The Contribution of MNCs to U.S. Productivity Growth, 1977-2000

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In this paper, we decompose aggregate labor productivity growth in order to gauge the relative importance of multinational corporations (MNCs) to the economic performance of the United States in the 1990s. As we define it, the MNC sector refers to the U.S. activities of multinational corporations operating in the United States. We develop productivity estimates for MNCs using (1) published and unpublished industry-level data from two surveys conducted by the Bureau of Economic Analysis and (2) the FRB productivity data system (Bartelsman and Beaulieu 2002, 2003). The resulting MNC sector accounted for about 40 percent of the gross product of all nonfinancial corporations and *all of* the pickup in nonfinancial corporate labor productivity in the late 1990s. Accordingly, the MNC sector accounted for *half* of the increase in labor productivity of all U.S. nonfarm private businesses.

Introduction and Background

Concomitant with the surge in productivity growth in the United States since 1995 has been a surge in research on productivity. Before the productivity step-up had become fully evident, Corrado and Slifman (1999) focused attention on productivity by major sector as well as problems in measuring productivity and their implications for the performance of productivity in the mid-1990s.[1] Later, others began to concentrate on the role of information technology (IT) – examining the productivity of the producers of IT equipment as well as the users of IT equipment. This research often uses growth accounting as the organizing principle for analysis, and it is conducted using both detailed industry-level data (Jorgenson and Stiroh 2000) and macroeconomic time-series data at only the broadest levels of disaggregation (Oliner and Sichel 2000).

But IT is not the only important economic force that has been influencing productivity growth in recent years. In particular, many companies reportedly have been able to achieve significant efficiencies by re-organizing the way they conduct their operations. Meanwhile, business has become increasingly global in its nature, with globalization arguably a significant part of the enhanced organizational efficiencies.[2]

Many studies that have examined the link between globalization and productivity have looked at the productivity of multinational corporations (MNCs). The emphasis in this literature is on foreign-owned MNCs in the host country. Using microeconomic data, two questions often addressed are whether the host-country operations of foreign-owned firms are more productive than the operations of domestically-owned firms in the host-country and whether the higher productivity creates favorable spillovers in the host country (see Keller 2004 for a review of the recent literature).[3] Doms and Jensen (1998a

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[1] The research by Corrado and Slifman was carried out in late 1996.
[2] Lipsey, Blomstrom and Rumstetter (1998) document the growth of internationalized production in world output.
[3] Mechanisms by which this might occur include learning externalities through labor training and turnover (Fosfurie, Motta, and Ronde 2001), technology transfer (Griffith, Harrison, and van Reenan 2004), and the provision of high quality intermediates (Rodriguez-Clare 1996). Haskel, Pereira, and Slaughter (2004) present evidence in support of a positive spillover effect in the US, though the implied economic magnitudes are fairly small relative to the subsidies paid to attract FDI. Keller and Yeaple (2003) find that spillovers are much larger, accounting for 11 percent of US manufacturing productivity growth between 1987 and 1996. In the UK, Griffith, Redding, and Simpson (2003) conclude there is a significant positive

and 1998b) broadened the scope of this research strain to look at both foreign-owned and domestically-owned MNCs and to inquire whether country of ownership matters.[4] Their results, which are based on microeconomic data, suggest that for productivity growth country of ownership does not matter: "It is not the fact that the plants are foreign owned that is important.... rather, it is the fact that the plants are owned by multinational corporations that seems important."[5]

In this paper, we attempt to merge these research strains by measuring the contribution of MNCs to the aggregate productivity record of the United States.   While we cannot examine the causal linkages between specific characteristics of MNCs and their higher productivity as carefully as most micro-level studies, we can move beyond such studies—which typically focus on the manufacturing sector—to assess the importance of MNCs in the macroeconomy. Towards this end, we first we develop a consistent database of information from 1977 to 2000 on the activities of foreign-owned operations in the United States and the domestic activities of U.S. firms that have foreign operations. Then we integrate that database with a more standard productivity database covering all establishments of all industries operating in the U.S. (Bartelsman and Beaulieu 2002, 2003). Finally, using the integrated database, we examine the contribution of the MNC sector to overall labor productivity growth in the United States.[6]

Although our final analysis is relatively straightforward—indeed, most of the hard work involved the integration of the various data sets—we nevertheless believe our findings are quite striking. Specifically, although the MNC sector accounts for only 40 percent of the output of nonfinancial corporations (NFCs) between 1977 and 2000, it appears to have accounted for more than three-fourths of average labor productivity growth in the NFC sector during this period. Moreover, MNCs also accounted for *all* of the much studied productivity acceleration in the late 1990s. And, while MNCs involved

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spillover from FDI, while Aitken and Harrison (1999) find a negative relationship between FDI and the productivity of domestic plants in Venezuela.
[4] Howenstein & Zeile (1994) use similar data but focus on comparing foreign-owned establishments to US-owned establishments. While foreign owned establishments pay higher wages and are more productive, this appears to be due largely to differences in industry mix, plant scale, and occupational mix.
[5] More recently, Criscuolo & Martin (2003) document a similar "MNC effect" in the UK manufacturing sector, while Griffith, Redding, and Simpson (2004) provide evidence of an MNC productivity advantage in the UK service sector
[6] In subsequent research, we plan to measure the extent of capital deepening in the MNC sector and conduct a complete growth accounting exercise.

in the production of IT contributed significantly towards this acceleration, MNCs in other manufacturing and non-manufacturing industries also contributed significantly as well.

Why might MNCs have better productivity performance than other firms?
Although the aggregate nature of our analysis does not allow for an examination of the specific sources of the MNC productivity advantage, there has recently been a great deal of micro-level research on the link between "global engagement" and firm productivity. Such work has focused mostly on two main factors – characteristics of the plants and cross-border integration of operations.

In terms of plant characteristics, MNCs tend to be larger than domestic plants, they are more capital intensive, and they use more advanced technology (Doms and Jensen). All else equal, these characteristics tend to be associated with higher labor productivity – in part because of the greater amount of capital per worker and in part because size and technology can enhance the organizational efficiency of a plant.[7] Several recent general equilibrium models propose that global engagement—either through trade or as an MNC—is a consequence rather than a cause of higher productivity. In these models, heterogeneity in firm productivity is exogenously determined (Melitz 2003; Helpman, Melitz, and Yeaple 2004). As such, only the most highly productive firms can afford the costs of becoming a multinational by establishing a foreign affiliate.

Alternatively, MNCs may be able to enhance their organizational efficiency through their ability to integrate their operations across borders. Indeed, intra-MNC trade by US-owned MNCs has risen steadily over time, accounting for 22 percent of total US exports in 2002, and 16 percent of total imports (Mataloni, 2004).[8] Such vertical integration between parents and affiliates allows MNCs to take advantage of international

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[7] In a similar vein, Bernard and Jensen (1995) document the superior productivity of exporters. Bernard and Jensen (1999) examine whether highly productive firms select into export markets or whether exporting boosts productivity and find more compelling evidence for the former. Baldwin and Gu (2003), however, find that export participation in Canada *is* associated with improved productivity and argue this is due to a learning effect associated with export activity.

[8] Hanson, Mataloni, and Slaughter (2001), Borga and Zeile (2004), and Bernard, Jensen, and Schott (2005) all provide evidence of the increasing use of parent-to-affiliate outsourcing over time. More generally, the US MNC share of total exports and imports was 58 percent and 37 percent respectively in 2002 (Mataloni, 2004).

factor price differentials as a means of holding down unit costs of production.[9]   In addition, outsourcing to foreign affiliates may also allow the parent to organize overall production processes more efficiently (Hanson, Mataloni, and Slaughter, 2001).

Finally, internationalized production by MNCs may serves as a conduit for the transfer of knowledge between parents and affiliates, thereby contributing to higher productivity. [10] For instance, Criscuolo, Haskel, and Slaughter (2005) find that MNCs generate more ideas than their purely domestic counterparts, not only because they use more researchers, but also because they draw on a larger stock of ideas through their "intra-firm worldwide pool of information." More generally, cross-border integration enables firms to spread firm-specific intangible assets (R&D, for example) across geographical boundaries (Lipsey, et. al. make this point).[11] This spreading of intangible assets, input production, and final processing across borders occurs prominently, for example, in industries that manufacture electronic and electrical equipment.

The Data

The primary data on U.S. multinational companies come from two surveys conducted by the Bureau of Economic Analysis (BEA). The survey of U.S. Direct Investment Abroad (USDIA) provides information on the operations of U.S.-headquartered multinational companies (parents), while the survey of Foreign Direct Investment in the United States (FDIUS) provides information on operations of foreign companies operating in the United States (affiliates). The surveys contain much data on the domestic activities of parents and affiliates—data such as total sales, gross product (value added), capital spending, R&D spending, compensation of employees, and employment. The BEA tabulates the data by industry of the parent or affiliate. Periodically, BEA also shows the sales and employment of parents (or affiliates) by industry of sales.

One major advantage of the data from these surveys is that they are designed to yield measures aligned with National Income and Product Account (NIPA) concepts. For

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[9]   For example, Hanson, Mataloni, and Slaughter (2003) discuss how the growth of overall world trade has been driven in large part by the rapid growth of trade in intermediate inputs by MNCs. Among their main findings are that demand for imported inputs is higher when affiliates face lower trade costs, lower wages for less-skilled labor, and lower corporate income tax rates.

[10] Coe and Helpman (1995) make a similar point with regard to the productivity benefits of international trade.

[11] See also Grossman and Helpman (1991), Howitt (2000) and Griffith, Redding, and van Reenan (2005).

example, the published figures for the gross product of nonbank parents of U.S. multinational companies are conceptually consistent with the NIPA figures for the gross product, or value added, of all businesses.[12] Because of the conceptual consistency, therefore, these data can be integrated with other relevant productivity data in order to conduct growth accounting exercises.

Creating a Multinational Corporate (MNC) sector. Corrado and Slifman highlighted the value of looking at the economy not only by industry but also by sector – for example, corporate and non-corporate, financial and nonfinancial. In particular, they focused their analysis on productivity trends in the *nonfinancial corporate (NFC) sector*. This paper carries that approach one step further by dividing the nonfinancial corporate sector into two distinct sectors: MNCs and domestically oriented firms. These sectoral data are then disaggregated into key industry sub-divisions. Each survey's results were therefore first adjusted to be conceptually consistent with this general approach. Results for nonbank finance and insurance MNCs were excluded to obtain data on nonfinancial activities, and results for real estate were excluded to approximate results for corporations.[13]

Because we are interested creating a MNC sector and studying its contribution to overall U.S. productivity growth, the published BEA survey data need further development, and they need to be integrated with broader aggregates to perform growth accounting for the overall U.S. economy. Fortunately, a tool exists to readily carry out the development and integration: the Federal Reserve Board Productivity Data System (Bartelsman and Beaulieu 2003). This is a general system that contains all the aggregate and industry-level data typically used by productivity researchers organized within a highly structured database. The system also contains specialized tools to manipulate and analyze the data. After adding the relevant USDIA and FDIUS data issued by BEA to the productivity data system, we used many of its tools to help carry out such tasks as

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[12] Indeed, these data are inputs to the NIPAs; see Mataloni 1995.

[13] The BEA reported to us that in the USDIA survey for 2000, corporate gross product and compensation was 99 percent of total gross product and virtually all of compensation. For FDIUS, corporations accounted for 91 percent of gross product and 95 percent of total compensation.

balancing, concording, deflation, and aggregation.[14] The routines in the system also facilitate the calculation of capital stocks and capital services for the MNC sector.

Before the USDIA and FDIUS data could be combined and used for productivity analysis, we had to deal with several important measurement issues. A forthcoming appendix will describe the methods we used in full. Here we present a brief overview.

Survey overlap. As we define it, the MNC sector refers to the U.S. activities of multinational corporations operating in the United States. Accordingly, we need to combine data on the activities of parents from the USDIA survey with data on activities of U.S. affiliates from the FDIA survey. In the spirit of the Doms and Jensen results, the combined data from the USDIA and FDIUS surveys provide information on the activities of MNCs in the United States regardless of country of ownership

However, some firms that are technically U.S. parents are actually under the control of a foreign parent company. Accordingly, some firms in the USDIA data are also captured in the FDIUS survey. The overlap of firms in the two surveys prevents us from simply adding together the results of the two surveys. Because we want to combine the data from both surveys, we need to adjust for the overlap.

The overlap arises because some U.S. affiliates of foreign companies engage in foreign direct investment that is attributed to U.S. affiliates. For survey purposes this makes some U.S. affiliates both a U.S. "parent" and a U.S. "affiliate;" accordingly, the company is counted in both the FDIUS survey (as a U.S. affiliate of a foreign company) and in the USDIA survey (as a U.S. parent of a foreign affiliate.) As an example, suppose a Japanese automaker sets up a foreign affiliate in the United States. That U.S. affiliate then sets up a parts-producing subsidiary in Canada that only serves the U.S. affiliate. The Canadian parts-producing facility is considered to be foreign direct investment by a U.S. entity, which, by definition, makes the U.S. affiliate of the Japanese company a "U.S. parent" of the Canadian affiliate. As a result, the U.S. affiliate will be counted in both surveys: as a U.S. affiliate of a Japanese parent in the FDIUS survey, and as a U.S. parent of a Canadian affiliate in the USDIA survey.

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[14] For example, we used the balancing (or "RASing") tools to help fill in missing observations and the concordance tools to put all the industry estimates on a consistent industry classification basis.

How big is the overlap? As it turns out, a substantial number of foreign affiliates operating in the U.S. have their own foreign affiliates. According to BEA, when measured in terms of gross product, about 45 percent of the activities of U.S. affiliates during 2000 took place at companies that had their own foreign affiliates. These "U.S. parent" foreign affiliates, however, represent only a small part of the overall number of U.S. parents. Again using gross product as the metric, the activities of "U.S. parent" foreign affiliates were only 11 percent of the gross product of all U.S. parents.[15] Moreover, these ratios have been relatively unchanged over time.

In order to adjust for the overlap, we obtained from the BEA special tabulations of the activities of those U.S. parents that are also affiliates of foreign companies and, hence, counted in both surveys. Because of concerns at the BEA regarding the disclosure of information about individual survey respondents, the data on overlap firms are only available for all non-bank industries and all manufacturing industries, and only for 1990 on. However, the BEA also provided us with industry-level information on the number of U.S. parent companies that are also foreign affiliates. As described in the (forthcoming) appendix, we used the information from these special tabulations and the concording and balancing tools of the FRB productivity system to create industry-level overlap data so that U.S. parent-foreign affiliates are only counted once when we combine the results of the two surveys.

Level of consolidation. Another issue with these data is that they are collected at the overall company level. For many multinational corporations, the company level is a very aggregate level of consolidation by industry. Most industry-level data used for productivity analysis is collected at the establishment (or plant) level. Thus, the activities of a company that produces in more than one industry (say, home appliances and jet engines) will have the activities of its individual plants allocated to the relevant industry. In contrast, data for the MNC surveys are collected for a group of enterprises under common control (referred to as "a consolidated business enterprise"). This can lead to

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[15] According to the BEA, "in 2000, U.S. parents that were in turn controlled by foreign parents accounted for 9 percent of the gross product of all U.S. parents." (Mataloni, 2002, p. 117, footnote 8.) The difference between the published number and the 11 percent figure that we cite reflects that, in our calculations, a foreign affiliate is defined as a U.S. business with 10 percent or more foreign ownership, whereas the figure cited by Mataloni is for majority-owned foreign affiliates.

serious problems in classifying the data by industry, because in most tabulations, all of the operations of a given U.S. parent or foreign affiliate are assigned to one primary industry, even if the parent or affiliate has secondary activities in other industries. In order to get around this problem, we constructed pseudo establishment estimates from the consolidated MNC data. The method is described in detail in the appendix. Essentially, however, we use the periodic information provided by BEA on sales and employment of affiliates or parents (as appropriate) by industry of sales. As noted by Zeile 1999, "these data ... approximate the disaggregation of the data for all U.S. businesses by industry of establishment." We apply the employment/sales shares to the consolidated data to create the pseudo establishment estimates.

Industry Classification. BEA's USDIA and FDIUS survey data for recent years use the North American Industry Classification System (NAICS) to group results by industry, whereas data for earlier periods apply various issues of the Standard Industrial Classification (SIC) system. We converted the more recently published NAICS-based data to the SIC system, which (as of the initial writing of this paper) BEA still used for its U.S. industry-level data on gross product and gross product prices.

Deflators. The data in the two MNC surveys are collected in current dollars (except, of course, employment). However, for productivity analysis it is necessary to have data measured in real terms, i.e., adjusted to remove the effects of price changes. Mataloni (1997) describes one method for deflating current dollar figures that relies on producer prices indexes (PPIs) by industry. However, PPIs alone are imperfect as deflators for industry gross product; PPIs are appropriate for gross *output*, but a gross *product* price should represent an implicit price for gross output less intermediate inputs. As an alternative, therefore, we used the deflators published by the BEA for gross product originating by industry. Real GDP by industry is computed using the double-deflation method in which separate estimates of real gross output and intermediate inputs are combined in a Fisher chain-type quantity-index-number formula (Yuskavage 1996). These deflators are for all establishments in an industry, not just those owned by MNCs. By applying these deflators to the data from the MNC surveys, we are assuming that

within a given industry establishments owned by MNCs and non-MNCs had the same product composition, input composition, and price behavior over time.[16]

Transfer pricing. One problem with these data is that it is not possible to know the extent to which transfer pricing influences our measure of value added. Since profits data are used in the construction of value added, any tendency for foreign owned affiliates to underreport profits by shifting them out of the US via transfer prices will lower our estimate of the contribution of MNCs to productivity growth. By the same logic, if US parents use transfer pricing to shift profits from abroad back to the US then our results will be overstated.

Transfer pricing is not supposed to be reflected in the official statistics, as tax regulations generally require that intra-firm transactions be made at "arms-length" prices. Nevertheless, inter-country differences in tax rates almost certainly create incentives to deviate from this standard. Moreover, as noted above, intra-MNC trade in intermediates accelerated in the second half of the 1990s, suggesting the possibility of at least some role for transfer pricing. However, Mataloni (2000), finds little evidence that transfer pricing has unduly impacted the profits data for MNCs.[17] Even at the more-detailed company level, he concludes there is no evidence of a strong relationship between 1988 and 1997: regressions estimates were only statistically significant in only two out of the ten years studied. Although Mataloni's results are not dispositive on the issue, we do not think that are results are being systematically biased by transfer pricing.

Method of analysis

Much of the recent literature on the post-1995 pickup in US productivity growth disaggregates the data into IT-producing and IT-using sectors. This paper adds a new dimension: specifically, we consider the role of MNCs. As indicated previously, we do this by looking separately at the role of U.S. parents and foreign affiliates. Then, in the spirit of the findings in Doms and Jensen, we combine the data to create a single MNC

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[16] In future work, we plan to test the robustness of this assumption.

[17] Specifically, Mataloni (2000) considered the relationship between the share of sales accounted for by intra-MNC imports and the rate of return gap, under the logic that that the greatest opportunities to shift profits using transfer prices exists for foreign-owned affiliates with a larger share of sales accounted for by intra-firm imports.

sector for the U.S. economy. As far as we know, this is the first time the data have been combined consistently to create time series for a single MNC sector.

Following the approach of Corrado and Slifman, we disaggregate the overall U.S. economy into an economically meaningful group of sectors and sub-sectors. We do this to examine the contribution of individual sectors to overall productivity growth. The ratios of each sector's gross product to the gross product of all U.S. nonfarm private businesses—the sector's contribution to the total (unduplicated) value of production by business—help unravel the role of each sector in the productivity decomposition. As may be seen on Table 1, we estimate that the share of nonfarm private business (NFPB) output accounted for by the gross product (or value added) of the MNC sector accounts for about 25 percent of U.S. nonfarm private business gross product. Although the MNC share fell off a bit in the early 1990s, it subsequently rebounded and, all told, has been relatively stable for the period shown.

The relative stability in the MNC share masks important developments within both the MNC and corporate sectors, however. As may be seen, the value added by financial corporations has been rising steadily over the period, whereas the share of overall value added accounted for by nonfinancial corporations has fallen off. The drop is in the domestically-oriented share: It was 45 percent in 1977 but was under 40 percent by 2002, with much of the drop occurring after 1995. Within the MNC sector, the share of value added accounted for by U.S. parents has declined, while the share attributed to foreign affiliates increased from 2 percent in 1977 to 6-1/2 percent in 2002. All told, the MNC sector currently is about 40 percent of the nonfinancial corporate sector.

Table 2 looks deeper within the nonfinancial corporate and MNC sectors. As may be seen, 43 percent of MNC gross product in 2000 originated in manufacturing. This is nearly 20 percentage points below the share observed in 1977, with the decline being offset by rising MNC concentration in services industries and in wholesale and retail trade. While the proportion of output originating in manufacturing is roughly equivalent for U.S. parents and affiliates of foreign companies, it appears that U.S. parents maintain a somewhat larger presence in IT equipment. In non-manufacturing, however, a larger proportion of the output of foreign affiliates is concentrated in wholesale and retail trade,

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while the proportion of output originating in the transportation, communications, and public utilities group is larger for U.S. parents.

Results for Labor Productivity

Our results for the sectoral decomposition of labor productivity are shown in tables 3 through 6. As may be seen on table 3, the rate of change in NFPB output per hour averaged 1.5 percent per year from 1977 to 2000 in the United States.[18] We estimate that the growth of output per hour in the MNC sector averaged 3.2 percent per year during the same period, or more than twice the NFPB average. As indicated in table 4, this accounted for more than half of the overall gain.

The sectoral decomposition by sub-period also reveals interesting developments: From 1977 to 1989 and, to a lesser extent, from 1989 to 1995, gains in MNC sector productivity accounted for a goodly portion of the overall increase in output per hour. The pickup in productivity in the late 1990s, however, was generally widespread across the individual sectors shown. Even so, as can be seen by comparing the two right-hand columns, the MNC sector contributed about ¾ percentage point to the 1.2 percentage point pickup in NFPB output per hour during the late 1990s.

Because output per hour varies by industry, part of the MNC productivity story in the late 1990s could be explained by differences between the industry mix of the MNC sector compared with that of all nonfinancial corporations or total nonfarm businesses. As is well known, the production of IT equipment was a major source of the rapid gains in U.S. productivity in the late 1990s (see Jorgensen and Stiroh 2000, Oliner and Sichel 2000, among others), and the IT equipment-producing sector has a relatively large MNC share.

Tables 5 and 6 present a broad industry cut of the productivity results for nonfinancial corporations. As may be seen, this decomposition is consistent with the extraordinary productivity change in the production of IT equipment accounting for part of the story for the pickup in MNC and nonfinancial corporate labor productivity in the

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[18] This figure differs slightly from the official figures for U.S. labor productivity issued by the BLS in that our measure is derived from the income side of the national accounts while the BLS measure is derived from the product side. In addition, our measure excludes the output of government enterprises.

late 1990s. The decomposition also shows, however, that the pickup in MNC productivity was based more broadly in other manufacturing and non-manufacturing industries. Meanwhile, the aggregate domestically-oriented sector did not contribute to the pickup in nonfinancial corporate labor productivity in the late 1990s, a result driven mainly by the poor performance of its manufacturing component.

To summarize, between 1977 and 2000, labor productivity growth in the MNC sector consistently outpaced that of the nonfinancial corporate sector as a whole, with the gap widening noticeably during the second half of the 1990s. A final question, therefore, is whether the pickup in MNC productivity growth has continued more recently. Unfortunately, at this stage it is not possible to know for sure. Data for both U.S. parents and foreign affiliates are only available through 2002. Moreover, the industry-level estimates contained in the Federal Reserve Board Productivity Data system currently only extend through 2001.[19] As such, only "back-of-the-envelope" estimates can currently be made for 2002 based on an extrapolation of the output and hours series for major sectors (i.e. nonfinancial corporations and manufacturing) using published estimates from the BLS and making an assumption about the growth of our deflators.

With this caveat in mind, MNCs appear to have been disproportionately affected by the onset of the 2001 recession. Indeed, we estimate that the average labor productivity of MNCs fell at an annual rate of 1.4 percent between 2000 and 2002, even while productivity for the nonfinancial corporate sector as a whole continued to rise. Interestingly, the weakness in the MNC sector appears to have been driven entirely by U.S. parents. Indeed, labor productivity growth for foreign affiliates accelerated further between 2000 and 2002. The productivity declines for U.S. parents probably reflected the particular circumstances in a number of industries where they have a significant presence. This includes the cyclically-sensitive durable goods manufacturing industries—like motor vehicles and high-tech—as well as telecommunications services. In contrast, the activities of foreign affiliates are more highly concentrated in less cyclical

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[19] The BEA has recently restructured its GDP-by-industry data which are the primary input to the Productivity System. Two features of the restructured system render the new data incompatible with previous data. First, the new data been released on a NAICS-basis for the period 1987-2003. Second, industry-level value added measures have been adjusted to sum to gross domestic product instead of gross domestic income, meaning the statistical discrepancy—which was previously excluded from the GDP-by-industry data has been implicitly spread across industries.

industries such as retail and wholesale trade.   However, in light of the rapid growth of overall productivity in 2003 and 2004, the productivity declines for U.S. parents in all likelihood were temporary.

Conclusions

In this paper we have begun to investigate the role played by the U.S. operations of multinational corporations in the overall performance of the U.S. economy, especially in the late 1990s. We identify these corporations as a separate segment of the economy— we call it the MNC sector—and we develop labor productivity estimates for this sector.

While progress has been made regarding the contribution of MNCs to aggregate trade flows and employment growth, much less is known about the significance of MNCs for overall productivity growth. This omission from the literature seems particularly glaring when one considers the substantial body of micro-level research on the link between global engagement and productivity at the firm level. We therefore hope that the results in this paper will complement this micro-level work by placing the superior performance of MNCs into a broader perspective.

Using the tools and procedures in the FRB productivity data system, the new productivity estimates were developed by integrating information from BEA's surveys of multinational operations with conventional productivity data in a consistent fashion. The resulting data set permits the decomposition of labor productivity along MNC/nonMNC, legal form of organization, and major industry lines for the period 1977 to 2000. The results clearly slice the U.S. aggregate productivity data in a novel way and, we hope, confirm the utility of our approach.

The results, which were foreshadowed by the Doms and Jensen findings, confirmed the important role played by multinational corporations in the *aggregate* productivity record of the U.S. economy. The sector (as we define it) accounts for more than 25 percent of the gross product of all nonfarm private businesses and about 40 percent of nonfinancial corporate gross product. Nonetheless, the sector accounted for *all* of the increase in the labor productivity of nonfinancial corporations in the late 1990s and more than *half* of the increase for all nonfarm private businesses.

Of course, our estimates may be sensitive to some of the assumptions we were forced to make when constructing our integrated dataset. For example, by applying the industry-level deflators published by the BEA to both MNCs and domestically oriented firms, we are implicitly assuming that, within a given industry, establishments owned by MNCs and non-MNCs had the same product composition, input composition, and price behavior over time. If, instead, value added deflators actually rose less rapidly for MNCs, then clearly our estimate of real output growth for MNCs woud be too low, meaning their contribution to productivity growth could be even larger. Given the literature on the organizational efficiencies afforded by the integration of MNC operations across borders, such a scenario certainly seems plausible. Another issue that merits further investigation is the extent to which transfer pricing may influence the interpretation of our results.

Clearly, additional work on the robustness of our findings to these issues is warranted. Of course, we have also not fully addressed one of the primary issues laid out in the introduction of this paper, namely, what are the respective contributions of total factor productivity and IT capital use for the MNC sector compared with other sectors? The data required for the estimation of TFP for all sectors and major industry groups shown in tables 3 through 6 are currently being developed.

REFERENCES

Aitken, Brian and Ann Harrison."Do Domestic Firms Benefit from Foreign Direct Investment? Evidence from Venezuela," <u>American Economic Review</u>. June 1999, 89 (3), pp. 605–618.

Baldwin, John R and Wulong Gu. "Export-Market Participation and Productivity Performance in Canadian Manufacturing," <u>Canadian Journal of Economics</u>. August 2003, 36 (3), pp.634-657.

Bartelsman, Eric J. and J. Joseph Beaulieu. "A Users' Guide to the Federal Reserve Productivity Data System," mimeo, Board of Governors of the Federal Reserve System, May 2003.

Bartelsman, Eric J. and J. Joseph Beaulieu. "A Consistent Accounting of U.S. Productivity Growth," mimeo, Board of Governors of the Federal Reserve System, July 2002.

Bernard, Andrew B and J Bradford Jensen. "Exports, Jobs, and Wages in U.S. Manufacturing: 1976-1987." Brookings Paper on Economics Activity, Microeconomics, (1995), pp.67-119.

Bernard, Andrew B and J Bradford Jensen. "Exceptional Exporter Performance: Cause, Effect, Both?" <u>Journal of International Economics</u>, 47 (1999), pp. 1-25.

Bernard, Andrew B., J Bradford Jensen and Peter K. Schott. "Importers, Exporters, and Multinationals: A Portrait of Firms in the U.S. that Trade Goods." National Bureau of Economic Research (Cambridge, MA), Working Paper No. 11404, June 2005.

Borga, Maria and William Zeile. "International Fragmentation of production and the intrafirm trade of U.S. Multinational Companies." Bureau of Economic Analysis Working Paper 2004-02, January 2004.

Corrado, Carol and Lawrence Slifman. "Decomposition of Productivity and Unit Costs," <u>American Economic Review</u>, May 1999, <u>89</u> (2), pp.328-332.

Criscuolo, Chiara, Jonathan E. Haskel and Matthew J. Slaughter. "Global Engagement and the Innovation Activities of Firms." National Bureau of Economic Research (Cambridge, MA), Working Paper No. 11479, June 2005.

Criscuolo, Chiara and Ralf Martin. "Multinationals and U.S. Productivity Leadership: Evidence from Great Britain." CeRiBa Discussion Paper, 2003.

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Doms, Mark E. and J. Bradford Jensen. "Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States," in R.E. Baldwin, R.E. Lipsey, and J. David Richardson, eds., <u>Geography and Ownership as Bases for Economic Accounting</u>, NBER Studies in Income and Wealth Volume 59. Chicago, Ill.: University of Chicago Press, 1998, pp. 235-58.

Doms, Mark E. and J. Bradford Jensen. "Productivity, Skill, and Wage Effects of Multinational Corporations in the United States," in D. Woodward and D. Nigh, eds., <u>Foreign Ownership and the Consequences of Direct Investment in the United States: Beyond Us and Them</u>. Westport, CT: Quorum Books, 1998, pp.49-68.

Fosfuri, Andrea, Massimo Motta and Thomas Rønde. "Foreign Direct Investment and Spillovers through Workers' Mobility," <u>Journal of International Economics</u>. February 2001. 53 (1), pp. 205–222.

Griffith, Rachel, Stephen Redding and Helen Simpson. "Productivity Convergence and Foreign Ownership at the Establishment Level," Center for Economic Policy Research. Working Paper No. 3765. June 2003.

Griffith, Rachel, Stephen Redding, and Simpson, Helen. "Foreign Ownership and Productivity: new Evidence from the Service Sector and the R&D Lab." <u>Oxford Review of Economic Policy</u>. October, 2004, 20 (3), pp. 440-456.

Griffith, Rachel, Rupert Harrison and John Van Reenan. "How Special is the Special Relationship? Using the Impact of R&D Spillovers on U.K. Firms as a Test of Technology Sourcing." Center for Economic Performance. Discussion Paper No. 659, November, 2004.

Griffith, Rachel, Stephen Redding, and John Van Reenan. "Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries." <u>Review of Economics and Statistics</u>. November 2004, 86(4), pp. 9883-895.

Grossman, Gene and Elhanan Helpman. *Innovation and Growth in the World Economy*. Cambridge, MA: MIT Press. 1991.

Hanson, Gordon H., Raymond J. Mataloni, Jr., and Matthew J. Slaughter. "Expansion Strategies of U.S. Multinational Firms," in Dani Rodrik and Susan Collins (eds) *Brookings Trade Forum 2001*, 2001, pp. 245-294.

Hanson, Gordon H., Raymond J. Mataloni, Jr., and Matthew J. Slaughter. "Vertical Production Networks in Multinational Firms," <u>Review of Economics and Statistics,</u> forthcoming.

Hanson, Gordon H., Raymond J. Mataloni, Jr., and Matthew J. Slaughter. "Vertical Production Networks in Multinational Firms," <u>Review of Economics and Statistics,</u> forthcoming.

Haskel, Jonathan, Sonia Pereira and Matthew Slaughter. "Does Inward Foreign Direct Investment Boost the Productivity of Domestic Firms?" National Bureau of Economic Research (Cambridge, MA), Working Paper No. 8724, May 2004.

Helpman, Elhanan, Marc J. Melitz, and Stephen R. Yeaple. "Export Versus FDI Heterogeneous Firms." <u>American Economic Review</u>. March 2004, 94 (1), pp. 300-316.

Howenstine, Ned G. and William J. Zeile. "Characteristics of Foreign-Owned U.S. Manufacturing Establishments," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, January 1994, pp. 34-59.

Howitt, Peter. "Endogenous Growth and Cross-Country Income Differences," <u>American Economic Review</u>. September 2000. 90 (4), pp. 829–846.

Jorgenson, Dale W. and Kevin J. Stiroh. "U.S. Economic Growth in the New Millenium." <u>Brookings Papers on Economic Activity</u>, 2000 (1), pp. 125-211.

Keller. Wolfgang. "International Technology Diffusion." <u>Journal of Economic Literature</u>. September 2004, XLII, pp. 752-782.

Keller, Wolfgang and Stephen R. Yeaple. "Multinational Enterprises, International Trade, and Productivity Growth: Firm Level from the United States." National Bureau of Economic Research (Cambridge, MA), Working Paper No. 9504, February 2003.

Lipsey, Robert E., Magnus Blomström, and Eric D. Ramstetter. "Internationalized Production in World Output," in R.E. Baldwin, R.E. Lipsey, and J.D. Richardson, eds., <u>Geography and Ownership as Bases for Economic Accounting</u>. NBER Studies in Income and Wealth Volume 59. Chicago, Ill.: University of Chicago Press, 1998, pp.83-135.

Mataloni, Raymond J, Jr. "U.S. Multinational Companies: Operations in 2002," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, July 2004, pp. 10-29.

Mataloni, Raymond J, Jr. "U.S. Multinational Companies: Operations in 2000," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, December 2002, pp. 111-22.

Mataloni, Raymond J, Jr. "An Examination of the Low Rates of Return of Foreign-Owned U.S. Companies," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, March 2000, pp. 55-73.

Mataloni, Raymond J, Jr. "<u>Real Gross Product of U.S. Companies' Majority-Owned Foreign Affiliates in Manufacturing</u>," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, March 1997.

Mataloni, Raymond J, Jr. "A Guide to BEA Statistics on U.S. Multinational Companies," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, March 1995, pp. 38-55.

Mataloni, Raymond J, Jr, and Daniel R. Yorgason. "Operations of U.S. Multinational Companies: Preliminary Results from the 1999 Benchmark Survey," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, March 2002, pp. 24-54.

Melitz, Marc J. "The Impact of Trade on Aggregate Industry Productivity and Intra-Industry Rallocations," <u>Econometrica</u>. 2003, 71(6), pp 1695-1725.

Oliner, Stephen D. and Daniel E. Sichel. "The Resurgence of Growth in the late 1990s: Is Information Technology the Story?" <u>Journal of Economic Perspectives</u>, Fall 2000, <u>14</u>, pp. 3-22.

Rodriguez-Clare, Andres. "Multinationals, Linkages, and Economic Development." <u>American Economic Review</u>, 1996, 86(4), pp. 852-73.

Yuscavage, Robert E. "Improved Estimates of Gross Product by Industry, 1959–94," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, August 1996, pp. 133-153.

Zeile, William J. "Foreign Direct Investment in the United States: Preliminary Results from the 1997 Benchmark Survey," in U.S. Commerce Department: Bureau of Economic Analysis, <u>Survey of Current Business</u>, August 1999, pp. 21-54.

Table 1
U.S. Gross Domestic Product of Nonfarm Private Businesses*,
By Sector
(percent of total)

	1977	1989	1995	2000	2002
Nonfinancial Corporations	70.5	68.8	67.7	66.7	65.5
MNC Sector**	25.5	24.2	24.7	28.6	26.2
Parents**	23.5	19.3	19.4	22.1	19.7
Affiliates of Foreign Companies	2.0	4.9	5.3	6.6	6.5
Domestically Oriented	45.0	44.6	43.0	38.1	39.3
Financial Corporations	4.6	6.3	7.4	9.0	9.2
Noncorporate Business	25.0	24.9	24.9	24.3	25.3

* Calculated using gross domestic income, excludes government enterprises.
**Excludes U.S parent companies that are also affiliates of foreign companies

Table 2
Nonfinancial Corporate Gross Product by Industry*
(percent of total)

	MNCs			Domestically Oriented	US Total
	Parents	Foreign Affiliates	Total		
2000	100.0	100.0	100.0	100.0	100.0
Manufacturing	42.5	44.9	43.0	15.5	19.2
High Tech	5.7	3.1	5.1	.6	1.7
Manufacturing,except High Tech	36.8	41.7	38.0	14.9	17.5
Non-Manufacturing	57.5	55.1	57.0	84.5	80.8
Wholesale & Retail Trade	13.6	24.5	16.1	34.4	20.0
Services	15.9	13.3	15.3	26.9	21.4
Transportation, Comm, and PU	18.9	9.5	16.8	10.1	10.2
Other	9.1	7.8	8.8	13.1	29.3
1995	100.0	100.0	100.0	100.0	100.0
Manufacturing	49.9	49.8	49.8	20.9	22.2
High Tech	5.4	3.8	5.0	1.7	2.0
Manufacturing,except High Tech	44.5	46.0	44.8	19.2	20.2
Non-Manufacturing	50.1	50.2	50.2	79.1	77.8
Wholesale & Retail Trade	11.4	22.5	13.8	32.5	19.8
Services	12.0	9.2	11.4	23.8	19.6
Transportation, Comm, and PU	19.8	8.7	17.4	12.3	11.0
Other	7.0	9.8	7.6	10.6	27.4
1989	100.0	100.0	100.0	100.0	100.0
Manufacturing	53.7	52.4	53.5	22.6	23.8
High Tech	5.9	4.2	5.6	1.3	1.9
Manufacturing,except High Tech	47.8	48.2	47.9	21.3	21.8
Non-Manufacturing	46.3	47.6	46.5	77.4	76.2
Wholesale & Retail Trade	9.5	21.8	12.0	32.4	20.0
Services	9.5	7.3	9.0	19.8	17.9
Transportation, Comm, and PU	19.5	4.8	16.5	12.9	10.9
Other	7.8	13.7	9.0	12.3	27.4
1977	100.0	100.0	100.0	100.0	100.0
Manufacturing	61.1	59.6	61.0	28.5	29.1
High Tech	3.4	5.5	3.5	.9	1.3
Manufacturing,except High Tech	57.7	54.1	57.5	27.6	27.8
Non-Manufacturing	38.9	40.4	39.0	71.5	70.9
Wholesale & Retail Trade	10.4	26.3	11.6	31.0	21.0
Services	4.4	2.6	4.3	12.7	12.3
Transportation, Comm, and PU	15.7	3.7	14.8	14.4	11.3
Other	8.3	7.9	8.3	13.4	26.3

* Excludes Corporate Farms

Table 3

Labor Productivity of Nonfarm Private Businesses, By Sector and Industry*
(Percent change, average annual rate)

	1977-2000	1977-1989	1989-1995	1995-2000
Nonfarm Private Business	1.5	0.9	1.6	2.8
Nonfinancial corporations	1.6	1.2	1.6	2.6
MNCs	3.2	2.5	2.7	5.6
Parents	3.5	2.8	2.8	6.0
Affiliates of foreign companies	1.9	0.6	2.4	4.5
Domestically oriented	0.7	0.6	1.0	0.5
Financial corporations	1.8	-0.5	3.7	5.4
Nonfarm noncorporate businesses*	1.2	0.3	1.6	2.9

* Calculated using gross domestic income, excludes government enterprises.

Table 4

Labor Productivity of Nonfarm Private Businesses, By Sector*
(Percentage points, annual rate)

	1977-2000	1977-1989	1989-1995	1995-2000
Nonfarm Private Business**	1.5	0.9	1.6	2.8
		-- Contributions to growth --		
Nonfinancial corporations	1.1	0.9	1.1	1.8
MNCs	0.9	0.6	0.7	1.5
Parents	0.8	0.6	0.5	1.2
Affiliates of foreign companies	0.1	0.0	0.1	0.3
Domestically oriented	0.3	0.3	0.4	0.2
Financial corporations	0.1	-0.0	0.3	0.4
Nonfarm noncorporate businesses*	0.3	0.1	0.4	0.7

Note -- Percent changes reflect mix shifts as well as changes for the individual sectors shown.

* Calculated using gross domestic income, excludes government enterprises.

** Percent change, average annual rate

Table 5

Labor Productivity of Nonfinancial Corporations, By Sector and Industry*
(Percent change, average annual rate)

	1977-2000	1977-1989	1989-1995	1995-2000
Nonfinancial corporations	1.6	1.2	1.6	2.6
MNCs	3.2	2.5	2.7	5.6
Manufacturing	4.1	3.3	2.5	7.8
IT equipment	25.0	20.0	19.5	45.3
Other mfg.	2.0	1.8	0.8	3.9
Non-manufacturing	2.3	1.4	2.9	3.6
Domestically oriented	0.7	0.6	1.0	0.5
Manufacturing	1.0	1.6	2.6	-2.3
Non-manufacturing	0.3	0.0	0.5	1.1

* Calculated using gross domestic income, excludes government enterprises.

Table 6

Labor Productivity of Nonfinancial Corporations, by Sector*
(Percentage points, annual rate)

	1977-2000	1977-1989	1989-1995	1995-2000
Nonfinancial corporations**	1.6	1.2	1.6	2.6
		-- Contributions to growth --		
MNCs	1.3	0.9	1.0	2.2
Manufacturing	0.8	0.7	0.5	1.4
IT equipment	0.4	0.3	0.4	0.9
Other mfg.	0.4	0.3	0.1	0.6
Non-manufacturing	0.4	0.2	0.5	0.8
Domestically oriented	0.4	0.4	0.6	0.3
Manufacturing	0.1	0.3	0.4	-0.3
Non-manufacturing	0.2	0.0	0.2	0.5

Note -- Percent changes reflect mix shifts as well as changes for the individual sectors shown.

* Calculated using gross domestic income, excludes government enterprises.

** Percent change, average annual rate