent in the U.S. (referred to as parent returns or parent investment) and the returns or invest-

ment of other affiliates of the parent operating abroad (referred to as other affiliate returns or other affiliate investment). Finally, measures of local firm activity are also included as explanatory variables as are varying combinations of affiliate, year, country/year, and industry/year fixed effects in order to ensure that these within-firm measures are not reflecting omitted factors. All standard errors are clustered at the firm level to correct for serial correlation.

3. The Distribution of Multinational Activity, 1982–1999

In order to consider the scope and nature of U.S. multinational activity, Table 1 provides some sense of where multinationals have historically been most active, by country, and how this compares with the share of non-U.S. economic output that these countries constitute. These figures are presented for the four benchmark years and are limited to those countries where either the country's share in worldwide output or the country's share of U.S. multinational output was at least 1 percent in 1999.

Several patterns emerge from this table. First, U.S. multinational activity is more concentrated than global output. By 1999, these 23 countries constitute 83 percent of non-U.S. output and 88 percent of U.S. multinational activity. This level of concentration has also increased quite markedly over the last two decades. Second, it is useful to consider those countries for which the two measures of the distribution of activity differ by large margins. Here, several large discrepancies are apparent. The United Kingdom, Canada, Australia, and Ireland stand out as countries with disproportionately large shares of U.S. multinational activity. In contrast, many countries in Asia—most notably Japan—feature uncharacteristically low levels of U.S. multinational activity. Finally, several large emerging markets—particularly China and India—that have received large amounts of attention for their inward foreign direct investment still have relatively little U.S. multinational activity given their share of world output, despite recent sharp accelerations. It is reassuring that these figures are relatively well-behaved over time and conform, largely, to the folklore on U.S. multinational activity as being concentrated in developed countries, as having a bias toward Anglo countries and as being of limited scope in Japan. It is also worth noting that if multinationals did play a significant role in driving international business cycles, the distribution of U.S. multinational activity would help explain the patterns presented in Stock and Watson (2003) of an Anglo block of correlated economies and the distinct dynamic of the Japan economy.

Table 1
The distribution of global output and U.S. multinational activity around the world, 1982, 1989, 1994, and 1999

	Year											
	1982			1989			1994			1999		
	GDP share	MNC share		GDP share	MNC share		GDP share	MNC share		GDP share	MNC share	
Asia												
China	2.81%	0.00%		2.64%	0.00%		2.83%	0.17%		4.68%	0.70%	
Hong Kong	0.44%	0.43%		0.52%	0.91%		0.68%	1.21%		0.75%	1.41%	
India	2.71%	0.10%		2.25%	0.05%		1.68%	0.06%		2.10%	0.19%	
Japan	15.30%	2.05%		22.90%	4.65%		25.10%	5.39%		21.23%	5.34%	
Korea	1.04%	0.10%		1.70%	0.23%		2.10%	0.36%		1.92%	0.58%	
Singapore	0.21%	0.50%		0.23%	0.73%		0.36%	1.42%		0.39%	1.74%	
Taiwan	0.68%	0.28%		1.15%	0.60%		1.27%	0.70%		1.36%	1.07%	
Europe												
Belgium	1.23%	2.29%		1.22%	2.66%		1.23%	2.92%		1.19%	2.33%	
France	7.84%	5.44%		7.58%	7.02%		7.05%	7.87%		6.82%	6.62%	
Germany	10.50%	11.07%		10.49%	11.12%		10.91%	13.68%		9.94%	10.93%	
Ireland	0.29%	0.85%		0.29%	1.39%		0.29%	1.57%		0.45%	2.62%	
Italy	5.59%	3.79%		6.73%	5.14%		5.35%	4.62%		5.58%	3.96%	
Netherlands	2.01%	2.41%		1.83%	4.12%		1.82%	3.61%		1.88%	3.36%	
Norway	0.85%	1.98%		0.76%	1.30%		0.64%	1.12%		0.73%	1.11%	
Spain	2.59%	1.15%		3.04%	2.30%		2.63%	2.00%		2.85%	1.90%	

Sweden	1.44%	0.84%	1.53%	0.69%	1.08%	0.63%	1.15%	1.09%
Switzerland	1.39%	1.43%	1.38%	1.59%	1.36%	1.75%	1.22%	1.58%
United Kingdom	6.73%	17.19%	6.49%	16.42%	5.44%	15.55%	6.89%	18.19%
North America								
Canada	4.22%	15.21%	4.22%	16.24%	2.90%	11.87%	3.07%	11.61%
Mexico	2.42%	1.59%	1.72%	1.52%	2.19%	2.44%	2.27%	3.10%
Oceania								
Australia	2.54%	4.50%	2.35%	4.33%	1.80%	3.72%	1.92%	3.46%
South America								
Argentina	1.17%	1.30%	0.59%	0.49%	1.34%	1.05%	1.34%	1.28%
Brazil	3.92%	5.01%	3.46%	5.49%	2.85%	4.17%	2.51%	2.93%
Total	77.92%	79.50%	85.09%	89.00%	82.90%	87.87%	82.22%	87.12%

Note: The table provides information on the distribution of GDP and U.S. multinational gross product across countries in 1982, 1989, 1994, and 1999. GDP Share is the ratio of individual country GDP to total non-U.S. GDP. MNC Share is the ratio total U.S. multinational gross product in a country to the gross product of U.S. multinational affiliates worldwide. The table is restricted to those countries that, in 1999, comprise either one percent of non-U.S. world output or one percent of U.S. multinational gross product.

In order to consider the possibility that multinational firms serve as channel of economic shocks, it is useful to isolate the relative contribution of U.S. multinationals to local output or investment. Table 2 presents the ratio of U.S. MNC gross product and investment to economy wide measures, by country. The first column presents the average ratio of affiliate gross product to host country GDP over the 1982 to 1999 period, and the second column presents this ratio for 1999. The third and fourth column present ratios of affiliate capital expenditures to gross fixed capital formation averaged over the sample period and for 1999. These ratios are crude measures of the relative importance of multinational activity for local economies. They are crude in several respects. First, they only represent U.S. multinational activity and, as such, understate the scope of overall multinational activity. Second, measures of economy-wide activity in the denominators include government activity, and, therefore, the ratios understate the relative importance of multinational firms to the private sector in these countries.

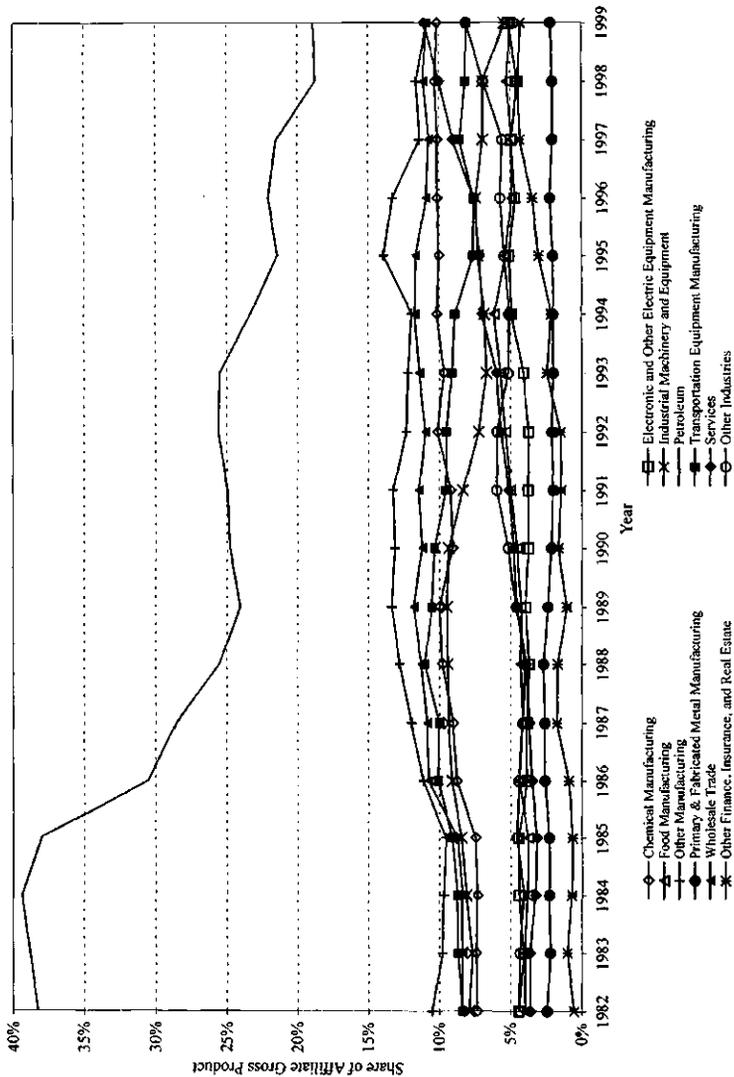
Table 2 reveals several salient facts about the relative importance of U.S. multinational activity. First, a comparison of the averages from 1982 to 1999 and in 1999 indicates that the relative importance of U.S. multinational activity has increased in almost all of the countries in the table. Second, the increases in the relative importance of multinationals are most pronounced in Asia, though multinationals maintain a more significant presence in Europe than in Asia. Third, the U.S. multinational shares of total output and investment vary considerably but are seldom trivial and are often quite large. For Ireland, the United Kingdom, and Canada, these shares are close to or above 10 percent. Most multinational shares are in the single digits, which given the measurement issues mentioned above, seems a significant enough channel to create global linkages.

Finally, it is useful to consider the industrial dispersion of U.S. multinational activity. The share of multinational gross product, by industry, is provided in Figure 1. Unsurprisingly, the share of petroleum, which is separated from manufacturing in the BEA data and includes extraction, refining, service, and wholesale trade activities related to oil and gas, has dropped precipitously over the period from 1982 to 1999 as shares of several sectors—notably, services and finance-related industries—have increased. Given the distinct dynamics that are potentially associated with the petroleum industry, the correlations of returns and investment presented below are considered separately for manufacturing industries.

Table 2
The scope of U.S. multinational activity, 1982–1999 and 1999

	Average ratio of U.S. MNC gross product to GDP, 1982–1999	Ratio of U.S. MNC gross product to GDP, 1999	Average Ratio of U.S. MNC capital expenditures to gross fixed capital formation, 1982–1999	Ratio of U.S. MNC capital expenditures to gross fixed capital formation, 1999
Asia				
China	0.10%	0.40%	0.24%	0.45%
Hong Kong	3.93%	5.06%	3.35%	3.28%
India	0.10%	0.24%	0.14%	0.37%
Japan	0.49%	0.67%	0.21%	0.32%
Korea	0.38%	0.81%	0.26%	0.41%
Singapore	8.43%	11.92%	5.08%	7.57%
Taiwan	1.23%	2.11%	NA	NA
Europe				
Belgium	5.26%	5.27%	3.21%	2.74%
France	2.31%	2.60%	1.47%	1.56%
Germany	2.82%	2.94%	1.59%	1.79%
Ireland	12.00%	15.65%	7.64%	9.69%
Italy	1.86%	1.90%	0.85%	0.99%
Netherlands	4.49%	4.78%	3.38%	3.25%
Norway	4.85%	4.10%	5.27%	4.40%
Spain	1.64%	1.79%	1.23%	1.23%
Sweden	1.52%	2.55%	1.12%	2.17%
Switzerland	2.86%	3.46%	1.15%	2.10%
United Kingdom	6.72%	7.07%	6.80%	8.47%
North America				
Canada	9.47%	10.12%	8.45%	11.16%
Mexico	2.42%	3.65%	2.56%	4.15%
Oceania				
Australia	4.53%	4.83%	3.46%	5.35%
South America				
Argentina	2.22%	2.56%	2.47%	3.92%
Brazil	3.51%	3.12%	2.49%	3.51%

Note: The table provides the ratio of U.S. multinational gross product (capital expenditure) to country GDP (gross fixed capital formation), by country, averaged from 1982 to 1999 and 1999. The table is restricted to those countries that, in 1999, account for either one percent of non-U.S. world output or one percent of U.S. multinational gross product.



Note: The figure provides the share of worldwide U.S. multinational gross product by industry from 1982 to 1999.

Figure 1
The sectoral composition of U.S. multinational affiliate gross product, 1982-1999

4. The Correlations of Returns and Investment Inside Multinational Firms

We begin by presenting some raw correlations of returns and investment rates of affiliates across countries and compare these correlations to correlations of economy wide measures across countries. These correlation tables are obviously only suggestive since the time series data on U.S. multinational activity only cover the 1982 to 1999 period. Descriptive statistics for the sample employed in the correlation tables and the regression tables are presented in Table 3. Tables 4 and 5 present the correlations across G-6 countries.

The top panel of Table 4 provides correlations of our three measures of returns to affiliate activity; these measures are the rate of return (ROR), the return on equity (ROE), and the return on assets (ROA). All of these correlations are positive, and all but five of them differ from zero by statistically significant margins. Correlations of rates of return are the largest, ranging from 0.87 to 0.97. There is more variation in the correlations of ROE and ROA than ROR. Part of this variation may result from shortcomings of these measures in capturing returns to capital. Net income and owners' equity reflect only a component of returns and a component of capital. They also reflect the capital structure choice of affiliates, a choice that is likely to vary through time within countries and one that may be guided by a variety of tax and managerial considerations.

The bottom panel of Table 4 presents similar correlations using economy wide measures of returns. The ROR correlations are all smaller than the ROR correlations observed for multinational firms. The Ken French data do not cover Canada, but for the other countries, economy-wide correlations of ROE are smaller than affiliate correlations for all but two country pairs. It is not possible to directly compare correlations of stock returns to any measure of affiliate returns since most affiliates are not publicly traded, but these correlations also are smaller than the correlations of affiliate rates of return, and they are of a similar magnitude as the correlations of affiliate ROE. If attention is restricted to multinational affiliates in manufacturing, in order to put aside concerns that common shocks to the petroleum industry are driving our results, the results are largely the same.

Table 5 shows correlations of measures of investment across countries. The top panel presents correlations computed from three measures of affiliate investment activity: the level of capital expenditures, capital expenditures scaled by gross product, and capital expenditures scaled

by assets. All but one of these correlations is positive and more than three-fourths of the presented correlations are positive and statistically significant. The correlations of levels of capital expenditures appear to be the highest. Since capital expenditures are measured in nominal terms, these correlations could reflect correlations in inflation rates. The other two measures are not subject to this potential shortcoming.

The bottom panel of Table 5 displays correlations of two economy-wide measures of investment. Capital expenditures are measured using data on gross fixed capital formation, and the correlations cover levels of capital expenditures and capital expenditures scaled by GDP. Although the correlations of country wide measures of investment exceed correlations of affiliate measures of investment in just over half of the comparable cases, both sets of correlations are of a similar magnitude for most country pairs. As with the correlations of returns, restricting attention to manufacturing affiliates does not materially change these results. Taken together, the evidence in Tables 4 and 5 indicates that returns and investment are correlated within U.S. multinational firms. In many cases, the correlations of these measures of activity within firms exceed correlations of these measures for the broader economy. In order to study the correlates of affiliate returns more carefully, we now turn to regression analysis that permits for a richer set of controls for other confounding factors.

5. Firm Level Regressions

The specification outlined in section 2.3 provides a method for further analyzing the degree to which the correlations of aggregate returns and investment represent within-firm dynamics. Table 6 presents firm-level evidence on the correlation of returns inside multinational firms. In order to facilitate comparison of returns across the different parts of a multinational firm, we consider the accounting based measure of return on equity and employ the Ken French data to control for local firm returns on equity. Observations are at the affiliate-year level, and the dependent variable is the return on equity, calculated as the ratio of net income to owner's equity. The specifications in columns 1-6 employ affiliate fixed effects to control for unobserved heterogeneity across affiliates and year fixed effects to capture movements in a world factor that might explain the comovement of returns. It is worth noting that these year fixed effects also control for a wide variety of global shocks like oil price changes that would potentially drive a world factor.

Table 3
Descriptive statistics

	Mean	Median	Standard deviation
Correlation Tables			
<i>Multinational Measures</i>			
ROR	0.1894	0.1864	0.0929
ROE	0.1308	0.1275	0.0440
ROA	0.0399	0.0392	0.0158
Capital Expenditures	5,266,974	4,057,498	4,464,127
Capital Expenditures/ Gross Product	0.1383	0.1311	0.0391
Capital Expenditures/Assets	0.0466	0.0449	0.0178
<i>Local Firm Measures</i>			
ROR	0.1404	0.1415	0.0261
ROE	0.1118	0.1151	0.0337
Stock Returns	0.1623	0.1514	0.3129
Capital Expenditures	322,000,000,000	203,000,000,000	328,000,000,000
Capital Expenditures/ Gross Product	0.2156	0.2089	0.0380
Regression Tables			
Affiliate ROE	0.1586	0.1285	0.3797
Parent ROE	0.1202	0.1273	0.2290
Other Affiliate ROE	0.1381	0.1284	0.1958
Host Country ROE	0.1201	0.1197	0.0340
Log of Affiliate Capital Expenditures	6.3604	6.5221	2.4253
Log of Parent Capital Expenditures	11.7526	11.9585	2.1054
Log of Other Affiliate Capital Expenditures	10.6546	10.8314	2.5011
Log of Host Country Gross Fixed Capital Formation	24.9104	25.1231	1.5006
Affiliate Capital Expenditures/ Assets	0.0504	0.0161	0.1108
Parent Capital Expenditures/ Assets	0.0518	0.0439	0.0480
Other Affiliate Capital Expenditures/ Assets	0.0457	0.0345	0.0542
Host Country Gross Fixed Capital Formation/GDP	0.2187	0.2095	0.0487

Note: The two panels of the table provide descriptive statistics for the correlation tables and regression tables, respectively. Each of the Multinational Measures in the correlation tables relates to measures for the G-8 (excluding Russia and the U.S.) and are based on the activities of U.S. multinationals from 1982 to 1999 as described in the text. Local Firm Measures relate to measures for the G-8 (excluding Russia and the U.S.) and are drawn from Poterba (1999), Ken French's website (<http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/>) and the World Bank Development Indicators as described in the text. "Affiliate," "Parent" and "Other Affiliate" variables are associated with a multinational affiliate, their parent's domestic activity, and their parent's other foreign operations, respectively. "Host country" refers to the country of activity for the multinational activity and that data is drawn from the Ken French website (for ROEs) and World Bank Development Indicators (for gross fixed capital formation).

Table 4
The correlation of returns for U.S. multinationals and local firms, 1982-1999

	U.S. Multinational Firms														
	Canada			France			Germany			Italy			United Kingdom		
	ROR	ROE	ROA	ROR	ROE	ROA	ROR	ROE	ROA	ROR	ROE	ROA	ROR	ROE	ROA
France	0.90 (0.11)	0.54 (0.21)	0.51 (0.22)												
Germany	0.90 (0.11)	0.29 (0.24)	0.41 (0.23)	0.94 (0.09)	0.78 (0.16)	0.87 (0.12)									
Italy	0.87 (0.13)	0.22 (0.24)	0.20 (0.25)	0.96 (0.07)	0.71 (0.18)	0.68 (0.18)	0.93 (0.09)	0.43 (0.23)	0.59 (0.20)						
United Kingdom	0.96 (0.07)	0.43 (0.23)	0.55 (0.21)	0.94 (0.08)	0.74 (0.17)	0.64 (0.19)	0.96 (0.07)	0.48 (0.22)	0.70 (0.18)	0.94 (0.08)	0.65 (0.19)	0.64 (0.19)			
Japan	0.92 (0.10)	0.66 (0.19)	0.68 (0.18)	0.97 (0.06)	0.83 (0.14)	0.70 (0.18)	0.94 (0.09)	0.51 (0.22)	0.69 (0.18)	0.95 (0.08)	0.64 (0.19)	0.70 (0.18)	0.97 (0.06)	0.66 (0.19)	0.82 (0.14)

Local Firms															
	Canada			France			Germany			Italy			United Kingdom		
	ROR	ROE	\$ Stock returns	ROR	ROE	\$ Stock returns	ROR	ROE	\$ Stock returns	ROR	ROE	\$ Stock returns	ROR	ROE	\$ Stock returns
France	0.31 (0.26)	NA	NA												
Germany	0.47 (0.25)	NA	0.81 (0.15)	0.90 (0.12)	0.71 (0.18)										
Italy	0.50 (0.24)	NA	0.88 (0.12)	0.96 (0.08)	0.65 (0.19)	0.84 (0.13)	0.93 (0.11)	0.54 (0.21)							
United Kingdom	0.43 (0.25)	NA	0.58 (0.20)	0.49 (0.24)	-0.02 (0.25)	0.67 (0.18)	0.57 (0.23)	-0.07 (0.25)	0.61 (0.22)	0.25 (0.24)	0.64 (0.19)				
Japan	0.20 (0.27)	NA	0.60 (0.20)	0.67 (0.20)	0.67 (0.18)	0.31 (0.24)	0.56 (0.23)	0.63 (0.19)	0.55 (0.23)	0.38 (0.23)	0.50 (0.22)	-0.19 (0.27)	-0.47 (0.22)	0.35 (0.23)	

Note: This table provides correlations of different measures of returns over the 1982-1999 period across G-8 countries excluding the U.S. and Russia. The top panel contains information for the affiliates of U.S. multinational firms. ROR is the affiliate rate of return, which is calculated as the ratio of returns to capital to total assets. Returns to capital include profit-type return, net interest paid, indirect business taxes and capital consumption allowances. ROE is the return on equity, measured as the ratio of net income to owners' equity. ROA is the return on assets, measured as the ratio of net income to total assets. The bottom panel contains information for local firms. Measures of rates of return for local firms are taken from Poterba (1998) and cover only the 1982-1996 period. Measures of ROE and \$ Stock Returns for local firms are taken from the Ken French website. Standard errors appear below each correlation coefficient in parentheses.

Table 5
The correlation of investment rates for U.S. multinationals and local firms, 1982-1999

	U.S. Multinational Firms															
	Canada			France			Germany			Italy			United Kingdom			
	Capital expenditures/gross product	Capital expenditures/assets														
France	0.77 (0.16)	-0.40 (0.23)	0.66 (0.19)													
Germany	0.87 (0.12)	0.29 (0.24)	0.68 (0.18)	0.92 (0.10)	0.22 (0.24)	0.95 (0.08)										
Italy	0.85 (0.13)	0.47 (0.22)	0.76 (0.16)	0.94 (0.09)	0.29 (0.24)	0.89 (0.11)	0.95 (0.08)	0.39 (0.23)	0.89 (0.11)							
United Kingdom	0.89 (0.12)	0.06 (0.25)	0.85 (0.13)	0.83 (0.14)	0.60 (0.20)	0.90 (0.11)	0.92 (0.10)	0.57 (0.21)	0.90 (0.11)	0.90 (0.11)	0.94 (0.08)					
Japan	0.93 (0.09)	0.34 (0.24)	0.80 (0.15)	0.89 (0.11)	0.37 (0.23)	0.92 (0.10)	0.94 (0.08)	0.55 (0.21)	0.93 (0.09)	0.91 (0.10)	0.91 (0.10)	0.38 (0.23)	0.88 (0.12)	0.25 (0.24)	0.93 (0.09)	

Local Firms											
	Canada		France		Germany		Italy		United Kingdom		
	Capital expenditures/gross product										
France	0.88 (0.12)	0.72 (0.20)									
Germany	0.76 (0.16)	0.96 (0.07)	0.25 (0.13)								
Italy	0.91 (0.11)	0.96 (0.07)	0.83 (0.14)	0.87 (0.12)	0.22 (0.44)						
United Kingdom	0.79 (0.15)	0.95 (0.08)	0.74 (0.17)	0.98 (0.06)	0.23 (0.39)	0.36 (0.23)	0.86 (0.13)				
Japan	0.96 (0.07)	0.90 (0.11)	0.68 (0.18)	0.82 (0.14)	0.22 (0.45)	0.49 (0.22)	0.90 (0.11)	0.81 (0.15)	0.48 (0.22)		

Note: This table provides correlations of different measures of investment activity over the 1982-1999 period across G-8 countries excluding the U.S. and Russia. The top panel contains information for the affiliates of U.S. multinational firms. Capital Expenditures is the log of affiliate capital expenditures and capital expenditures/gross product is the ratio of affiliate capital expenditures to affiliate gross product. Capital expenditures/assets is the ratio of affiliate capital expenditures to affiliate assets. The bottom panel contains information for local firms. Gross fixed capital formation data from the World Bank are used to measure country investment and the log of these expenditures and these expenditures scaled by country GDP are used as measures of capital expenditures and capital expenditures/gross product. Standard errors appear below each correlation coefficient in parentheses.

Table 6
The interrelationship of returns within multinational firms

Dependent variable:	Full Sample			Affiliate ROE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.1638 (0.0063)	0.1458 (0.0068)	0.1584 (0.0134)	0.1062 (0.0083)	0.1514 (0.0082)	0.1320 (0.0166)	0.1975 (0.0653)
Parent ROE	0.0878 (0.0111)	0.0679 (0.0102)	0.0671 (0.0135)	0.0887 (0.0134)	0.0662 (0.0135)	0.0668 (0.0165)	0.0620 (0.0133)
Other Affiliate ROE		0.1400 (0.0144)	0.1619 (0.0192)		0.1318 (0.0161)	0.1598 (0.0214)	0.1256 (0.0158)
Host Country ROE			0.0465 (0.0817)			0.1563 (0.1314)	
Affiliate and Year Fixed Effects?	Y	Y	Y	Y	Y	Y	N
Affiliate, Country/Year, and Industry/Year Fixed Effects?	N	N	N	N	N	N	Y
No. of Obs.	178,980	170,634	99,696	76,372	70,892	54,141	70,892
R-Squared	0.5156	0.5184	0.5064	0.4981	0.5014	0.5027	0.5063

Note: The dependent variable in these specifications is affiliate ROE defined as the ratio of net income to owner's equity. The specifications in columns in 4 through 7 are restricted to affiliates in G-6 countries. The specifications in columns 1 through 6 and 8 employ affiliate and year fixed effects. The specification in column 7 employs affiliate, country/year and industry/year fixed effects. "Parent ROE" is the ratio of net income to owner's equity of the affiliate's parent in the U.S. "Other Affiliate ROE" is the ratio of net income to owner's equity of the other foreign affiliates of the affiliate's parent. "Host Country ROE" is the return on equity for local firms taken from the Ken French website. Standard errors are clustered at the affiliate level.

In the simple specification in column 1, the coefficient on parent return on equity indicates that an affiliate's parent domestic return helps explain movements in affiliate returns in a statistically significant manner. Column 2 considers the role of the return on the activities of the other foreign affiliates within a parent system by including this return as an additional explanatory variable. In this specification the sample size is reduced as affiliates that are the only foreign affiliate in a parent system are dropped. The coefficient on the parent's domestic activity is slightly smaller but remains significant, and the 0.14 coefficient on the parent's other foreign activity is positive and highly significant. Of course, these coefficients might represent the underlying correlation of country level returns across countries in which a parent is active. In order to address this concern, the specification in column 3 includes the affiliate's host country return on equity. Given the limited coverage of the French ROE data, the sample is reduced quite dramatically. In this specification, the local return is not significant, and the coefficients on the parent's domestic and foreign activities remain largely unchanged.

Given the prevalence of affiliate activity in G-6 countries, the high level of interest in the transmissions of shocks among these countries and the availability of data within these countries, it is useful to run the specification presented in columns 1-3 in just this setting. The results are largely similar with parent domestic and foreign returns explaining affiliate returns and local returns having a positive but insignificant sign. Coefficients on parent ROE and other affiliate ROE are very similar to previous specifications reflecting the importance of G-6 activity to the overall sample and suggesting that these factors have a similar relationship to affiliate ROE both inside and outside the G-6.

Within the context of the G-6, it is possible to impose even further controls to account for the dynamics of local economies and affiliate industries. Specifically, the specification in column 7 employs country/year and industry/year fixed effects.⁹ The country/year fixed effects control for a variety of shocks that have similar effects across firms within a country including changes in interest rates, supply or demand shocks, and policy changes. These fixed effects also control for time varying factors that are specific to U.S./host country pairs, and therefore they rule out interpretations of the parent return variable related to such factors. For example, any common variation in affiliate returns or U.S. parent returns driven by changes in the host country currency to U.S. dollar exchange rate is absorbed by the country/year fixed effects and cannot explain the results. Since the specification also includes

industry/year fixed effects, identification comes from variation within industries so shocks to specific sectors are also implicitly controlled for. In the specification in column 7, the coefficients on parent domestic and foreign returns are similar to their level in previous specifications and retain their statistical significance. Across all of the specifications, the domestic and foreign within-MNC returns help explain an affiliate's returns after controlling for various measures of local returns.

Table 7 employs a similar empirical framework to investigate the interrelationship of investment within the multinational firm. In columns 1 through 7 the dependent variable is the log of affiliate capital expenditures, and all specifications employ affiliate and year fixed effects. As with returns, the coefficient on parent domestic investment in column 1 is positive and highly significant. When the additional independent variable of other affiliate investment is included in column 2, the coefficient on parent domestic investment is reduced in magnitude but retains its statistical significance. Other affiliate investment is also highly significant and the relevance of parent domestic and foreign activities for affiliate investment mirrors the results in Table 5. In column 3, the additional control for local investment is highly significant but does not materially change the coefficients or significance levels of the within-parent variables. When attention is restricted to the G-6 in columns 4 through 7, the results are qualitatively similar with parent domestic and foreign activities helping to explain affiliate investments after controlling for local investment rates. As in Table 6, column 7 of this table includes country/year and industry/year fixed effects to pick up country or industry specific factors that might drive affiliate investment. Parent domestic investment and investment by parent affiliates in other host countries remain positive and significant in explaining affiliate investment.

The evidence provided on the correlates of affiliate investment might be affected by changes in firm scope related to merger activity or spin-off activity. In order to address this concern, we repeat the analysis in Table 7 using scaled measures of investment activity. The results of this analysis appear in columns 8 through 14 of Table 7. The results are qualitatively similar to those in columns 1 through 7. Both parent domestic investment and investment by other affiliates of a parent are significantly correlated with affiliate investment. The magnitude of the coefficients on these variables is similar for the full sample and for G-6 countries, and these results are robust to controlling for country and industry factors.

6. Robustness Checks

The results in Tables 6 and 7 may reflect the dynamics of a particular industry (particularly petroleum) or the fact that some affiliates selling large fractions of their output to outside of their host country. The analysis in Table 8 considers these two possible explanations using specifications similar to those already examined. Although the results in Tables 6 and 7 are similar for specifications that do and do not include industry/year fixed effects, it could be the case that the results are driven by patterns in particularly important sectors such as petroleum. For example, oil price shocks might have effects that differ across firms but are similar within firms in the petroleum sector. To address this possibility, we allow estimates of the correlations of affiliate returns and investment with returns and investment of other parts of the same firm to vary for affiliates within and outside of manufacturing since all petroleum related industries are classified outside of manufacturing in the BEA data. We do this by classifying affiliates into manufacturing and non-manufacturing affiliates and including interactions of a dummy equal to one for affiliates outside of manufacturing and measures of parent and other affiliate returns in the basic specifications provided in Table 6.¹⁰

The specification presented in column 1 of Table 8 is similar to the specifications of Table 6 but includes the additional interaction terms with the non-manufacturing dummy. The 0.063 coefficient on parent ROE indicates that the returns of affiliates in manufacturing are significantly correlated with parent returns, and the 0.007 coefficient on parent ROE interacted with the non-manufacturing dummy indicates that this correlation is statistically indistinguishable for non-manufacturing affiliates. The same pattern holds for the coefficient on other affiliate ROE. Similar results are also obtained in the specification presented in column 3, which includes country/year and industry/year fixed effects and is restricted to the G-6 sample. The specifications in columns 5 and 7 of Table 8 are similar to those from columns 8 through 12 of Table 7 and illustrate that the correlations of investment within the multinational firm are also not distinctive for manufacturing affiliates. It does not appear that peculiarities of a single dominant sector can explain the interrelationships of returns and investment within multinational firms.

Another potential explanation of the results in Table 6 and Table 7 is that they represent the effect of trade linkages within multinational firms. While it is not possible to isolate the extent to which affiliates buy

Table 7
The interrelationship of capital expenditures within multinational firms

Dependent variable:	Log Affiliate Capital Expenditure						Affiliate Capital Expenditure/ Assets							
	All countries			G-6			All countries			G-6				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Constant	3.7416 (0.2156)	2.6550 (0.2524)	-12.5957 (1.1998)	3.6315 (0.2128)	2.9509 (0.2597)	-17.1811 (2.4016)	2.4224 (0.4886)	0.0505 (0.0022)	0.0380 (0.0031)	0.0264 (0.0051)	0.0289 (0.0020)	0.0196 (0.0025)	0.0177 (0.0075)	0.1631 (0.0213)
Log of Parent Capital Expenditure	0.2043 (0.0190)	0.1445 (0.0161)	0.1385 (0.0154)	0.2102 (0.0194)	0.1574 (0.0188)	0.1564 (0.0186)	0.1455 (0.0186)							
Log of Other Affiliate Capital Expenditure		0.2106 (0.0155)	0.2071 (0.0151)		0.1902 (0.0164)	0.1898 (0.0164)	0.1848 (0.0166)							
Log of Host Country Gross Fixed Capital Formation			0.6104 (0.0465)			0.7582 (0.0906)								
Parent Capital Expenditure/ Assets								0.1455 (0.0273)	0.0961 (0.0208)	0.0991 (0.0217)	0.1177 (0.0261)	0.0842 (0.0216)	0.0842 (0.0216)	0.0809 (0.0211)
Other Affiliate Capital Expenditure/ Assets								0.2928 (0.0409)	0.3043 (0.0437)		0.2771 (0.0483)	0.2771 (0.0483)	0.2771 (0.0483)	0.2703 (0.0477)

Table 8
Industry factors, trade linkages, and the interrelationship of returns and capital expenditures

Dependent variable:	Affiliate ROE				Affiliate Capital Expenditure / Assets			
	All countries		G-6		All countries		G-6	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.1589 (0.0136)	0.1597 (0.0130)	0.1238 (0.0771)	0.1171 (0.0717)	0.0254 (0.0050)	0.0280 (0.0052)	0.1781 (0.0169)	-0.3292 (0.0105)
Parent ROE	0.0626 (0.0189)	0.0712 (0.0158)	0.0473 (0.0190)	0.0604 (0.0167)	0.1370 (0.0230)	0.1006 (0.0193)	0.1292 (0.0250)	0.0935 (0.0161)
Parent ROE * Non Manufacturing Dummy	0.0072 (0.0230)		0.0330 (0.0262)		-0.0584 (0.0385)		-0.0748 (0.0402)	
Parent ROE * Local Sales Focus		-0.0232 (0.0254)		-0.0001 (0.0271)		0.0088 (0.0529)		-0.0228 (0.0636)
Other Affiliate ROE	0.1650 (0.0249)	0.1760 (0.0205)	0.1142 (0.0211)	0.1340 (0.0188)	0.2577 (0.0307)	0.2507 (0.0374)	0.2078 (0.0384)	0.2406 (0.0435)
Other Affiliate ROE * Non Manufacturing Dummy	-0.0034 (0.0339)		0.0148 (0.0299)		0.0705 (0.0651)		0.1021 (0.0795)	
Other Affiliate ROE * Local Sales Focus Dummy		-0.0591 (0.0362)		-0.0381 (0.0304)		0.2091 (0.1125)		0.1340 (0.1341)
Affiliate and Year Fixed Effects?	Y	Y	N	N	Y	Y	N	N

Affiliate, Country/ Year, and Industry/ Year Fixed Effects?	N	N	Y	Y	N	N	Y	Y
No. of Obs.	96,169	91,977	68,441	65,655	180,167	171,904	80,244	77,215
R-Squared	0.5056	0.4975	0.5044	0.4985	0.5964	0.5722	0.5844	0.5642

Note: The dependent variable in the specifications presented in columns 1 through 4 is affiliate ROE. The dependent variable in the specifications presented in columns 5 through 8 is the ratio of affiliate capital expenditures to affiliate assets. The specifications in columns 1, 2, 5, and 6 employ affiliate and year fixed effects. The specifications in columns 3, 4, 7, and 8 are restricted to G-6 countries and employ affiliate, country/year and industry/year fixed effects. "Non Manufacturing Dummy" is equal to one if an affiliate's main industry is not a manufacturing industry. "Local Sales Focus Dummy" is equal to one if all of the affiliate's sales are directed at the affiliate's host country market. "Parent ROE" is the ratio of net income to owner's equity of the affiliate's parent in the U.S. "Other Affiliate ROE" is the ratio of net income to owner's equity of the other foreign affiliates of the affiliate's parent. "Parent CapEx/Assets" is the ratio of the capital expenditure of an affiliate's parent in the U.S. to their U.S. assets. "Other Affiliate CapEx/Assets" is the ratio of the capital expenditure of an affiliate's parent abroad to their foreign assets. All specifications include, but do not report, measures of host country activity (as in Tables 6 and 7) and those measures interacted with the dummy variables. Standard errors are clustered at the affiliate level.

inputs from abroad, it is possible to consider if within-firm correlations of returns and investment depend on the degree to which affiliates sell output locally or outside of their host country. To do this, we create a dummy that is equal to one for affiliates that sell all of their output in their host country in all years they appear in the sample, and we interact this dummy with parent returns and other affiliate returns and include these interactions in specifications similar to those presented in Table 6.

The results of these specifications appear in columns 2 and 4 of Table 8. In column 2, the coefficient on parent ROE indicates that parent returns and affiliate returns of affiliates that sell some output abroad are positively correlated, and the small and insignificant coefficient on parent ROE interacted with the local sales focus dummy illustrates that this correlation is no different for affiliates that are purely focused on serving the domestic market. The returns of locally focused affiliates and affiliates that sell goods abroad also exhibit similar correlations with the returns of other affiliates. These results are similar in the specification in column 4, which includes country/year and industry/year fixed effects and is restricted to G-6 countries. The correlations of affiliate capital expenditures and parent capital expenditures and the correlations of affiliate capital expenditures and other affiliate capital expenditures are also no different for affiliates that are focused on the local market and those that sell outside of their host country, as the regressions presented in columns 6 and 8 of Table 8 demonstrate. This evidence suggests that observed interrelationships of returns and investment within multinationals are not driven by the outward orientation of affiliate sales.

7. Conclusion

U.S. multinationals comprise significant fractions of output and investment in much of the world. Their rates of return and investment levels are more highly correlated around the world than many similar measures for local firms. Controlling for local returns and investment levels, a multinational parent's domestic and foreign operations are highly correlated with an affiliate's returns and investment levels. Although the results do not discriminate among all the channels through which multinationals could affect the transmission of economic shocks, they do indicate that interrelationship within multinational firms are not solely driven by affiliates outside of manufacturing or by affiliates that play a role in a worldwide production process and sell goods outside of their host country.

These results generate a number of additional questions. Given the high degree of interdependence in returns across countries for multinational firms, is it fair to view them as an asset class that provides exposure to foreign markets? If, indeed, investment plans and returns are highly correlated around the world within a multinational firm, this may help explain why investors place a limited value on multinationality, as examined in Errunza and Senbet (1984) and Morck and Yeung (1991). What characteristics of multinational firms—their internal capital markets, their intrafirm trade, their ability to explore intangible property in several locations—are driving these linkages in returns and investments? If these linkages are so significant, how should firms consider capital budgeting when they allocate capital around the world?

Similarly, these facts prompt questions related to the nature of economic linkages. To what degree is the emergence of an Anglo business cycle and the distinct dynamic of Japan, as in Stock and Watson (2003), a reflection of the nature of FDI flows between those countries? What exogenous shocks might usefully be employed to better identify the relevance of multinational firms for transmitting shocks? How can macroeconomic models used to decompose the sources of global correlations incorporate the activities of multinational firms? If financial integration through foreign direct investment is associated with such highly correlated investments and returns, what are the welfare consequences of such integration? We leave these questions for future research.

Notes

This paper was prepared for the 2004 NBER International Seminar on Macroeconomics in Reykjavik, Iceland. The statistical analysis of firm-level data on U.S. multinational companies was conducted at the International Investment Division, Bureau of Economic Analysis, U.S. Department of Commerce under arrangements that maintain legal confidentiality requirements. The authors thank José Campa, Fabio Canova, Richard Clarida, Jeffrey Frankel, Francesco Giavazzi, Evi Pappa, Bill Zeile and other seminar participants for helpful comments. The views expressed are those of the authors and do not reflect official positions of the U.S. Department of Commerce. Desai thanks the Division of Research at Harvard Business School for generous financial support.

1. Throughout the paper, we refer to the G-6 countries to indicate the G-7 (G-8) after excluding the United States (the United States and Russia). G-6 countries include Canada, France, Germany, Italy, Japan and the United Kingdom.

2. See Canova and Marrinan (1998), Canova and de Nicoló (2003) and Lumsdaine and Prasad (2003) for alternative econometric techniques for identifying common components to business cycles and their sources using aggregate data.

3. See the papers collected in Claessens and Forbes (2001).

4. See Stein (2003) for a survey of this literature.
5. In order to be considered as a legitimate foreign affiliate, the foreign business enterprise should be paying foreign income taxes, have a substantial physical presence abroad, have separate financial records and should take title to the goods it sells and receive revenue from the sale. In order to determine ownership stakes in the presence of indirect ownership, BEA determines the percentage of parent ownership at each link and then multiplies these percentages to compute the parent's total effective ownership.
6. In non-benchmark years, reporting exemption levels were higher and less information is collected.
7. For a detailed description of the BEA data, see Mataloni (1997).
8. The Ken French data can be found at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.
9. Computational constraints limit the use of these fixed effects in the full sample.
10. The specifications in Table 8 also include controls for local market ROE and investment and their interactions with either the non-manufacturing dummy or local sales dummy. These coefficients are not reported in order to emphasize the relative effect of industry and sales destination on the primary coefficients of interest.

References

- Backus, David K., Patrick J. Kehoe, and Finn E. Kydland. 1992. "International Real Business Cycles." *Journal of Political Economy* 100(4): 745–775.
- Backus, David K., Patrick J. Kehoe, and Finn E. Kydland. 1995. "International Business Cycles: Theory and Evidence." In Charles Plosser, ed., *Frontiers of Business Cycle Research*. Princeton, NJ: Princeton University Press, 331–357.
- Baxter, Marianne, and Alan Stockman. 1989. "Business Cycles and the Exchange Rate Regime: Some International Evidence." *Journal of Monetary Economics* 23: 377–400.
- Bordo, Michael D., and Thomas Helbling. 2003. "Have National Business Cycles Become More Synchronized?" Working Paper no. 10130. Cambridge, MA: National Bureau of Economic Research.
- Budd, John W., Jozef Konings, and Matthew J. Slaughter. 2002. "International Rent Sharing in Multinational Firms." Working Paper no. 8809. Cambridge, MA: National Bureau of Economic Research.
- Canova, Fabio, and Jane Marrinan. 1998. "Sources and Propagation of International Output Cycles: Common Shocks or Transmission?" *Journal of International Economics* 46: 133–166.
- Canova, Fabio, and Gianni de Nicoló. 2003. "On the Sources of Business Cycles in the G-7." *Journal of International Economics* 57: 77–100.
- Claessens, Stijn, and Kristin J. Forbes, eds. 2001. *International Financial Contagion*. Boston: Kluwer Academic Publishers.
- Denis, David J., Diane K. Denis, and Keven Yost. 2002. "Global Diversification, Industrial Diversification, and Firm Value." *Journal of Finance* 57: 1951–1979.

- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. 2004a. "A Multinational Perspective on Capital Structure Choice and Internal Capital Markets." *Journal of Finance* 59: 2451–2488.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. 2004b. "Capital Controls, Liberalizations, and Foreign Direct Investment." Working Paper no. 10337. Cambridge, MA: National Bureau of Economic Research.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. 2004c. "The Costs of Shared Ownership: Evidence from International Joint Ventures." *Journal of Financial Economics* 73: 323–374.
- Doyle, Brian, and Jon Faust. 2002. "An Investigation of Co-movements among the Growth Rates of the G-7 Countries." *Federal Reserve Bulletin*, October, 427–437.
- Eichengreen, Barry, and Andrew Rose. 1999. "Contagious Currency Crises: Channels of Conveyance." In Takatoshi Ito and Anne Krueger, eds., *Changes in Exchange Rates in Rapidly Developing Countries: Theory, Practice, and Policy Issues*. Chicago: University of Chicago Press, 29–50.
- Errunza, Vihang R., and Lemma W. Senbet. 1984. "International Corporate Diversification, Market Valuation, and Size-Adjusted Evidence." *Journal of Finance* 39(3): 727–743.
- Feenstra, Robert C. 1998. "Integration of Trade and Disintegration of Production in the Global Economy." *Journal of Economic Perspectives* 12(4): 31–50.
- Forbes, Kristin J., and Menzie D. Chinn. 2003. "A Decomposition of Global Linkages in Financial Markets Over Time." Working Paper no. 9555. Cambridge, MA: National Bureau of Economic Research.
- Frankel, Jeffrey, and Andrew Rose. 1998. "The Endogeneity of the Optimum Currency Area Criteria." *The Economic Journal* 108(449): 1009–1025.
- Glick, Reuven, and Kenneth Rogoff. 1995. "Global and Country-Specific Productivity Shocks and the Current Account." *Journal of Monetary Economics* 35: 159–192.
- Goetzmann, William N., Lingfeng Li, and K. Geert Rouwenhorst. 2005. "Long-Term Global Market Correlations." *Journal of Business* 78(1): 1–38.
- Heathcote, Jonathan, and Fabrizio Perri. 2002. "Financial Globalization and Real Regionalization." Working Paper no. 9292. Cambridge, MA: National Bureau of Economic Research.
- Jansen, W. Jos, and Ad C. J. Stokman. 2004. "Foreign Direct Investment and International Business Cycle Comovement." De Nederlandsche Bank Working Paper. Amsterdam
- Kaminsky, Graciela, Richard Lyons, and Sergio Schmukler. 2001. "Mutual Fund Investment in Emerging Markets: An Overview." In Stijn Claessens and Kristin J. Forbes, eds., *International Financial Contagion*. Boston: Kluwer Academic Publishers, 158–185.
- Karolyi, G. Andrew, and René M. Stulz. 2002. "Are Financial Assets Priced Locally or Globally?" In George Constantinides, Milton Harris, and René M. Stulz, eds., *Handbook of the Economics of Finance*. Amsterdam: North-Holland.
- King, Mervyn, and Sushil Wadhvani. 1990. "Transmission of Volatility between Stock Markets." *Review of Financial Studies* 3(1): 5–33.

- Kose, M. Ayhan, Christopher Otrok, and Charles H. Whiteman. 2003. "International Business Cycles: World, Region, and Country-Specific Factors." *American Economic Review* 93(4): 1216–1239.
- Lumsdaine, Robin L., and Eswar S. Prasad. 2003. "Identifying the Common Component in International Economic Fluctuations: A New Approach." *Economic Journal* 113: 101–127.
- Mataloni, Raymond J. 1997. "Real Gross Product of U.S. Companies' Majority-Owned Foreign Affiliates in Manufacturing." *Survey of Current Business*, April, 8–17.
- Morck, Randall, and Bernard Yeung. 1991. "Why Investors Value Multinationality." *Journal of Business* 64(2): 165–187.
- Peek, Joe, and Eric Rosengreen. 1997. "The International Transmission of Financial Shocks: The Case of Japan." *American Economic Review* 87(4): 495–505.
- Peek, Joe, and Eric Rosengreen. 2000. "Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States." *American Economic Review* 90(1): 30–45.
- Poterba, James M. 1998. "The Rate of Return to Corporate Capital and Factor Shares: New Estimates Using Revised National Income Accounts and Capital Stock Data." *Carnegie-Rochester Conference on Public Policy* 48: 211–246.
- Rajan, Raghuran, Henri Servaes, and Luigi Zingales. 2000. "The Cost of Diversity: The Diversification Discount and Inefficient Investment." *Journal of Finance* 55(1): 35–80.
- Scharfstein, David S., and Jeremy C. Stein. 2000. "The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment." *Journal of Finance* 55(6): 2537–64.
- Stein, Jeremy. 2003. "Agency, Information and Corporate Investment." In George Constantinides, Milt Harris and Rene Stulz eds., *Handbook of the Economics of Finance*. New York: Elsevier, 111–165.
- Stevens, Guy V. G., and Robert Lipsey. 1992. "Interactions between Domestic and Foreign Investment." *Journal of International Money and Finance* 11(1): 40–62.
- Stock, James H., and Mark W. Watson. 2003. "Understanding Changes in International Business Cycle Dynamics." Working Paper no. 9859. Cambridge, MA: National Bureau of Economic Research.
- Stockman, Alan C. 1988. "Sectoral and National Aggregate Disturbances to Industrial Output in Seven European Countries." *Journal of Monetary Economics* 21: 387–409.
- World Bank. 2003. *World Development Indicators*. Washington, D.C.: The World Bank.

Comment

José Manuel Campa, IESE Business School

This paper is interested in providing an understanding for the transmission of international business cycles. The paper sets out to address the question of whether increased multinational activity in the form of foreign direct investment has led to changes in the synchronization of business cycles. The paper tackles this large question by providing evidence in three specific issues: (i) whether multinational activity is sufficiently important for this task; (ii) whether evidence exists of a distinct comovement of multinational activity different from that of the host country in which these firms operate; and, (iii) what drives the activity of multinational affiliates in foreign countries—mainly host country factors or issues having to do with the multinational firm itself. The paper provides suggestive evidence on each of these three questions. However, I find that the paper falls short of providing convincing evidence that increased FDI and multinational activity has been or can be a major source of international business cycle transmission in the world today.

The paper provides evidence on these questions by looking at the activity of foreign affiliates of U.S. multinationals. It compares the correlation of value added, returns and investment among the different affiliates of U.S. multinationals across countries and analogue measures of domestic activity of the host countries. This use of U.S. multinationals data is one of the paper's main advantages as well as its major limitation. The advantages in using this data rely on having detailed information at the level of the multinational affiliate on value added and investment by host country. One of the disadvantages is the fact that this data reports accounting information as opposed to market information. Much of the reported correlations in returns in this data are likely to come from reporting smoothing more than from changes in the underlying business opportunities. Furthermore, as will be dis-

cussed below, this adds significant noise to the comparisons that use the returns by foreign affiliate and those of the host economies. Most important, the data in the paper is limited to activity by U.S. multinationals and the evidence may not be representative of the world. There is a strong Anglo bias in U.S. foreign investment activity. According to the paper, Ireland, the UK and Canada have the highest degree of multinationality (see Table 2). This contrasts with the rankings provided by the Transnationality Index published by the United Nations, which measures the extent of multinational activity in different host countries. According to the latest ranking of this index (United Nations 2003), Belgium, Ireland and Denmark are the developed countries with the highest degree of foreign activity in their economies. The UN index ranks U.K. and Germany as having similar degrees of foreign activity while by looking only at U.S. multinational activity the U.K. had five times higher ratio of multinational investment to GDP than Germany in 1999 (see Table 2 of the paper).

The first question addressed in the paper focuses on whether multinational activity is sufficiently important in host countries to change the degree of synchronization of business cycles. The paper presents evidence on the degree of U.S. multinational activity in a set of developed and developing countries. U.S. multinational activity has increased over the last two decades although not in a homogeneous manner. U.S. multinational activity is concentrated in developed countries, with a strong bias toward Anglo countries, and of limited importance in large Asian economies such as Japan or newcomers China and India. U.S. multinational activity has been growing but it continues to be focused on a few large or fast growing countries.

The second and third questions provide evidence on the comovement of U.S. foreign affiliates operating across the G-6 countries (G-7 less United States). There is strong evidence that value added, investment and reported returns are much more correlated among affiliates of U.S. multinational corporations than among the aggregate economies of these countries. This correlation is clearly higher for value added and for investment returns, while the correlations of the capital expenditure measures are more similar among the two groups.

In my view, the paper falls short of providing convincing evidence on this point due to data comparability issues. The data is difficult to compare in two dimensions. One is the use of accounting and financial market data to make this comparison. As mentioned above, the use of accounting data to measure U.S. multinational activity is likely to be

affected by reporting issues, data smoothing, and tax considerations. On top of this, the comparison is later drawn between this data and financial market information for the corresponding domestic economies. There is a long literature on the advantages and disadvantages of using accounting or financial information as measures of activity that could be brought up here. Despite arguing which one is better to use, what is crucial for comparison purposes is that the same sort of data is used for both samples. To the extent that the paper uses accounting information for U.S. foreign affiliates and financial information for the domestic economies this comparison is problematic.

The second data comparability issue is the industry/company composition of the samples of U.S. foreign affiliates and their domestic counterparts. The paper uses aggregate measures of economic activity to measure domestic activity. However, FDI activity is not evenly distributed within the economy of the host country. There is strong evidence that foreign affiliates operate in sectors with higher growth, export potential and openness than the overall host economy (see United Nations 2003). The authors are aware of this problem and try to correct for it in part of their analysis by looking only at the activity of foreign affiliates in manufacturing industries, and by controlling for the export orientation of the U.S. affiliates. This is a direction worth exploring and I think that much more needs to be done in this dimension. It may well be that correlations among activity of U.S. affiliates and a matching sample of similar domestic firms operating within the same sectors look very similar. Evidence in this front will be enlightening. If we were to find that those correlations were similar it would not necessarily mean that multinational activity is not important for increases in international business cycle correlations. Multinational activity would indeed be a good proxy. The important point being that such correlations would not be due to the presence of multinational firms but rather due to the underlying shocks in the industries in which these firms operate.

A major limitation of the paper is the lack of a model to provide us with both a quantitative benchmark and a framework to understand the sources and implications of these correlations of economic activity. This absence of a model becomes obvious in trying to provide a context for the reported evidence on the extent of U.S. multinational activity. For instance, we do not know whether changes in U.S. multinational activity are "sufficient" to suggest a structural break in the transmission of business cycles internationally. This is one of the stated goals of the

paper but, lacking a model to guide us through the quantitative implications of the evidence, it is impossible to provide an answer. Most important, we do not even know whether this correlation of activity, if it were to exist and be due to the increase in U.S. multinational activity, is welfare enhancing or not. In principle, we think that international economic activity is taking advantage of differential rates of return in different locations and therefore moving resources from less productive parts of the world to more productive areas. However, we need to have a better understanding of the mechanisms that lead to the transmission of activity and shocks within multinational firms to provide convincing evidence on this front.

This brings me to my final point. The paper does not discuss what the welfare implications are of these comovements in activity among affiliates of multinational corporations. Are multinationals facilitating the transmission of real economic shocks across countries, or are they the source of part of the shocks that get transmitted across the world economy? Much of the work cited in the paper on the investment and wage policies of large conglomerates has the implication that internal markets exist for capital and labor within these conglomerates and that such markets are not efficient mechanisms for resource allocation. Rajan, Servaes, and Zingales (2000) highlight the inefficient allocation of capital within conglomerates and multinationals. Budd, Konings, and Slaughter (2002) also show the existence of comovement of wages within a multinational through internal risk-sharing. If such links were the predominant source of comovement among affiliates of multinational corporations, international business cycles may be driven by market failures within these corporations rather than by the underlying shocks to real economic activity in those countries.

References

- Budd, John W., Jozef Konings, and Matthew J. Slaughter. 2002. "International Rent Sharing in Multinational Firms." Working Paper no. 8809. Cambridge, MA: National Bureau of Economic Research.
- Rajan, Raghuran, Henri Servaes, and Luigi Zingales. 2000. "The Cost of Diversity: The Diversification Discount and Inefficient Investment." *Journal of Finance* 55(1): 35–80.
- United Nations. 2003. *World Investment Report, 2003*. New York.

Comment

Evi Pappa, Universitat Autònoma de Barcelona and CEPR

The paper provides information on the comovements of a variety of measures of returns and investment within U.S. multinationals and highlights firm-level relationships between affiliates and parent companies in the U.S. It presents evidence on the importance of multinationals in the G-6 economies and suggests that multinationals may constitute an important channel for the transmission of shocks across countries in the industrialized world.

The paper is intriguing and its message is interesting. The authors use countrywide measures of gross multinational product to GDP to establish the importance of U.S. multinationals for many major economies and the correlation of countrywide returns and investment for multinational activity across countries. They take their countrywide results as a preliminary proof for the importance of multinationals in explaining movements in economic aggregates. In order to test their hypothesis more rigorously they perform firm-level regressions studying the correlation of returns within multinational firms.

Both the data used for the analysis, as well as the methodology employed to establish the relevance of multinationals in explaining comovements across countries are novel. The evidence provided, however, is consistent with many theoretical explanations and there is little effort in the current work to distinguish the various alternatives.

The authors claim that increasing levels of financial integration represented by the development of multinational activity may be a key factor for explaining the synchronization of business cycles. This is dubious for several reasons. First, international business cycles transmission existed even when multinationals activities were limited. For example, evidence from the pre-World War I period supports the existence of important comovements of aggregate measures of economic activity across countries. Second, the trend in multinational activities is in

contrast with the pattern of international correlations of economic activity. Recent work in the international business cycle literature¹ points towards a declining importance of common factors in explaining international comovements. Moreover, the evidence on U.S. multinational activity provided by the authors suggests an "Anglo block of correlated economies." In the aggregate data European cycles have regularly followed U.S. cycles (with two quarters delay) while the correlation of UK and U.S. cycles is typically smaller. Third, the authors fail to explain and, sometimes, to control for several features of the international transmission of shocks. For example, the incidence of common factors is more important during recessions than during expansions. Although the authors attempt to control for this in their firm-level regressions including a year dummy, their investigation cannot explain it.

The fact that returns and investments of multinationals are correlated across countries does not give an indication on the causality of the effect, since it is consistent with the presence of common shocks. The authors provide some summary of theoretical work where causality goes the right way; however, they are unable to distinguish the two hypotheses empirically. Their firm-level regressions are not informative on the exact mechanism through which these correlations may arise and they cannot, thus, explain this causality. Furthermore, the job of tax accountants is to equalize companies' returns across countries. The fact that this correlation is high tells us nothing about the importance of multinationals in explaining international business cycles.

The authors include affiliate and year fixed effects to account for common shocks, such as oil prices, and in section 6 they do some robustness exercise to account for common sectoral shocks. Still, not all possible factors that could drive the results are controlled for. For example, the second and third column of Tables 4 and 5 indicate the presence of an "EMU effect" which the authors ignore in their analysis. Also, aggregate data suggest that the variables that are most strongly correlated with world factors are (a) international trade, (b) world consumption to output ratio and (c) commodity prices. While they control for world trade in section 6, they do not check the robustness of their results relative to the two other factors. Hence, their results may represent the effects of these factors within multinational firms.

Apart from the above-mentioned shortcomings, the current work is stimulating and leaves space for future work both at empirical and at theoretical level. The regression analysis performed neglects issues such as dynamic heterogeneity across sectors, or countries, lagged

dependent variables and endogeneity issues. Future work should solve some of these problems and make the analysis more informative. Also, as the authors discuss in their conclusions, there are a number of open questions that need to be addressed in future theoretical work.

Note

1. See, for example, Canova et al. (2003), Kose et al. (2003), and Lumsdaine and Prasad (2003).

References

- Canova, F., M. Ciccarrelli, and E. Ortega. 2006. "Similarities and Convergence of G-7 Cycles" Mimeo. *Journal of Monetary Economics*, forthcoming.
- Kose, A., C. Ortok,, and C. Whiteman. 2003. "International Business Cycles: World, Region, and Country-Specific Factors." *American Economic Review* 93(4): 1216–1239.
- Lumsdaine, R., and E. Prasad. 2003. "Identifying the Common Component in International Economic Fluctuations: A New Approach." *Economic Journal* 113: 101–127.

Part II: Macroeconomic Policy in a Union of Diverse Economies

