FOREIGN AFFILIATES IN OECD ECONOMIES: PRESENCE, PERFORMANCE AND CONTRIBUTION TO HOST COUNTRIES' GROWTH

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INTRODUCTION

In recent decades, foreign direct investment (FDI) has steadily increased so that foreign owned multinational enterprises (MNEs) now play an important role in the economy of many developed and developing economies. Countries compete with each other to attract FDI because they expect affiliates of foreign MNEs to contribute to the welfare of the host economy through multiple channels. But what precisely is the impact of foreign affiliates on the host country economy?

International trade models assume that MNEs must have inherent advantages that allow them to compete with domestic firms despite the higher costs of operating in a foreign country with a different cultural and legal environment, where they often have less knowledge of demand conditions and of local business networks involving suppliers and customers (see for example Helpman, Melitz and Yeaple, 2004 and references therein; Hymer, 1976; Helpman 1984; Dunning, 1993 and Markusen, 1995). The literature suggests that these inherent advantages derive from firm-specific assets, such as better management techniques and better production technology and employees' technical knowledge, which MNEs can share with their affiliates, as well as brand names and product innovations from which the affiliates benefit.

MNEs' affiliates benefit from being part of a global group and from the advantages of vertical and/or horizontal integration. They can gain not only from the knowledge transfers from parent companies and flows among subsidiaries but also from factor price differentials, global economies of scale and outsourcing. This makes them more productive than firms that are not part of an MNE (see for example Doms and Jensen, 1998 for evidence on the United States; Griffith, 1999 and Criscuolo and Martin, 2004 for evidence on the United Kingdom). Since there is a paucity of data identifying firms that are part of domestic MNEs, and since only a small fraction of all domestic firms are part of domestic multinationals, this MNE advantage is mainly reflected in an advantage of foreign affiliates.

Empirical evidence has shown that foreign affiliates are larger, and more capital and skill intensive; they invest more in both physical and knowledge capital and pay higher wages[1] than domestic firms within the same industry. Also, as shown by previous OECD work, foreign affiliates are often concentrated in more capital and skill intensive sectors and are more R&D intensive and more innovative than

domestic firms. Therefore, they are likely to grow more than domestic firms and thus contribute *directly* to productivity growth of the host economy.

Foreign affiliates may also contribute *indirectly* to productivity growth of the host economy, by raising the productivity of domestic firms. Host countries hope to benefit from the presence of foreign affiliates by appropriating some of the productivity and knowledge advantages that foreign affiliates cannot fully internalise. These externalities take place through "knowledge spillovers" such as international technology transfer, diffusion of best practices and demonstration effects (see Keller, 2004 for a survey).[2] The presence of foreign affiliates affects the productivity of domestic firms also through the increased competitive pressure on domestic firms. This effect is, however, ambiguous. Increased competitive pressure on domestic firms in the same industry might force them to introduce new technology and improve efficiency (see Blomström and Kokko, 1997). However, the entry of foreign firms could also result in lower productivity or exit of domestic firms because of lower market shares, through a "market stealing" effect (Aitken and Harrison, 1999). This study does not attempt to assess and quantify the "knowledge spillovers" and "market stealing" effects (*i.e.* the *indirect* contribution) from foreign affiliates to domestic firms.

Instead, this study quantifies the *direct* contribution of foreign affiliates to labour productivity growth across OECD countries using a growth accounting approach and investigates how much of the contribution is derived from an increase in the size of foreign affiliates' presence in the host country and how much is derived from their higher labour productivity growth. The data on which the analysis is based comes from matching three sources: the OECD STAN database for industrial analysis, the AFA (Activities of Foreign Affiliates) and FATS (Foreign Affiliates' Trade in Services) databases. Despite some limitations, this combined database provides longitudinal information at the industry level on the productivity of the host country and the presence and the productivity of foreign affiliates.

Only the study by Corrado, Lengermann and Slifman (2003) has previously used a growth accounting approach to quantify the contribution of the (foreign and domestic) multinational sector to labour productivity growth using, in this case, aggregated plant-level data from the United States for the period 1977 to 2000.

The present study assesses the contribution of the foreign multinational sector across several OECD countries and extends their analysis by decomposing the contribution of foreign affiliates to labour productivity growth into two components: the *within* effect, *i.e.* the contribution from labour productivity growth of existing foreign affiliates, and the *between* or *compositional* effect, *i.e.* the contribution from the increase in the share of foreign affiliates' employment in the host economy.

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The rest of the paper is organised as follows: Section two describes the data; Section three reports the presence of foreign affiliates and Section four analyses their relative labour productivity across OECD countries. Section five outlines the methodology used for decomposing labour productivity growth and describes the results of the labour productivity growth decomposition. Finally section six concludes. The Annexes include more details regarding the data and additional results at a more disaggregated level.

THE DATA

The data used for the analysis are derived from three OECD databases: the STAN productivity database; the AFA (Activity of Foreign Affiliates) database, which contains information on activity of foreign affiliates in the manufacturing sector and the FATS (Foreign Affiliates' Trade in Services) database, which contains information on the activity of foreign affiliates in the services sector. A brief description of each dataset and a short discussion of the issues that arise when matching the three datasets follow below. Annex 1 reports further detail on the measurement of output and labour input in STAN, discusses the characteristics of the AFA/FATS data that are relevant for our cross-country longitudinal analysis and outlines some issues related to deflation of the matched data.

The Structural Analysis (STAN) database is provided and maintained by the Economic Analysis and Statistics Division of the OECD[3] and contains information on annual measures of output, measured as gross output and/or value added, labour input, investment, import and exports at the industry level,[4] both in the manufacturing and the services sector for 29 OECD countries. The analysis reported in this paper uses only measures of output and labour input to construct measures of labour productivity growth. STAN is mostly based on member countries' annual National Accounts, which are primarily derived from data collected at the establishment level, but also uses other sources (*e.g.* national industrial surveys/censuses; short term indicators of industrial activity; labour force surveys; business registers; income surveys and input-output tables) to estimate missing information. The output measures available in STAN are value added and/or gross output measured in nominal terms, *i.e.* at current prices, and in real terms, *i.e.* as volumes, so it is possible to calculate implicit deflators for gross output and/or for value added.

AFA and FATS are both survey-based databases. OECD member countries report on the basis of their own surveys or their own business registers sectoral level information on the outputs, inputs and importing/exporting activity of foreign affiliates in the host country. The output measures available in AFA/FATS are value added and/or turnover measured in nominal terms, *i.e.* at current prices, only.[5] To overcome this limitation, this study uses the implicit deflators calculated from STAN

to deflate value added and turnover in AFA/FATS. The only measure of labour input available in AFA and FATS is the number of employees of foreign affiliates.

In interpreting the results of the analysis that follows it is important to bear in mind a number of limitations with the data.

1. The time series of foreign affiliate activity in AFA and FATS are affected by several structural breaks, as discussed in detail in Annex 1. To prevent the results of this study being biased by these breaks, the analysis of the contribution of foreign affiliates to labour productivity growth is carried out for 1995-2001, a period which is virtually unaffected by these breaks.

2. AFA/FATS report information at the enterprise rather than at the establishment level. This implies that the statistics on foreign affiliates' activity reported might incorporate secondary activity. This point is particularly relevant in this study because measures of foreign affiliates' activity are calculated relative to national totals primarily based on establishment level data from STAN. Since the two aggregates are not based on the same statistical unit, some measurement problems arise (see also the OECD *Handbook on Economic Globalisation Indicators*, Section 3.3.7).

3. In STAN the industry allocation is mostly based on the main activity of each plant that is part of an enterprise. In AFA/FATS, the industry classification is based on the primary activities of the consolidated enterprise. This might cause the relative presence of foreign affiliates in certain sectors to be under- or overestimated, depending on whether the industry concerned is the secondary or primary activity of the foreign enterprise.[6] Contrary to the study by Corrado, Lengermann and Slifman (2004), where an adjustment was made by using the underlying micro level data, the data underlying this analysis do not provide a straightforward solution to this problem. A similar adjustment, based on use of the underlying micro level data, could be part of future research.[7]

4. A final set of issues that arise in merging production data from AFA/FATS and STAN concerns definitions of the main variables used in the datasets. Firstly, STAN contains information on total employment. AFA and FATS only contain information on the total number of employees. However, the difference between total number of employees and total employment, which corresponds mostly to the "self-employed", is likely to be negligible for foreign affiliates. Therefore, the statistics reported should reflect very closely the foreign affiliates' share of total employment in the host economy. Secondly, STAN contains information on value added and gross output, while AFA and FATS have information on value added and turnover. Since turnover equals the value of goods and/or services sold in a year, while gross output is defined as the value of goods or services produced in

a year whether sold or stocked, the direction of the biases that may arise from this difference is not always clear.[8] This study therefore will concentrate on measures of labour productivity based on value added rather than gross output (or turnover) to avoid incurring these biases.

The study compares labour productivity of foreign affiliates to labour productivity of domestic firms and measures the contribution of foreign affiliates to labour productivity growth. The choice to focus on labour productivity (LP) rather than multifactor productivity (MFP) is mainly dictated by data availability, since AFA and FATS do not contain information on enterprises' capital stocks. Although labour productivity only measures the efficiency of one of the inputs to production, labour, and thus cannot distinguish whether an increase in productivity is due to an improvement in efficiency or an increase in capital stock, labour productivity measures are less data intensive, impose very few theoretical restrictions and do not rely on measures of capital stock that are likely to be affected by measurement error.

THE PRESENCE OF FOREIGN AFFILIATES IN OECD COUNTRIES

The employment share of foreign affiliates in the manufacturing sector in the 19 OECD countries considered here varies widely (Figure 1).[9] However, for virtually

Figure 1. **Employment share of foreign affiliates in the manufacturing sector of 19 OECD countries**
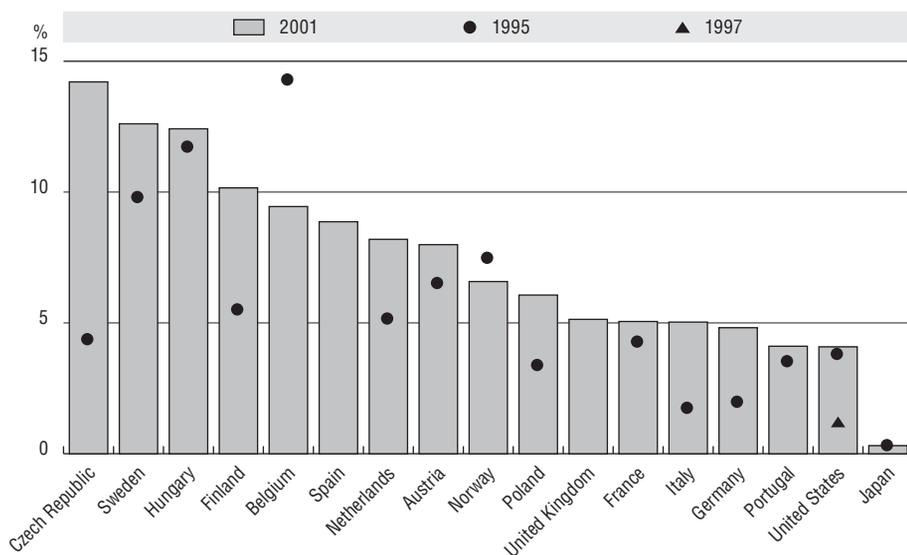
Source: OECD AFA database.
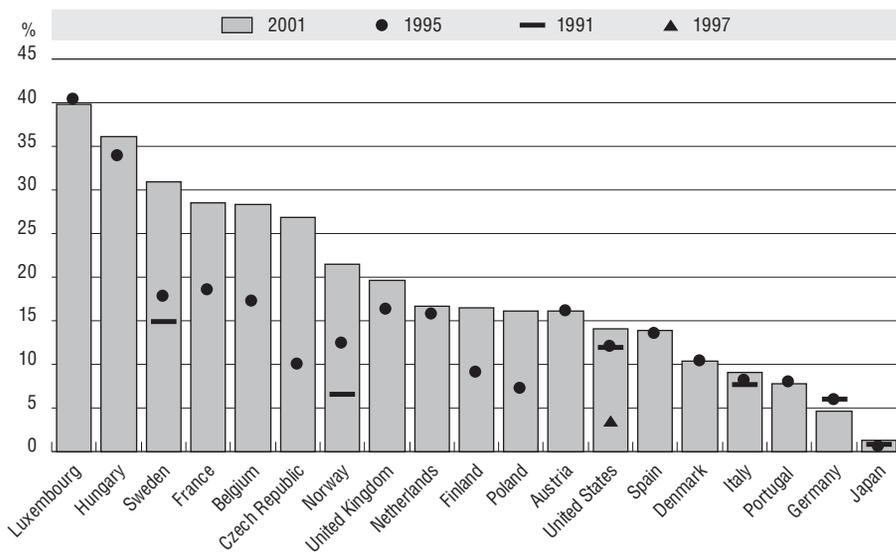
all countries the share of employment of foreign affiliates has increased over time, the sole exception being Germany (where there has been a slight fall).

However, care needs to be taken in interpreting these changes as they are sometimes partly attributable to changes in definition of the foreign affiliates' group or in the coverage of the data.[10] Most of changes in definitions and coverage took place before 1995, so the analysis of labour productivity growth will concentrate on the period 1995 to 2001.

The presence of foreign affiliates is much lower in the service sector[11] relative to the manufacturing sector (Figure 2). This might be due to higher barriers to entry in the services sectors. As for the manufacturing sector, there is a general trend increase in the presence of foreign affiliates (although as for the manufacturing sector there are some data inconsistencies which affect the data for some countries, mainly prior to 1995).[12] The presence of foreign affiliates is lowest in Japan and highest in Central European countries, notably Hungary and the Czech Republic; and in Nordic countries, notably Sweden and Finland. Note, however, that relative to the manufacturing sector the time period covered is much shorter and the data much more sparse over time.

Figure 2. **Employment share of foreign affiliates in the private services sector of 17 OECD countries**

Note: Japan: data excludes ISIC Rev. 3 sectors 60 to 64; 65 to 67 and in 1995 also 70 to 74. United States: data for sectors 70 to 74 are only available from 1987. Finland: data for sector 55 are missing in 1995.
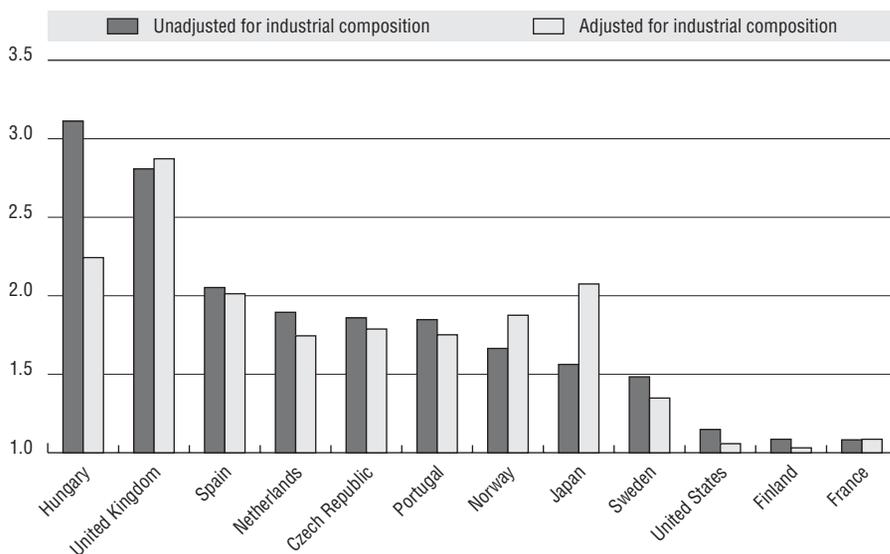*Source:* OECD FATS database.

THE RELATIVE LABOUR PRODUCTIVITY OF FOREIGN AFFILIATES IN OECD COUNTRIES

In the manufacturing sector foreign affiliates have a higher level of labour productivity than domestic firms[13] in 2001 (Figure 3). In the services sector this is not always the case (Figure 4): in Finland, France and the United States domestic firms appear to be more productive than foreign affiliates.

The labour productivity differential between foreign affiliates and domestic firms might be driven by differences in industrial composition since foreign affiliates are likely to be in high technology, high value added industries. The importance of this compositional effect can be judged by comparing the "unadjusted" data with a series which corrects for the industrial composition of the foreign affiliates group (Figures 3 and 4). This adjustment consists of calculating the productivity differential between foreign and domestic firms keeping the distribution across industries for foreign affiliates equal to the distribution of domestic firms. In nearly all cases, the adjustment does not have a large impact on the relative

Figure 3. **Relative labour productivity of foreign affiliates in the manufacturing sector, 2001**
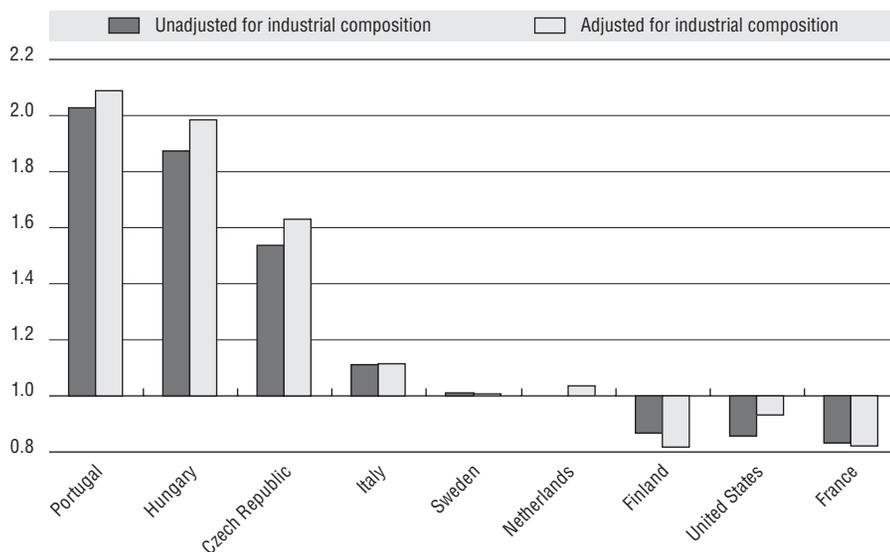
LP of domestic firms = 18

Note: Figures reported are for 2001, except for the Czech Republic (2002), Japan (2000), Hungary and the United Kingdom (1999) and Portugal (1998).
Source: OECD AFA database.

Figure 4. **Relative labour productivity of foreign affiliates in the services sector, 2001**

LP of domestic firms = 18

Note: Figures reported are for 2001, except for Czech Republic, Hungary and Portugal (2002) and Sweden (2000). Hungary: data for ISIC Rev 3. 65 to 67 are missing.

Source: OECD FATS database.

labour productivity differential between foreign and domestic firms. Two exceptions are Hungary and Japan. In Hungary, the decrease in the foreign affiliates' productivity advantage in the adjusted figure is driven by the strong LP advantage of foreign affiliates in chemical, rubber, plastic and fuel products (sectors 23 to 25), non-metallic mineral products (26), electrical and optical equipment (30 to 33) and transport equipment (34 and 35). These are medium-high technology sectors where foreign affiliates are also more present. In the aggregate "adjusted" figure, the weight of these medium-high technology sectors decreases and so does the labour productivity advantage of foreign firms. For Japan, the food products, beverages, and tobacco sectors (15 and 16) drive the increase in the labour productivity advantage of foreign firms in the adjusted results. In these sectors the presence of foreign affiliates is very small and the labour productivity advantage of foreign affiliates is very large. Since the adjustment uses the domestic distribution across sectors, the weight of these sectors in the adjusted relative productivity figure increases nine fold and so does the labour productivity advantage of foreign affiliates.

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The figures also show great cross-country heterogeneity in foreign affiliates' relative labour productivity. In the United States, France and Sweden, labour productivity of foreign and domestic firms is very similar, while in Spain, Hungary and the United Kingdom foreign affiliates are twice as productive as domestic manufacturing firms.

One way to investigate the source of this heterogeneity is to analyse the labour productivity differentials between foreign and domestic firms at a more disaggregated level,[14] as reported in Table 5 and 6 in Annex 2. These results are summarised here using box and whiskers diagrams[15] to describe the distribution of labour productivity differentials between foreign and domestic firms within industries and within countries (Figure 5). The first panel in the figure reports the distribution of relative labour productivity in the manufacturing sectors. In high tech and medium-high sectors (such as 23 to 25, chemical, rubber, plastics and fuel products; and 30 to 33, machinery and equipment) both the productivity advantage of foreign affiliates and the spread of the distribution – measured as the interquartile range – are on average smaller than in low-tech sectors (such as 15 and 16, food products, beverages and tobacco; 17 to 19, textiles, textile products, leather and footwear; and 36 and 37 manufacturing NEC and recycling). This might be due to the tougher competition in these medium-high and high technology sectors, which have already been opened to global competition through imports and large FDI flows.

The lower panel of Figure 5 compares the distribution of the LP differential between foreign affiliates and domestic firms across sectors within countries. Countries where the foreign LP advantage is smallest (France, Finland, Sweden and the United States) are also countries where the spread of the distribution of the LP advantage is smallest. This might again be due to tougher competition in these countries, but also to the fact that these countries are at the technology frontier (see for example Caselli and Coleman, 2005) in most sectors and therefore the gap with foreign affiliates is very small across all sectors.

Table 6 in Annex 2 shows similar figures for the services sector. The table shows that the strong labour productivity performance of domestic firms relative to foreign affiliates in Finland, France and the United States is mainly driven by the transport, storage and communication and the real estate, renting and business activity sectors. The communication and business activity sectors are considered knowledge intensive high technology sectors. The retail and wholesale; and the hotel and restaurant sectors are considered less knowledge intensive. In these sectors, with the exception of France, Italy and the United States in the hotel and restaurants sector, foreign affiliates' labour productivity is always higher than that of domestic firms.

The results from both the manufacturing and services sectors seem to suggest that in sectors with high knowledge intensity the labour productivity differential

Figure 5. **Relative labour productivity of foreign affiliates
in the manufacturing sector, 2001**

Relative to domestic firms = 1, by sector and country
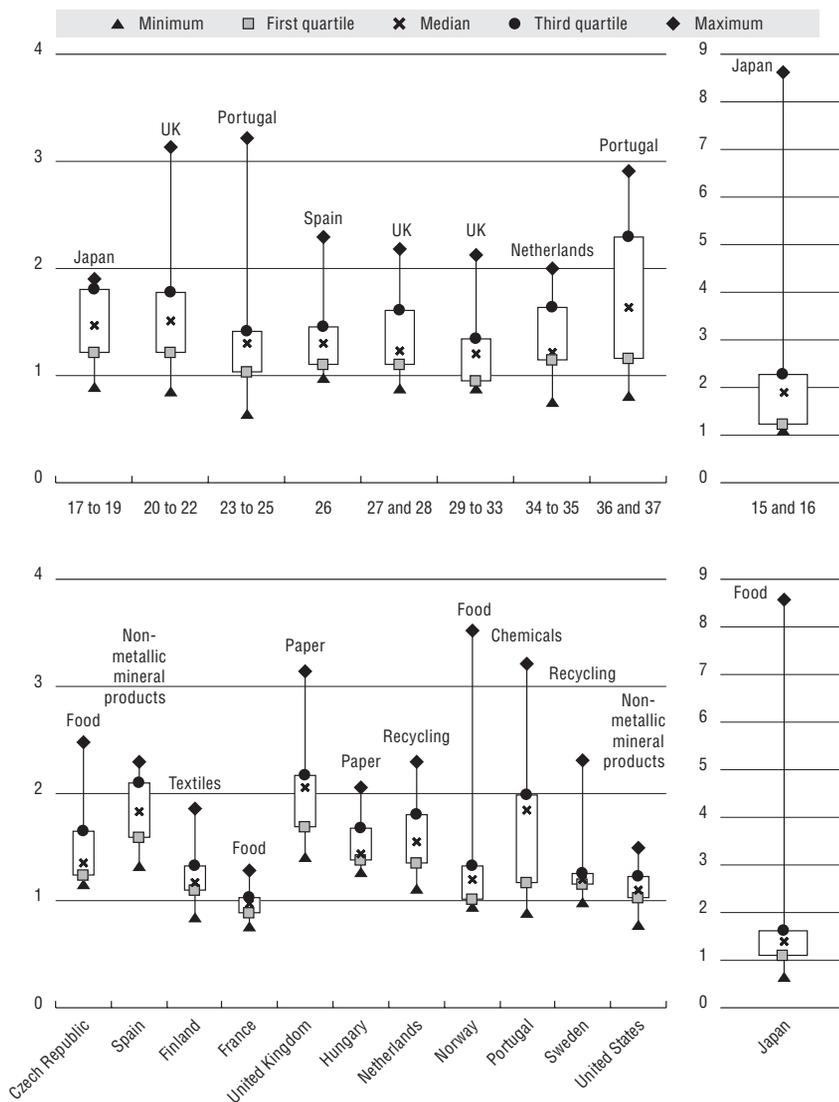
between foreign and domestic firms is smallest. Secondly, in countries that are at the technology frontier, such as Finland, France and the United States, not only is the labour productivity advantage of foreign affiliates very small and in some cases negative, but also the within country heterogeneity of the LP differential is smallest. A possible explanation for these results could be differences in the level of competition and regulation across sectors, with high technology sectors being more open to global competitors, and across countries, where differences in the level of regulations and barriers to entry persist.

Finally, it is important to note that this section has compared the labour productivity of foreign affiliates to that of all domestic firms. However, one might question whether all domestic firms in the host country constitute the sole reference group for comparison. The group most directly comparable with affiliates of foreign MNEs is likely to consist of the affiliates of domestic MNEs. Domestic MNEs are similar in size; enjoy economies of scale and the benefits of being part of global groups to the same level as foreign affiliates. When such comparisons have been made at the micro level (*e.g.* Doms and Jensen, 1998 for the United States and Criscuolo and Martin, 2004 for the United Kingdom) the results show that in general the nationality of the owner does not affect the productivity outcome. The exception seems to be the United States; in both studies affiliates of American MNEs are consistently the most productive. However, data on domestic MNEs are currently only available for very few countries and contain only information on the domestic activity of the consolidated group rather than at the enterprise level, thus hampering the comparison between foreign controlled affiliates and affiliates of domestic multinationals.

MEASURING THE CONTRIBUTION OF FOREIGN AFFILIATES TO LABOUR PRODUCTIVITY GROWTH

The study has already shown that foreign affiliates are on average more labour productive than domestic firms, but is their labour productivity also growing more quickly than that of domestic firms? What is their contribution to the (labour productivity) growth of the host economy?

Methodology

Total annualised labour productivity growth is defined as the weighted sum of the domestic firms' and foreign affiliates' labour productivity growth, where the weights used are the shares of domestic firms' and foreign affiliates' total employment, as shown in the formula below:

$$\frac{1}{k} * \frac{\Delta LP_t}{LP_{t-k}} = \sum_{i=DOM,FOR} \frac{w_{it} LP_{i_t} - w_{it-k} LP_{i_{t-k}}}{LP_{t-k}} * \frac{1}{k}$$

where LP is labour productivity calculated as the ratio of output at constant prices to labour input (EMP), Δ indicates change; k indicates the number of years between observations, so that the left hand side is the aggregate annualised labour productivity growth and $w_{it} = \dfrac{EMP_{it}}{EMP_t}$, is the employment share.

For each sector the contribution to labour productivity growth of foreign affiliates can be calculated as: $1/k * \left(\left(\dfrac{EMP_{FOR,t}}{EMP_t} * LP_{FOR,t} - \dfrac{EMP_{FOR,t-k}}{EMP_{t-k}} * LP_{FOR,t-k} \right) \middle/ LP_{t-k} \right)$. This contribution is calculated for the aggregate manufacturing and services sectors, but also at a more detailed sectoral level.

The paper also shows how much of the contribution to labour productivity growth by foreign affiliates derives from the increase in the labour resources employed by foreign affiliates (the "between effect") and how much is due to the labour productivity growth within the group of foreign affiliates (the "within effect").

$$\frac{1}{k} * \left(\left(\frac{EMP_{FOR,t}}{EMP_t} * LP_{FOR,t} - \frac{EMP_{FOR,t-k}}{EMP_{t-k}} * LP_{FOR,t-k} \right) \middle/ LP_{t-k} \right) = \underbrace{\frac{1}{k} * \frac{\Delta LP_{FOR,t}}{LP_{t-k}} * \overline{w}_{FOR}}_{within} + \underbrace{\Delta w_{FOR,t} * \frac{1}{k} * \frac{\overline{LP}_{FOR}}{LP_{t-k}}}_{between}$$

The first term on the right hand side is the "within" or "productivity growth" effect and the second is the "between" or "compositional" effect term. Thus, for example, the contribution of foreign affiliates to labour productivity growth might be larger than the domestic firms' contribution if their increase in their labour productivity growth and/or in their employment share is larger; and/or if their average employment share and/or their labour productivity level is higher relative to those of domestic firms.[16] The next section reports the results for the manufacturing and services sector. Criscuolo (2005) reports results of a more detailed industry level analysis.

The results of this growth accounting decomposition reported below describe the absolute "contribution" to labour productivity growth of foreign affiliates rather than their contribution "relative" to domestic firms.

Therefore, the reader should be cautious in interpreting positive contributions of foreign affiliates as showing that foreign affiliates contribute to labour productivity growth more than domestic firms. According to the definition used, if both the labour productivity level and growth of foreign affiliates and domestic firms were exactly the same, and foreign affiliates represented an unchanging positive share of employment then their contribution to productivity growth would also be positive and would derive completely from the "within effect". The positive "within effect" and the positive contribution do not capture the fact that for the host economy's labour productivity growth the presence of foreign affiliates in the

economy would not matter, since they are equally productive and grow at the same rate.[17] The paper, therefore, also reports the components of the "within effect" term, *i.e.* the labour productivity growth and the average foreign employment share. Similarly, according to the decomposition formula, if over the period considered the presence of foreign affiliates increases and foreign affiliates' average LP is positive, the "between effect" component for foreign affiliates will be positive. If the average labour productivity of foreign affiliates over the period is positive but lower than that of domestic firms the decomposition will not capture the fact that labour productivity in the host country might have been higher if the presence of foreign affiliates had decreased over the period (and the share of domestic firms increased).[18]

Labour productivity growth and the contribution of foreign affiliates to labour productivity growth

Figure 6 and Figure 7 describe annualised labour productivity growth over the period 1995-2001 for the total sector, foreign affiliates and domestic firms in the

Figure 6. **Average annual labour productivity growth in the manufacturing sector, 1995-2001, percentage points[1]**
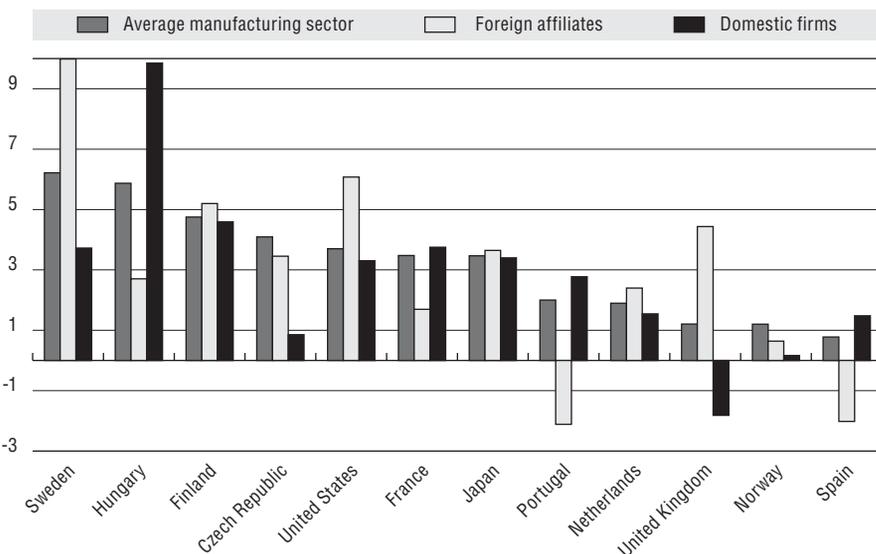

1. Or nearest available years: Czech Republic 1996-2002; United Kingdom 1995-1999; Finland 1995-2002; Hungary 1996-2002; Spain 1999-2001 and Portugal 1996-2002.
Note: Labour productivity is measured as value added in constant prices over employment.
Source: OECD AFA database.

Figure 7. **Average annual labour productivity growth in the services sector, 1995-2001, percentage points**
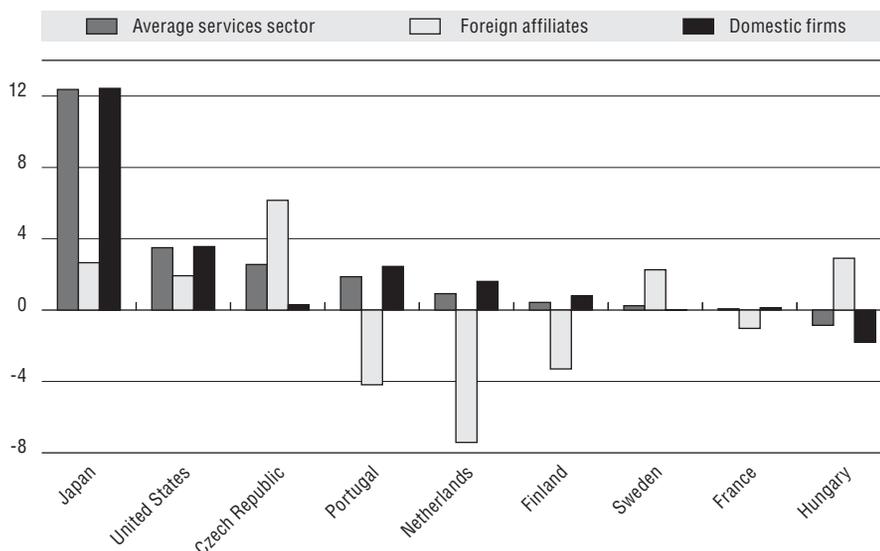
Note: Japan: data for sectors 60 to 64 and 70 to 74 are only available in 1997 and 2000. Data for sectors 65 to 67 are not available in any year. United States: data for sector 55 are only available from 1992; data for 60 to 64 are missing in 1999; data for sectors 70 to 74 are available from 1992 and missing in 1999. Czech Republic: data for sectors 65 to 67 are missing in 1999. Finland: data for sector 55 are missing in 1995. Hungary: data for sectors 65 to 67 are missing in 2000, 2001 and 2002.
Source: OECD FATS database.

manufacturing and services sectors respectively. The figures show a (sizeable) variation across countries and across domestic and foreign firms. Figure 6 shows that in the manufacturing sector of eight out of the twelve OECD countries considered, foreign affiliates have higher labour productivity growth than domestic firms. However, this is not the case in France, Hungary, Spain and Portugal where foreign affiliates have experienced lower labour productivity growth than domestic firms.[19]

Figure 7 illustrates labour productivity growth for the services sector as a whole (ISIC Rev. 3.50 to 74), foreign affiliates and domestic firms for nine OECD countries. The picture here differs from the manufacturing sector: except for the Czech Republic, Sweden and Hungary foreign firms have experienced less rapid labour productivity growth than domestic firms. In four countries (Portugal; Finland; France and the Netherlands), they have experienced negative labour productivity growth.

Figure 8 and Figure 9 show the contribution of foreign affiliates and the breakdown in "within" and "between" effects in the manufacturing and services sectors

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Figure 8. **Contribution of foreign affiliates to average annual labour productivity growth and break down in "within" and "between effect" in the manufacturing sector, 1995-2001, percentage points**
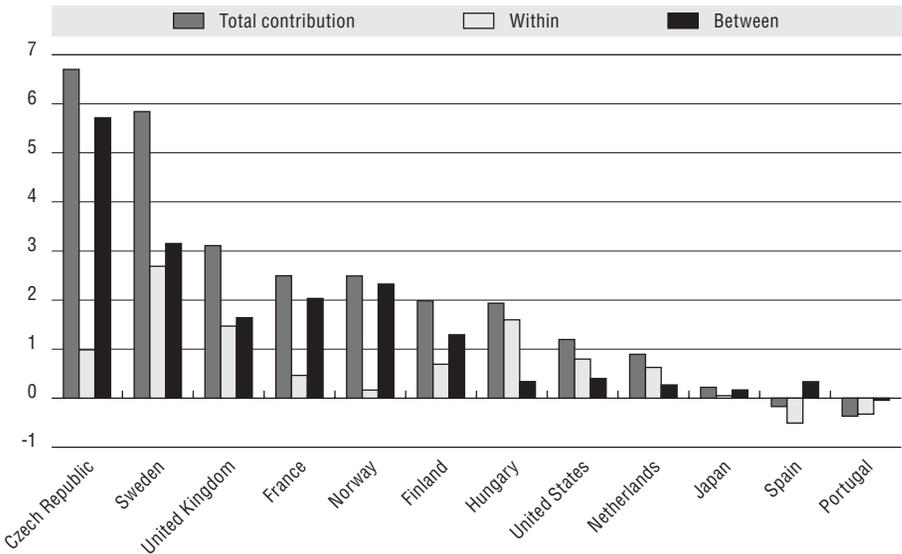
respectively. Reading this figure together with Figure 6 and Figure 1 helps interpret the source of the sign and magnitude of the within and between components. For example, the contribution of foreign affiliates to the LP growth of the Spanish and Portuguese manufacturing sectors is negative, where, as shown by Figure 6, the labour productivity growth of foreign affiliates is negative and, in line with this result, the "within" effect is also negative. The contribution is very small and positive in Japan (where it only accounts for 5% of aggregate labour productivity growth), this is in line with the small share of employment of foreign affiliates shown in Figure 1. The "between effect" accounts for two thirds of this contribution, in line with the large increase in the share of foreign employment over the period.

The results show that the contribution of foreign affiliates accounts for about 32% of total labour productivity growth of the US manufacturing sector. Across European countries, there is wide variation in the contribution of foreign affiliates to labour productivity growth, ranging from Hungary (33%); Finland (42%), France (72%), Netherlands (47%) to Sweden (94%). In few cases [the Czech Republic (164%), the United Kingdom (158%) and Norway (251%)], the contribution of foreign affiliates is larger than total national labour productivity growth. This result,

Figure 9. **Contribution of foreign affiliates to average annual labour productivity growth and break down in "within" and "between effect" in the services sector, 1995-2001, percentage points**

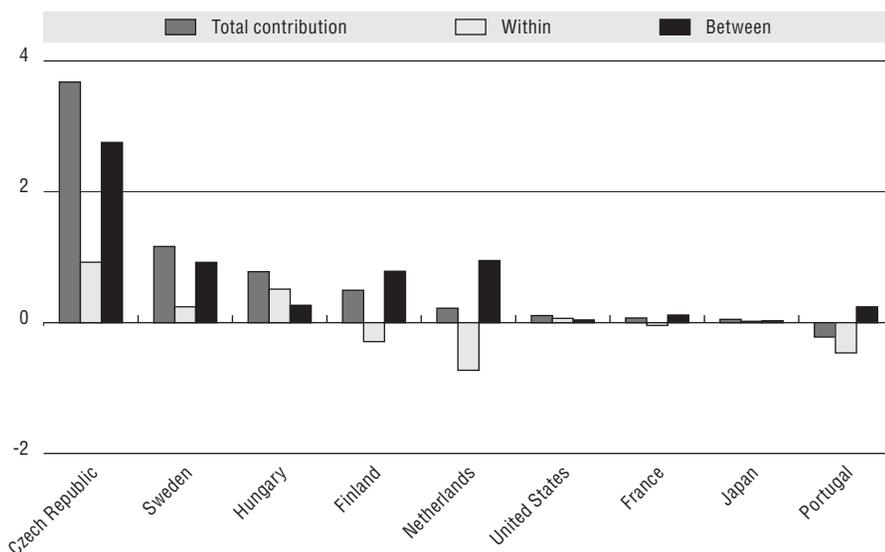
Source: OECD FATS database.

which seems counterintuitive, can be driven by a sharp increase in the presence of foreign affiliates with a higher LP (*e.g.* for the Czech Republic and Norway) or by negative labour productivity growth of domestic firms over the period analysed (as in the case of the United Kingdom). Only in few countries is the contribution of foreign affiliates driven by the "within" effect (Hungary, the United States and the Netherlands; and in the negative contributions in Spain and Portugal). In all other cases, as shown in Figure 8, the "between" effect is the main component of the contribution of foreign affiliates.

The sectoral level analysis (Criscuolo, 2005) shows that the relevance of the within and the between effects in the contributions of foreign affiliates seems to be related to the technology intensity of the sector considered. In the medium-high and high-tech sectors, such as machinery and equipment and chemical, rubber, plastics and fuel products, the "within" effect is as important as and in some cases more sizeable than the "between" effect. This result seems in line with previous evidence that foreign affiliates have higher labour productivity growth than domestic firms in high-tech sectors. Also, the results for the United States are in agreement with the evidence in Corrado, Lengermann and Slifman (2004).

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Figure 9 presents the contribution of foreign affiliates and its breakdown for the services sector: except for the United States, Hungary and Portugal, the "between effect" accounts for most of the contribution of foreign affiliates to labour productivity growth. For Finland, the Netherlands, France and Portugal the "within effect" represents a negative component of the contribution, in line with the negative labour productivity growth of foreign affiliates shown in Figure 7.

CONCLUSIONS

This paper represents a first attempt to investigate the contribution of foreign affiliates to labour productivity growth in OECD countries using a growth accounting approach.

The study describes the general trend of increased presence of foreign affiliates in OECD countries over the nineties, with all of the countries presented in the study, except for Germany, showing an increase in the aggregate presence of foreign affiliates. The study also highlights differences in the presence of foreign affiliates across countries: Japan has the smallest presence of foreign affiliates in both the manufacturing and services sectors, while Sweden, Belgium and two Central European countries analysed – the Czech Republic and Hungary – have in both the manufacturing and services sectors the largest presence of foreign affiliates.

Secondly, the study analyses the labour productivity differential between foreign affiliates and domestic firms. The results show that the difference in labour productivity between foreign and domestic firms persists after controlling for differences in industrial distribution of foreign and domestic firms. The results show that in all manufacturing industries foreign affiliates are on average more labour productive than domestic firms and that this advantage is smallest and its distribution less spread in countries at the technology frontier (Finland, France and the United States) and in medium-high and high technology sectors. In the services sector, Finnish, French, and American domestic firms are on average more labour productive than foreign affiliates. The sectoral analysis for services confirms a negative correlation between the level of knowledge intensity of the sector and the magnitude of the labour productivity gap between foreign and domestic firms. These results might suggest that the tougher competition in high technology sectors and in countries at the technology frontier push the average domestic firm to be at least as efficient as its foreign competitors.

The study confirms that foreign affiliates can make an important absolute contribution to labour productivity growth. In the manufacturing sector, the average contribution of foreign affiliates to annual labour productivity growth ranges from 6.7% in the Czech Republic to –0.1% in Portugal. For three countries, the Czech Republic, the United Kingdom and Norway, the contribution of foreign affiliates is larger than labour productivity growth in the total manufacturing sector. This is

due to sharp growth in the foreign affiliates' share of employment in the Czech Republic and Norway and to negative labour productivity growth of domestic firms in the United Kingdom. Across countries, the contribution of foreign affiliates is determined mainly by the "between" effect, *i.e.* the growth in the share of foreign affiliates' employment. However in the United States, the within effect is the most important component of the contribution to LP of foreign affiliates both in the manufacturing and services sectors. Sectoral level evidence suggests that despite great heterogeneity across sectors and countries in the medium-high and high technology manufacturing sectors the contribution reflects mainly "within" effects.

In the services sector, the contribution of foreign affiliates to productivity growth is much smaller than in the manufacturing sector ranging from 3.7 % in the Czech Republic to –0.2% in Portugal. As in the manufacturing sector, the "between effect", with the exception of Hungary and the United States, accounts for most of the contribution of foreign affiliates to labour productivity growth in the services sector.

In line with previous evidence, the results for the United States show that the significant contribution to US labour productivity growth of foreign affiliates derives mainly from the higher labour productivity growth of foreign affiliates, especially in high technology sectors.

The work conducted in this study is intended as a first attempt to analyse the contribution to labour productivity of foreign affiliates using information from AFA, FATS and STAN and can be extended along several dimensions. The empirical analysis has highlighted some limitations in the data and future efforts should be directed towards improving the data. The analysis focused on labour productivity growth rather than multi-factor productivity; the main reason being that measures of capital stock are only available for a few countries in STAN and not available at all in AFA/FATS. Efforts aimed at constructing a measure of capital stock would make it possible to calculate multifactor productivity (MFP) growth. This would allow investigating the sources of the productivity advantage of foreign affiliates, such as higher technical efficiency and greater use of information and communications technology (ICT). Finally, an interesting policy question is the differences in the presence of foreign affiliates in and the contribution to OECD economies. Current research in the OECD Economics Department is studying the impact of institutions and regulation on the presence of foreign affiliates in the OECD.

Notes

1. See Lipsey, 2003 for a survey of empirical evidence.

2. Domestic firms can imitate foreign affiliates; workers trained in foreign firms might leave foreign firms and move to domestic firms. In the case of backward and forward linkages, foreign firms are also likely to improve the knowledge of domestic suppliers and/or distributors (see evidence in Smarzynska, 2004).

3. STAN has been widely used and comprehensively documented. Thus, this section only briefly describes the variables used and the main issues of interest. See Webb (2005) for a thorough user guide and *www.oecd.org/sti/stan* for an overview of the sources.

4. The STAN list of industries is based on ISIC Rev. 3.

5. For some countries AFA and FATS also contain information on national totals, *i.e.* the combined activities of domestic and foreign firms. Data for national totals are missing for the United States. For most countries the figures are only available at an aggregate level and only for some years. For example, data for the manufacturing sector in Japan are only available between 1992 and 1996; in Italy only for 1999 and 2001.

6. In a few cases, the ratio of foreign presence relative to the national total is greater than one. In the service sector, the employment share is always within the 0-1 range; but for turnover the ratio is greater than 1 in 30 cases, 27 of which are in the wholesale and retail trade sector. The high turnover ratio for these sectors is easily explained by the difference in definition of output in FATS (sales) and STAN (margins).

7. A related concern might arise because of the conversion of national industrial classifications to international classifications. This issue occurs when the conversion to an international classification is based on aggregated published data. This particularly affects data from the United States and Canada. Therefore, the sectoral analysis will be conducted mainly at the subsection level, rather than at the 2-digit level.

8. However, in the services sector, sizeable biases, especially in the wholesale and retail sectors, might derive from differences in the definition of gross output. As noted by Triplett and Bosworth (2004) and Timmer and Inklaar (2005), the system of national accounts, which constitutes the basis for STAN, measures trade output as margins rather than sales, where margins are defined as sales minus the value of the goods that would need to be purchased to replace the ones sold.

9. Data on employment in foreign affiliates is not available in the AFA/FATS databases for Canada.

10. Such inconsistencies are a particular feature of the data for France; Sweden; Norway and Finland. See Annex 1 for full details.

11. The private services sector is defined as ISIC Rev. 3 sectors 50 to 74. For those countries for which data on foreign affiliates for the financial services are not available, we report data on 50 to 64 and 70 to 74, as described in the notes to Figure 2.

12. Such inconsistencies are a particular feature of the data for Italy, and the United States. See Annex 1 for full details.

13. Relative labour productivity is defined as the ratio of value added per employee of foreign affiliates over the value added per employee of domestic firms. The data for the group of domestic firms are derived as the difference between data for national totals and foreign affiliates

14. An additional way to investigate the relative country's performance is to look at the relative labour productivity by country of origin. AFA contains some detail on the country of origin of foreign affiliates. This information is only available for some countries and mostly at the aggregate manufacturing level. Criscuolo (2005) shows the ratio of labour productivity of foreign affiliates by country of origin relative to national labour productivity in the manufacturing sector in 2001 (or the latest available year) in nine OECD countries. The analysis does not suggest any clear cut general insight.

15. In the box and whiskers diagrams reported the middle of the box is the median relative LP. The edges of the box are the 25th and 75th percentile (first and third quartile) of the distribution. The two whiskers identify the minimum and the maximum value of the distribution.

16. The contribution can be negative if either or both "within" and "between" terms are negative, or if either of the components of the right hand side terms is negative and larger in absolute value than the positive components. The first term on the right hand side can be negative if productivity growth is negative; the second term can be negative if there is a negative change in the employment shares of foreign affiliates or if foreign affiliates have, on average, negative labour productivity levels during the period. A similar expression can be derived for domestic firms.

17. This argument holds only if one assumes that domestic firms could employ the share of employees that are working in foreign affiliates. If this were not the case, the sheer presence of foreign affiliates in the economy would represent an absolute and relative contribution to the labour productivity growth of the host economy.

18. Criscuolo (2005) discusses these issues in more detail.

19. The sectoral analysis in Criscuolo (2005) shows that these results are associated with great heterogeneity across sectors in the same country. Contrary to the analysis of the labour productivity level, however, these figures do not suggest the presence of any particular pattern across countries and/or sectors. The only clear trend is that in the United States, foreign affiliates in the services sector have had lower labour productivity growth than domestic firms in all but the retail and wholesale sector.

Annex 1

Details of the Databases Used

STAN: Measures of output and labour inputs

In STAN, gross output is defined as the value of goods and/or services produced in a year whether sold or stocked.

The definition of value added in STAN is at the valuation most commonly presented in national publications; however this definition differs across countries. Indeed, value added is not measured directly, but calculated as the difference between production and intermediate inputs, or as the sum of labour costs, consumption of fixed capital, taxes less subsidies and net operating surplus and mixed income. Table 1 (from Webb, 2005) describes the different definitions.

Table 2 describes the difference in definitions across countries used in the current analysis; as the table shows, most countries present value added at basic prices, in line with SNA93 (or in Europe, ESA95) recommendations. Japan and the United States use valuations at producer's prices.

Table 1. **Valuation of Value added**[1]

Value added at **Factor costs** + *other* taxes, less subsidies, *on production* = Value added at **Basic prices** + Taxes less subsidies, *on products* (*not including imports and* VAT) = Value added at **Producer's prices** + Taxes, less subsidies, *on imports* + Trade and transport costs + Non-deductible VAT = Value added at **Market prices**	1. This table draws on concepts outlined in both the 1968 and 1993 version of a *System of National Accounts* (SNA68 and SNA93). Until the late 1990s, most countries adhered to recommendations in SNA68 (where the notions of Factor Costs, Producer's Prices and Market Prices were predominant). However, many OECD member countries have now implemented SNA93 (or the EU equivalent, ESA95) which recommends the use of Basic Prices and Producer's prices (as well as Purchaser's Prices for Input-Output tables). 2. These consist mostly of current taxes (and subsidies) on the labour or capital employed, such as payroll taxes or current taxes on vehicles and buildings. 3. These consist of taxes (and subsidies) payable per unit of some good or service produced, such as turnover taxes and excise duties. 4. Market prices are those which purchasers pay for the goods and services they acquire or use, excluding deductible VAT. The term is usually used in the context of aggregates such as GDP, whereas Purchaser Prices refer to the individual transactions.

Source: Colin Webb, 2005.

Table 2. **Differences in Valuation of Value added across countries**[1]

Definition	Country
Value added at **Basic prices**	Austria; Belgium; Czech Republic; Germany; Finland; France; Hungary; Italy; Netherlands; Norway; Poland; Portugal; Spain; Sweden
Value added at **Producer's prices**	Japan; United States

Source: OECD, STAN country notes, 2005.

STAN includes information on total employment and on the number of employees. The preferred measure of labour input in this study is employment. For many countries the measure of employment provided is headcounts, *i.e.* the actual number engaged full- and part-time. However, some countries such as Austria, Japan and the United Kingdom provide the number of jobs, as recommended in SNA93, so that those with more than one job are counted more than once. For measuring productivity, a measure of hours worked or comparable measures of full-time equivalent employment would be preferable.[1] However, hours worked by detailed activity are only available for some countries. Moreover, there are still concerns related to the measurement of hours actually worked and their degree of international comparability (see Chapter 4 of the OECD's Manual "Measuring Productivity"), consequently this study prefers the headcounts measure.

AFA and FATS

The definition of a "foreign affiliate" in both AFA and FATS is based on the concept of controlling interest. As outlined in Chapter 3 of the OECD H*andbook on* E*conomic* G*lobalisation* I*ndicators* data covering the operations of affiliates and parent companies should be compiled, if possible, "for affiliates in which the direct investor has an unambiguous control and should be attributed to the country of the investor of ultimate control".

The criterion recommended for a firm to be classified as under unambiguous control of a foreign owner is that a single foreign investor (or a group of foreign investors acting in concert) holds the majority (more than 50% of the capital) of ordinary shares or voting power. Some countries, however, define foreign-controlled affiliates as those firms where a foreign owner holds more than 10% of the capital, based on the assumption that foreign owners can still influence management decisions. As outlined in Tables 3 and 4 this is the case for Hungary and the United States in both AFA and FATS.

To identify the "investor of ultimate control", *i.e.* the parent firm at the end of a chain of domestic and/or foreign directly and indirectly controlled companies, it is necessary to have information not only on the foreign firms that directly control the firm but also on the indirect owners of the firm. However, this information is not available for all countries. As shown in Tables 3 and 4, some countries include indirectly foreign-owned establishments, *i.e.* owned by foreigners through foreign majority-owned resident enterprises.

The definition of foreign owned firms within countries has sometimes changed over time. For example, in Germany the data available up to 2001 comprise enterprises directly owned by foreigners, but after 2001 the figures provided also include enterprises indirectly owned by foreigners through foreign majority-owned resident enterprises. In Norway and Finland, data from 1995 include indirectly foreign-owned establishments and are not comparable with those for previous years, which only include enterprises directly owned by foreigners. In the services sector data for the United States the definition of foreign affiliates include

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Table 3. **Definition of foreign-owned companies in AFA**

		Ownership	
		Majority (> 50%)	Minority (> 10%)
CONTROL	Direct	Czech Republic; Finland (until 1995); Germany (until 2001); Ireland; Japan; Netherlands; Poland; Canada; Norway (until 1995); Turkey	Hungary (> 10%)
	Indirect	Finland (from 1996); Norway (from 1996); France; Germany (from 2001); Italy; United States (from 1997); Luxembourg	United States (until 1997)

Table 4. **Definition of foreign-owned companies in FATS**

		Ownership	
		Majority (> 50%)	Minority (> 10%)
	Direct	Austria; Belgium; Poland; France; Japan; Luxembourg; Germany (until 2001); Portugal; Greece; Netherlands	Hungary (> 10%)
CONTROL	Indirect	Finland; Sweden; Ireland; Italy; Norway; Germany (from 2002); United States from 1997 partially indirect)	United States until 1996 (partially indirect)

until 1996 all firms where foreigners had an interest of at least 10%; after 1996 the definition of foreign ownership only covers majority owned foreign affiliates.

Thirdly, statistics on foreign presence in some sectors are only available for more recent years (*e.g.* for France, data for the food and beverages and energy sectors were added in 1999) or are missing in the database for some years due to confidentiality issues.

Fourthly, the coverage of the sources used has sometimes changed over time (*e.g.* in the Czech Republic the Business Register used as a source by the Czech Statistical Office covered units employing at least 20 employees in 1997 and 1998; and all units from 1999; in Norway the data sources used by Statistics Norway covered all establishments with five or more persons up to 1991; those employing more than ten persons for the period 1992-95 and all manufacturing establishments from 1996; in Sweden the coverage of the data on foreign affiliates has improved over time).[2]

Finally, there are differences in the sources of information on the presence of foreign affiliates both within countries over time and across countries. (*e.g.* for Italy the sources of information on the services sectors have changed over time. Information for 1997 comes from the Reprint database developed at the Department of Management, Economics and Industrial Engineering of the "Politecnico di Milano" with the support of the Italian National Council for Economy and Labour (CNEL). Information for 2001 comes from ISTAT.) Some countries use business register information; others use specific surveys. In the latter case a related issue relates to sampling frames: *e.g.* if the stratification by size excludes smaller firms below different thresholds. Since foreign affiliates are likely to be larger firms, this issue might be less

of a concern as regards differences between both register data and surveys and across surveys with different sampling stratification.

Deflators

AFA/FATS only contain value added and turnover in nominal values, but STAN contains measures of output at current and constant prices, so that deflators can be derived. When comparing labour productivity growth of foreign owned and domestic firms at the aggregate manufacturing and/or services sector level, the same deflators calculated from STAN are used for both groups. However, the industry distribution of foreign affiliates likely differs from the national average. For example, foreign affiliates might be mainly concentrated in high-tech sectors characterised by low inflation, while domestic firms might be more evenly distributed across sectors, including sectors with higher inflation. Applying the same deflators to foreign affiliates and domestic firms assumes that foreign and domestic firms have the same industry distribution. For the countries for which the complete sectoral distribution of foreign affiliates across different industries is available, separate deflators for foreign affiliates can be derived, so that it is possible to construct a deflator which accounts for the sectoral distribution of foreign affiliates.[3]

Notes

1. A related issue concerns also the composition of labour, which is much more difficult to compare across countries. While some efforts have been made, the statistical basis remains rather limited. The OECD has, therefore, not yet estimated levels of labour input adjusted for its composition in the context of its work on international comparisons of productivity levels, see *www.oecd.org/statistics/productivity*.

2. These improvements, however, only partly explain the increase in measured foreign presence between 1991 and 1995, which reflects sharp changes in the paper, printing and publishing, pharmaceutical and motor vehicles industries. In the 1990s, some major mergers with and acquisitions of foreign firms took place in Sweden: for example, General Motor's 50% ownership of Saab Automobile (1990); the merger between Asea and Swiss Brown Boveri (1988) (ABB); the merger between Pharmacia and Upjohn (1996); Tetra Pak's acquisition of Alfa Laval (1991) and Dutch Akzo's acquisition of Nobel Industries (1994). In 1999, a year that corresponds to a big increase in foreign presence in the data, Ford acquired the automobile operations of Volvo.

3. The first step derives weights that reflect the presence of foreign affiliates in each sector relative to the total manufacturing level, calculated as the share of foreign value added in the sector relative to foreign value added in total manufacturing, and uses these weights to aggregate sectoral-level deflators to the whole manufacturing level. This is possible for only some countries and for few years. The formula of the new deflators will differ across countries according to whether the deflators are fixed weight or annually re-weighted chained Laspeyres. The limitations of this approach are related to the fact that sudden and/or spurious changes in the presence of foreign affiliates within a particular sector of the economy might affect the deflators for that particular sector, for reasons unrelated to inflation.

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Annex 2

Results at the Sectoral Level

Table 5. **Relative LP of foreign affiliates in the manufacturing sectors in 2001 or latest available year**

LP of domestic firms = 1

	Czech Republic	Spain	Finland	France	United Kingdom	Hungary	Japan	Nether-lands	Norway	Portugal	Sweden	United States
Sectors **15 and 16**: food products, beverages and tobacco	2.46	2.06	1.15	1.27	2.06	1.68	8.59	1.81	3.50	1.95	1.07	1.10
Sectors **17 to 19**: textiles, textile products, leather and footwear	1.14	1.81	1.84	0.98	1.81	1.47	1.88	1.54	1.32	0.88	1.46	1.26
Sectors **20 to 22**: wood and products of wood and cork; pulp, paper, paper products, printing and publishing	1.50	1.76	0.84	1.22	3.12	2.04	1.41	1.80	1.52	1.75	1.14	1.20
Sectors **23 to 25**: chemical, rubber, plastics and fuel products	1.36	1.39	1.36	1.01	1.67	1.44	0.63	1.13	0.97	3.20	1.25	1.03
Sector **26**: other non-metallic mineral products	1.79	2.29	1.32	1.03	1.39	1.28	1.43	1.10	1.08	1.15	0.97	1.48
Sectors **27 and 28**: basic metals and fabricated mineral products	1.24	2.13	1.09	0.87	2.17	1.37	1.10	1.36	1.00	1.84	1.16	1.22
Sectors **29 to 33**: machinery and equipment	1.22		0.94	0.97	2.11	1.26	1.47	1.34	1.19	0.87	1.20	0.93
Sectors **34 and 35**: transport equipment	1.23	1.30	1.17	0.74	1.53	1.75	1.10	1.99	1.20	1.99	1.22	0.76
Sectors **36 and 37**: manufacturing NEC; recycling	1.65	1.84	1.27	0.80	2.85	1.38	1.63	2.29	0.93	2.89	2.30	1.01

N*ote*: Figures reported are for 2001, except for the Czech Republic (2002), Japan (2000); Hungary and the United Kingdom (1999) and Portugal (1998). Sectors 23 to 25 exclude sector 23 for the Czech Republic, Finland and Spain. Data for Spain do not include sectors 29 to 33.

Source: STAN and AFA databases, OECD.

Table 6. **Relative LP of foreign affiliates in the services sectors in 2001 or latest available year**

LP of domestic firms = 1

	Czech Republic	Finland	France	Hungary	Italy	Japan	Netherlands	Portugal	Sweden	United States
Sectors **50 to 52**: wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	2.13	1.83	1.94	2.38	1.86	n/a	2.04	3.33	2.09	1.87
Sector **55**: hotels and restaurants	1.40	1.16	0.77	2.05	0.85	n/a	1.34	1.34	1.29	0.69
Sectors **60 to 64**: transport, storage and communications	1.65	0.53	0.73	4.26	1.79	1.62	0.63	2.66	0.92	0.23
Sectors **65 to 67**: Financial intermediation	2.14	n/a	1.51	2.71	n/a	n/a	n/a	1.29	n/a	0.46
Sectors **70 to 74**: REAL estate, renting and business activities	1.30	0.47	0.43	0.87	0.48	0.35	0.57	0.73	0.56	0.44

Note: Figures are for 2001, except for the Czech Republic, Hungary and Portugal (2002) and Japan and Sweden (2000). The figures for sectors 65 to 67 in Hungary refer to 1998.

Source: STAN and AFA databases, OECD.