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THE SERVICE ECONOMY IN OECD COUNTRIES

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THE SERVICE ECONOMY IN OECD COUNTRIES

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Abstract

Improving the performance of the services sector is important to enhance aggregate economic growth. This is primarily since the service sector has become the quantitatively most important sector in all OECD economies. The growing role of services is not only the result of a resource re-allocation towards services, as the sector with low productivity growth. It is also related to demand side factors, such as a high income elasticity of demand for some services, demographic developments, the provision of certain services as public goods, and the growing role of services as providers of intermediate inputs. The empirical evidence points to several areas where employment and productivity growth in services is held back. For example, labour-intensive production in many services industries may reduce the potential for productivity growth. Innovation is held back by obstacles that are particularly relevant for services industries. The evidence also shows that the regulatory environment for services in product and labour markets may affect the scope for employment and productivity growth. However, policy should not necessarily look at services separately from manufacturing industries. In contrast, several services industries show characteristics and problems similar to those of manufacturing industries and the blurring of the two sectors is becoming more and more prevalent. Moreover, addressing some of the problems faced by services may also improve the performance of other industries, since services provide key intermediate inputs to such sectors.

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L'ÉCONOMIE DE SERVICES DANS LES PAYS DE L'OCDE

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Résumé

Il est important d'améliorer les performances du secteur des services pour renforcer la croissance économique globale. Celui-ci est en effet devenu dans tous les pays de l'OCDE le secteur le plus important sur le plan quantitatif. Le rôle croissant des services ne résulte pas seulement d'une réaffectation des ressources en direction de cette branche d'activité, dont la productivité augmente peu. D'autres facteurs entrent en ligne de compte du côté de la demande, comme la forte élasticité revenu de la demande de certains services, l'évolution démographique, la fourniture de certains services à titre de biens publics et le rôle croissant des services en tant que fournisseurs de facteurs de production intermédiaires. Les données empiriques dont on dispose montrent que l'emploi et la productivité progressent peu dans plusieurs domaines. La forte intensité de main-d'œuvre de nombreux secteurs de services peut réduire les possibilités de croissance de la productivité. L'innovation est ralentie par des obstacles qui touchent particulièrement les secteurs de services. Les données montrent aussi que le cadre réglementaire qui s'applique aux services sur les marchés des produits et du travail peut influer sur les capacités de croissance de l'emploi et de la productivité. Cependant, les politiques publiques ne doivent pas nécessairement envisager les services séparément des industries manufacturières. Plusieurs secteurs de services présentent en effet des caractéristiques et des problèmes similaires à ceux des industries manufacturières et les limites entre les deux types d'activités s'estompent. En outre, la résolution des problèmes rencontrés dans les secteurs de services pourra améliorer les résultats d'autres industries, auxquelles les services fournissent des facteurs de production intermédiaires essentiels.

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1. INTRODUCTION

The service sector accounts for about 70% of aggregate production and employment in OECD economies and continues to grow. Countries differ, however, in the role and performance of the service sector. This paper examines the performance of the services sector across OECD countries. It first addresses the importance of the service sector in OECD economies. Section 2 explores the role of services and how the increasing shift towards services may be explained. Such explanations include the growing role of services in final and intermediate demand, as well as differences in productivity growth between the services and the manufacturing sector. This section also analyses the performance of individual services industries in terms of productivity growth and employment shares and growth, as well as the contribution of services industries to aggregate productivity and employment growth.

The second issue that will be addressed in this paper relates to the factors that drive the performance of the services sector. The poor performance of the services sector has typically been attributed to certain structural characteristics that may impede productivity or employment growth. For instance, services are perceived to be less intensive in their use of physical capital; they typically demonstrate a lower degree of innovation and knowledge accumulation; are often characterised by a smaller firm size; and typically focus on domestic or regional markets, implying that they are not confronted with international competition to the same degree as the manufacturing sector. Section 3 examines the ways in which services differ from manufacturing industries and explores why some countries perform better than others in service industries. The analysis of these factors will lead to some conclusions as regards structural problems that could eventually be addressed by policy makers.

The role of services and their performance are analysed in this paper using various sets of cross-country comparable data. These are taken from the OECD STAN Database which provides a broad range of variables, such as value added and gross output at current and constant prices, employment and gross fixed capital formation, for long time periods and for almost all OECD countries. The OECD Input-Output Tables are used to analyse the demand structure of services industries. Data on trade and foreign affiliates enable an analysis of the degree to which services are focused on domestic or international markets. Data from the OECD ANBERD Database are used to analyse the extent of formal research and development (R&D) in services industries. The distribution of educational attainment and occupation skills are analysed using data from the European Labour Force Survey. Finally, analysis of the entry and exit of services firms is based on empirical studies using Eurostat data on firm demographics.

2. THE ROLE AND PERFORMANCE OF SERVICES IN THE ECONOMY

2.1 The role of services in the economy

The service sector has become the quantitatively most important sector in all OECD economies (Figure 1). By 2002, the share of the service sector amounted to about 70% of total value added in most OECD economies, and this has increased considerably since the 1970s. Some cross-country differences can be distinguished, however. A first group of countries already had a relatively high share of service sector value added in the 1970s, *e.g.* Denmark and the United States, or have experienced strong increases in their value added share from initially low levels, *e.g.* France, the Netherlands and the United Kingdom. In a second group of countries, including Austria, Germany, Italy and Spain, shares were between 65% and 70% of total value added in 2000, but these have continuously increased since the 1970s. In a third group of countries, value added shares of the service sector remain at a relatively low level of between 55% and 60%, *e.g.* Ireland, or have shown only slight increases over the period, *e.g.* Canada and Norway.[1]

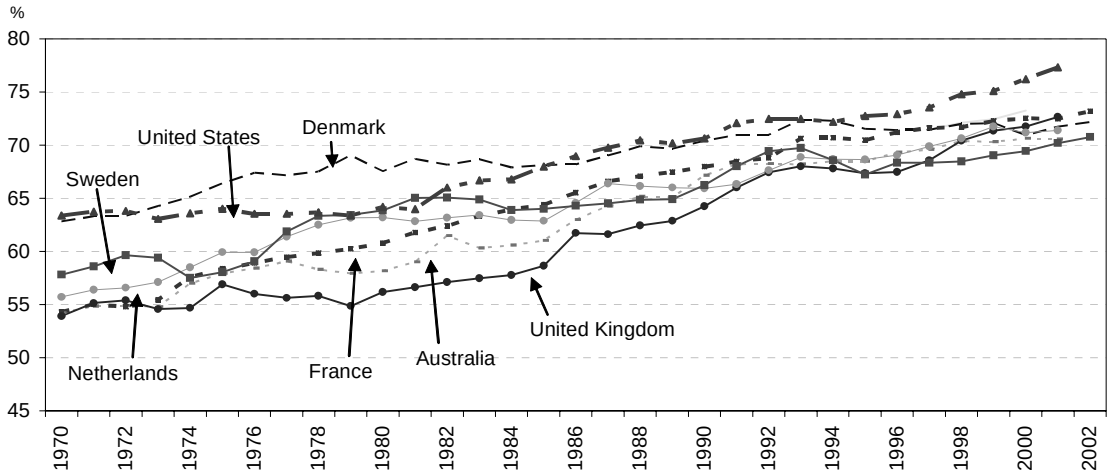
The services sector is, however, composed of a wide variety of different activities ranging from fast food to brain surgery. This is reflected in the shares in total value added of different service industries. The increase in the share of the service sector in total value added can mainly be attributed to the growth of business related services (Figure 2, Tables A1 and A2). In particular, finance, insurance and business services have experienced a strong increase in value added shares. These industries now account for about 20%-30% of value added in the total economy, while their respective shares were between 10% and 20% in 1980. These service industries are primarily driven by market forces, which typically imply greater pressure to improve productivity.

There has been very little change in the value added shares of trade, restaurants and hotels as well as transport and communications services over the past decade. In the case of transport and communications services, trends in prices and quantities have moved in opposite directions. The demand for these services increased in the 1990s, notably in the case of telecommunication services. If prices had been constant and the increase in production in these services had been higher than in other industries, this would have resulted in an upward shift in the value added shares of these services. However, more efficient production, linked to rapid technological progress and growing competitive pressure, has contributed to a decline in relative prices and consequently to lower current price shares of value added for these industries.

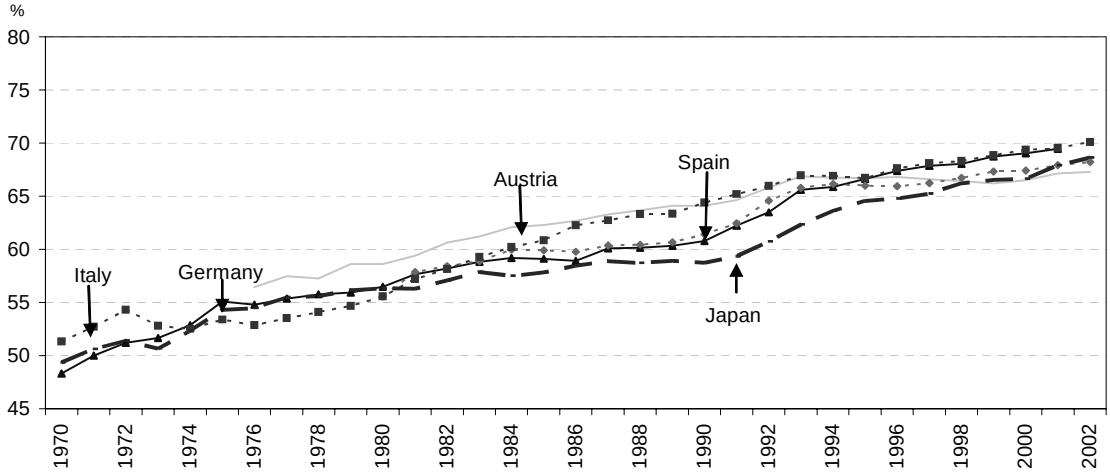
1. The structural shift towards an increasing share of the services sector in total value added has taken place in nominal and real terms. For most countries, the increase in the value added share at current prices is due to real growth in value added and an increase in relative prices of services (Figure A1).

Figure 1. **Value added shares of the service sector over time (in per cent)**[1]

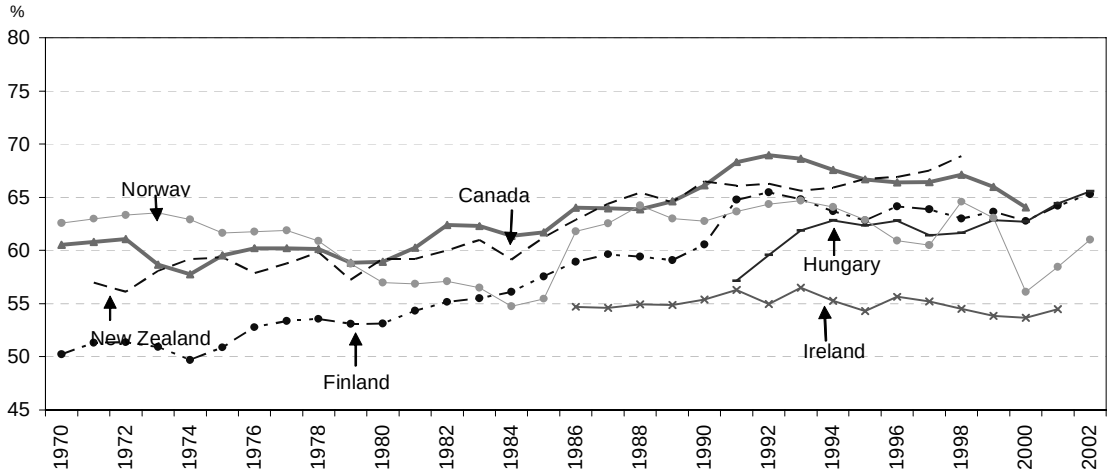
Countries with value-added shares above 70% in 2001



Countries with value added shares between 65% and 70% in 2001



Countries with value added shares below 65% in 2001

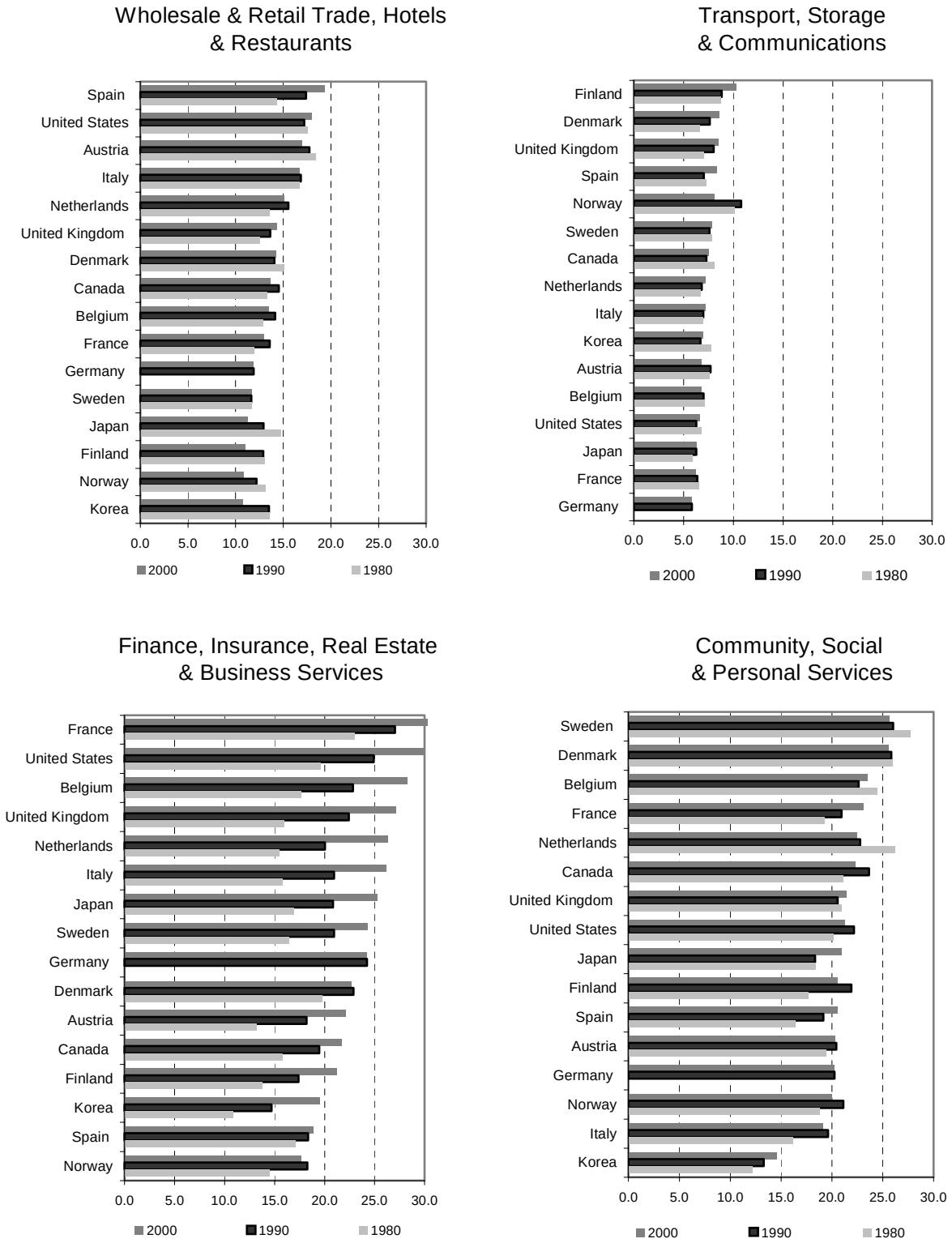


1. Shares in value added at current prices. The services sector refers to ISIC rev.3 class 50-99.

Source: OECD STAN Database, 2004.

Figure 2. **Value added shares within the service sector over time**[1]

Share of broad service groups in current price value added of the total economy (in per cent)



1. The services sector comprises ISIC classes 50-99.

Source: Wölfl (2003), based on the OECD STAN Database.

A similar picture prevails for the increase in the share of services in total employment (Tables A3 and A4). In 2002, services accounted for about 70% of total employment on average across OECD countries. Relatively high shares of around 75% can be observed in Canada, New Zealand, the United Kingdom and the United States. In contrast, relatively low shares, below 60%, can be observed in Poland, the Slovak Republic, Portugal, Korea, Hungary, Greece and Austria. For most countries, increases in the employment share of services in the 1990s as compared with the 1980s can be observed in financial and business services, as well as in social and community services; in contrast, in transport and communication services the shares in total employment have stayed relatively constant in most OECD countries.

While a broad pattern of the shares of different services in the economy can be observed, considerable cross-country differences exist in the composition of services. These national differences appear to persist, even at similar levels of income, and reflect a variety of factors, such as differences in female participation, the size of the welfare state, regulatory policy and trade specialisation patterns (OECD, 2000). Cross-country differences in the incidence of part-time and temporary work, as well as in job tenure may also explain some of the cross-country differences in the share of the services sector in the economy, or in the composition of value added and employment within the services sector (OECD, 2001). As these factors are important to understand the performance of services industries in terms of employment composition and growth, section 3.5 below will come back to the labour market characteristics of services as compared to manufacturing.

From a policy point of view, an important question is whether structural change and having a large service sector affect economic growth (Figure 3 and Box 1). Figure 3 suggests a negative, albeit not statistically significant, correlation between the share of services in total value added or employment and the growth of GDP per capita and aggregate productivity growth. Countries with a high share of services in total value added or employment, such as the United States and France, also show relatively low growth in GDP per capita or per person employed. In contrast, countries with a very low share of services in total value added and employment, such as Korea and Ireland, show relatively strong growth in GDP per capita or GDP per person employed.[2]

In general, the results in Figure 3 may be related to both, supply- and demand-side factors.[3] For example, the correlation may be linked to factors that hamper productivity growth in services industries. Such supply side factors are, for instance, a low knowledge or skills intensity of services or weak exposure to competitive markets. Understanding these factors is important as some are influenced by public policy, *e.g.* a regulatory environment that may limit competition. These factors will be discussed in more detail in section 3 of this paper. Problems in measuring productivity growth of services industries, notably in computing constant price value added may also play a role (see Box 5 and Wölfl, 2003).

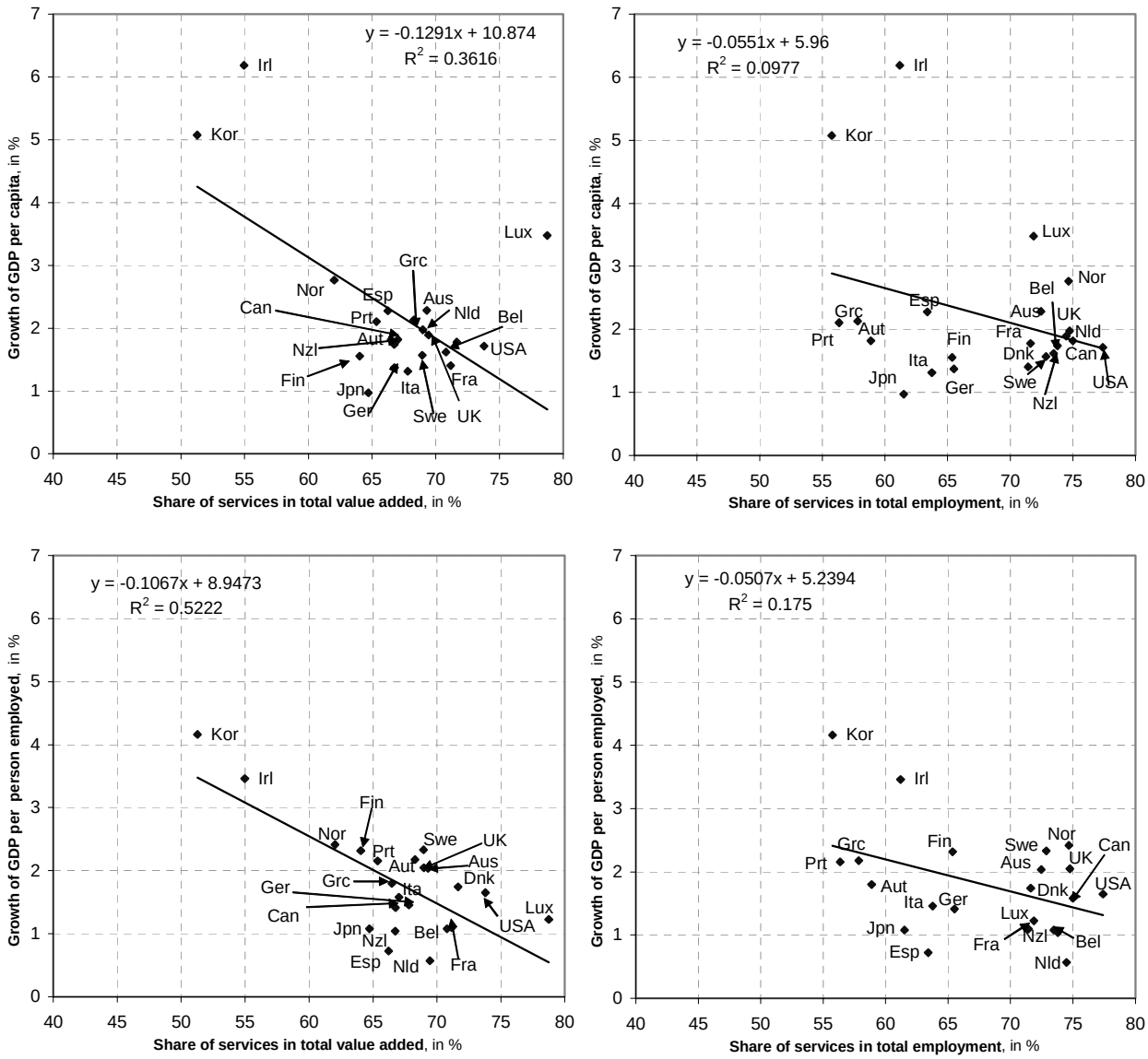
2. To some degree the negative correlation is related to the performance of Korea and Ireland. If these countries were taken out, the sign of the relationship would change in the top diagrams, and would become less statistically significant. The sign of the relationship in the bottom diagrams would stay negative, but would become less statistically significant.

3. High shares of services in total nominal value added may also reflect high relative prices of the services sector as compared to the manufacturing sector. Additional empirical evidence has shown that social and personal services show particularly high and increasing producer prices relative to the total economy in most countries (see also Wölfl, 2003). High and increasing relative prices over time are consistent with the stylised empirical facts of the 1960s on which traditional theories of unbalanced growth and demand bias were based. However, the observation that the relative price increases of several services is lower than that for the total services sector suggests that growth in services may not be appropriately explained by these hypotheses alone.

A negative, albeit weak, relation between a high share of services industries and low growth in aggregate productivity growth may also be related to strong demand for certain services, such as social and personal services, health and education. Strong demand for these services may have induced a resource allocation towards these services and an increase in their value added. As these services are characterised by a weak potential for productivity growth, the growing importance of these sectors in value added will have a depressing effect on productivity growth.

Figure 3. **Share of services in total value added and employment and the growth in GDP per capita and GDP per person employed, 1990-2001[1]**

Annual average share and growth rates, in per cent



1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90. The services sector covers ISIC classes 50-99. See also footnote 2.

Source : OECD STAN Database and OECD Productivity Database, 2004.

Box 1. **Structural change and economic growth**

Empirical evidence suggests that there is no common pattern of structural change across OECD countries. Figure 1, Box 1 illustrates the speed of structural change within OECD countries over the 1980s and the 1990s. According to the modified Lilien-Indicator, used here, the speed of structural change can generally be expressed as a function of the weighted sum of changes in the shares of industries over time; the weights are given by the average shares of each industry over the respective time period.

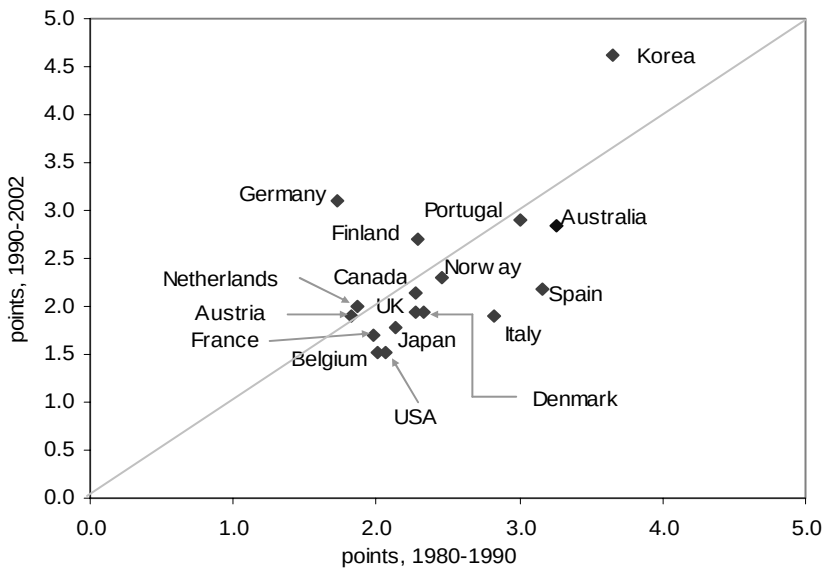
This can be written as: $SC_t = \sqrt{\sum_{i=1}^{n} (\bar{x}_i) \cdot \left(\ln \frac{x_{i,t}}{x_{i,t-1}} \right)^2}$, where $x_{i,t}$ is the share of industry i in total employment, and $\bar{x}_i$ is the average index of the shares of period *t* and *t-1* (Stamer, 1999).[4]

In general, any indicator of structural change should ideally fulfil five conditions (Stamer, 1999): the index should take on the value zero if there are no structural changes within one period; structural change between two periods should be independent of the time sequence; structural change in one period should be smaller or equal to structural change between two sub-periods; an appropriate indicator of structural change should reflect the variation around the mean, and it should take the size of sectors into account.

While the original Lilien-index does not fulfil all these characteristics, the modified index is closer to meeting these conditions. Like most indicators for structural change, however, the modified index is sensitive to the level of aggregation, and cannot be applied for comparisons between countries, if it is based on different levels of aggregation across countries.

OECD countries differ substantially with respect to the speed of structural change (Figure 1, Box 1). Between 1990 and 2001, for instance, rapid structural change can be observed for Korea, Germany, Portugal, Australia and Finland, while structural change over the same period was relatively weak in Belgium, the United States, France and Japan.

Figure 1, Box 1. **Speed of structural change in selected OECD countries**[1]



1. Modified Lilien-Indicator, based on employment per industry. Data for 1980-90 for Germany refer to West-Germany. The results in Figure 1 are computed on the basis of the shares of disaggregated services industries in total employment, using STAN-employment data at the lowest level of aggregation possible.

Source : OECD STAN Database, 2004.

4. See Stamer (1999) for an overview of measures of structural change and its speed that are commonly used in the empirical literature.

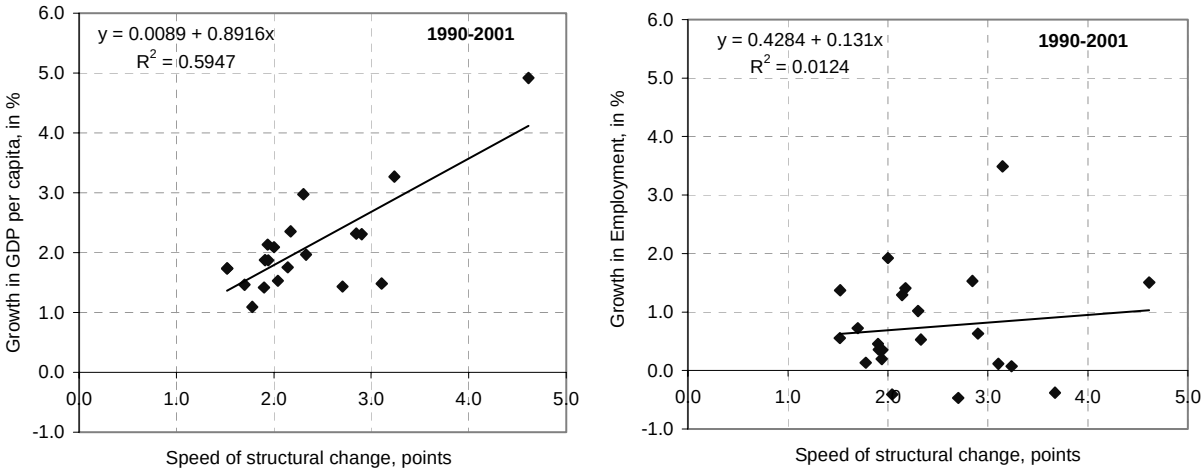
Box 1 *(contd.).* **Structural change and economic growth**

To some degree, these changes are related to differences in the timing of structural change across OECD countries, as indicated by the location of the respective country points relative to the 45 ^{o} line. If structural change was relatively balanced across the different time periods, the country points would be close to the 45 ^{o} line. Such balanced structural change can be observed for Austria, the Netherlands, Canada and Norway. In contrast, Spain and Italy, and to a lesser degree the United States, experienced more rapid structural change over the 1980s, and less structural change over the 1990s. Korea and Germany showed faster structural change in the 1990s as compared to the 1980s.[5]

Figure 2, Box 1 shows a significantly positive relationship between the speed of structural change and growth in GDP per capita; countries with more rapid structural change show more rapid growth of GDP per capita. This relationship is, however, not as clear cut with regard to employment growth. Certain countries with relatively fast structural change also experienced strong growth in total employment, whereas others with similar speeds of structural change experienced weak or even negative employment growth. This suggests counteracting effects of structural change on the allocation of labour across the economy, where these effects depend on factors such as differences in productivity growth, final demand for services or the use of services as intermediate inputs. These factors will be analysed in more detail below.

Figure 2, Box 1. **Structural Change and growth in GDP per capita or aggregate employment growth, 1990-2001**[1]

Annual average growth rates, in per cent



1. Modified Lilien-Indicator, based on employment per industry. Data for 1980-1990 for Germany refer to West-Germany.

Source : OECD STAN Database, 2004.

While these results, combined with findings from other empirical studies, suggest a positive correlation between structural change and economic growth, the main factors determining this relationship and, in particular, the direction of causality of this relation are not clear *a priori*; both from a theoretical and empirical point of view. Structural change, *e.g.* in terms of a shift towards industries with higher productivity growth, would typically increase growth of GDP per capita, unless growth in GDP is accompanied by a strong decline in the labour participation rate. Vice versa, a positive correlation between a high income level and the speed of structural change may also reflect that final demand factors are driving structural change.[6]

5. As data for Germany and for 1980-90 refer to West Germany, this result may reflect to a large degree reunification induced structural change.

6. See Aiginger (2001), Peneder (2003), Gouyette and Perelman (1997) and Nickell *et al*. (2004) for more detail on the theory and empirics of structural change and economic growth.

2.2 Potential explanations for the growth of the services sector

Imbalances in productivity growth between services and manufacturing

A number of factors affect the size of the service sector in the economy.[7] The first possible explanation is a low potential for productivity growth in some services industries. In his seminal paper of 1967, Baumol stressed that unbalanced growth between the manufacturing and the service sector induces a resource re-allocation towards the "stagnant" service sector, eventually slowing down aggregate growth (Box 2).

Box 2. **Cost Disease and the service sector: Baumol's theory**

The main idea behind Baumol's theory of Cost Disease is that the tendency of unbalanced growth across sectors induces resource re-allocation towards the slowly growing or stagnant sector, eventually slowing down aggregate growth. Baumol's views derive from the assumption that the economy consists of two distinct sectors. The first is a growing (manufacturing) sector, subsidised by rapid technological progress, capital accumulation, and economies of scale. The second one is a relatively stagnant (service) sector, consisting of services such as education, performing arts, public administration, health and social work. Due to the nature of this second sector, any potential for technological progress in this sector would only be temporary. These services might thus be subsidised by an eventual increase in the costs that would have to be incurred in providing them.

The crucial point for differentiation between the two sectors lies in the role of labour. In the first sector, labour is mainly an input in the production of some final good. In the second sector, labour is rather an end in itself. In order to stress the point, Baumol (1967) assumes that labour is the only input into production, with the total supply of labour being constant. Furthermore, wages in the two sectors are assumed to change in parallel to money wages, and thus to income in the economy, rising as rapidly as output per man hour in the growing sector. As a consequence, costs (*i.e.* wage costs) would steadily increase in the stagnant sector, while costs could be held constant within the growing sector, due to the productivity growth that can be achieved there.

This leads to two possible scenarios of inter-sectoral resource allocation and aggregate economic performance. In the first scenario, there is a tendency for the output of the stagnant sector to disappear. This would mainly be the case if demand for the service industries is not highly price or income inelastic. In the second scenario, however, the relative supply of both sectors' goods is assumed to be constant. Either the demand for stagnant sectors' goods is highly price inelastic, as is the case for social and health services, or production of these sectors is subsidised, as is the case in cultural services. In this second scenario, an increasing share in labour would have to be transferred to the stagnant industry, while the share of labour allocated to the growing industry would eventually approach zero. In the long term, the second scenario would lead to declining aggregate productivity growth, as the weighted average of the two sectors, with the weights being the relative employment shares of each contributing sector.

Despite the intuitive appeal of Baumol's argument and its foundation in empirical evidence during the 1960s, two factors argue against declining aggregate productivity growth. First, not all service industries are stagnant; ICT use, for instance, has contributed to improved productivity growth in the services sector in several countries (see also Baumol, Blackman and Wolff, 1985). Second, declining aggregate productivity growth might only occur if these service industries produce final goods, not if they produce intermediate inputs (Oulton, 1999, and Fixler and Siegel, 1999).

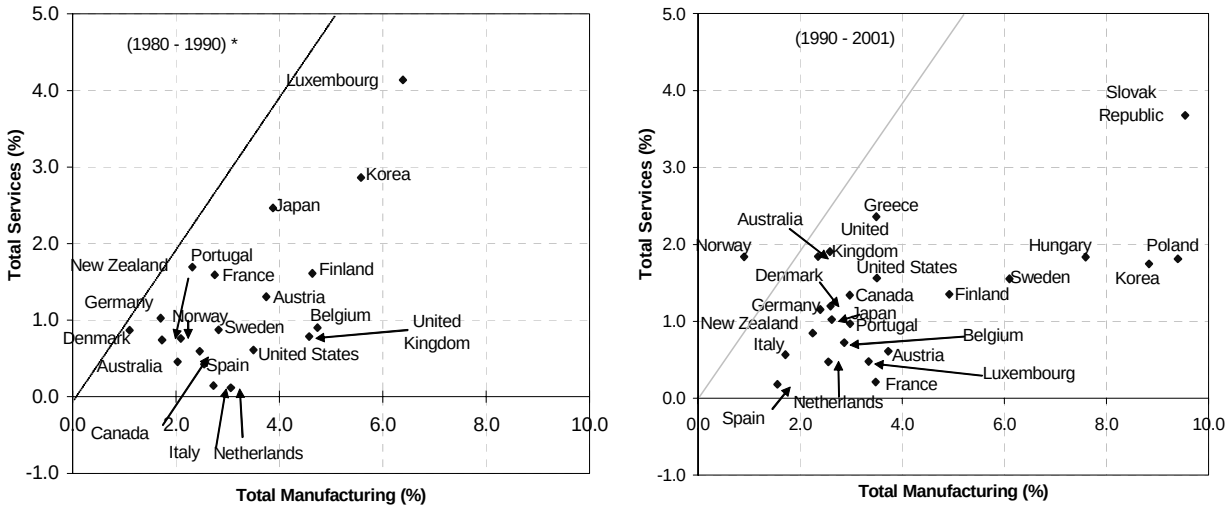
Figures 4a and 4b provide an aggregate perspective on unbalanced productivity growth between the manufacturing and the services sector in OECD economies. Equal productivity growth in manufacturing and service sectors would imply that all country points are on or close to the 45° line in the graph. Most countries are located to the right of the line, however. Productivity growth is thus higher in manufacturing than in services in (almost) all OECD countries. Moreover, in most countries, service productivity growth

7. Aiginger (2001) provides a list of different theories that may explain structural change towards the services sector. In principle, however, all possible explanations can be summarised in the three explanations given below.

is only about half of manufacturing productivity growth. In the United States, Sweden and Finland, the ratio is less than one-third.[8]

Figure 4a. **Growth in value added per person employed in manufacturing and services**

Annual average percentage growth rates, 1990-2001[1]

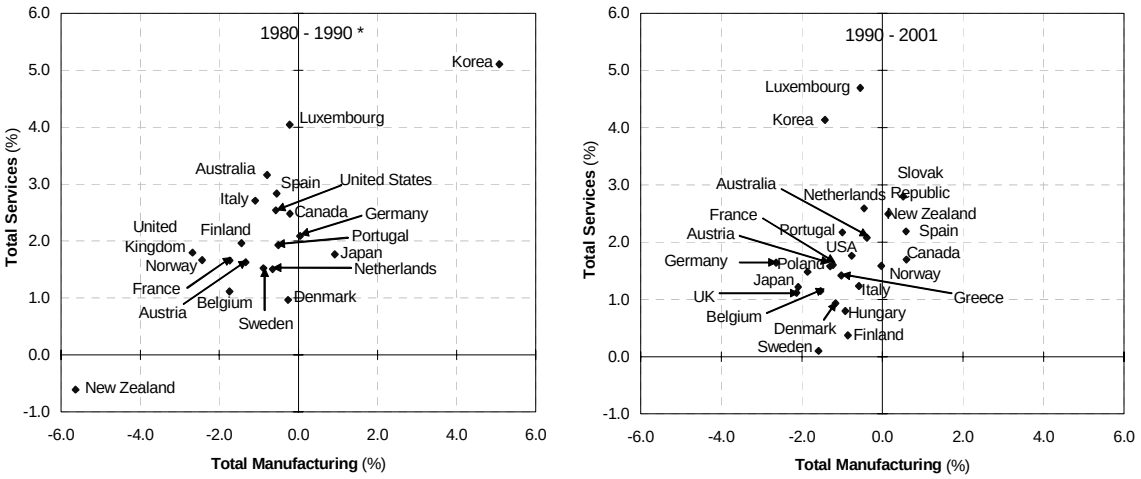


1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90. The services sector covers ISIC classes 50-99.

Source: OECD STAN Database, 2004.

Figure 4b. **Employment growth in manufacturing and services, 1980-90, 1990-2001[1]**

Annual average growth rates, in per cent



1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90. The services sector covers ISIC classes 50-99.

Source: OECD STAN Database, 2004.

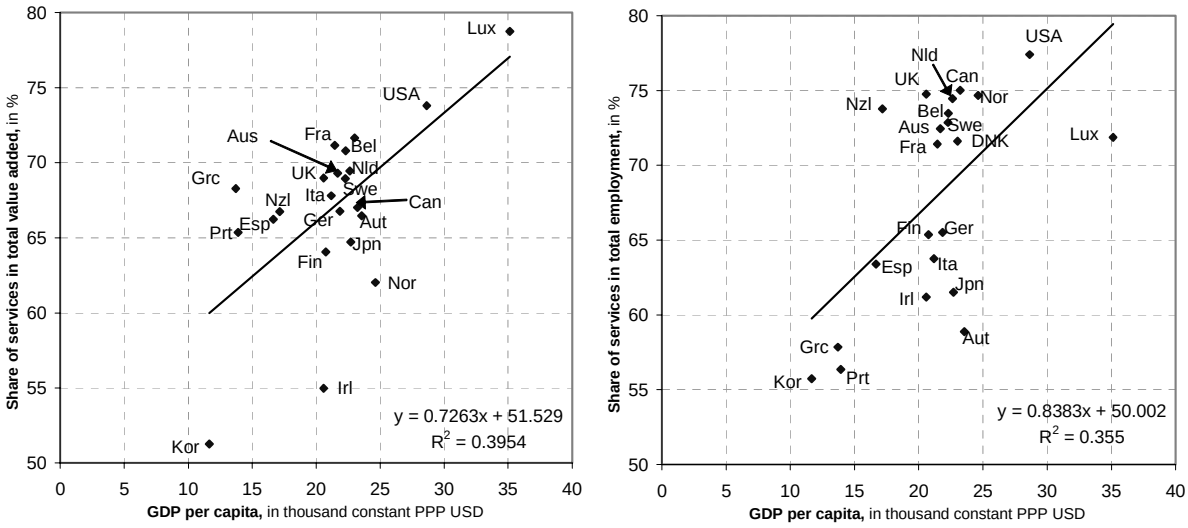
8. Lower productivity growth is to some degree due to problems in measuring service productivity. See Box 5 and Wölfl (2003). The comparison between manufacturing and services may differ if hours worked instead of employed persons were chosen as the labour input measure, for instance, due the stronger incidence of part-time work in services than in manufacturing industries.

Figure 4b illustrates that, at the aggregate level, the differential in productivity growth between the manufacturing and the service sector coincides with a re-allocation of labour resources towards the service sector. Most country points are located in the top left quarter of the figure, *i.e.* in most countries, employment growth is positive in services, but negative in manufacturing. In the 1990s, this picture changed slightly from that observed in the 1980s. In this period, employment growth in services declined slightly, and a few country points (*e.g.* Canada and Spain) can now be found in the top right quarter, indicating positive employment growth in both the services and the manufacturing sector.

Factors related to final demand

A second potential explanation for the growing role of services in some countries may be factors that are related to final demand, such as a high income elasticity of demand for some services, demographic developments in society, notably population ageing, or the growing provision of certain services as public goods in many OECD countries. If final demand is an important determinant of the growing role of the services sector in the economy, cross-country differences would likely be associated with differences in GDP per capita, since higher incomes would lead to greater demand for services.

Figure 5. **GDP per capita and the share of services in total value added or employment**[1]



1. 2001, 2002, or most recent year available. The services sector covers ISIC classes 50-99.

Source : OECD STAN Database and OECD Productivity Database, 2004.

Figure 5 shows a strong positive relationship between GDP per capita and the share of the services sector in total value added or employment. Certain countries, notably Luxembourg, Norway and the United States, have relatively high GDP per capita and a relatively high share of services in total employment. In contrast, in countries such as Greece, Portugal and Korea, both per capita GDP and the share of services in total employment are relatively low. The picture is similar for the relationship between GDP per capita and the share of services in total value added, with regard to both its size and significance.[9]

9. A significant and strong positive relationship between GDP per capita and the share of services in total employment was also found in OECD (2000). The regression analysis in this study also included the relative cost of services and two additional variables capturing the composition of final demand. However, Messina (2004) found some indications for a turning point in the relationship and suggests that mature economies have entered a saturation point.

Final demand is an important factor for the growth of certain services, notably social, community and personal services. These industries produce up to about 80% of their output for final demand (Wölfl, 2003). The role of final demand for structural shift towards services relates to several factors. First, demand for these services is typically perceived to be income elastic,[10] implying that an increase in incomes would lead to more than proportionate increases in the demand. This is typically considered to be the case for services such as leisure activities, high quality health and care services, higher education or other services, such as travel, that may contribute to an improved quality of life. Second, demographic changes are also likely to affect demand patterns; declining birth rates and longer life expectancy in industrialised countries are resulting in a rapidly ageing population, so that demand for certain goods and services (*e.g.* primary schooling) is declining and demand for others (*e.g.* health and personal services) is rising. Third, demand for some services, notably education and health services, are closely linked to the size of welfare states in OECD countries. Previous empirical work has reported a significant positive effect of the size of the welfare state on the share of services in total employment (OECD, 2000).

Box 3. **Income elastic demand as an explanation of structural change towards the services sector?**

Final demand for services is traditionally seen to be one of the main explanations for structural change towards the services sector. The basic idea behind the so-called demand bias hypothesis is that (final) demand for services is income elastic: With rising income, expenditures for services would increase more than proportionally. This would not only lead to rising nominal shares of services in value added and employment. Other "stylised" empirical facts, such as an increase in relative prices of services, and more or less constant shares of services in real output, are also associated with a high income elasticity of demand for services. (Gundlach, 1994)

While demand bias in terms of an income elastic demand for services may explain much of the differences in structural change between industrialised and developing countries, the empirical evidence notably within the group of industrialised countries is not compelling; nor is the theoretical evidence as has been shown by Gundlach (1994, 1996). Few empirical studies have actually estimated the income elasticity of demand for services, and those studies found very limited evidence for income elastic demand. As Messina (2004) states, there are few reasons to assume that the preference structure of the population should differ across countries at similar levels of development. Moreover, even if final demand for services was income elastic, this would not be sufficient to lead to an increasing share of services in value added and employment, and to high relative prices of services. Gundlach (1994) suggests that this would only be the case under specific conditions with regard to the general model setup, the productivity differential, the values of income elasticities and the values of own and cross price elasticities of demand for goods and services.[11]

The hypothesis that an income elastic demand would be a main determinant of the empirical trend towards the services sector can be challenged on both theoretical and empirical grounds. For instance, it is based on a one-factor-two-good model. It does not take into account investment nor intermediate goods production and use. Several services industries produce, however, for intermediate production that is used by services and manufacturing industries, an issue which will be addressed in more detail below. The final demand bias hypothesis also assumes – as in Baumol (1967) – productivity growth in the services sector to be lower than productivity growth in the manufacturing sector. While this is the case for the aggregate services sector, the evidence suggests that this is not necessarily the case for all services industries. Finally, the consistency between income elastic demand and the empirical stylised facts focuses on the constant production structure of services in real terms. The empirical evidence for such a constant real output share of services is, however, weak; in contrast, several countries have shown increasing shares of services in real value added over time (Figure A1).

10. Although the empirical evidence for income elastic demand is weak (Gundlach, 1994, 1996, see Box 3).

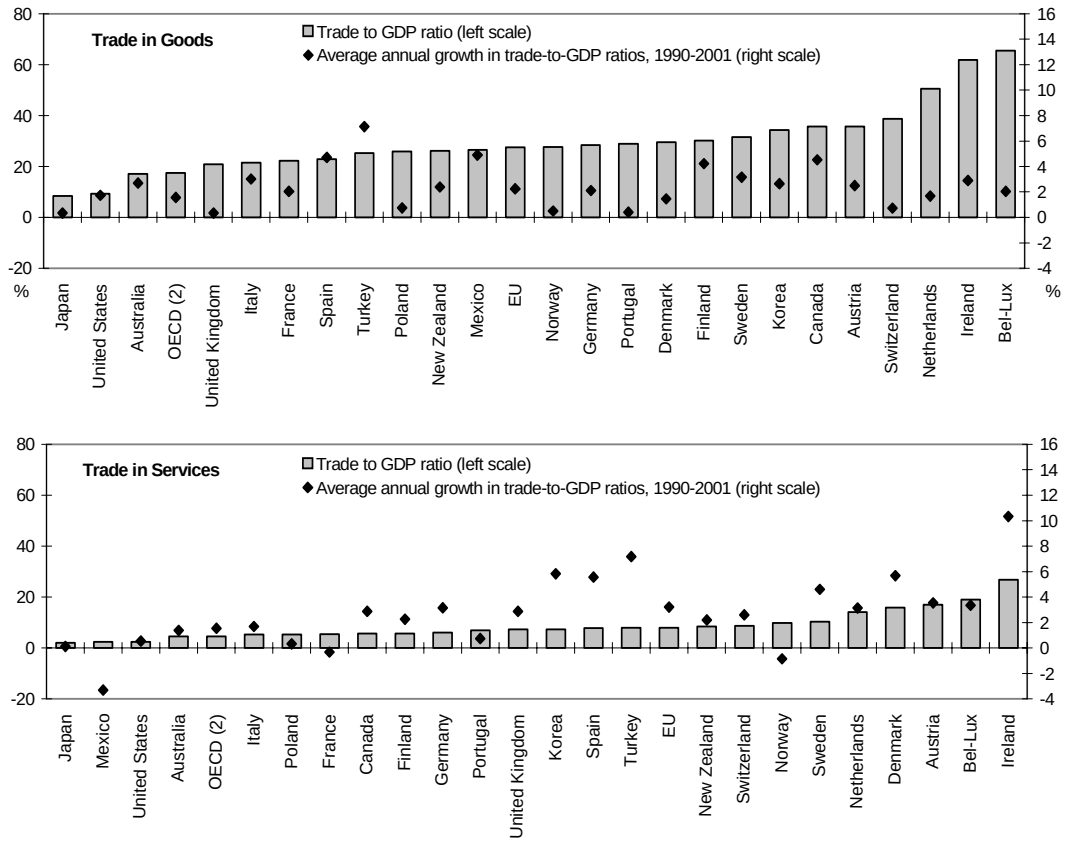
11. These models assume mobility of labour across sectors so that productivity and wages can adjust. In reality, such inter-sectoral labour mobility is, however, not as immediate as assumed in these models (Dathe and Schmid, 2000).

Fourth, demand for services is not restricted to domestic final demand; services are also increasingly engaged in international trade. The services sector exports about 6% of its total gross output (Figure 7). Business related services, notably transport, storage, post and telecommunication services, produce between 10% and 20% of their gross output for international demand (Wölfl, 2003). The increase in trade in services is linked to the increasing importance of new modes through which services can be traded, *i.e.* cross-border supply of services; consumption from abroad, notably in tourist services; commercial presence, *e.g.* via affiliates; or presence of natural persons (OECD, 2001*c*, 2004*b*).[12]

While trade in goods has been and is still the main form of international trade, services trade is growing (Figure 6). In 2001, the share of trade in goods in total GDP amounted to about 15% across OECD countries, while trade in services accounts for about 4% of GDP on average across OECD countries. However, services trade picked up in the 1990s in certain countries. This is notably the case in Korea, Spain, Turkey and Ireland, where the annual average growth rate of the trade to GDP ratio in services in the 1990s was between 6% and 10%.

Figure 6. **Level and change of the trade to GDP ratio of trade in goods and services**

Level of 2001[1] in per cent and annual average percentage growth 1990-2002[1]



1. Or nearest year available. In current prices.
2. Includes OECD countries shown in the graph.

Source : OECD Science, Technology and Industry Scoreboard, 2003.

12. See section 3.5 for more detail on labour mobility in services.

Transport and travel services as well as some business services are the services with the highest share in total services trade. In 2002, these services accounted each for between 21% and 27% of total imports or exports of services (Table 1). Strong growth in trade in services between 1997 and 2002 can be observed for trade in insurance as well as for computer and information services, to a lesser degree also for trade in financial services and other business services. The high growth rate of trade in computer and information services that can be observed between 1997 and 2002 may partly reflect the new economy bubble; between 2001 and 2002, this growth rate fell down to about 7% for exports and about 2% for imports. In contrast to their strong share in total services trade, trade in transportation and travel services changed little in the late 1990s, although their growth rate increased from 2001 to 2002 (Table 1).

Table 1. **Share and annual change of detailed services in total services trade**

Level of 2002 in per cent and annual average percentage change 2001-2002, 1997-2002, in current prices

	Shares in total exports/ imports of the services sector 2002		Average annual percentage change 2001-2002		Average annual percentage change 1997-2002	
	Exports	Imports	Exports	Imports	Exports	Imports
TOTAL SERVICES	100.0	100.0	5.6	5.7	3.3	4.1
Transportation	21.6	23.5	3.6	3.3	0.9	1.5
Travel	27.5	27.9	2.7	4.2	1.6	2.6
Communications services *	2.1	2.3	-2.1	-1.7	4.8	1.1
Construction services **	1.9	1.4	3.5	3.0	-8.7	-6.7
Insurance services	3.0	3.8	52.3	22.8	12.8	12.7
Financial services	6.5	3.4	5.1	0.4	8.1	7.1
Computer and information services ***	3.4	2.3	7.1	2.2	17.4	11.4
Royalties and license fees ****	6.4	6.2	6.6	5.9	5.7	6.3
Other business services	23.0	24.0	6.9	7.3	5.1	7.3
Personal, cultural and recreational services	1.6	1.4	7.7	-9.6	8.7	-1.8
Government services, n.i.e.	3.0	3.6	10.6	24.2	-0.8	6.6

Note: * Estimated by the OECD Secretariat, ** excluding Mexico and Switzerland, *** excluding Mexico, Switzerland and Turkey, **** excluding Switzerland.

Source: Statistics on International Trade in Services Volume I, OECD/Eurostat, 2004.

One of the main channels through which services are traded is commercial presence via affiliates.[13] Despite some limitations[14] the available data confirm an increasing importance of foreign affiliates in the services sector in the late 1990s (OECD, 2003*c*). In 2001, the share of turnover under foreign control in the services sector was relatively high; it amounted to more than 20% for Hungary, Belgium, Ireland, the Czech Republic, Poland and Italy. In terms of employment, the share of foreign affiliates ranged from 19% in Belgium and around 15% in Hungary, Poland, the Czech Republic and Ireland to less than 1% in Japan.

In all countries except Finland, the share of turnover of foreign affiliates was greater for manufacturing than for services in 2001. In terms of employment, however, the penetration of foreign affiliates seems evenly distributed between services and manufacturing in Belgium, Finland, Portugal and the Czech Republic, with the largest differences to be found in Hungary, Ireland and Luxembourg. In Japan, the penetration of foreign affiliates was similar in services and manufacturing with respect to employment and turnover, but the shares were quite low compared with those of other OECD countries (OECD, 2003*c*).

13. Cross-border mobility of services workers is another major channel through which services are traded. Mobility of services workers will be addressed in more detail in section 3.5.

14. OECD's collection of data on the activity of foreign affiliates in services started in the second half of the 1990s; data are not yet available for all OECD countries.

The role of intermediate demand

A third explanation for the structural shift towards services may be the increasing role of service firms as providers of intermediate inputs. Intermediate input production by services may substantially change the conclusions with regards to the production and employment structure in an economy (Oulton, 1999, Fixler and Siegel, 1999, Box 4). The role of services as intermediate input providers also highlights the importance of the interaction between manufacturing and services (Pilat and Wölfl, 2004).

Box 4. **Services as intermediate input providers and productivity growth**

The traditional theoretical discussion of the explanations for structural change is based on simple two sector-one-input models where goods or services are solely produced for final demand. However, services may be produced to provide intermediate inputs in the manufacturing sector, and this may change the conclusions drawn with regard to the production and employment structure across sectors or industries. Oulton (1999) and Fixler and Siegel (1999), for instance, show that if services produce for intermediate demand this might act in the opposite direction of Baumol's unbalanced growth model or might at least lower the speed with which aggregate productivity growth would decline. Oulton (1999) shows moreover that this would even be the case if resources shifted to the service industry with lower productivity growth and if intermediate service providers were industries where only low productivity growth can be realised. The underlying condition would however be that the productivity growth rate of these industries is positive.[15]

However, assessing the effect of intermediate goods producing services on aggregate productivity growth and the resulting resource allocation across industries is not straightforward. On the one hand, there are reasons to assume strong positive effects on productivity growth. First, positive effects may arise from outsourcing services, notably from the specialisation advantages that can be achieved; it becomes cheaper to buy the service than to deliver it in-house, *i.e.* services become cheaper relative to labour. In order to deliver accountancy services within a firm, for instance, investment into specific competencies is necessary. But these are costly investments that only pay off with a minimum amount of services provided. These resources might be allocated more efficiently to functions that are more directly linked to the goods produced by a manufacturing firm. As a consequence, there will be a productivity increase in the service-using firm from outsourcing, independent of whether the outsourced service is characterised by strong or weak productivity growth.

Second, intermediate service providers do not necessarily produce at lower productivity than the final good producing manufacturing firm – as was assumed in the model of Oulton (1999) and Baumol (1967), as well as in the traditional demand bias theories (see Gundlach, 1994). This is particularly the case since intermediate demand itself drives productivity increases in service industries. Although many services are less involved in international trade or foreign direct investment than the manufacturing sector, services that produce for intermediate goods markets, *e.g.* business or telecommunications services, are often confronted with intensive competition, and are, therefore, induced to increase productivity.

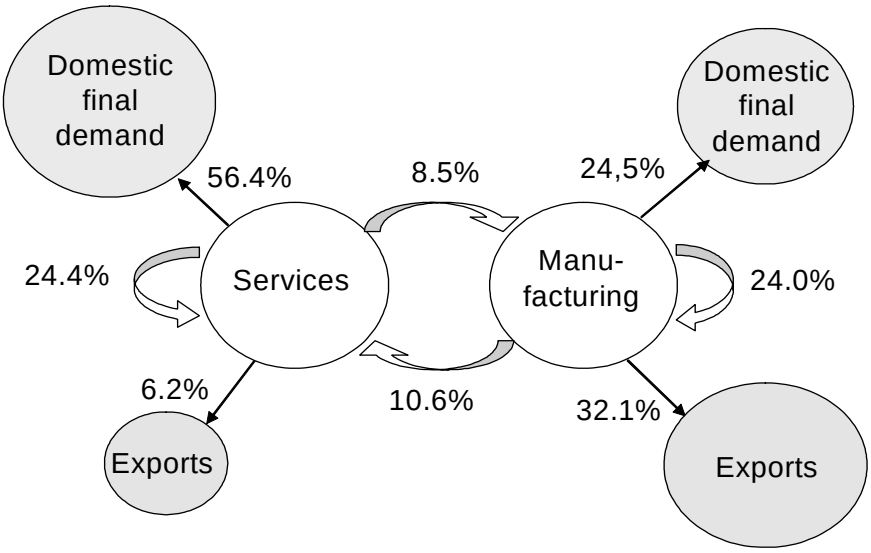
The effect on resource allocation is not clear cut either. If intermediate input providing service industries are indeed characterised by lower productivity growth than the industry from which they are outsourced, a shift of labour towards high-cost, low-productivity growth service industries may lead to unbalanced growth between industries at a lower level of aggregation. Within the model of Oulton (1999), growth in productivity of the services sector more than outweighs the increasing share of services in total demand, eventually raising aggregate productivity growth. The main reason behind this, however, is that in this model manufacturing is assumed to be the only industry that produces for final demand. Thus, the impact on aggregate productivity growth is driven by the fact that services are becoming cheaper relative to labour and it is of minor importance that the shift of resources to the services sector may render services more expensive relative to the manufactured goods. In reality, however, both sectors produce for intermediate *and* final demand. The final effect on aggregate productivity growth and the resource allocation across industries when services produce for intermediate demand thus depends on the industrial composition of both sectors and on the productivity growth differentials across industries.

15. With the introduction of intermediate inputs in the analysis, the appropriate productivity concept to examine aggregate productivity growth is multifactor rather than labour productivity (OECD, 2001*a*). The model of Oulton (1999) therefore examines the impact of intermediate inputs on aggregate multifactor productivity growth.

Services and manufacturing sectors do not differ in the share in total gross output that is produced for intermediate use (Figure 7). Both sectors produce about 24% of total output for intermediate demand within their own sector, and about 34% for intermediate consumption of services and manufacturing together. For instance, more than half of transport and communications services are used as intermediate inputs and only about 20% for final demand. Financial and business services produce between 40% and 60% of their output for intermediate demand (Wölfl, 2003).[16]

Figure 7. **Shares of demand components in total output of services and manufacturing, 1997[1]**

Average shares across countries, in per cent of total output per sector



1. Italy: 1992; Australia, Germany, France, and United Kingdom: 1995; Australia, Canada, Japan, United States:1997.

Source : OECD Input-Output Tables.

Two trends may help explain the increasing interaction between services and manufacturing. First, the share of services activities that is necessary for or complementary to manufacturing goods production has increased. The production of a car, for instance, would not be possible without services activities such as market research, technical research and development and design, human resource management, control and business consulting. Moreover, a car is often sold in a package that includes financing, which may be provided directly by the car producer or indirectly via subcontracting. Second, the past two decades have seen an increasing trend towards the outsourcing of business related services, such as research and development, financing or logistics. Services have been contracted to existing specialised service providers, or are provided by a newly created firm or spin-off from a manufacturing firm that can provide the services at lower cost or higher quality. In that sense, Czarnitzki and Spielkamp (2000), for instance, talk of the services industries as “bridges for innovation” not only within the services, but notably also in services-using manufacturing industries.

Most recently the policy debate about the interaction between the services and the manufacturing sector has centred on outsourcing and off-shoring of services functions. Several OECD countries are concerned that outsourcing of services functions by domestic manufacturing firms to other countries, notably to some low wage countries, in order to reduce labour costs, would occur at the expense of

16. There is also some empirical evidence for a positive effect of the direct and indirect use of ICT-related financial and business services on productivity growth in manufacturing industries (Wölfl, 2003).

domestic employment. Whether this is the case cannot be said *a priori*, though, and would have to be based on a detailed analysis of the various direct and indirect effects of outsourcing for OECD countries. Moreover, the interaction between manufacturing and services is more complex and also comprises other forms of interaction, such as the use of intermediate inputs from an independent service provider that has not been previously integrated in the final goods-producing firm or industry. Due to the complexity of the interaction between services and manufacturing and its importance for economic policy, these issues will be analysed in more detail, using several data sources:

1. Structural data, *i.e.* the OECD STAN Database. This can provide a broad picture of the role of intermediate inputs for output growth in manufacturing and services.

2. Input-Output Tables can help to analyse the output and employment flows between industries. I-O data allow a distinction of the source of intermediate inputs. Moreover, they allow the analysis of the direct and indirect effect of a demand change in one sector or industry on output and employment in another sector or industry.

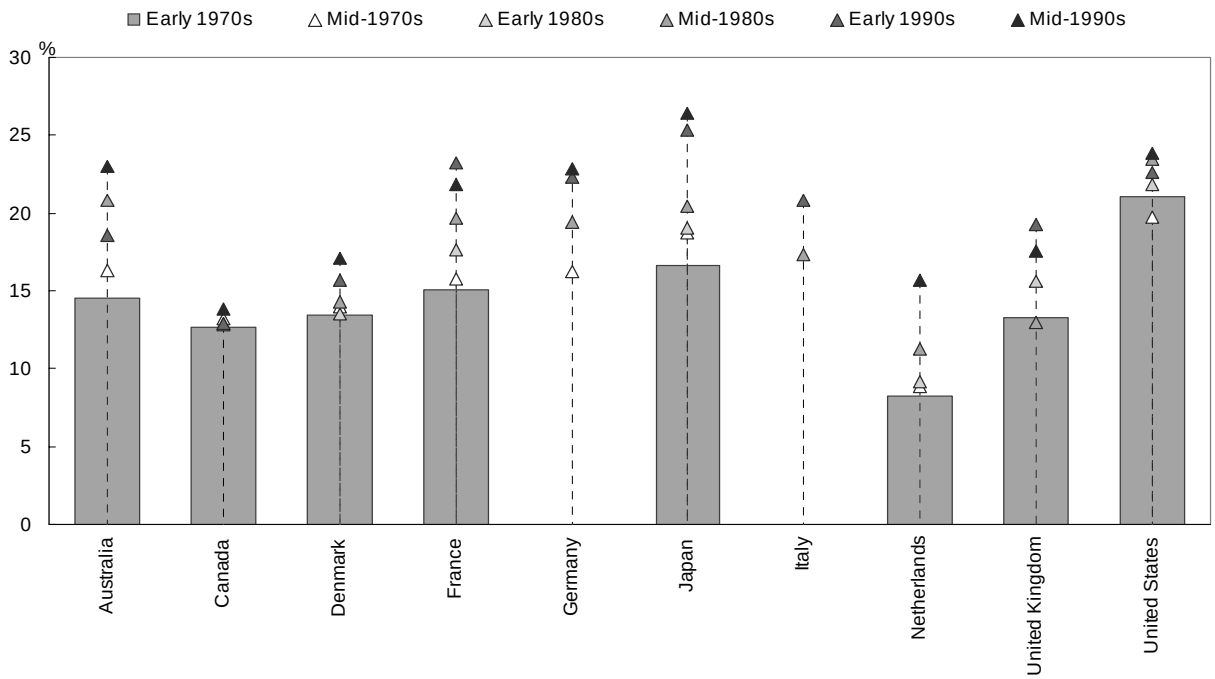
3. Occupation data can help to examine the employment or activity composition within manufacturing and services industries.

4. Data on trade and foreign affiliates can provide international evidence on the role of the services and manufacturing interaction. To some degree, these data can distinguish between domestic outsourcing and international sourcing or off-shoring of services functions.

5. Micro-level data allow an analysis of the employment and sales composition within a firm or a firm-group. To some degree these data can highlight the role of vertical integration as opposed to outsourcing of specific functions to outside providers.

Figure 8. **Services sector value added embodied in manufacturing goods**

Percentage of total value of manufacturing goods in final demand



Source: OECD Input-Output Tables, OECD Science, Technology and Industry Scoreboard, 2003.

As an example, Figure 8 provides a first indication for the increasing importance of services activities for manufacturing and the total economy. It measures the extent to which services are "embodied" in manufacturing processes, *i.e.* the extent to which services contribute inputs to manufacturing production at any stage of the production process. In the mid 1990s, services accounted directly or indirectly for about 22% of manufacturing production, on average across OECD countries for which Input-Output Tables were available. A particularly high contribution of services can be observed in the case of the United States, Japan, Germany and Australia.

2.3 Productivity growth in services

While section 2.1 pointed to unbalanced growth between manufacturing and services at the aggregate level, the empirical evidence for unbalanced growth is less compelling when examining the service sector in detail. Several services industries indeed have weak or even negative productivity growth (Figure 9, Table A5 and A6). This is, for example, the case for social and personal services, such as education, health and social work, as well as for hotels and restaurants. These industries are typically relatively labour-intensive and primarily provide services to final consumers in domestic markets – both factors that will typically limit the potential for productivity growth.

However, several other industries within the service sector are characterised by strong productivity growth. These are notably business related services, such as financial intermediation, transport and storage, as well as post and telecommunication services. Over the past decade, annual average productivity growth amounted to about 4.5% in financial intermediation and about 10% in post and telecommunications. These growth rates are comparable to some high-growth industries within manufacturing, such as machinery and equipment, where productivity growth has been around 5% on average since the 1980s. Moreover, these business-related services have persistently shown strong positive growth rates over the past 20 years.

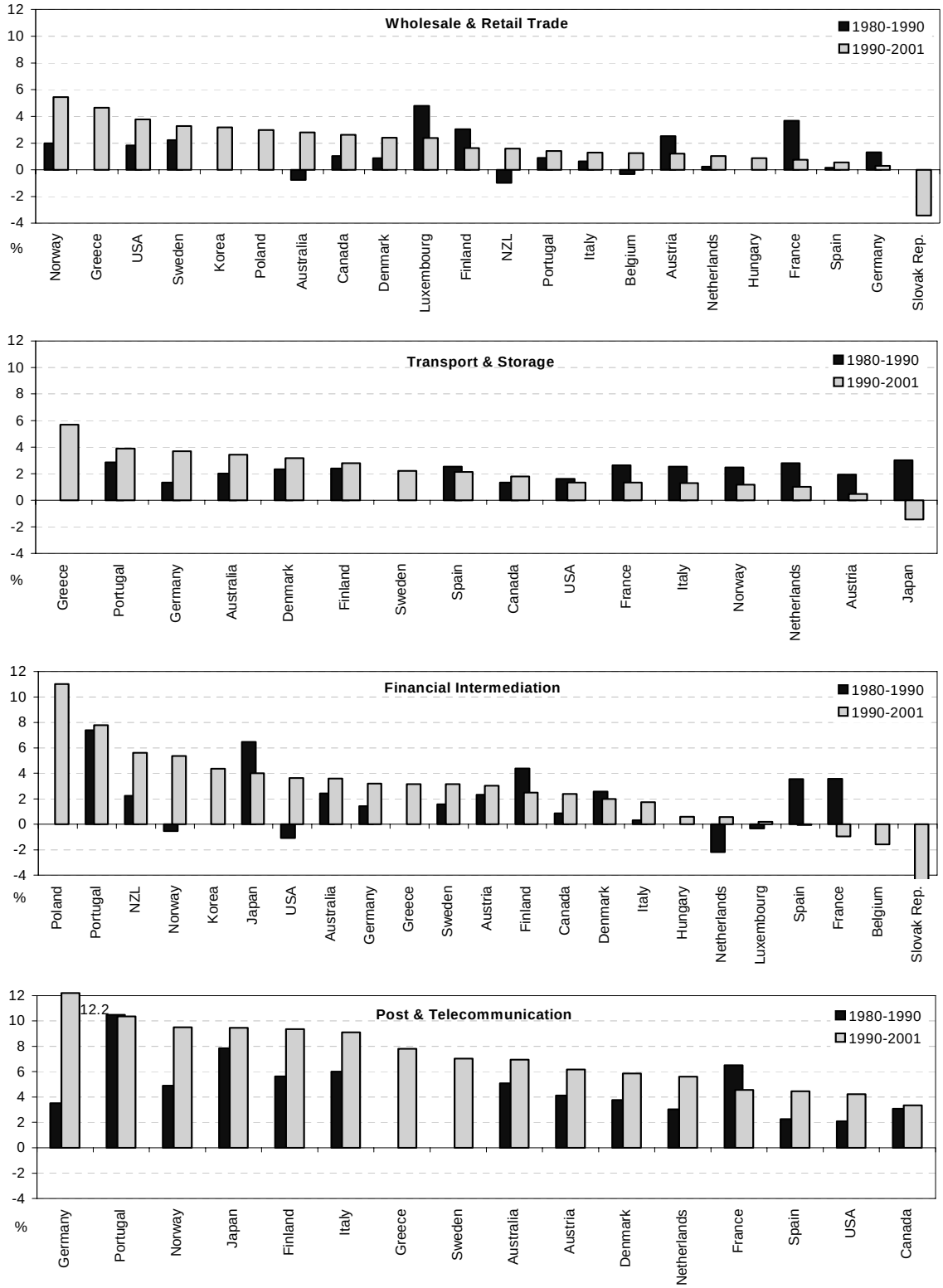
Relatively strong productivity growth can also be found – albeit to a lesser degree – in wholesale and retail trade and in transport and storage services. Productivity growth rates in these services are on average about 2.5%, which is equivalent to productivity growth in the economy as a whole. Positive growth rates in these services are sometimes attributed to the presence of increasing returns to scale in some service industries, or to the strong uptake of productivity-enhancing ICT equipment during the 1980s and 1990s. This has helped to improve logistics in wholesale trade and in transport services, and inventory control in retail trade (Triplett and Bosworth, 2002 and 2003). Competitive pressures, notably when related to expansion strategies of large incumbents, are also perceived to be a driver of productivity growth in these service industries (Baily, 2003).

Strong differences in productivity growth rates across countries and weak or negative productivity growth over long periods may also be due to measurement problems (Box 5). For example, certain services, *e.g.* business related services or social and community services, are characterised by a high degree of temporary and part-time work as well as a relatively high share of self-employed persons (INSEE, 2004; OECD, 2000 and 2001*b*). Accurately measuring labour input in this industry is therefore quite complicated. More importantly, it is difficult to measure output in many services sectors in nominal and real terms.[17]

17. See Wölfl (2003) for a detailed analysis of measurement problems in services and their effect on productivity growth in OECD countries. See OECD (2004*b*) for a description of the problems and ways to measure hours worked in a consistent and comparable way across countries.

Figure 9. **Labour productivity growth in services – industries with relatively strong growth**

(annual average growth of value added per person employed, in per cent)

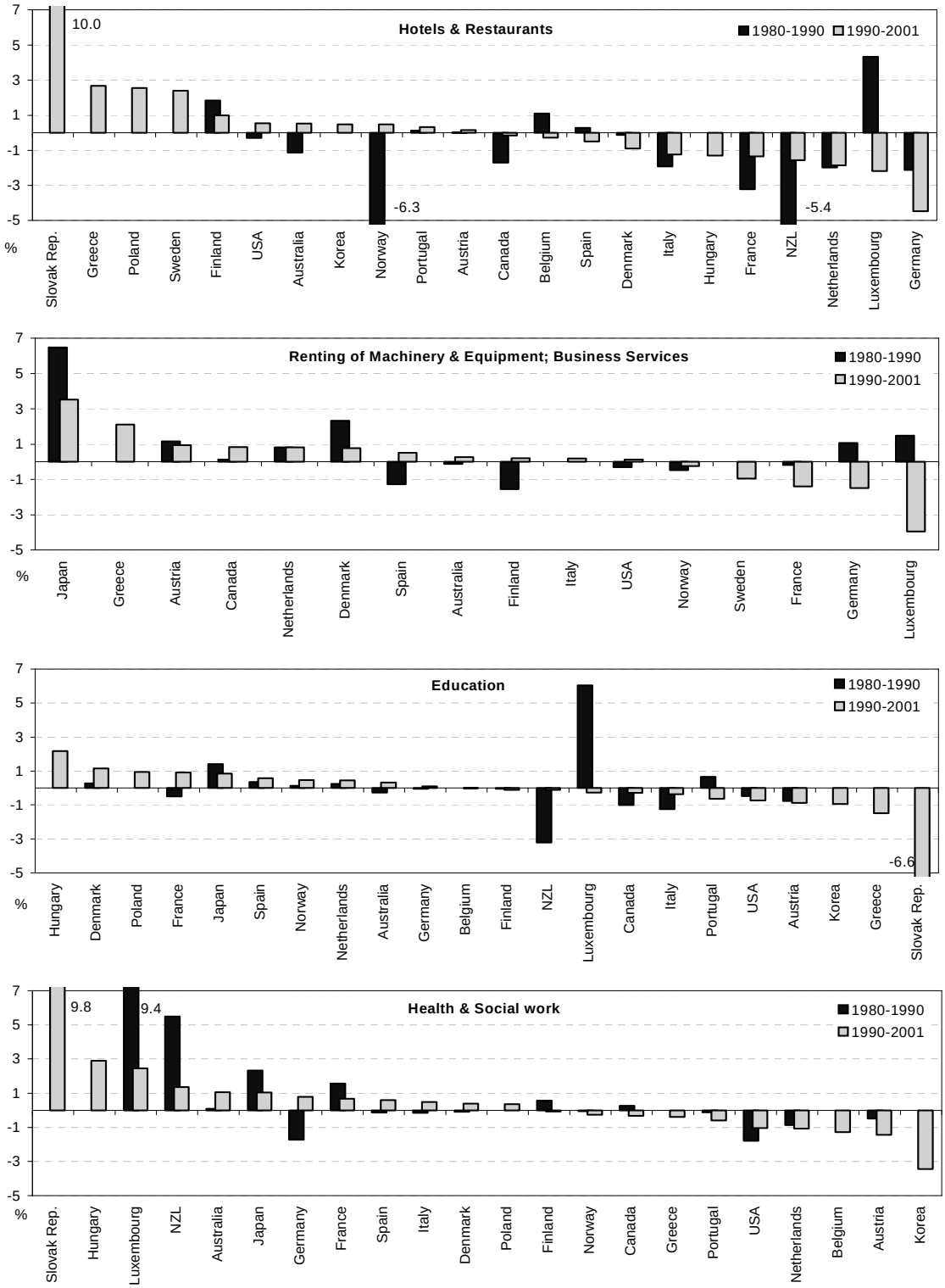


1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90.

Source: OECD STAN Database, 2004.

Figure 9. **Labour productivity growth in services – industries with relatively weak growth**

(annual average growth of value added per person employed, in per cent)



1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90.

Source: OECD STAN Database, 2004.

Box 5. **Measuring productivity growth in services industries**[18]

Low or negative productivity growth rates in some services may be linked to problems in the adequate measurement of service productivity growth. Any under-estimation of productivity growth in individual service industries may eventually lead to an under-estimation of aggregate productivity growth, via intermediate input flows. In general, measurement bias may arise from biases in measuring inputs or output at current and constant prices, or it may relate to the method of aggregation across industries. Of core relevance is the way in which constant price value added of services is computed, *e.g.* how the change in the volume and quality of the service provided is assessed.

There is, however, no clear evidence on which service industries are the most problematic from a measurement perspective. The extent of measurement bias seems to depend on the specific component of labour productivity growth where measurement bias arises. General problems of definition and computation of the underlying price index can be noted in social and personal services and in wholesale and retail trade. In social services, for example, several countries use indicators of labour input to derive constant price volumes of value added. This is a way of computing trends in constant price value added which is problematic as it typically presumes zero productivity growth. In services such as post and telecommunications and financial intermediation, strong differences in price developments across countries can be noted that seem inconsistent with underlying developments in these industries; to the extent that these differences are due to poor measurement, they result in poor international comparability of constant price value added estimates.

Different definitions and data sources used for employment and hours worked also bias international comparisons of labour productivity growth. The empirical evidence shows that the difference between labour productivity growth as measured per person employed and as measured per hour worked varies across industries and countries. For example, hours worked per person employed are relatively high in transport and communications services as well as in financial and business services, while they are relatively low in personal and social services. This is partly due to the varying prevalence of part-time work in different service industries.

Finally, the effect of a potential under-estimation of labour productivity growth in specific services on aggregate productivity growth depends on the type and extent of the measurement bias, the weight of the under-estimated services in the whole economy, and the degree to which the mis-measured service industry produces for intermediate demand. For example, any under-estimation of productivity growth in financial and business services will primarily have impacts on other industries, notably manufacturing, since these industries are important users of financial and business services. In contrast, any under-estimation of labour-productivity growth in social and personal services as well as in hotels and restaurants does not greatly affect other industries, but primarily leads to an underestimation of aggregate productivity growth.

The existing empirical evidence on measurement problems in services can only give an initial picture of the extent of measurement bias and its effect on industry and aggregate productivity growth. It does not resolve the measurement problems that have become increasingly apparent in the services sector. Some countries have recently taken steps to improve output measurement and OECD is working with its member countries in several areas, including financial services, insurance and software.

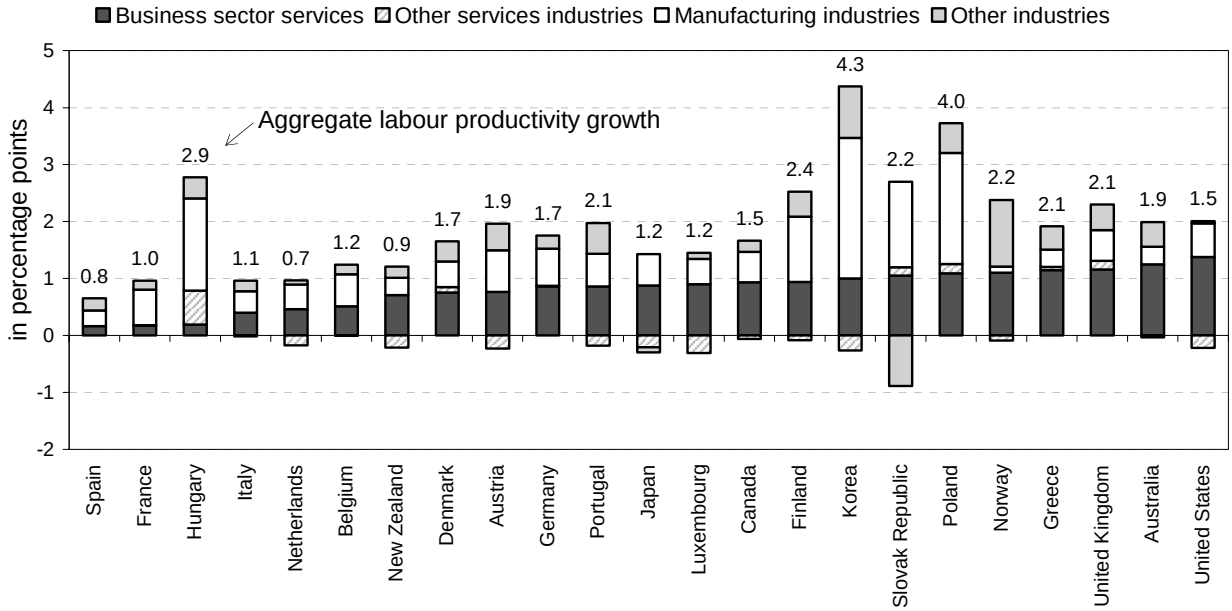
While some services industries have experienced high productivity growth, this does not imply that these high growth industries have also contributed in a significant way to aggregate productivity growth. Figure 10 illustrates that in many OECD countries, manufacturing – and not the services sector –accounted for the bulk of aggregate productivity growth in the 1990 - 2002 period. This is in particular the case for Hungary, Belgium, Korea, Finland, the Slovak Republic and Poland.

A relatively small contribution of services to overall productivity growth in some countries results from low or negative productivity growth in social or personal services industries that may outweigh high productivity growth in business sector services. Figure 9 shows, for instance, negative contributions of social and personal services for Germany, the Netherlands, New Zealand, Austria, Portugal, Japan, Luxembourg, Norway and the United States. In Belgium and Canada, and to some degree also the Netherlands, the contribution of high growth service industries, such as finance and business services and transport, storage and communications was almost fully balanced by negative contributions of social and personal services, and of trade, hotels and restaurants (Wölfl, 2003).

18. This is based on Wölfl (2003) and OECD (2003*b*).

Figure 10. **Contribution to aggregate labour productivity growth, 1990-2002**[1]

Annual average contribution to GDP per person employed, in percentage points



1. Or nearest year available. Germany: 1992-2001, West Germany: 1980-90.
2. The sum of the contributions per industry may be slightly different from the aggregate values.

Source : OECD STAN Database, 2004.

The contribution of the service sector to overall productivity growth has increased over the past ten years in some OECD countries, notably the United States, Australia and the United Kingdom. Strong aggregate productivity growth can in particular be attributed to high-growth service industries, such as finance, insurance and business services, as well as transport, storage and communications. These high-growth services contributed about 1 to 2 percentage points, *i.e.* about one-third, to aggregate productivity growth between 1990 and 2000 in several OECD countries, and their relative contribution increased in the late 1990s (Wölfl, 2003).

Moreover, as discussed above, the share of services in total value added has increased continuously since the 1970s in almost all OECD countries and amounted to between 60% and 80% in 2000. The large share of services implies that by aggregation, an increase in productivity growth in services by about 1.1 percentage points is sufficient to achieve a 1 percentage point increase in aggregate productivity growth. For an equivalent increase in aggregate productivity growth, productivity growth in manufacturing would have to increase by about 4.7 percentage points.[19]

2.4 Employment in services

The empirical evidence for unbalanced growth and a resource allocation towards low growth services industries is also not very compelling if one examines employment growth within the services sector (Figure 11). At first sight, the group including services industries with relatively high productivity growth rates, such as telecommunication, financial intermediation and transport and storage, is also the group of services with relatively weak employment growth. Conversely, the group of services industries with

19. Assuming average productivity growth rates of 2% on aggregate, 3% in manufacturing and 1% in services, and a services share of 70% in total value added.

relatively weak or negative productivity growth, including education, health and social work, is the group that shows relatively strong employment growth.

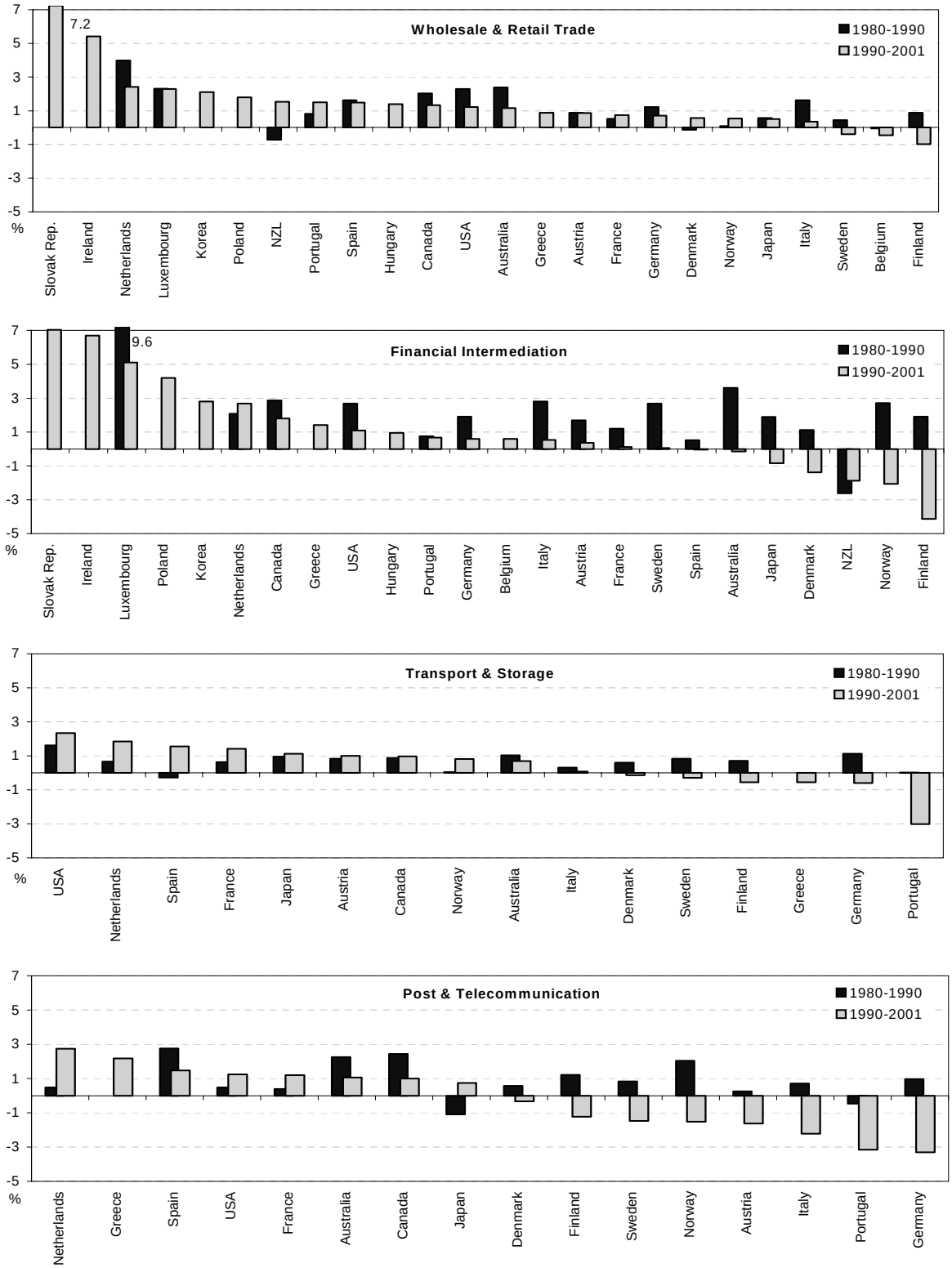
The empirical picture is not clear cut, though. For instance, the financial intermediation sector and the wholesale and retail trade sector demonstrate strong differences in employment growth across OECD countries. Relatively strong employment growth in these industries over the 1990-2001 period can be observed for the Slovak Republic, Ireland, Luxembourg, and to some degree Germany and Poland. In contrast, Japan, Denmark, New Zealand, Norway and Finland, show negative employment growth in these industries, notably in financial intermediation. Moreover, while productivity growth performance over time was characterised by strong differences across OECD countries, employment growth has been lower in the 1990s compared to the 1980s for almost all countries and almost all services industries. Exceptions are transport and storage services and, for some countries, hotels and restaurants as well as renting of machinery and business services.

Existing empirical studies also point to large cross-sectoral differences in job flows, *i.e.* job creation and job destruction. In European countries, services industries show a much stronger rate of job creation and job destruction than manufacturing industries (Gomez-Salvador, Messina and Vallanti, 2004). This is notably the case for business services as well as for community, social and personal services. Job re-allocation[20] ranged between 6 and 13 percentage points across industries. It was highest in business services, with about 13 percentage points, and amounted to about 11 percentage points for social services. Moreover, job creation was significantly higher in services industries than in manufacturing industries. This was also the case for total job flows. Job destruction was, however, significantly lower in trade, transport and other services, including social services.

20. Job re-allocation was measured in this study as the sum of the size-weighted rates of employment growth and employment loss per industry.

Figure 11. **Employment growth in services, 1980 – industries with relatively weak growth**

(1980-1990 and 1990-2001,[1] average annual growth rates, in per cent)

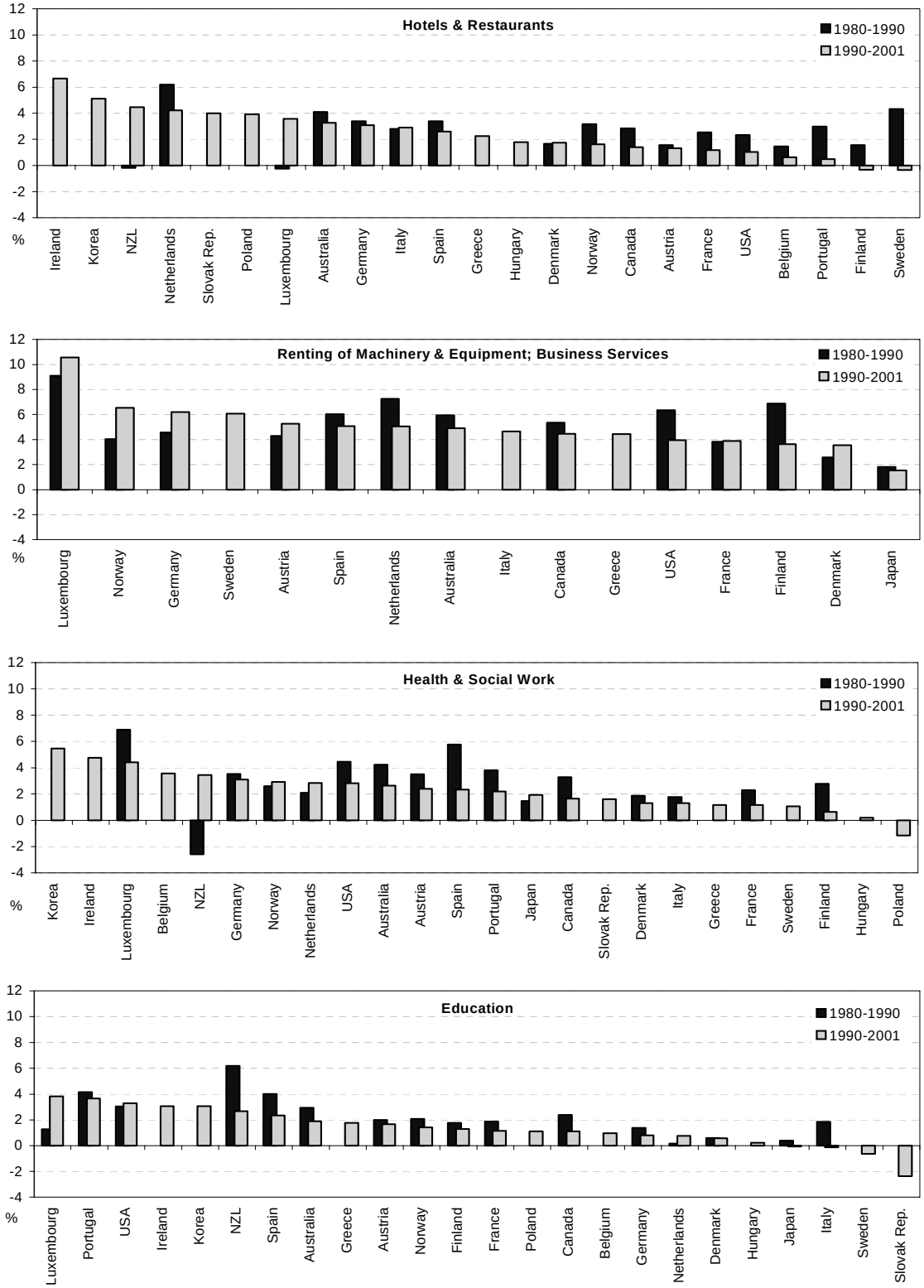


1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90.

Source: OECD STAN Database, 2004.

Figure 11. **Employment growth in services – industries with relatively strong growth**

(1980-1990 and 1990-2001,[1] average annual growth rates, in per cent)



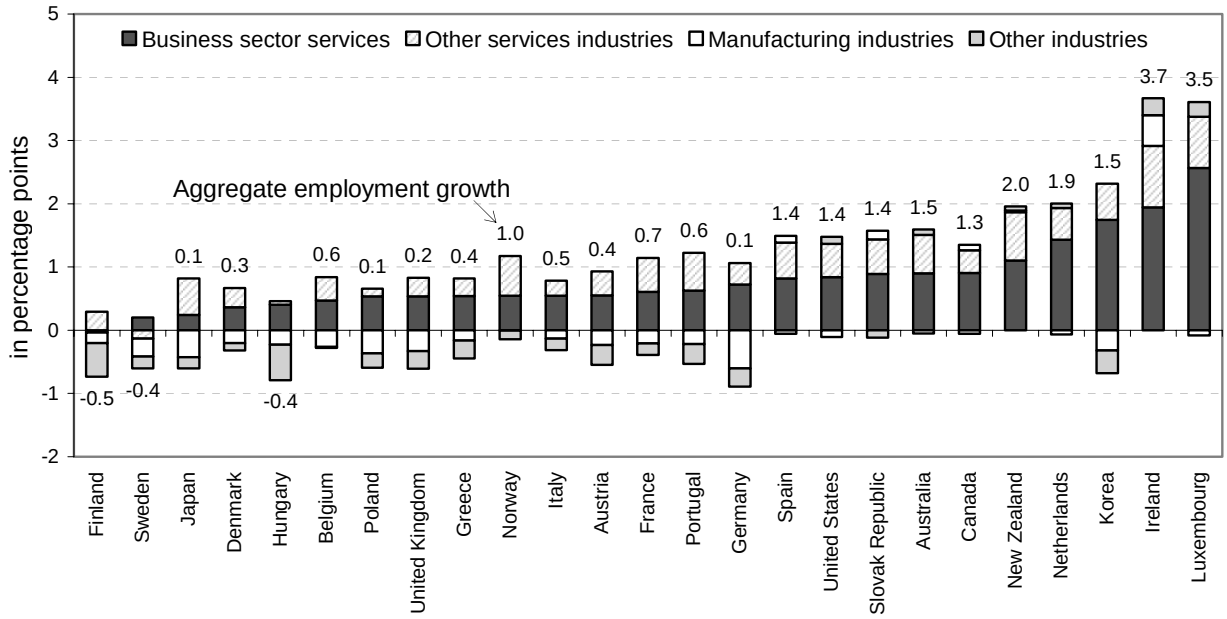
1. Or most recent year available, Germany: 1992-2001, West Germany: 1980-90.

Source: OECD STAN Database, 2004.

Figure 12 illustrates the contribution of employment growth in business sector services, social services, manufacturing industries and other industries to aggregate employment growth. As with productivity growth, business sector services, comprising trade and restaurants, transport and communication, financial intermediation, and business services, contributed to between 0.5 and 2 percentage points, *i.e.* between one third and one half, to aggregate employment growth. Other services industries, notably social and personal services, such as education and health and social work, contributed to around 0.5 percentage points on average to employment growth across OECD countries. In several OECD countries, strong growth in employment in services was almost totally balanced by negative employment growth in manufacturing and other industries. This is notably the case in Finland, Sweden, Hungary, Japan and the United Kingdom.

Figure 12. **Contribution to aggregate employment growth, 1990-2002**[1]

Average annual contribution in percentage points



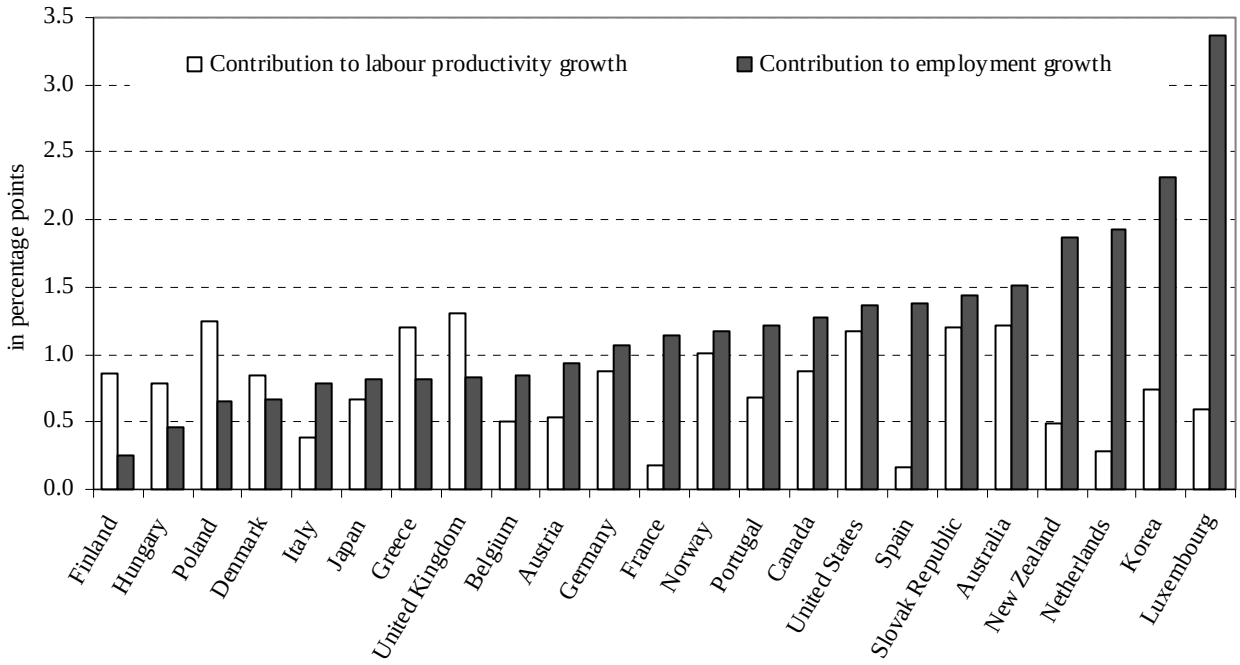
1. Or nearest year available, Germany: 1992-2001, West Germany: 1980-90.

Source : OECD STAN Database, 2004.

The strong contribution of business sector services to employment growth is linked to a very high share of wholesale and retail trade, and to a lesser degree, of renting of machinery and equipment and business services, in total employment (Table A4). Between 1990 and 2001, wholesale and retail trade services accounted for about 15% of total employment on average across OECD countries, and to about 20% of total employment in Australia, New Zealand and the United States. Renting of machinery and equipment and business services accounted for about 8% of total employment in OECD countries. Very high shares of business services can be observed in Australia, France, Luxembourg, the Netherlands and the United States. In the case of social and personal services, the relatively strong contribution to overall employment growth is due to strong growth, but also to relatively high shares of these services industries in total employment. Education services account for about 6% of total employment across OECD countries; health and social work services account for about 10% of total employment, with particularly high shares in Denmark, Finland, Norway and Sweden.

Figure 13. **Contribution to aggregate productivity and employment growth of the services sector, 1990-2002**[1]

Average annual contribution in percentage points



1. Or latest available year.

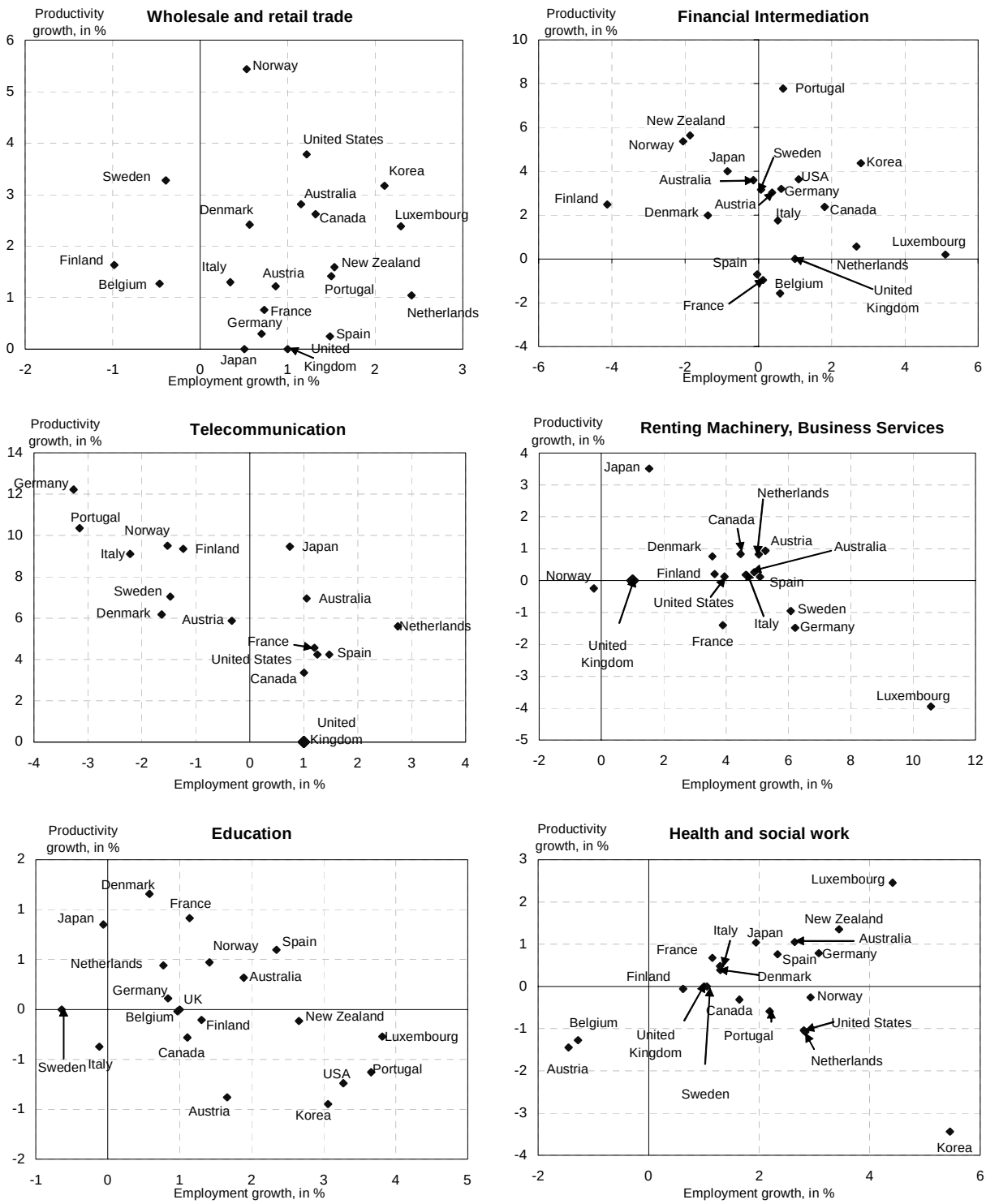
Source: OECD STAN Database, 2004.

On aggregate, Figure 13 suggests very different experiences of OECD countries as regards the contribution of services to employment and labour productivity growth. In certain countries, such as Korea, New Zealand and the Netherlands, services have made an important contribution to employment growth over the past decade, but a relatively small contribution to productivity growth. In a few others, such as Greece, Poland and the United Kingdom, the contribution of services to productivity growth has been larger than their contribution to employment growth. In yet another group of countries, including Australia, Canada, the Slovak Republic and the United States, services have made important contributions to both employment and productivity growth.

Figure 14 suggests that there is no general trade-off between growth in productivity and employment. In contrast, the relationship between employment and productivity growth differs across industries. Post and telecommunication services, education and to some degree also financial intermediation show a negative relationship between productivity growth and employment growth. There seems to be no correlation between employment and productivity growth in wholesale and retail trade and renting of machinery and business services, however. In the case of health and social work, two country groups can be distinguished; a first group, including Korea, Germany, the United States and the Netherlands, show stronger employment than productivity growth. In a second group of countries, such as Luxembourg, New Zealand, Australia, Spain and Japan, however, both employment growth and productivity growth are relatively strong. The evidence at the industry level therefore shows no general trade-off between employment and productivity. While productivity growth is associated with downsizing in some parts of the services sector, other parts are characterised by employment and productivity growth, possibly reflecting increasing demand for such services.

Figure 14. **Productivity and Employment growth 1990-2002**[1]

Average annual percentage growth



1. Or nearest year available. Germany: 1992-2001, West Germany: 1980-90.

Source : OECD STAN Database and OECD STAN Indicators Database, 2004.

3. FACTORS DRIVING THE PERFORMANCE OF SERVICES INDUSTRIES

The evidence above points to cross-country and cross-industry differences in the performance of services industries in terms of productivity and employment growth. From a policy point of view, the question is how such differences arise and how they can be addressed in order to achieve higher economic growth. Supply-side factors may be among the explanations. For instance, the services sector may be characterised by certain factors that may not be conducive to productivity growth or that may hamper employment growth. Services are, for instance, often perceived to be less intensive in their use of physical capital; they typically have a lower degree of innovation and knowledge accumulation, as well as a smaller firm-size. They are also perceived to be primarily focused on domestic or regional markets, implying that they are less confronted with international competition than most manufacturing industries. Moreover, service sectors have typically been more heavily regulated than manufacturing industries, which is likely to have reduced the degree of competition in service markets. The section below discusses some evidence on these factors.

3.1 The role of physical capital

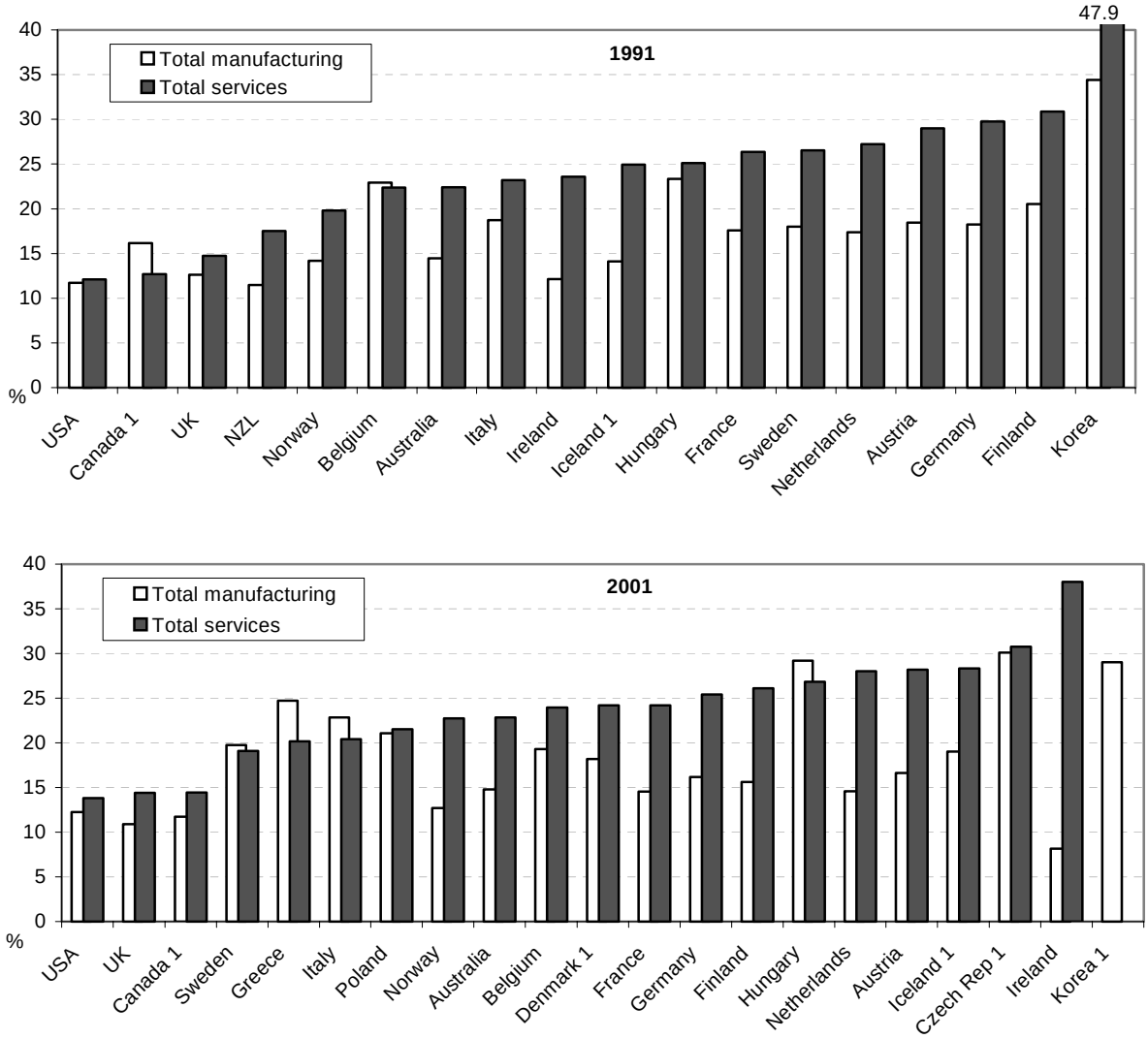
Investment in physical capital spurs economic growth. This is directly the case through the positive effect of capital-deepening on productivity growth, albeit this effect is transitory due to the decreasing marginal returns to investment in physical capital. Investment is also an important way through which new technology becomes embodied in the capital stock that is available for workers. Investment in physical capital may also indirectly induce innovation, which may have a long-term positive effect on economic growth (De Serres, 2003, OECD, 2003*d*). The services sector accounted for between 50% and 70% of gross fixed capital formation in the whole economy in 2001 (Table A9), although most of this is due to real estate which accounts for about 25% to 30% of total gross fixed capital formation. A high share of services in total investment can be observed in the Netherlands, France, Ireland and Germany. In certain countries, in particular in Norway, the United Kingdom and Ireland, the share of services in total physical investment increased over the 1990s.

Services have a relatively high intensity of investment (Figure 15 and Table 2).[21] In 2001, total gross fixed capital formation (GFCF) accounted, on average, for about 25% of value added in the services sector and for about 20% in the manufacturing sector. Very high investment intensities in services of about 30% or more could be observed in Korea, Finland and Germany, while the United States, the United Kingdom and Canada showed relatively low intensities of about 12%. In general, the investment intensities in services have increased slightly since 1991. They increased relatively strongly in Iceland and Ireland, while they declined in Sweden, Italy, France, Germany and Finland.

21. In Figure 15 and Table 2, the investment intensity is measured as the percentage share of total GFCF in total value added per sector or industry. See Tables A10 and Figure A2 for production based investment intensities for total manufacturing and services.

Figure 15. **Investment intensity for manufacturing and services, 1991 and 2001**[1]

Total GFCF as a percentage of value added per sector



1. Or nearest year available.

Source : OECD STAN Database and OECD STAN Indicators Database, 2004.

Within the services sector, wholesale and retail trade, transport and communication services and, for some countries, financial intermediation showed high investment intensities; in 2001, GFCF accounted for up to 30% of total value added in these industries. In contrast, education and health and social work showed relatively low investment intensities for most OECD countries; in 2001, total gross fixed capital formation accounted for between 5% and 10% of value added in these services industries. If investment intensity is considered as an indicator for capital-intensive production, this suggests that the more capital-intensive service industries tend to have had higher rates of labour productivity growth than service industries with a low level of capital intensity.

Table 2. **Investment intensity for broad services groups**

Total GFCF as a percentage of value added

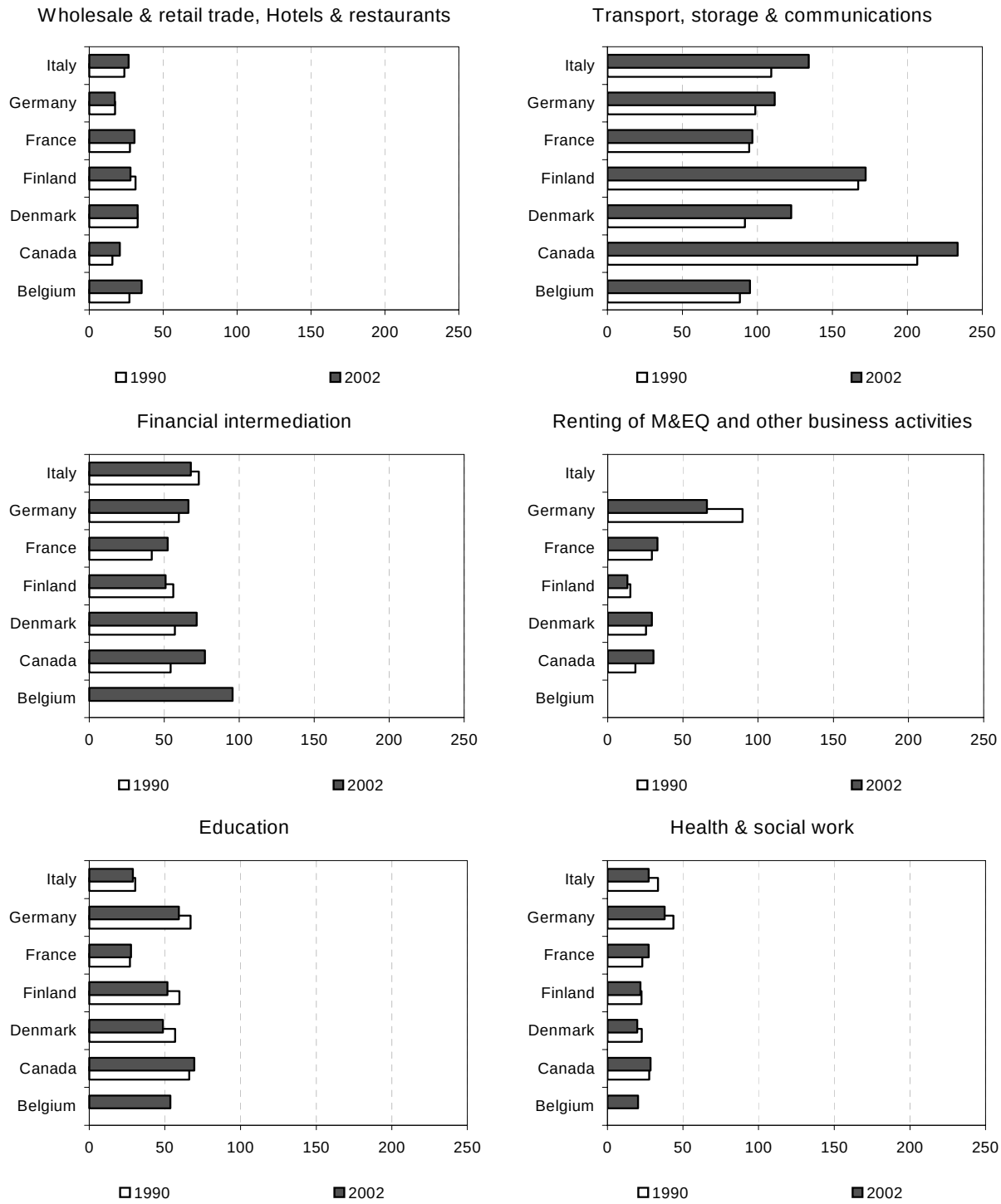
	50-52 Wholesale & Retail Trade		55 Hotels & Restaurants		60-63 Transport & Storage		64 Post & Telecommunication		65-67 Financial Intermediation		71-74 Renting of Machinery; Business Services		80 Education		85 Health & Social work	
	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
Australia	22.8	24.4	22.3	16.2	33.2	38.0	27.8	37.1	19.5	12.3	14.5	12.2	14.1	14.6	11.5	12.1
Austria	25.6	24.5	16.5	13.6	41.2	46.7	45.7	36.0	9.5	11.4	23.5	21.5	8.7	5.1	12.1	17.4
Belgium	22.3	22.6	31.7	17.6	..	..	..	..	19.4	17.4	..	..	3.6	3.6	10.0	6.8
Canada [1]	15.5	15.9	11.0	5.2	27.4	30.7	28.4	37.1	15.6	24.2	11.5	18.0	8.8	9.6	4.3	6.6
Czech Rep [1]	25.5	30.5	..	10.5	..	76.8	..	67.7	..	10.4	..	16.5	..	19.8	0.0	0.0
Denmark [1]	21.2	22.6	..	13.6	..	51.1	..	25.2	..	10.0	..	18.9	..	10.8	..	5.9
Finland	27.3	23.0	16.9	7.0	31.0	28.5	29.1	23.5	14.4	11.2	11.6	11.1	15.9	14.1	9.4	8.5
France	23.5	21.9	15.9	11.9	35.5	28.1	32.2	25.9	22.6	18.8	14.9	16.4	11.6	12.3	12.9	11.6
Germany	25.6	22.6	13.3	9.5	38.0	34.3	44.9	25.9	11.6	13.6	30.6	27.3	12.9	10.6	21.3	18.0
Greece	..	26.3	..	17.8	..	45.5	..	33.7	..	5.6	..	16.5	..	20.7	..	10.4
Hungary	22.8	26.8	20.1	15.6	..	..	..	..	18.9	14.2	..	..	8.3	11.9	13.4	10.7
Iceland [1]	22.2	26.9	..	21.4	28.2	..	30.0	..	..	2.9	..	..	..	0.2	..	3.3
Ireland	19.7	25.9	..	13.6	68.7	..	25.9	..	19.5	17.5	..	..	5.4	12.2	4.5	13.3
Italy	22.1	21.2	10.1	12.9	..	..	..	..	8.5	4.7	..	..	5.3	6.8	13.8	9.3
Korea	39.0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	23.8	24.4	11.6	10.0	38.2	32.3	31.4	64.3	30.2	28.4	17.4	17.2	7.2	6.4	10.3	9.8
New Zealand	17.0	..	12.6	..	14.3	..	28.7	..	5.4	..	..	..	13.3	..	7.4	..
Norway	21.5	20.3	11.2	12.2	30.1	26.7	22.1	37.9	8.3	16.2	8.2	7.6	11.8	13.3	11.1	11.8
Poland	19.5	23.9	..	23.3	..	..	..	..	..	62.1	..	..	..	16.5	..	12.3
Portugal	26.5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sweden	23.8	19.4	20.2	14.0	35.4	38.8	32.4	38.0	9.9	10.9	..	16.1	..	11.0	..	5.7
United Kingdom	15.4	13.8	12.8	14.5	21.3	27.7	20.9	46.7	29.2	13.8	..	..	7.2	8.7	8.3	5.9
United States	12.6	14.4	14.9	14.4	14.1	23.0	23.2	35.4	19.2	18.5	7.9	9.5	1.9	2.2	3.2	4.0

1. Data refer to 2000 and not to 2001.

Source : OECD STAN Indicators Database, countries for which GFCF data are available..

Despite strong investment in physical capital in several services industries, the capital-labour ratio, *i.e.* physical capital stock per employed person, is much lower in most services industries as compared to the total economy (Figure 16).

Figure 16. **Ratio of physical capital to total employment of broad service industries**[1]



1. Capital stock in constant prices per total employment, relative to the total economy.

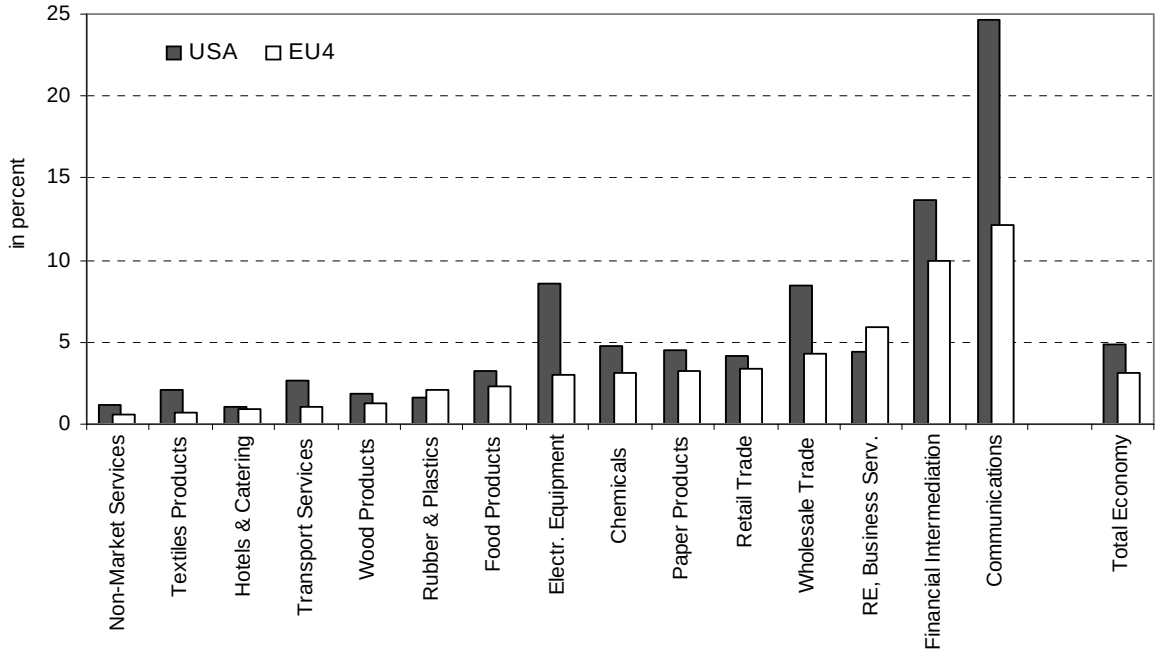
Source: OECD STAN Database, 2004.

Figure 16 suggests – like Table 2 – a positive relationship between capital-intensive production and labour productivity growth. Transport and communications services have a very high capital to labour ratio relative to the overall economy for most OECD countries for which data are available, and notably in Canada and Finland; these industries also show strong productivity growth rates. Figure 16 also shows an increase in the capital to labour ratio in most service industries, in particular for financial services and transport and communication services. At the same time, Figure 14 points to relatively labour-intensive production in services industries such as social and personal services, or trade, hotels and restaurants. These services industries show capital-to-labour-ratios that are about half the respective ratios for the total economy. These services are also characterised by low productivity growth rates.

A different picture prevails, however, if one differentiates among assets or types of physical capital. For instance, some services industries use information and communication technology (ICT) to a higher degree than many manufacturing industries (Inklaar, O'Mahony and Timmer, 2003, see also Triplett and Bosworth, 2003). From 1990 to 2001, the share of ICT capital in value added per industry was higher in several market services, notably communications services, financial intermediation, business services and wholesale and retail trade, than in many manufacturing industries (Figure 17). In the four European countries for which a detailed growth-accounting exercise was undertaken, the IT-intensity was highest in these services industries, and ranged between 3% and 13%. The ICT-intensity was higher in almost all industries in the United States as compared to the EU4. This was notably the case for communications services, financial intermediation and wholesale trade.

Figure 17. **IT capital as a percentage of value added per industry, 1990-2001***

United States and EU4, annual average shares



* 2001 for the United States, 2000 for the EU4; EU4 comprises France, Germany, the Netherlands, the United Kingdom.

Source: O'Mahony and van Ark (2003) CD-ROM.

ICT capital deepening in ICT-using services, notably financial intermediation services, contributed also strongly to aggregate labour productivity growth (Figure 17). In the United States, ICT capital deepening in financial intermediation accounted for about 0.27 percentage points, *i.e.* one-third of aggregate labour productivity growth between 1995 and 2000 (Inklaar, O'Mahony and Timmer, 2003); in

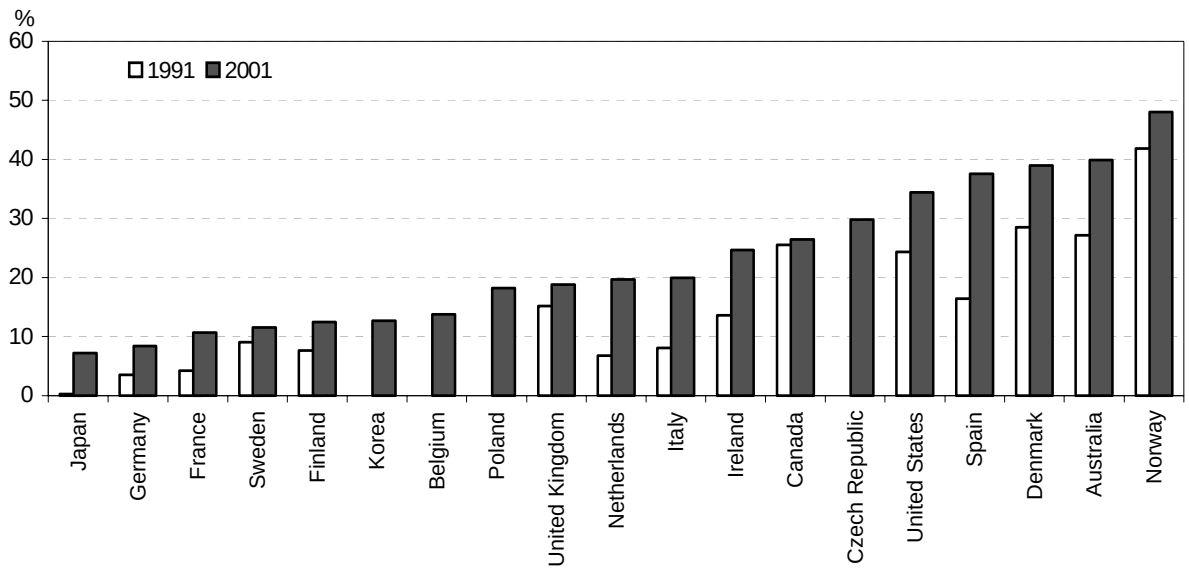
ICT-using manufacturing industries, the contribution of ICT capital deepening to aggregate labour productivity growth was about 0.03 percentage points. In the four European countries, the respective contributions are 0.10 percentage points, *i.e.* about one fifth of aggregate labour productivity growth, in the case of financial intermediation and 0.03 percentage points for ICT-using manufacturing industries.

3.2 Innovation in services industries

Services are often perceived to be characterised by low knowledge-intensity. This may be a drawback in achieving stronger performance in the service sector since knowledge intensity is a key determinant of long-term productivity and economic growth. For example, using knowledge to innovate is an important driver of firm performance; process innovations may help reduce production costs, and product innovation may allow the entry into new markets and help firms gain market share. Moreover, knowledge capital is – in contrast to physical capital – characterised by non-decreasing returns, and may thus spur long-term growth.

Figures 18 and 19 as well as Table 3 and A11 provide a mixed picture of the knowledge-intensity of services production. Figure 18 shows that services industries account for up to 20% to 30% of overall business R&D; and this share has increased strongly since 1991 in several OECD countries. A high share of services in business R&D can in particular be observed in Norway, Australia, Spain, Denmark and the United States, while services account for only about 10% of overall business R&D in countries such as Japan, Germany, France and Sweden.[22]

Figure 18. **Share of service industries in business R&D**[1]



1. The services sector covers ISIC classes 50-99.

Source : OECD ANBERD Database, 2003.

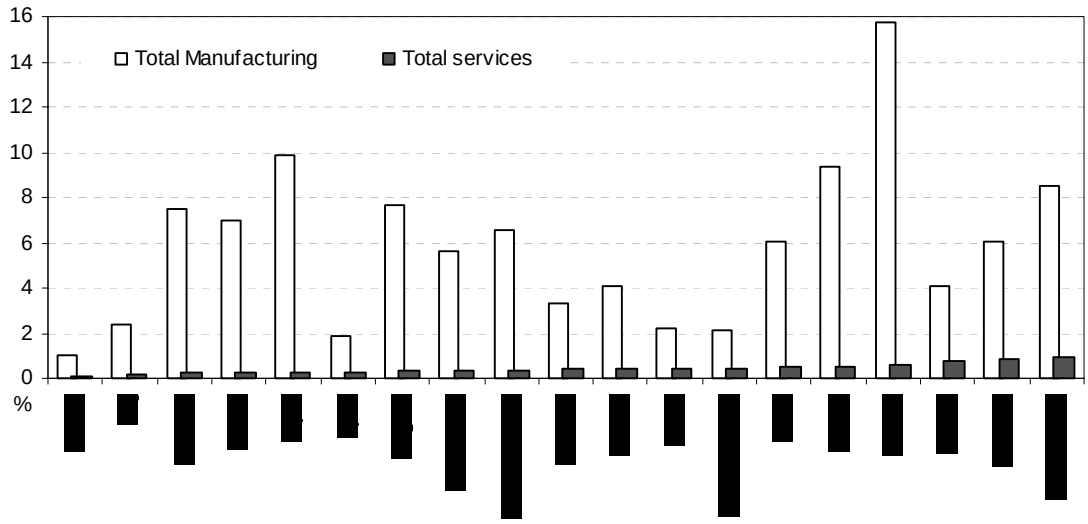
The high share of service industries in total R&D in some countries partly reflects the large share of the services sector in the economy. The R&D-intensity of services production, as measured by the share of business R&D expenditure (BERD) in value added of the services sector is very low as compared to the

22. To some degree these results may be related to problems in measuring R&D in services industries.

intensity in the manufacturing sector (Figure 19). In 2001, the share of BERD in total value added of the services sector amounted to about 0.4% on average across OECD countries, while its share amounted to about 7% on average across OECD countries in the case of the manufacturing sector.

Figure 19. **R&D intensity of the services and the manufacturing sector, 2001**[1]

Total BERD as a percentage of value added per sector



1. The services sector covers ISIC classes 50-99.

Source : OECD ANBERD Database, 2003.

Within the services sector, certain industries, such as wholesale and retail trade, transport and storage as well as financial intermediation have a very low R&D intensity (Table 3). The share of business R&D expenditures in total value added of these industries in 2001 was about 0.1% on average across OECD countries. In contrast, post and telecommunication and business services, notably research and development and computer related services, are high-tech, knowledge intensive industries. The R&D intensities in these industries amount to more than 6% and are sometimes higher than R&D intensities in the manufacturing sector (Table 3). A large proportion of R&D that is carried out in several of these services industries pertains to software development.

Relatively low R&D intensity in services as compared to manufacturing may be related to the innovation process in services itself. Services innovation often takes the form of changes in markets or in processes within the innovative firm (OECD, 2004). Results from the European Community Innovation Survey (CIS3), for instance, have shown that the innovation process and performance in services differs in several respects from processes and performance in manufacturing firms (OECD, 2004). Firms in both manufacturing and services industries are engaged in product innovation, but, in many countries, innovative service firms are more likely to introduce new products on the market than manufacturing firms. The reported higher success of services firms to introduce new services in the market may be related to their stronger (reported) focus on innovation marketing. Manufacturing firms, in contrast, are typically found to focus on production, delivery or design improvements. In general, manufacturing firms are also more often found to develop or introduce process innovations than services firms. However, empirical evidence suggests that the distinction between product and process innovations may not be applicable to services innovation. Finally, while manufacturing firms rely more frequently on internal R&D, services firms rely more often on R&D acquired from external sources or from other knowledge sources, such as training or patents, software and licenses (OECD, 2004).

Table 3. **R&D-Intensities for selected services industries**

Total BERD as a percentage of value added per industry

	Wholesale & Retail trade; Repairs		Transport & Storage		Post & Telecommunication		Financial Intermediation		Computer & Related Activities		Research and Development		Other business activities		Total Services		Total Manufacturing	
	50-52		60-63		64		65-67		72		73		74		50-99		15-37	
	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001
Australia [1]	0.0	..	..	..	..	..	0.0	..	..	..	..	..	..	..	0.3	0.4	4.3	3.3
Belgium	0.2	0.1	..	..	..	..	0.5	0.2	..	..	..	..	..	..	0.3	0.3	5.4	7.7
Canada [1]	0.7	0.5	0.1	0.1	1.0	0.2	0.6	0.2	..	..	..	..	..	..	0.5	0.4	3.6	4.1
Czech Republic	0.0	0.1	0.0	..	0.0	..	0.0	0.0	0.0	..	39.2	..	0.1	..	0.3	0.5	2.0	2.1
Denmark [2]	0.5	1.0	..	..	1.4	4.8	..	0.7	6.8	11.4	14.8	36.8	3.2	1.7	0.5	0.9	4.7	6.0
Finland	0.0	0.0	0.1	0.2	2.4	4.7	..	..	6.8	6.5	..	..	0.3	0.3	0.2	0.5	5.6	9.4
France [1]	..	0.0	1.2	1.8	..	..	..	..	3.0	1.9	..	..	0.3	0.5	0.2	0.2	7.2	6.9
Germany [2]	0.0	0.1	0.3	0.7	..	..	0.0	0.0	0.6	3.0	3.9	14.3	0.3	0.3	0.1	0.2	6.7	7.5
Ireland [2]	0.0	0.0	0.0	..	1.3	..	0.2	0.0	..	..	..	..	..	..	0.2	0.4	3.0	2.2
Italy	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.2	0.5	0.8	..	..	0.1	0.2	0.1	0.2	2.2	2.4
Japan	..	0.1	0.1	0.1	..	..	..	0.0	..	..	..	..	..	..	0.0	0.2	7.9	9.9
Korea	..	0.1	..	0.0	..	2.9	..	0.0	..	..	..	..	..	..	0.3	0.5	5.2	6.0
Netherlands [1]	0.3	0.4	..	0.1	1.3	0.9	0.1	0.4	1.1	3.4	2.1	7.1	0.5	0.4	0.2	0.3	5.1	5.6
Norway [3]	0.1	..	0.1	..	3.0	..	0.2	..	8.5	..	51.7	..	1.0	..	0.6	0.7	4.5	4.1
Poland	0.0	0.0	..	..	..	..	0.0	0.0	..	..	..	..	..	..	0.1	0.1	1.0	1.0
Spain	0.0	0.0	0.0	..	0.6	..	0.0	0.1	2.1	..	2.3	..	0.5	..	0.1	0.3	1.7	1.8
Sweden	0.1	0.0	..	0.0	3.0	1.9	..	1.1	3.7	6.8	..	..	0.3	0.1	0.4	0.6	10.9	15.7
United Kingdom	..	0.1	..	0.0	2.3	2.7	..	..	7.4	..	8.3	..	0.6	..	0.4	0.4	5.1	6.6
United States [1]	..	1.5	..	0.1	..	..	..	0.5	..	..	..	..	..	..	0.5	0.9	8.1	8.5

Source : OECD ANBERD Database, 2003.

Low investment in R&D and innovation activities may arise from several industry specific obstacles to innovation (Klodt, 1995, and Müller, 2001). The relevance of each factor may differ across countries and may thus explain differences in the R&D intensities and the innovation success across countries. First, external effects from R&D and internal knowledge creation arise since the return from research can not be fully appropriated. Since knowledge of one firm may benefit competitors' profits, by enabling them either to launch the innovation first or to introduce follow–up innovations, each individual firm may invest less in R&D than would be socially optimal. Each firm would also have an incentive to protect its own knowledge by firm specific measures other than patents, and this may lead to a lower diffusion of knowledge than would be socially desirable. External effects may be of particular relevance for services firms as knowledge that is created in the innovation process of services firms is typically not protected by patent law; it may also diffuse more slowly than knowledge created in innovation of goods since the IPR regimes used by services are not based on registration of information pertaining to the innovation (OECD, 2001*c*).

Second, lack of exploitation of economies of scale from innovation projects typically creates a barrier to innovation, in particular by small firms, and it may prevent entry of new innovative firms. This is especially the case since investment in innovation activities is often irreversible and has a high risk of failure. In contrast to large firms, small firms can not distribute the costs and risks across different projects nor exploit learning curve effects from staff resources with long–term experience in R&D and the introduction of innovation. This may be of particular relevance for services firms, as services firms are typically characterised by small firm size structure (see section 3.4 below).

Third, incomplete and asymmetric information may be a major obstacle to innovation. Innovation projects are typically characterised by long time lags between the investment in R&D and knowledge creation and its return in terms of sales from the new good or service. Innovation projects are also typically projects with a high degree of uncertainty and risk of failure. Moreover, while the innovative firm itself has sufficient information to approximately estimate the potential costs and risks of innovation projects, this is not the case for external persons or firms that would be able to provide financial means for innovative firms. As a consequence, innovation projects are often not launched as innovative firms are not able to fully finance these projects internally, but also face problems of access to external financial resources. Indeed, OECD (2004) shows that the lack of financing as an obstacle to innovation is particularly relevant for services firms.

Fourth, empirical evidence suggests that services are much more linked to other firms or institutions in their innovation process than manufacturing firms. Services innovation does not necessarily result from internal R&D, but from the use of knowledge and technologies that have been created in other firms or industries. Services firms also concentrate more strongly on the marketing of innovation than manufacturing firms. Sub–optimal diffusion of knowledge may therefore result from insufficient absorptive capacity of existing knowledge. Also lack of technological and market information were more frequently regarded as obstacles to innovation by services as compared to manufacturing firms (OECD, 2004). Firms' problems accessing and using information on the market and knowledge that is produced by a different firm may arise from low investment in necessary training or organisational changes, or weak incentives to invest in R&D in order to read and to implement knowledge produced elsewhere.

Innovation in services may also be constrained by a lack of international competition. Empirical studies point to a positive correlation between innovation and exports (Wakelin, 1998). Outward orientation, exposure to international markets and competition via trade in goods and services are important drivers of productivity enhancing activities such as innovation. At the same time, trade opens up markets for new goods and services, in particular if domestic markets are mature. Thus, exporting firms are

found to be innovative and innovative firms are found to be exporting (Ebling and Janz, 1999).[23] While trade in services has been growing recently, the share of services in total trade is still relatively low. If the same positive relationship between trade or openness of firms and their innovation activities applied equally for manufacturing and services firms, the relatively low exposure to international markets of services in some countries may thus contribute to the low R&D-intensity of some countries.

Finally, services, notably business or science-related services, also contribute indirectly to the innovation and knowledge activity of an economy. However, these indirect innovation activities are not well reflected in available measures of innovation. Czarnitzki and Spielkamp (2000) point to the role of services as providers of support for the innovation of their customers. Legal and business advisors, for instance, analyse the basic legal and financial framework for innovation; software providers enable the implementation and design of innovations; engineers take over the development of prototypes; market researchers help to launch the new good or services on the market. Three main channels of support can be distinguished (Czarnitzki and Spielkamp, 1999). First, services purchase knowledge or investment goods from the manufacturing industry or from other services (demand pull). Second, they provide services or knowledge for companies in the manufacturing or other services industries, which may become part of the purchasers' production or innovation (knowledge push). Third, services deliver services or knowledge that is complementary to the goods or services provided by firms in other industries.

3.3 The skills distribution in services industries

The share of R&D performed in service industries is only one indicator of innovativeness and knowledge intensity. The performance of firms and their ability to innovate also depend on the skills that are available, both as measured by educational attainment and occupational skills (Box 6). Moreover, a high quality of skills has a direct positive effect on productivity growth. The skills distribution of services is analysed using the data on occupation and education from the European Labour Force Survey for several years.[24] This includes the analysis of the composition and distribution of skills as measured by *education level* as well as by *occupational skill level* for selected services industries. This includes also an analysis of the match between education and occupational skills per services industry or across industries and per country.

Figure 20 shows from an aggregate perspective that services are characterised by highly skilled employment, as measured by the level of educational attainment. The share of highly skilled persons in total employment is higher in the service sector than in the manufacturing sector for all European countries for which data are available (Figure 20). The share of high-skilled employment in total employment of services amounts to between 15% and 40%. To a large degree this may be explained by a relatively high share of skilled employment in non-market services, such as education, health and social services.

23. The direction of causality is not clear *a priori*, though; the direction and extent of the impact may also depend on what additional variables are included in the estimation of the innovation and export propensity of firms or industries. Ebling and Janz (1999), for instance, found a positive and significant impact of innovation on the export propensity of German firms, but no significant impact of the export activities on the innovation propensity of firms.

24. This is mainly due to a lack of comparability of data from the European Labour Force Survey and occupation data from non-European sources.

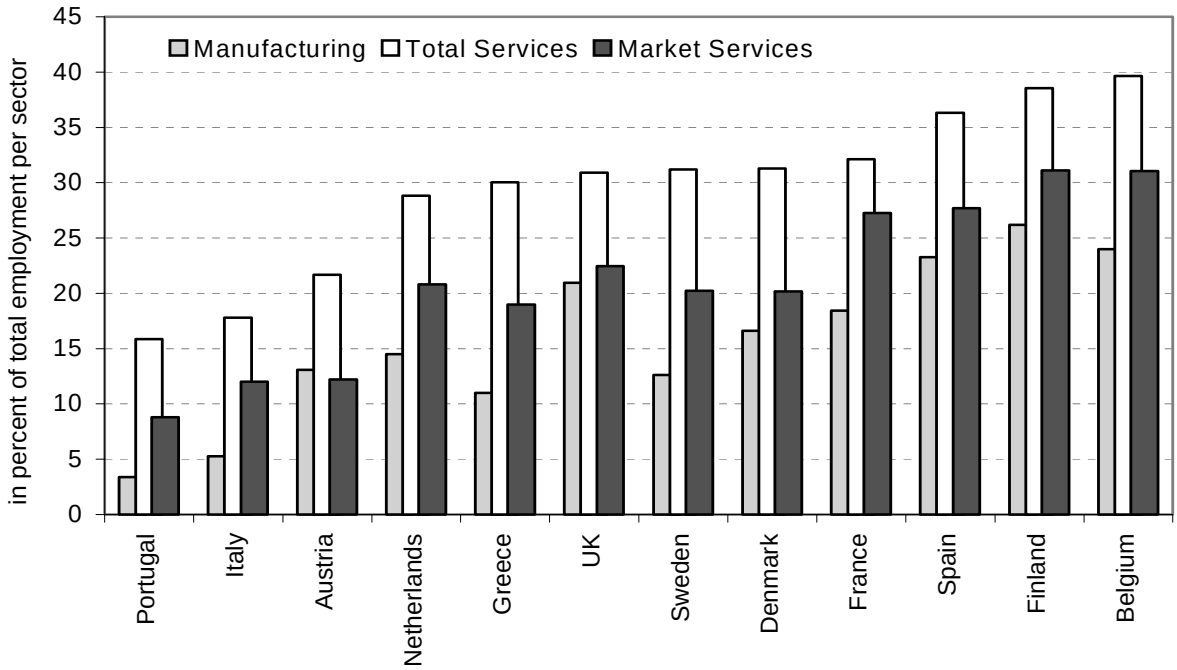
Box 6. **Analysing skills by industry**

An analysis of the skills level of industries has to distinguish between two different types of skills: formal skills as measured by the level of education attainment, and the skills level of a certain job as measured by the occupational skill. The International Standard Classification of Education (ISCED) identifies four educational attainment levels: less than upper secondary education (level 2 and under), upper secondary education (level 3), non-university tertiary education (level 4 and 5B) and university education (level 5A and 6) (Lemaître, 2002). Occupations, on the other hand, are based on the International Standard Classification (ISCO) and can be roughly grouped into the following four groups of occupational skills: *1)* professionals, *2)* technicians and associate professionals, *3)* clerks, service workers and shop and market sales workers, skilled agricultural and fishery workers, craft and related trade workers, plant and machine operators and assemblers, *4)* elementary occupations (labourers) (Lemaître, 2002).

Roughly speaking, educational attainment can be regarded as a measure of the supply of skills, while occupational skills can be viewed as a measure of demand for skills. Both do not necessarily match though, as, for instance, some employed persons may have reached a high level of occupational skill through their working experience, while they may have attained a relatively low level of formal education.

The skills distribution may vary across industries and over time. Cross-industry differences may prevail within each measure, *i.e.* independent of whether skills are measured by educational attainment or occupations. Cross-industry differences may also prevail with regard to the match between educational and occupational skills. Finally, both the distribution of skills across services industries as well as the match between educational and occupational skills may have changed over the past ten years.

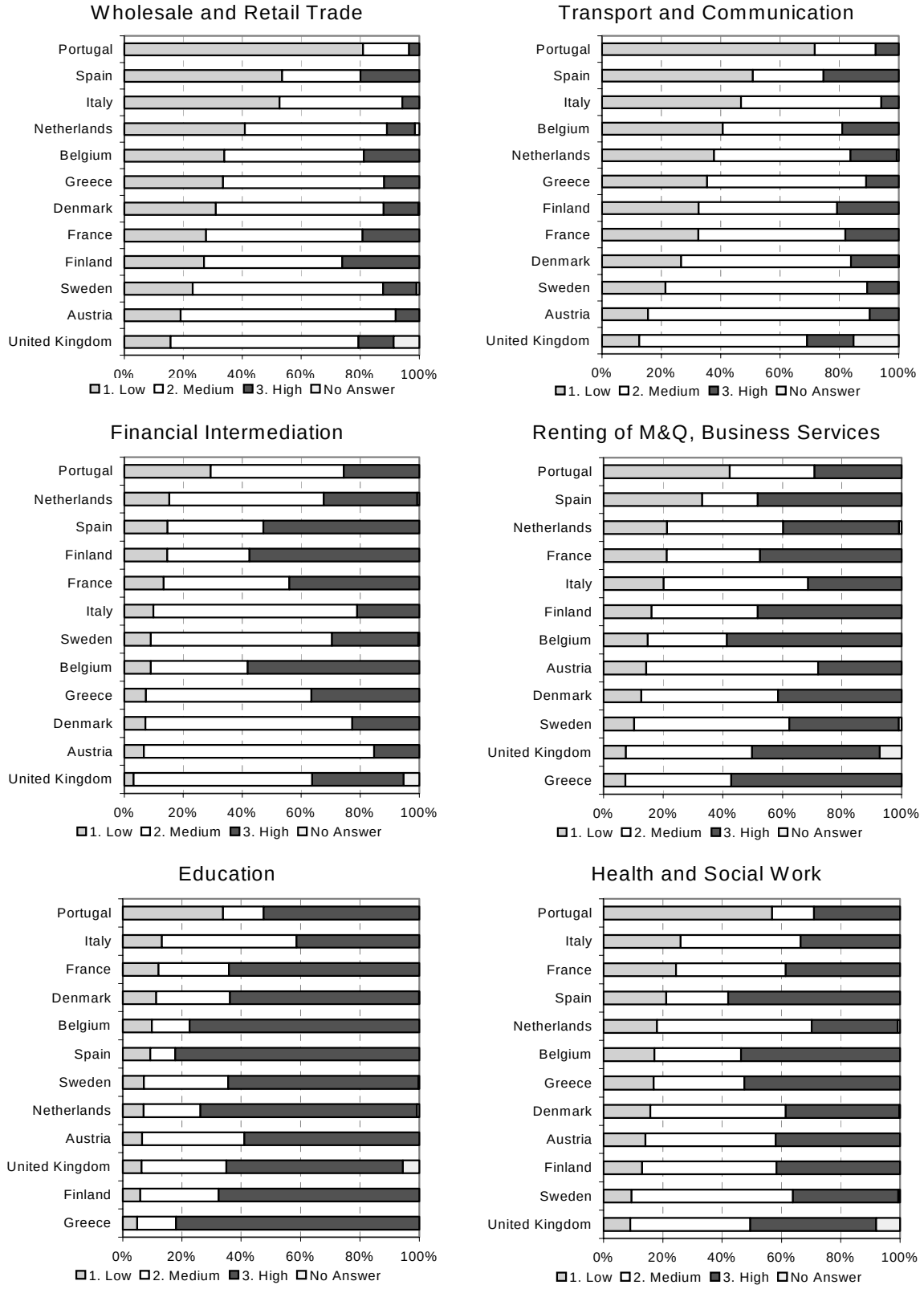
Figure 20. **Share of high-skilled employment in total employment per sector, 2002**[1]



1. The services sector covers NACE classes 50-99. Market services cover NACE classes 50-74. High skilled employment is defined according to the ISCED classification and reflects employment with tertiary education.

Source : OECD, Labour Force Survey 2003.

Figure 21. **Educational skills distribution of broad services groups, 2002**[1]



Source: OECD, Labour Force Survey 2003.

Figure 21 shows the distribution of education skills of selected services industries. For financial intermediation, education and, to a lesser degree, business services and health and social work, it shows a skills distribution that is skewed towards very high or medium-high educational skills. A different picture prevails for wholesale and retail trade services, where the skills distribution as measured by education attainment is very different across European countries. Portugal and Spain, for instance, show a high share of low-skilled employment, with about 60% of total employment. The opposite is true for Austria and Sweden, where the share of low-skilled employment in these industries amounts to only about 20%. To some degree the strong variation across countries may be due to the composition of trade within the different OECD countries. Wholesale and retail trade is a heterogeneous group of industries that comprises basic neighbourhood shops as well as retailers that are specialised in high-tech machinery or computer equipment and software.[25]

Figure 22 presents the skills distribution across services industries on the basis of occupational skills. It distinguishes between five classes of occupational skills, based upon Lemaître (2002) (see also Box 6). These are the four occupation skill classes mentioned in the box, *i.e.* professionals, associate professionals and technicians, clerical occupations and service workers, and elementary occupations, as well as the group of managers that have not been analysed in Lemaître (2002).

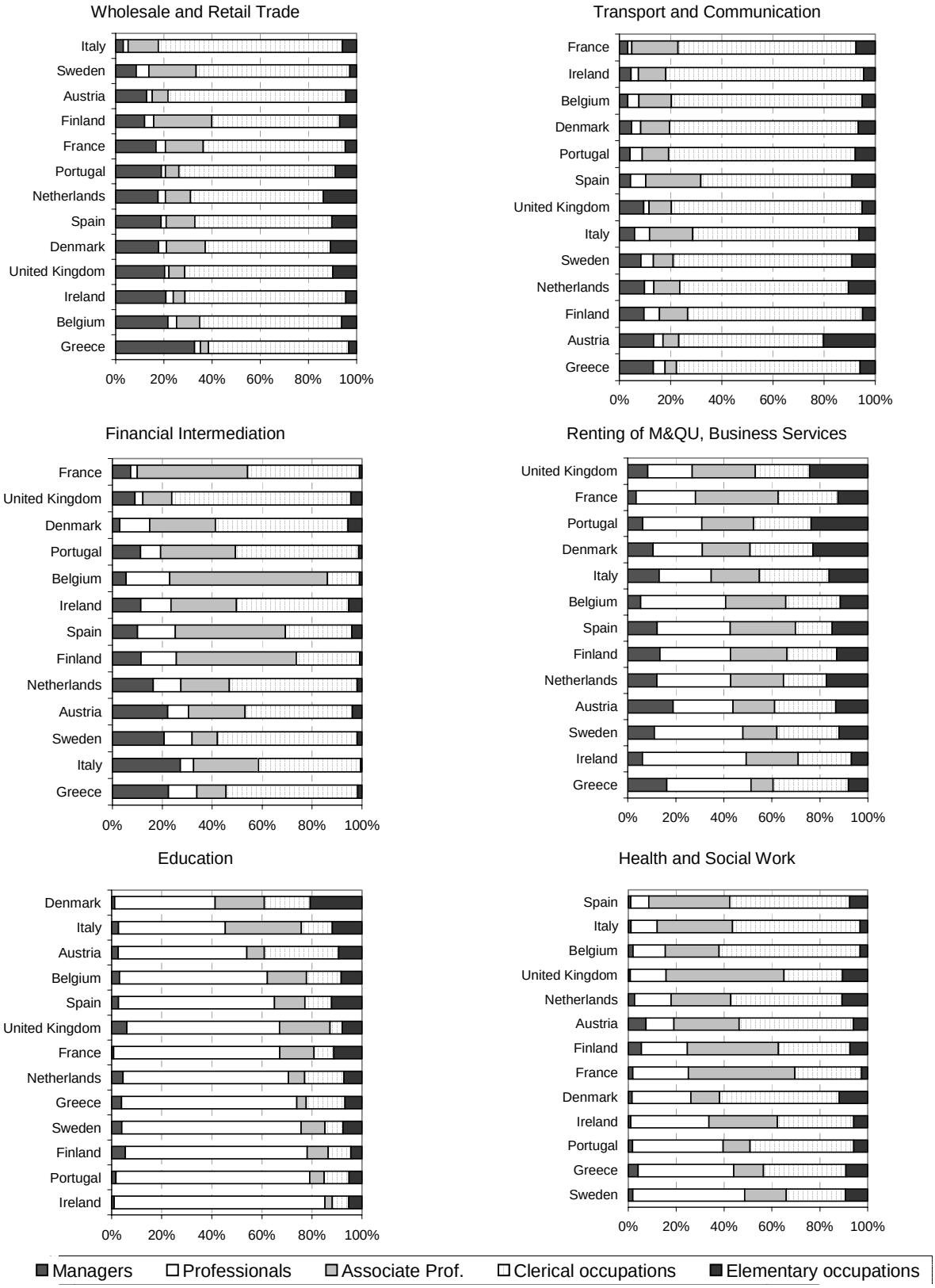
As for education skills, the distribution of occupation skills varies strongly across services industries and countries. In wholesale and retail trade services as well as in transport and communication services, persons are mainly employed as clerks or services workers, such as sales workers or machine operators and locomotive or motor vehicle drivers. These occupations are typically perceived to be medium-low skill intensive. Financial intermediation services, renting of machinery and equipment and business services, as well as health and social services show a relatively high share of professionals and technicians and associate professionals, such as health and life science professionals and associate professionals, as well as business and legal professionals, and administrative associate professionals. These occupations are typically perceived as high or medium-high skill intensive. Finally, persons that are employed in education services are about 60% professionals, such as science and health or teaching professionals, and are thus characterised by a high level of occupation skills.

Whether education and occupation skills overlap and, thus, whether there is a match between the skills offered and those demanded by the market, cannot be answered unambiguously. Figure 23 and Table 4 suggest some correlation between education and occupation skills. This can be seen by linking the data points of education skills by occupation skill class. For instance, the number employed in rather high-skill occupations, such as professionals (2) and associate professionals (3), is higher the higher the level of educational skills. In contrast, the number of persons employed in medium-low or low skill occupations, such as clerical and services workers or elementary occupations, decreases with the level of education skill. Moreover, the correlation coefficients between education and occupation skills range between 0.4 and 0.6 and are statistically significant (Table 4).[26]

25. Another indicator for the educational skills level in an industry is the extent of continuing vocational training. Empirical evidence has shown that the incidence of continuing vocational training is higher in the service sector, especially in the producer and social services industries (OECD, 2001*b*).

26. The strong level of statistical significance may partly be due to the way the correlation is calculated. Both education and occupation skills have been grouped before the analysis in sub-groups, according to the definition proposed by Lemaître (2003).

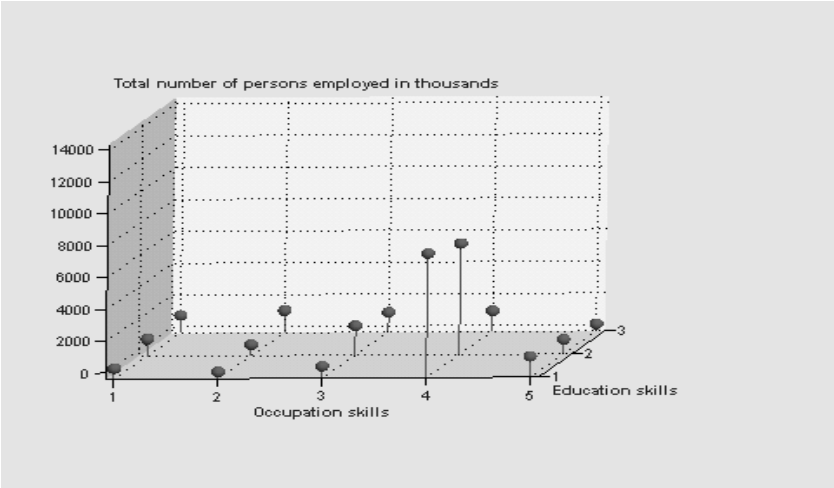
Figure 22. **Occupational skills distribution of broad services groups, 2002**



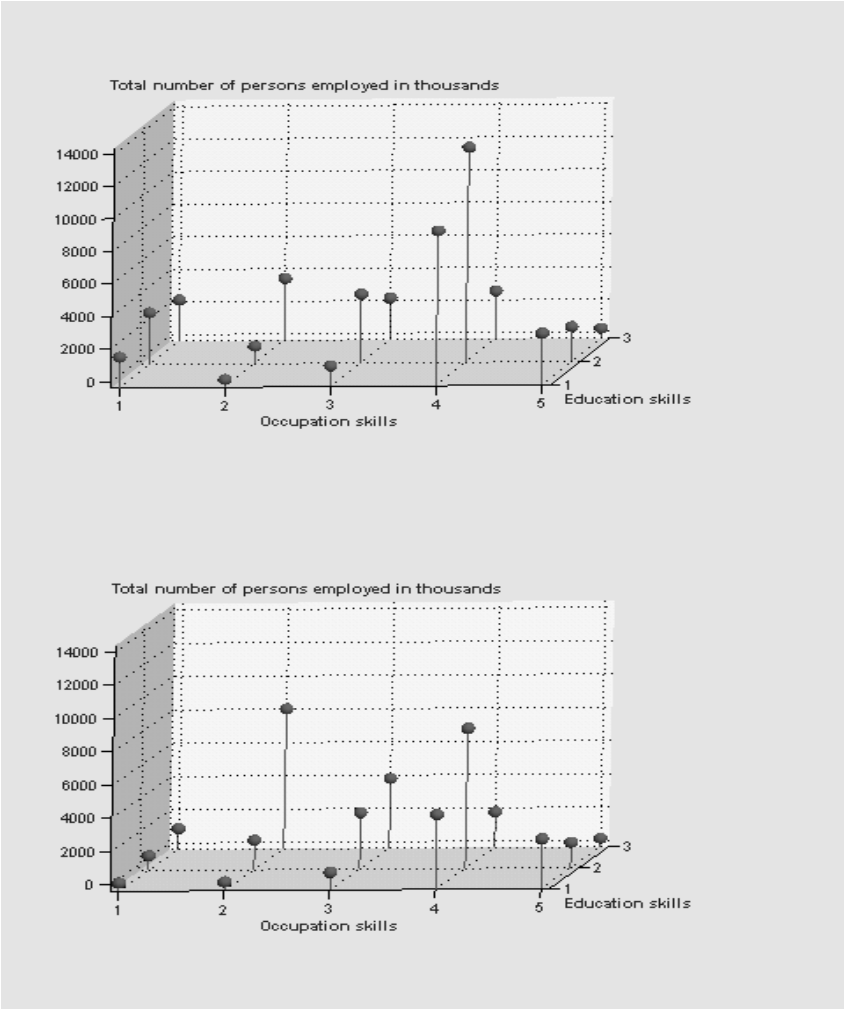
Source: OECD Labour Force Survey, 2003.

Figure 23. **The match between education and occupation skills for industry groups, 2002**

Total manufacturing



Business related services



Social and community services

Notes:
Education skills: 1=low, 2=medium, 3=high.
Occupations skills: 1=managers, 2=professionals, 3=associate professionals, 4 = clerks and service workers, 5 = elementary occupations. 2. Business related services comprise NACE classes 50-74.

Source: OECD Labour Force Survey, 2003.

There are, however, differences in the match between education and occupation skill levels across industries and countries (Figures 21 to 23 and Table 4). The strongest correlation can be found for social and community services. This may be related to the high share of high skilled professionals and medium-high skilled associate professionals and technicians in social and community services (Figures 21 to 23). In contrast, the correlation is weakest in business-related services. This may be related to the high share of clerical occupations in trade services and transport and communication services. Clerical occupations are typically perceived as medium or medium-low skill intensive. The results suggest, however, that several persons are employed as clerical and service workers have attained a higher level of education.

Table 4. **Coefficients of correlation between education and occupation skills per industry group, 2002**

	Manufacturing	Business related services	Social and Community Services
Austria	-0.42	-0.40	-0.62
Belgium	-0.47	-0.35	-0.65
Denmark	-0.54	-0.47	-0.64
Finland	-0.51	-0.40	-0.60
France	-0.48	-0.37	-0.62
Greece	-0.40	-0.18	-0.72
Ireland	-0.47	-0.42	-0.62
Italy	-0.39	-0.50	-0.64
Netherlands	-0.45	-0.47	-0.60
Portugal	-0.35	-0.26	-0.77
Spain	-0.37	-0.26	-0.70
Sweden	-0.42	-0.44	-0.63
United Kingdom	-0.45	-0.36	-0.56

Notes:
1. Business related services comprise NACE classes 50 to 74.
2. Correlation coefficients are statistically significant at the 1% level.

Source: OECD Labour Force Survey 2003.

3.4 Entry and exit of services firms

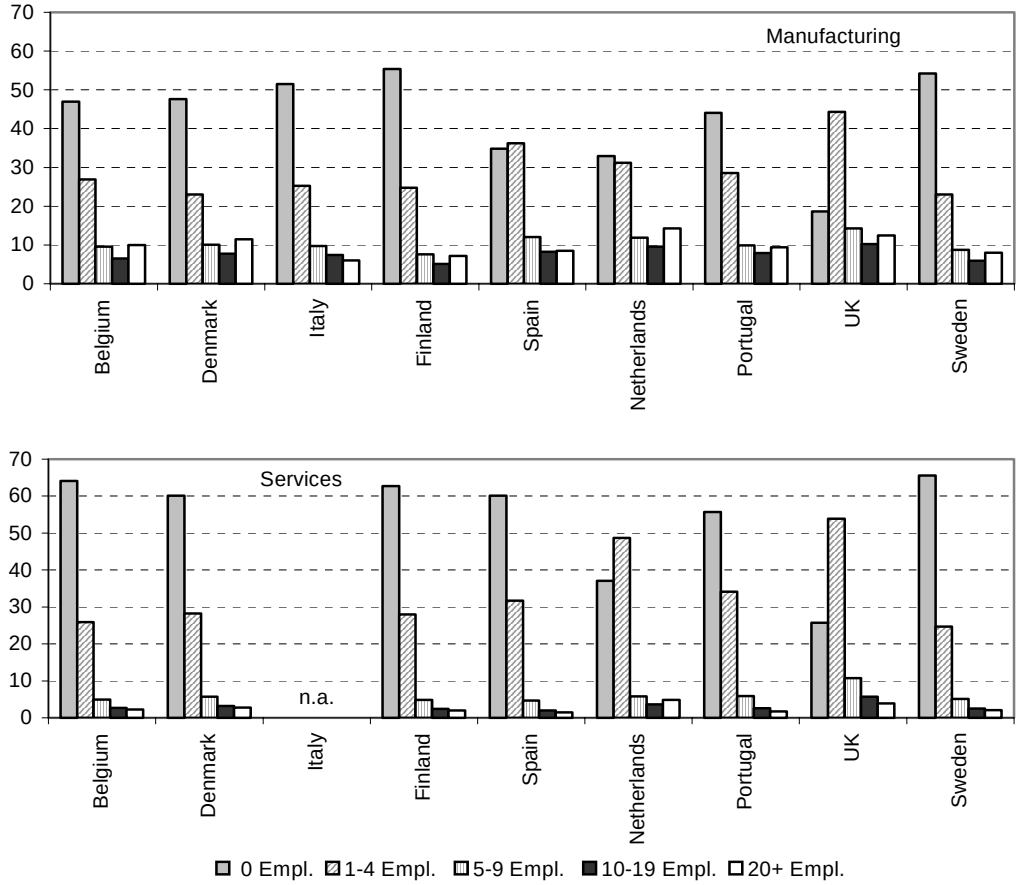
Whether the size of service firms can explain low productivity growth in the service sector cannot be said unambiguously. Figure 24 shows that the firm size distribution in the service sector is more skewed towards small firms as compared with the manufacturing sector; this is the case for all countries for which data are available. In general, only a very small percentage of service firms as compared with manufacturing firms have more than five employees. Differences between manufacturing and services are particularly large in the group of single-person firms.

There are two possible opposite effects of this small firm size structure on productivity and employment growth. On the one hand, the small size of service firms may reflect markets that are open to entry and exit. The available statistics show that the rate of firm entry is significantly higher in service industries as compared with manufacturing industries (Brandt, 2003). This is in particular the case for ICT-related services as well as business-related services. A similar picture prevails for exit of firms. Exit rates are relatively low and not significant for most manufacturing industries, but significant and relatively large for services industries, notably market services, such as retail, renting of machinery and equipment, ICT-related services and other business services. Previous OECD studies have shown that entry and exit of firms have an important direct impact on productivity growth, notably if new – more productive – entrants

replace declining firms in mature markets. Ease of entry may also impose a (potential) threat to existing firms and may thus indirectly induce productivity growth in incumbent firms.

Figure 24. **Firm size structure of the services and the manufacturing sector**[1]

Share of firms per size group as a percentage of all firms per country, average 1997-2000



1. The services sector covers ISIC classes 50-99.

Sources: OECD, Eurostat (2003), Brandt (2003).

On the other hand, productivity and employment growth may not emerge in the long term if small firm size as well as high exit rates imply a weak potential for firm growth. For instance, firm-level evidence shows that several service firms stay small over a long time period while manufacturing firms grow (OECD, 2001*c*). Furthermore, the risk of failure of small young firms in the retail trade, telecommunications and some business services such as market research seems to be higher as compared to other industries (Brandt, 2003). One reason for the low potential for firm growth may be a lack of possibilities to exploit economies of scale, for instance if the market for the service is not big enough to expand. This may be more probable in services industries than in manufacturing industries, notably in services that are focused on domestic or regional, rather than international, markets.

Both firm entry and firm growth may be impeded by the behaviour of large incumbent firms. Empirical evidence has shown that some services industries are characterized by strong concentration rates. In France for instance, the 10 largest enterprises in business services achieved more than one fifth of total industry turnover in 2001; enterprises with 100 employees and more achieved about one half of total

turnover and enterprises with less than 10 employees, which accounted for about 90% of the total number of enterprises, achieved one quarter of the total industry turnover (INSEE, 2004).

3.5 The labour market characteristics of the services sector

Differences across industries and countries in employment share and growth may also be related to specific characteristics of services as compared to manufacturing labour markets. Substantial cross-sector or cross-industry differences can be observed for part-time and temporary work arrangements, average job tenure and female work participation (OECD, 2000, 2001*b*). The incidence of part-time work is substantially higher in the services sector than in the manufacturing sector. This is notably the case for personal and social services where the incidence of part-time work is 1.5 times that of the average incidence across countries. Temporary work arrangements are also more often found in services industries, notably in personal and social services, than in manufacturing industries.[27] The differences across sectors in the incidence of temporary work arrangements are lower than the differences in part-time work arrangements, however. Average job tenure in the services sector in general and for most services industries is almost as high as in the manufacturing industries, but lower for certain services industries, notably social services.

Differences in part-time work, temporary work and job tenure are influenced by institutional settings and workforce characteristics, such as the female participation rate or the education level of employees. Workforce characteristics differ between the services and the manufacturing sector, but also within the services sector; for instance, women occupy a large and disproportionate share of employment in social and personal services. This is supported for German regions (Dathe and Schmid, 2000); regions with a high share of personal and social services have a higher female labour participation and vice versa.[28] Cultural or institutional differences across countries that affect female labour participation may represent, thus, one explanation for the observable cross-country differences in the employment share of services (Messina, 2004). Differences across countries can also be found in the growth of jobs per wage class. In most countries, job growth over the 1990s took place in high-paying services jobs rather than low-paying jobs, and was relatively strong in some countries. However, Europe as a whole experienced slower employment growth in all wage groups than the United States (OECD, 2000).

The labour market for services is also influenced by differences in the international mobility of services workers. Greater mobility of labour offers potentially significant economic benefits for both the source and the host country. The mobility of service workers has recently been at the heart of the policy discussion in several OECD countries as foreign services workers may help to close labour shortages in some services-related high-skilled occupations or may help in facing challenges linked to an ageing society (Coppel *et al*., 2001; OECD, 2004*c*). Immigrants are also found to be prepared and eager to set up their own enterprise and this may enhance competition in the host countries (OECD, 2004*c*). Indeed, from 1995 to 1998, immigrants in services employment accounted on average for between 33% (Japan) and 73% (Netherlands) of total immigrant employment. The share of foreign manufacturing employment in total foreign employment amounted to between 20% (Canada, Luxembourg) and 62% (Japan) (Coppel *et al.*, 2001).

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27. However, temporary employment covers a broad range of different types of work arrangements, which render cross-country comparisons and their interpretation difficult. Temporary work covers, for instance, fixed-term contracts, as well as seasonal and casual work and working under contract for a temporary work agency.

28. Dathe and Schmid (2000) speak thus of the “road in the service society” as the “road of women into the system of gainful labour market work”.

The level, mix and changes in immigration vary strongly across OECD countries though. In 1998, for instance, skills induced immigration accounted for 1% of total immigration in Sweden while it accounted for 49% of total immigration in New Zealand (Coppel *et al*., 2001). These differences can be explained by a broad range of factors, such as differences in the motivations behind immigration, the skills-level of immigrants, or the history and immigration policies of different countries. In general, a country's attitude towards immigration depends on its expectation of the size and sign of the net effect of immigration. Host countries are typically concerned about the potential downward pressure on wages or a potential increase in unemployment if wages are not flexible enough to adjust; the argument would be that immigrants are willing to accept lower wages than nationals. Another concern relates to the social costs that would have to be incurred if long-term immigrants were allowed to apply for social security or health insurance in the host country. A third concern relates to the argument that the immigration of skilled workers would be a substitute for the training carried out by companies of host countries. Finally, source countries worry about brain drain through the long-term emigration of highly skilled persons (OECD, 2004*c*).

To what extent such concerns influence migration of services workers and, as a consequence, services employment in individual countries cannot be said *a priori*. The empirical evidence for or against these concerns is rather weak, and most of these concerns are related to long-term or permanent immigration. Migration of services workers is not necessarily of a long-term nature, though. Indeed, temporary mobility of workers to supply services as covered under Mode 4 of the General Agreement on Trade in Services (GATS) may benefit both source and host countries (OECD, 2004*c*).

Temporary mobility of services workers can, for instance, help overcome labour shortages from strong and fast increases in demand for highly-skilled labour or for labour with specific skills. Structural change towards the knowledge-intensive industries has raised the demand for labour that is highly skilled in modern technologies, such as ICT, or in R&D in general (Coppel *et al.*, 2001); and the increasing trend across OECD countries towards an ageing population continues to create demand for health related skills, notably in nursery occupations. Certain OECD countries, such as Germany, Ireland, Korea, the United Kingdom and the United States, managed to raise temporary immigration in specific fields, notably ICT and health services, through the introduction of specific immigration programmes (OECD, 2004*c*).

Moreover, since the mobility of services workers under Mode 4 is by its very definition temporary, the amounts received by these workers from the host country's social security would be limited. Since the temporary mobility is typically intended to fill gaps in labour supply, there is also some worry about a crowding out and increased unemployment rate of national workers of the same skill level.[29] And since the temporary worker would typically return to his home country after the expiry of his contract, his or her emigration would not lead to brain drain; in contrast, both the host and the source country may benefit from the knowledge or skills that the temporary worker would "import".

Despite strong increases in recent years, temporary mobility of services workers under Mode 4 of GATS is still limited due to various factors. For instance, migration policy has typically been dealt with at the national level and bilateral, regional or international agreements are slow to emerge. Bi- or multilateral agreements on basic issues, such as labour rights and social security issues, as well as the recognition of qualifications as one of the main prerequisites to make temporary mobility work, have yet to be developed or improved. The scope of Mode 4 remains uncertain, and its applicability is influenced by problems measuring the temporary mobility of workers (OECD, 2004*c*). Finally, temporary mobility may not be the panacea for filling labour shortages or solving population-related problems in different countries. Migration policy is typically relatively slow to adjust, and may thus not be the appropriate means to act against relatively rapid changes in labour markets or skills demands. It is also primarily a short-term

29. Whether temporary work will have a negative wage effect in the host country cannot be said *a priori* and depends, amongst other factors, on the flexibility of the wage system in the host country.

instrument and must not be seen as a substitute for reforms in national labour markets that can enable smooth adjustment in the longer term.

3.6 The role of regulation

The services sector has traditionally been a highly regulated sector. Prominent examples of regulated services are transportation and communication services, but also trade and business services. Some of these regulations may be or may have formerly been justified by the existence of market failures and by the wish to satisfy non-economic objectives where competition was not perceived to be possible or appropriate. However, many restrictions no longer have any economic justification other than the protection of incumbent firms, or are the result of the domestic influence of special interest groups (Nicoletti and Pilat, 2004).

In general, regulations affect labour and product market in different ways, including entry, pricing and service provision. There is also evidence that shows that the effects of both labour and product market regulations do not only affect the market under consideration, but work through into other markets and the total economy. Until recently, empirical, notably econometric, evidence of the impacts of regulations in services industries on structural and macroeconomic outcomes was limited. This may to some degree be related to the difficulty in finding appropriate data and indicators for both industry-specific regulations as well as for the performance of services industries, in particular for cross-country comparisons. Recent OECD work has developed a large dataset on regulations affecting the services sector (Nicoletti *et al.*, 1999).

The existing empirical studies, *i.e.* both simulation studies and cross-country comparisons of effects of regulation in specific services industries, point to sizable effects of regulation on services sector performance (Nicoletti and Scarpetta, 2003). Simulated efficiency gains from a set of plausible medium-term programmes of regulatory reform amounted to up to 6% of GDP, depending on the initial state of regulation in different countries (Blondal and Pilat, 1997). Studies using the OECD summary indicators of regulation found, for instance, that policies lifting border restrictions and promoting domestic competition can affect quality-enhancing capital formation by making the economy more attractive to foreign direct investment and by stimulating investment in crucial sectors. Multifactor productivity may also be positively affected by pro-competitive regulatory environments, by enabling a faster catch-up to best practice in countries that are far from the technological frontier (Nicoletti and Scarpetta, 2003).

More specifically there is evidence that restrictive regulations may disproportionately damage entrepreneurial initiative, and this may limit service sector growth in particular (Brandt, 2003). Limits on the creation of new firms tend to have negative impacts on employment growth and on innovation in emerging industries, also within the services industries (Messina, 2004). Alternatively, empirical evidence on regulation in ICT-related services, such as wholesale and retail trade, finance, insurance and business services, showed that regulations may impair the ability of the economy to trigger "new economy" externalities, with negative consequences on productivity growth (Nicoletti and Scarpetta, 2003, OECD, 2003*b*). Regulation may also impede innovation. Regulation of venture capital markets, for instance, restricts the access to external finance of innovative firms, which reduces investment in innovation projects (De Serres, 2003).

The share and growth of employment in the services sector are also influenced by labour market regulation and taxes on labour income (OECD, 2000). Panel regressions for the period 1986 to 1998 have shown significant effects of average tax wedges and employment protection regulation, but the sign, the magnitude and the significance level of the effects are different across services industries.[30] In general,

30. The lower the degree of regulation the easier firms can adjust to demand fluctuations, as the cost of fluctuations in staff would be lower. See here for instance Dathe and Schmid (2002).

stricter employment protection legislation is associated with lower employment shares of services, notably of producer services. A higher tax wedge on labour income reduces to some degree the share of distributive and personal services (OECD, 2000). Finally, Messina (2004) finds a strong negative and statistically significant effect of the strength of union bargaining power, measured by union density or by the degree of wage-setting co-ordination, on service employment share.

Over the past two decades, many service markets have been extensively liberalised and countries have seen an extensive reform of service sector regulation. However, cross-country differences in initial conditions, as well as in the pace and extent of regulatory reform, suggest that the friendliness to market mechanisms of regulatory environments remains uneven across countries in many service industries. Nicoletti and Scarpetta (2003) summarised the main effects of regulatory reform for two services industries, retail trade and network industries which include rail transportation and communication services:

- The main types of regulations in retail trade are legal or administrative entry barriers, such as restrictions on large outlets, requirements for setting up businesses, limitations on product ranges, or provisions that constrain business operation, such as opening hours or pricing restrictions. Existing empirical evidence points unequivocally to large welfare gains from the liberalisation of entry and prices in retail trade (Nicoletti and Scarpetta, 2003). Distribution systems can become more efficient, and this is notably the case when restrictions on large outlets are removed; the range of services provided to consumers increases, particularly in countries where opening hours are liberalised; employment and the volume of sales increase, and margins decline putting downward pressure on consumer prices.

- Assessing the impact of regulation in network industries is complicated. In general, network industries are characterised by non-competitive segments that need to be regulated. Moreover, their price structure is often distorted, either as a result of past regulatory arrangements, or due to the specific way in which network industries have been de-regulated in several OECD countries. As in the case of retail trade, empirical studies point to substantial welfare gains from regulatory reforms (Nicoletti and Scarpetta, 2003). In general, liberalisation in network industries has led to lower prices, greater competition and increased productivity; competitive pressures following liberalisation can further increase productivity and lower prices; privatisation reduces inefficiency but does not enhance welfare unless it is matched by effective market liberalisation. Finally, the mere perspective of liberalisation may set adjustments in motion that reduce inefficiencies and curb prices as incumbents prepare to meet future competition.

3.7 Some conclusions

In general, it is no longer appropriate to distinguish between a manufacturing sector that is characterised by technological progress, capital accumulation, and economies of scale, and the service sector, a rather stagnant sector in which the potential for technological progress or other productivity increasing activities is only temporary. Several service industries are characterised by factors that drive productivity growth. This is notably the case for transport, storage and communications services and financial intermediation. These services are characterised by a relatively high capital to labour ratio, are important contributors to overall business R&D or use new, productivity enhancing technologies such as ICT. To some degree the small firm size structure of services firms may reflect easy entry and exit of firms, and this may induce productivity increasing activities by all market participants. Several services, notably financial intermediation and communication services are also strongly involved in international competition and are thus pressured to increase productivity and expand their activities.

Nevertheless, the empirical evidence points to several areas where structural characteristics of services markets may hamper productivity or employment growth. First, the services sector is still characterised by labour-intensive production as compared with other industries. Since capital intensity is typically a main determinant of productivity growth, the potential for future productivity growth may be low in those industries that are characterised by low capital intensity, or respectively, very labour-intensive production. Moreover, some of the most labour-intensive services are services such as education, health and social work that have a very high share in the total economy. Low capital intensities in these services may indirectly limit the potential for aggregate growth.

Second, differences in innovativeness across industries and countries may be related to obstacles for innovation that are particularly relevant for services industries. Of particular importance for service firms may be external effects from R&D, as knowledge that is created in the innovation process of services firms is not protected by patent law or it diffuses slowly since the IPR regimes used by services are not based on registration of information pertaining to the innovation (OECD, 2001*c*). The empirical evidence suggests also that innovation in services does not necessarily result from internal R&D, but from the use of knowledge and technologies that has been created in other firms or industries. Firms' problems accessing and using knowledge that is produced by a different firm may arise from low investment in necessary training or organisational changes, or weak incentives to invest in R&D that would enable firms to read and to implement knowledge produced elsewhere. Finally, specific innovation problems may result from the small firm size structure which characterises services. Innovations and the investment in new technologies are typically high-risk and high-cost activities, for which small firms often lack the necessary financial means or the access to external financial sources such as venture capital markets.

Third, several services industries are still characterised by a low intensity of competition, both in domestic and international markets. Regulatory reforms in selected services industries have substantially increased competition and, thus, indirectly enhanced services provision and reduced service prices. However, there is still room for improvement. In particular, cross-country differences in initial conditions and the way in which specific services markets have been privatised or de-regulated suggest an uneven level of pro-competitiveness of the regulatory environment in services markets across OECD countries. In addition, while the observable small firm size structure may suggest that services markets are open to entry, some empirical evidence points to possibly negative effects from small firm sizes for services markets. This may act as an obstacle for future productivity and employment growth if there is no potential for small firms to grow. Existing regulations may also limit firm entry and growth, or weak competition in services markets may lead to entry-deterring behaviour of incumbent firms. Finally, several services, notably social services, as well as hotels and restaurants, are focused on domestic markets with a high share of final demand, and thus do not face intensive international competition.

Differences in the employment share and growth performance of services across countries seem to be related to differences in characteristics and regulation of the services labour markets across countries. In particular, services jobs are more often characterised by part-time and temporary work arrangements, and show a stronger participation of female workers – factors that are also influenced by national labour market regulations. The labour market for services is also influenced by differences in the international mobility of services workers. Notably, the temporary mobility of services workers may help to close labour shortages in some services-related high-skilled occupations or may help in facing challenges linked to an ageing society. However, despite strong increases in recent years, temporary mobility of services workers is still limited due to various factors, such as the limited number of bilateral, regional or international agreements, notably on basic mobility issues, an insufficient recognition of qualifications and, in general, long time lags and a slow adjustment of migration policy to rapid changes in labour needs.

However, despite room for improvement in many services, some service industries do not show characteristics that are favourable for high-productivity growth, and this may not change in the medium

term. First, it is in the very nature of some services, such as social, health and public services, education, or retail trade, to provide a "service" to the final user. In some of these industries, it is not a primary objective to increase efficiency, *e.g.* by limiting shop opening hours or by moving from person-based to automatic service provision. It is sometimes more important for these service firms to increase the value of the service provided, even if this implies higher staff or operating costs. As long as this additional value of the service provided is not adequately captured in measured value added, this may lead to lower measured productivity growth of these service industries.

Second, some service industries are still mainly producing for regional or domestic markets and are only to a small degree involved in international markets which could spur productivity increasing activities. Although the empirical evidence has shown that there are new channels to open up service markets, an outward orientation of service industries may not be feasible for all services. This may be due to the specific nature of the service, which is notably true for some personal services. Some services may also be designed for a specific market whose characteristics are only present in a specific region and may thus not be directly transferable to markets outside this specific region.

CONCLUSIONS

It is important to look at services if the aim of economic policy is to increase economic growth. First, the service sector has become the quantitatively most important sector in all OECD economies. By 2002, the share of the service sector amounted to about 70% of total value added in most OECD economies, and this has increased considerably since the 1970s. Services contribute also to between 0.5 and 2 percentage points to employment growth and the contribution of the service sector to overall productivity growth has increased over the past ten years in some OECD countries.

The strong and increasing role of services can be explained by different factors. First, unbalanced growth between the manufacturing and the service sector has induced a resource re-allocation towards the "stagnant" service sector. The size of the services sector may also be explained by demand side factors, such as a high income elasticity of demand for some services, demographic developments in society, notably population ageing, or the growing provision of certain services as public goods in many OECD countries. A further explanation for the structural shift towards services may be the increasing role of service firms as providers of intermediate inputs. Services and manufacturing sectors do not differ in the share in total gross output that is produced for intermediate use.

Second, it is important to look at services, since the empirical evidence points to several areas through which the employment and productivity growth performance of services could be improved. The services sector is still characterised by labour-intensive production as compared with other industries, and this may reduce the potential for future productivity growth. Differences in innovativeness across industries and countries may be related to obstacles for innovation that are particularly relevant for services industries. Several services industries are still characterised by a low intensity of competition, both in domestic and international markets, suggesting room for improvement of the regulatory environment of services. Finally, differences in the employment performance of services across countries seem to be related to differences in characteristics and regulation of services labour markets across countries, and these factors are influenced by labour market regulations.

However, these characteristics of service performance and factors influencing the performance do not imply that policy should look at services separately from manufacturing industries. First, several services industries show characteristics that are similar to several manufacturing industries, concerning both their performance as well as the problems they are facing. Second, services and manufacturing interact and this interaction can be beneficial for all industries. Addressing some of the problems that services are facing may therefore not only improve the performance of services industries, but indirectly also the performance of other industries via the provision and use of intermediate inputs and labour resources.

Finally, the importance of services, their performance and the factors that are driving that performance are confronted with measurement problems, *e.g.* as regards productivity growth. A key problem is the accurate measurement of labour input, for instance, since it may be influenced by cross-industry differences in working time. An important problem also arises in measuring services output, notably the quality of the service provided. As long as these issues are not adequately captured in measured value added, this may lead to a biased measure of productivity growth in services industries.

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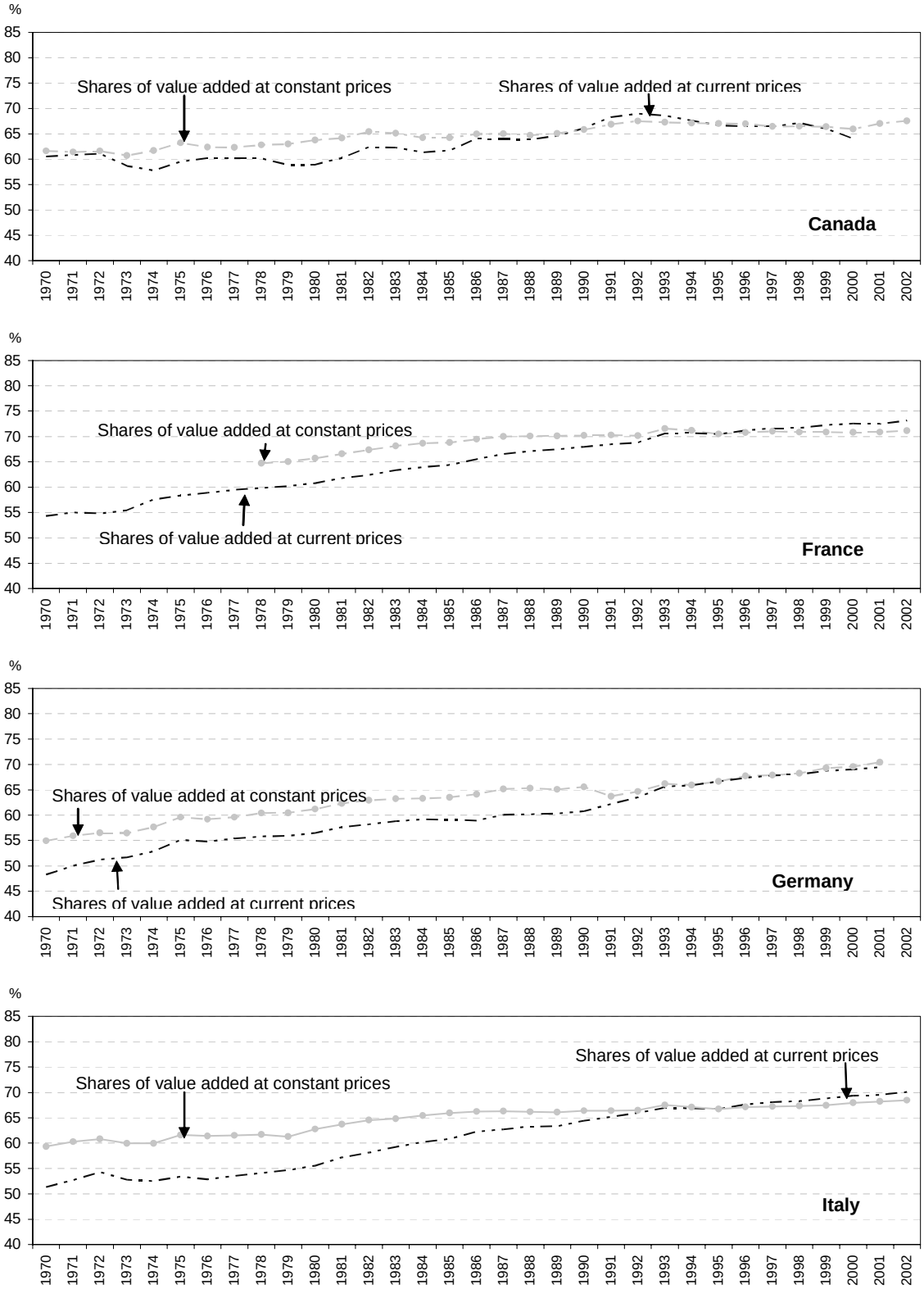
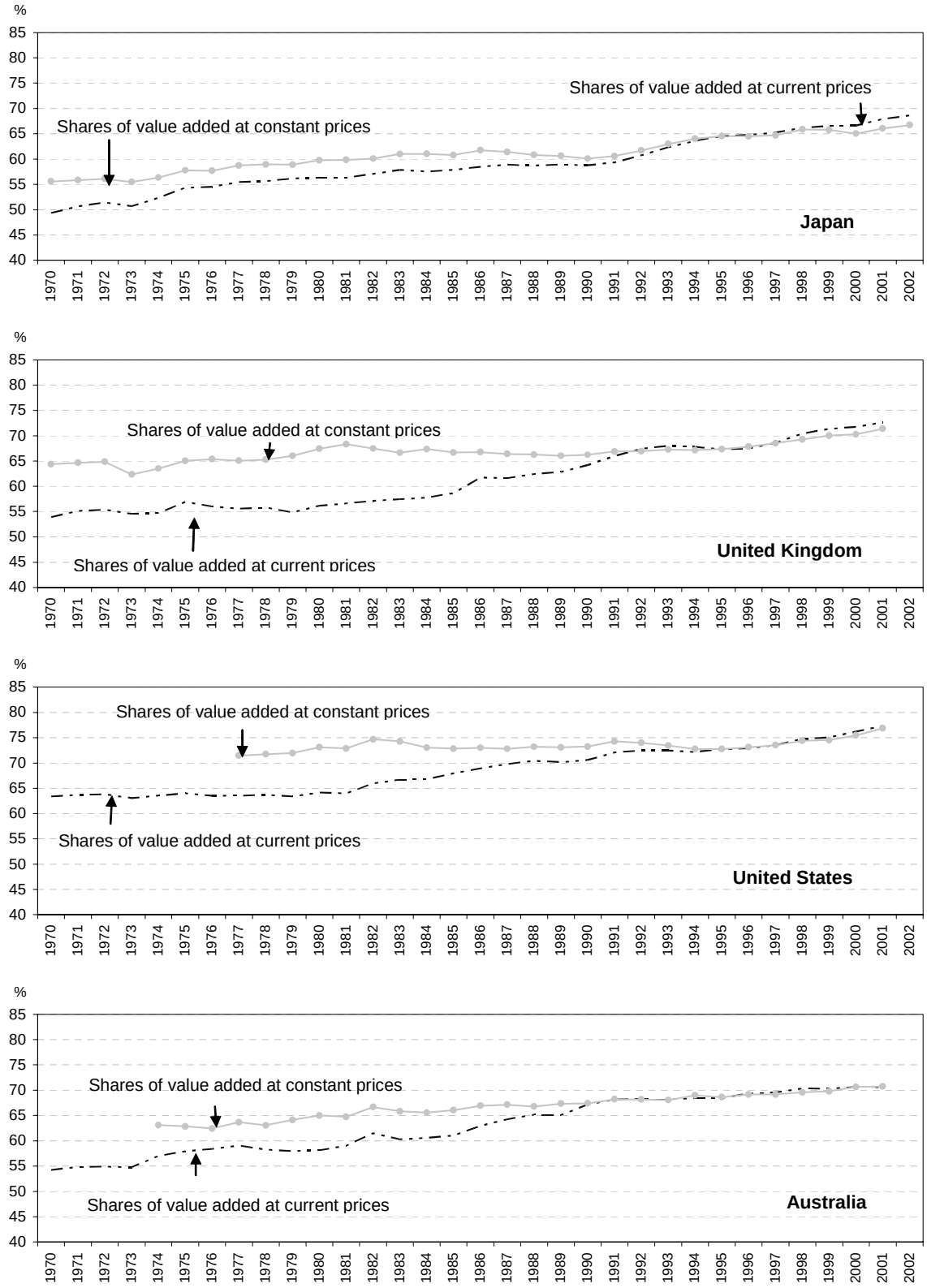
APPENDIX

Figure A1. **Service sector value added as a percentage of total value added, at current and constant prices, selected countries**



Sources: OECD STAN, STAN Indicators Databases, March 2004.
The services sector refers to ISIC rev.3 class 50-99.

Figure A1 *(contd.).* **Service sector value added as a percentage of total value added, at current and constant prices, selected countries**



Sources: OECD STAN, STAN Indicators Databases, March 2004.
The services sector refers to ISIC rev.3 class 50-99.

Table A1. **Shares of broad sectors in total value added, 1980-90 and 1990-2001**

Value added at current prices, annual average percentage shares

	Grand Total		Total manufacturing		Total services		Non-agriculture business sector		High-technology industries		Medium-high technology industries		Medium-low technology industries		Low-technology industries	
	01-99		15-37		50-99		10-74		353,2423,30,32,33		31,34,24 excl. 2423,352+359,29		351,25,23,26,27,28		36-37,21-22,15-16,17-19,20	
	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001
Australia	100.0	100.0	15.8	13.2	62.7	69.3	67.4	66.9	0.8	0.9	3.3	2.7	4.8	4.1	6.9	5.8
Austria	100.0	100.0	22.6	20.2	62.4	66.5	69.1	68.7	2.0	2.0	5.1	5.1	6.6	5.6	9.0	7.5
Belgium	100.0	100.0	22.1	19.6	65.5	70.8	..	..	..	2.0	..	6.3	..	5.1	7.1	6.2
Canada	100.0	100.0	17.7	17.7	63.1	67.0	65.3	63.8	1.5	1.7	4.6	4.9	4.0	3.7	7.7	7.4
Denmark	100.0	100.0	18.0	16.5	68.9	71.7	58.4	59.4	1.5	2.0	4.3	4.1	3.9	3.6	8.4	6.8
Finland	100.0	100.0	24.7	23.7	57.6	64.0	65.0	62.6	1.5	3.5	5.5	5.2	5.5	4.9	12.2	10.0
France	100.0	100.0	22.5	18.5	65.0	71.2	65.1	62.2	2.6	2.4	5.9	5.0	6.4	4.9	7.6	6.4
Germany	100.0	100.0	29.8	22.9	59.3	67.2	68.9	65.7	3.0	2.3	12.6	9.6	6.8	5.3	7.3	5.7
Greece	100.0	100.0	17.2	12.9	60.1	68.3	..	58.6	..	0.6	..	1.3	4.2	3.1	10.9	7.8
Hungary	..	100.0	..	22.7	..	62.1	..	66.5	..	3.4	..	7.0	..	5.9	..	8.3
Italy	100.0	100.0	25.5	21.2	61.2	67.8	..	67.1	2.2	1.9	6.7	5.4	6.7	5.7	9.9	8.3
Japan	100.0	100.0	26.6	22.1	58.0	64.7	68.1	66.5	4.1	3.7	7.8	6.7	6.3	5.2	8.4	6.7
Korea	100.0	100.0	30.1	29.5	45.9	51.3	70.1	71.8	4.1	5.1	6.0	7.1	8.2	9.6	11.8	7.6
Luxembourg	100.0	100.0	21.2	12.7	69.8	78.7	72.3	72.3	..	..	..	..	..	..	3.4	3.3
Netherlands	100.0	100.0	18.5	17.1	64.4	69.4	64.0	65.5	..	..	..	..	..	..	7.5	7.3
New Zealand	100.0	100.0	20.8	17.7	62.4	66.7	65.2	62.6	..	..	..	..	..	..	..	..
Norway	100.0	100.0	13.9	12.0	59.5	62.0	69.1	66.9	0.9	0.9	..	..	..	..	5.8	5.0
Poland	..	100.0	..	21.7	..	58.7	..	..	..	1.4	..	4.6	..	5.8	..	10.2
Portugal	100.0	100.0	22.4	20.0	59.1	65.4	..	..	1.0	1.1	3.2	2.9	6.2	4.3	12.0	11.7
Slovak Republic	..	100.0	..	23.3	..	59.2	..	71.6	..	..	..	..	..	..	..	8.2
Spain	100.0	100.0	23.4	18.4	59.8	66.2	68.4	67.2	1.5	1.3	5.3	4.7	6.8	5.1	9.7	7.3
Sweden	100.0	100.0	21.8	20.7	64.8	69.0	61.3	60.9	2.5	3.2	7.0	6.5	4.9	4.2	7.5	6.9
United Kingdom	100.0	100.0	23.5	19.7	60.0	69.0	..	68.0	3.1	3.0	6.4	5.1	5.6	4.5	8.5	7.3
United States	100.0	100.0	19.2	16.5	68.1	73.8	65.5	64.9	3.8	3.6	5.0	4.5	4.1	3.3	6.3	5.3

Current prices value added.

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A2a. **Shares of selected services industries in total value added, 1980-90**

Value added at current prices, annual average percentage shares

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Communi cation	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	43.2	12.7	11.2	1.7	8.7	6.2	2.5	21.8	5.0	9.5	..	..	..	..	19.5	5.0	4.9	5.8	3.5
Austria	41.8	17.7	13.8	4.0	7.6	5.2	2.4	16.5	6.4	6.4	0.5	0.3	0.1	2.8	20.6	6.5	6.0	4.7	3.1
Belgium	41.3	13.1	11.8	1.3	6.9	..	..	21.2	5.7	..	..	..	..	..	24.3	8.5	7.3	5.7	2.1
Canada	42.2	13.9	11.3	2.5	7.7	4.7	3.0	20.6	5.6	10.4	0.5	..	..	..	20.9	6.9	5.4	6.0	2.6
Denmark	42.7	15.0	13.6	1.4	7.0	5.2	1.8	20.7	4.6	10.4	0.1	0.9	0.5	4.2	26.1	7.3	5.4	10.0	3.1
Finland	37.3	13.3	11.5	1.7	8.8	6.6	2.1	15.2	3.7	7.7	0.3	0.7	0.3	2.4	20.4	5.1	4.7	7.3	3.2
France	44.0	12.6	10.2	2.5	6.6	4.3	2.4	24.8	5.1	9.8	1.0	1.1	1.2	6.6	21.0	8.3	4.3	5.6	2.8
Germany	39.4	11.3	10.0	1.4	6.0	3.6	2.4	22.1	5.0	9.4	0.9	0.7	0.3	5.7	19.9	7.0	4.0	4.9	3.9
Greece	43.0	19.5	..	..	7.4	..	..	16.2	..	..	..	..	..	..	17.1	7.6	..	..	..
Hungary	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Italy	43.1	17.2	14.1	3.2	7.2	5.4	1.8	18.6	5.9	..	..	..	..	..	18.1	5.3	5.2	4.0	3.0
Japan	38.9	13.3	13.3	..	6.4	4.8	1.6	19.2	5.2	9.9	..	..	..	..	19.1	4.2	3.3	1.0	10.5
Korea	33.0	14.0	12.0	2.1	7.5	5.5	2.1	11.4	4.4	5.0	0.3	..	..	..	12.9	4.3	4.6	1.5	2.5
Luxembourg	52.8	14.8	12.4	2.3	6.9	..	..	31.1	17.3	9.0	0.6	0.3	..	3.9	17.0	6.6	4.0	3.2	2.7
Mexico	45.4	27.2	20.5	4.3	7.5	8.1	1.0	10.7	3.6	7.7	0.2	0.0	..	2.5	16.1	2.8	3.7	2.7	5.4
Netherlands	39.3	14.2	12.6	1.7	6.7	4.8	1.9	18.4	5.1	7.4	0.6	0.7	0.5	5.5	25.1	9.3	4.6	7.2	2.8
New Zealand	45.9	17.7	14.7	1.6	7.9	4.9	3.0	20.3	6.4	11.4	0.5	..	..	..	16.5	5.7	4.0	4.6	2.2
Norway	39.7	13.4	12.0	1.4	9.5	7.3	2.2	16.7	4.9	7.5	0.3	0.5	0.3	3.2	19.8	5.7	4.6	6.9	2.5
Poland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Portugal	41.7	19.6	17.7	1.9	7.1	5.3	1.8	15.0	6.4	..	..	..	..	..	17.3	7.5	4.1	3.5	2.2
Slovak Republic	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Spain	42.1	17.1	11.6	5.4	7.9	6.0	1.8	17.2	5.3	8.0	..	..	..	..	17.7	5.7	3.9	4.1	3.9
Sweden	39.6	12.7	11.1	1.6	8.1	6.0	2.0	18.8	4.6	9.6	..	..	..	..	25.1	..	..	..	..
United Kingdom	39.6	12.9	10.8	2.5	7.7	5.2	2.8	19.0	6.0	..	..	..	..	..	20.4	6.3	4.3	5.0	3.6
United States	47.0	17.7	16.9	0.8	6.7	3.3	3.4	22.7	5.5	11.0	..	..	..	..	21.1	13.2	0.6	5.1	2.0

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A2b. **Shares of selected services industries in total value added, 1990-2001**

Value added at current prices, annual average percentage shares

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Communi cation	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	49.6	13.7	11.4	2.2	8.8	5.6	3.1	27.1	6.7	9.8	..	..	..	..	19.7	4.4	5.0	6.2	4.2
Austria	45.6	16.9	12.9	4.0	7.4	5.1	2.4	21.3	6.8	7.8	1.1	0.8	0.2	4.5	20.9	6.4	5.4	5.3	3.6
Belgium	47.1	13.7	12.0	1.6	6.9	..	..	26.6	6.1	..	..	..	..	..	23.7	7.9	6.6	6.3	2.3
Canada	45.5	13.6	11.1	2.5	7.2	4.3	2.9	24.7	6.8	11.9	0.6	..	..	..	21.6	6.5	5.5	6.7	2.9
Denmark	45.2	14.4	12.7	1.7	7.7	5.5	2.2	23.1	4.9	10.9	0.4	1.3	0.3	5.2	26.5	7.0	5.3	10.1	3.9
Finland	41.2	11.7	10.2	1.5	10.0	7.3	2.7	19.6	3.7	10.3	0.2	1.2	0.5	3.6	22.8	5.4	5.2	8.5	3.7
France	48.2	13.0	10.3	2.7	6.4	4.1	2.2	28.9	5.0	11.8	1.0	1.5	1.4	8.0	22.9	8.4	4.9	6.4	3.2
Germany	45.8	11.8	10.5	1.3	5.8	3.4	2.4	28.2	4.9	11.6	1.6	1.3	0.3	8.5	21.4	6.5	4.2	6.0	4.7
Greece	48.7	20.3	13.4	7.3	7.2	4.6	3.0	21.2	5.1	13.2	0.4	0.1	0.1	2.8	19.5	7.2	4.6	5.3	2.7
Hungary	41.6	13.3	11.4	1.9	9.1	6.1	3.1	19.2	4.4	7.1	0.6	0.8	0.5	5.5	20.5	7.5	5.0	4.6	3.4
Italy	48.3	16.8	13.5	3.4	7.3	5.2	2.1	24.2	6.0	10.4	..	1.6	..	6.4	19.5	5.7	5.1	4.6	3.4
Japan	44.7	14.0	14.0	..	6.4	4.8	1.7	24.3	5.6	11.8	..	..	..	..	20.0	4.0	3.1	1.1	10.8
Korea	36.7	12.0	9.3	2.7	6.6	4.5	2.1	18.0	6.5	7.7	0.7	..	..	..	14.6	4.3	4.9	1.8	3.4
Luxembourg	62.2	12.9	10.6	2.3	8.9	..	..	40.3	22.9	10.2	0.8	0.9	..	5.5	16.6	5.8	3.8	3.8	2.7
Mexico	50.0	20.9	16.0	4.9	10.1	8.5	1.6	19.0	3.7	10.1	0.2	0.1	..	4.8	17.2	3.6	5.3	3.3	5.1
Netherlands	46.3	15.1	13.3	1.9	7.2	4.9	2.3	23.9	5.7	8.0	0.9	1.3	0.4	7.6	23.2	8.1	4.3	7.3	3.1
New Zealand	49.7	15.4	13.7	1.7	8.2	4.8	3.4	26.2	5.6	13.0	0.6	..	..	..	17.0	5.1	4.1	4.9	2.9
Norway	40.0	11.7	10.2	1.6	9.9	7.8	2.1	18.4	4.3	8.3	0.3	0.9	0.4	3.9	22.0	5.7	4.8	8.4	3.1
Poland	38.4	20.2	19.2	1.0	6.9	..	..	11.3	1.4	..	..	..	..	..	20.3	6.9	4.4	4.6	4.5
Portugal	42.0	17.6	15.0	2.6	6.4	3.8	2.4	18.0	6.4	..	..	..	..	..	23.4	8.7	6.4	5.1	3.2
Slovak Republic	44.0	16.1	14.5	1.6	10.7	8.0	2.4	17.2	4.4	7.5	0.4	0.7	0.7	2.8	15.2	5.6	3.5	3.5	2.5
Spain	45.8	18.9	11.4	7.5	8.0	5.4	2.4	18.9	5.6	7.9	0.4	0.8	0.0	4.4	20.4	6.3	4.7	5.3	4.2
Sweden	44.2	12.2	10.7	1.4	8.4	5.9	2.5	23.7	4.0	12.0	0.4	1.6	..	5.8	24.7	5.9	5.3	9.4	3.8
United Kingdom	47.3	14.4	11.5	2.9	7.8	4.9	2.9	25.0	5.8	8.8	0.9	1.7	0.5	7.2	21.7	5.7	5.3	6.3	4.4
United States	51.7	17.7	16.8	0.8	6.6	3.1	3.4	27.4	7.5	11.3	..	..	..	..	22.1	12.5	0.8	6.4	2.3

Current prices value added.

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A3. **Shares of broad sectors in total employment, 1980-90 and 1990-2001**

Annual average percentage shares

	Grand Total		Total manufacturing		Total services		Non-agriculture business sector		High-technology industries		Medium-high technology industries		Medium-low technology industries		Low-technology industries	
	01-99		15-37		50-99		10-74		353,2423,30,32,33		31,34,24 excl. 2423,352+359,29		351,25,23,26,27,28		36-37,21-22,15-16,17-19,20	
	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001
Australia	100.0	100.0	16.8	13.3	66.8	72.5	69.1	68.2	1.1	0.8	3.4	2.5	4.6	3.5	7.7	6.6
Austria	100.0	100.0	21.1	17.7	51.3	58.9	60.1	61.3	1.7	1.5	4.5	4.2	5.3	4.4	9.6	7.6
Belgium	100.0	100.0	21.2	17.2	68.5	73.5	..	..	..	1.3	..	4.6	..	4.3	8.6	6.8
Canada	100.0	100.0	15.9	13.5	70.9	75.0	67.3	66.9	1.2	1.1	3.2	2.8	3.3	2.9	8.1	6.7
Denmark	100.0	100.0	19.4	17.6	67.2	71.6	59.8	59.8	1.5	1.5	4.4	4.2	4.2	4.1	9.3	7.8
Finland	100.0	100.0	22.2	19.7	57.5	65.4	60.8	58.9	1.1	2.0	4.8	4.5	4.7	4.4	11.5	8.7
France	100.0	100.0	20.9	16.9	63.4	71.4	62.5	60.6	2.0	1.8	5.0	4.0	5.5	4.4	8.4	6.8
Germany	100.0	100.0	29.2	22.4	57.4	65.5	70.6	68.5	2.8	2.1	11.1	8.3	6.5	5.3	8.9	6.7
Greece	..	100.0	..	15.7	..	57.8	..	59.5	..	0.6	..	1.6	..	3.3	..	10.3
Hungary	..	100.0	..	24.5	..	58.0	..	..	..	..	..	..	..	..	..	..
Italy	100.0	100.0	25.8	22.9	55.9	63.8	..	65.9	1.7	1.6	6.1	5.1	6.4	5.9	11.6	10.3
Japan	100.0	100.0	23.2	20.4	55.7	61.5	65.4	64.0	3.1	2.7	5.8	5.4	4.5	3.9	10.0	8.6
Korea	100.0	100.0	24.5	22.4	43.1	55.8	..	..	2.9	3.1	4.2	6.1	4.7	5.2	12.7	8.7
Luxembourg	100.0	100.0	21.1	14.7	64.7	71.9	74.2	75.4	..	..	..	..	..	..	4.3	3.7
Netherlands	100.0	100.0	17.9	14.7	69.7	74.5	62.0	63.7	..	..	..	..	..	..	8.6	7.2
New Zealand	100.0	100.0	20.8	18.1	71.2	74.7	..	..	..	..	..	..	..	..	..	..
Norway	100.0	100.0	16.4	13.7	67.4	73.8	60.6	57.4	1.0	0.8	..	..	..	..	7.8	6.5
Poland	..	100.0	..	19.6	..	44.4	..	..	..	..	..	..	..	..	..	..
Portugal	100.0	100.0	24.4	21.7	46.6	56.4	..	..	0.9	0.8	2.4	2.3	4.4	3.8	16.7	14.8
Slovak Republic	..	100.0	..	26.7	..	51.4	..	..	..	..	..	..	..	..	..	..
Spain	100.0	100.0	20.6	18.4	55.5	63.4	62.5	64.1	1.0	0.9	4.2	3.9	5.1	4.7	10.2	8.9
Sweden	100.0	100.0	20.8	17.8	67.8	72.9	..	56.7	2.2	2.2	5.8	5.2	4.9	3.8	7.9	6.5
United Kingdom	100.0	100.0	20.2	15.7	67.8	74.8	..	..	..	..	..	..	..	..	7.7	6.2
United States	100.0	100.0	16.9	13.7	73.4	77.4	64.9	63.9	3.0	2.2	3.7	3.2	3.5	2.9	6.7	5.5

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A4a. **Shares of selected services industries in total employment, 1980-90**

Annual average percentage shares

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Communi cation	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	41.9	23.7	20.2	3.6	7.4	5.3	2.1	10.8	4.4	..	..	..	..	..	24.8	4.7	6.5	8.1	5.6
Austria	31.6	18.7	13.5	5.2	5.9	4.4	1.5	7.0	2.9	0.7	0.2	0.2	0.1	3.0	19.7	5.8	5.1	5.3	3.3
Belgium	37.3	19.4	16.1	3.4	6.7	..	..	11.2	..	..	..	..	..	..	31.2	..	..	..	..
Canada	43.4	24.7	17.8	6.9	6.2	4.1	2.1	12.6	6.0	0.5	..	..	..	..	27.4	6.4	6.5	8.8	5.8
Denmark	34.9	18.0	15.6	2.4	6.8	4.8	2.0	10.0	3.3	1.2	0.2	0.7	0.3	4.4	32.4	7.8	6.9	13.8	3.5
Finland	30.9	15.9	12.9	2.9	7.2	5.2	2.1	7.8	2.6	1.3	0.1	0.6	0.4	2.8	26.7	6.5	5.1	11.4	3.4
France	34.4	16.8	13.8	3.0	5.8	4.0	1.8	11.8	3.4	1.2	0.3	0.8	1.2	6.5	29.0	9.7	6.7	7.9	4.7
Germany	33.0	18.1	14.9	3.2	6.0	4.0	2.0	9.0	3.4	0.5	0.1	0.5	0.2	4.2	24.4	8.7	4.1	6.7	3.9
Greece	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hungary	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Italy	31.9	19.1	15.7	3.4	5.3	3.9	1.5	7.5	2.5	..	..	..	..	..	24.0	6.5	7.1	4.9	3.0
Japan	33.1	17.9	17.9	..	5.7	4.9	0.8	9.4	3.2	1.2	..	..	..	..	22.7	3.5	2.8	1.1	15.3
Korea	30.3	21.8	..	..	4.7	..	..	3.8	..	..	..	..	..	..	12.8	..	..	..	..
Luxembourg	43.2	21.5	16.5	5.0	7.1	..	..	14.6	8.3	0.6	0.2	0.3	..	5.1	21.5	6.6	4.6	4.7	3.2
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	36.6	18.0	15.5	2.7	5.8	4.1	1.7	12.8	3.5	0.7	0.2	0.5	0.3	8.8	33.1	7.8	6.1	11.0	3.8
New Zealand	45.5	25.8	20.9	4.9	6.8	..	..	12.9	4.5	..	..	..	..	..	25.7	4.8	7.1	9.1	4.7
Norway	35.4	18.0	15.5	2.5	9.2	6.8	2.4	8.2	2.9	0.3	0.2	0.4	0.4	4.0	32.0	7.7	6.8	13.7	3.4
Poland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Portugal	25.6	17.3	13.5	3.7	3.9	3.0	1.0	4.4	2.3	..	..	..	..	..	20.9	6.9	4.1	4.2	5.7
Slovak Republic	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Spain	32.5	19.5	14.6	5.0	6.2	5.1	1.1	6.8	2.8	0.4	..	..	..	..	23.0	7.7	4.7	5.0	6.7
Sweden	29.7	14.8	12.5	2.3	7.1	4.6	2.4	7.9	1.9	..	..	..	..	..	38.1	..	..	..	..
United Kingdom	41.1	21.8	..	..	6.0	..	..	13.3	..	..	..	..	..	..	26.7	..	..	..	..
United States	42.5	24.9	23.5	1.4	4.9	2.9	2.0	12.7	4.5	1.3	..	..	..	..	30.8	16.5	1.4	7.5	4.1

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A4b. **Shares of selected services industries in total employment, 1990-2001**

Annual average percentage shares

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Communi cation	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	45.7	25.3	20.6	4.7	6.5	4.7	1.8	13.8	3.9	..	..	..	..	..	26.8	4.3	7.0	9.3	6.2
Austria	35.9	20.6	14.5	6.0	6.1	4.8	1.3	9.3	3.0	0.8	0.3	0.6	0.1	4.5	22.9	6.0	5.9	6.8	4.0
Belgium	40.8	18.7	15.1	3.7	6.6	..	..	15.5	3.6	..	..	..	..	..	32.7	10.1	8.4	9.0	3.6
Canada	46.3	25.0	17.7	7.3	5.9	3.9	2.0	15.5	6.2	0.7	0.6	..	..	..	28.7	5.5	6.8	9.8	6.4
Denmark	37.0	18.5	15.6	2.9	6.8	4.8	1.9	11.7	3.0	1.2	0.2	1.1	0.2	6.0	34.6	7.6	7.0	15.2	4.3
Finland	33.0	15.4	12.3	3.0	7.5	5.4	2.1	10.1	2.1	1.5	0.2	1.2	0.5	4.6	32.4	7.4	6.5	13.7	4.4
France	37.9	17.0	13.6	3.4	5.9	4.2	1.8	15.0	3.3	1.3	0.3	1.0	1.2	7.7	33.3	10.4	7.4	8.9	6.5
Germany	37.8	19.4	15.4	4.0	5.7	4.1	1.6	12.7	3.3	0.9	0.2	0.8	0.3	7.1	27.8	7.7	5.2	9.1	4.7
Greece	35.4	20.9	14.7	6.2	6.8	5.6	1.2	7.7	2.2	0.1	0.1	0.2	0.1	5.0	22.5	7.1	6.1	4.5	3.6
Hungary	31.4	16.6	13.3	3.3	8.4	..	..	6.4	2.1	..	..	..	..	..	26.5	7.1	8.5	6.3	4.6
Italy	36.1	19.8	15.6	4.2	4.8	3.6	1.2	11.4	2.8	0.8	..	1.4	..	6.6	27.7	6.3	7.1	5.7	4.1
Japan	33.6	17.7	17.7	..	5.8	5.0	0.7	10.2	3.1	1.5	..	..	..	..	27.5	3.2	2.6	1.2	19.7
Korea	40.0	26.2	18.4	8.2	5.5	..	..	8.3	3.5	..	..	..	..	..	15.7	3.3	5.2	1.7	4.6
Luxembourg	50.0	20.1	15.2	4.9	7.6	..	..	22.4	10.5	0.9	0.2	1.1	..	9.7	21.8	5.4	4.4	6.0	3.7
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	42.9	20.0	16.6	3.5	5.7	4.1	1.5	17.2	3.5	0.8	0.3	1.0	0.4	11.3	31.6	6.5	5.4	11.7	4.1
New Zealand	46.5	26.5	20.7	5.8	6.3	..	..	13.8	3.6	..	..	..	..	..	28.1	4.0	8.4	9.8	5.9
Norway	36.5	17.2	14.3	2.9	9.0	6.8	2.2	10.2	2.4	0.5	0.2	0.9	0.4	5.4	37.3	7.6	7.6	18.1	3.6
Poland	26.8	14.7	13.4	1.3	5.7	..	..	6.4	1.8	..	..	..	..	..	17.6	2.9	5.8	6.5	2.4
Portugal	30.9	19.5	15.1	4.4	3.4	2.7	0.8	8.0	2.2	..	..	..	..	..	25.5	7.9	5.8	5.1	6.7
Slovak Republic	26.1	13.2	10.4	2.7	7.6	..	..	5.3	1.3	..	..	..	..	..	25.3	6.7	8.0	6.6	3.9
Spain	35.9	21.2	15.4	5.8	5.9	4.7	1.2	8.8	2.5	0.4	0.2	0.6	0.1	5.2	27.5	8.4	5.3	5.8	8.0
Sweden	33.9	15.4	12.7	2.6	7.0	4.9	2.1	11.5	2.1	1.5	0.2	1.4	..	6.5	38.9	7.1	9.0	16.6	6.3
United Kingdom	46.1	23.0	..	..	5.8	..	..	17.3	..	..	..	..	..	..	28.6	..	..	..	..
United States	45.2	24.8	23.5	1.3	4.9	3.2	1.7	15.4	4.4	1.3	..	..	..	..	32.2	15.4	1.6	9.5	4.7

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A5. **Growth in value added per employed person in broad sectors, 1980-90 and 1990-2001**

Annual average percentage growth rates

	Grand Total		**Total manufacturing**		**Total services**		**Non-agricultural business sector**		**High-technology industries**		**Medium-high technology industries**		**Medium-low technology industries**		**Low-technology industries**	
	01-99		15-37		50-99		10-74		353,2423,30,32,33		31,34,24 excl. 2423,352+359,29		351,25,23,26,27,28		36-37,21-22,15-16,17-19,20	
	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001
Australia	1.2	1.9	2.0	2.4	0.5	1.8	1.0	2.3	..	..	..	..	..	..	..	..
Austria	2.4	1.9	3.7	3.7	1.3	0.6	2.6	2.3	..	..	..	..	..	..	3.7	3.5
Belgium	1.9	1.2	4.7	2.9	0.9	0.7	..	..	..	..	..	..	..	..	3.7	2.9
Canada	0.9	1.5	2.5	3.0	0.6	1.3	1.3	1.8	3.9	6.0	3.7	3.3	2.3	2.9	1.0	2.0
Denmark	1.4	1.7	1.1	2.6	0.9	1.2	1.7	2.1	3.0	7.9	0.9	1.8	1.5	1.4	0.7	1.8
Finland	2.6	2.4	4.6	4.9	1.6	1.4	3.1	3.0	..	..	..	..	4.9	2.3	4.5	4.5
France	2.3	1.0	2.7	3.5	1.6	0.2	2.6	1.2	..	9.5	..	5.0	..	1.9	..	1.2
Germany	1.4	1.7	1.7	2.4	1.0	1.2	1.5	1.8	..	..	..	..	..	..	1.6	1.6
Greece	..	3.0	..	3.5	..	2.4	..	3.8	..	..	..	..	..	..	..	2.5
Hungary	..	3.7	..	7.6	..	1.8	..	..	..	..	..	..	..	..	..	..
Italy	1.7	1.1	2.7	1.7	0.1	0.6	..	1.4	..	..	..	..	..	..	2.5	2.3
Japan	3.2	1.2	3.9	2.6	2.5	1.0	4.2	1.6	..	..	..	..	..	..	2.2	0.7
Korea	5.6	4.3	5.6	8.8	2.9	1.7	..	..	..	..	..	..	..	..	..	..
Luxembourg	4.5	1.2	6.4	3.3	4.1	0.5	4.7	1.6	..	..	..	..	..	..	7.7	0.8
Netherlands	1.4	0.7	3.1	2.6	0.1	0.5	0.8	0.9	..	..	..	..	..	..	..	..
New Zealand	2.5	1.1	1.7	2.2	0.7	0.8	..	..	..	..	..	..	..	..	..	..
Norway	2.1	2.2	2.1	0.9	0.8	1.8	2.8	3.2	3.4	2.4	..	..	..	..	0.7	1.2
Poland	..	4.0	..	9.4	..	1.8	..	..	..	..	..	..	..	..	..	..
Portugal	2.8	2.1	2.3	3.0	1.7	1.0	..	..	..	..	..	..	..	..	1.9	2.1
Slovak Republic	..	4.0	..	9.5	..	3.7	..	..	..	..	..	..	..	..	..	..
Spain	1.9	0.8	2.5	1.6	0.4	0.2	1.7	0.5	..	..	..	..	..	..	2.9	0.8
Sweden	1.6	2.4	2.8	6.1	0.9	1.6	..	3.3	..	..	..	..	..	..	..	3.1
United Kingdom	2.1	2.1	4.6	2.6	0.8	1.9	..	..	..	..	..	..	..	..	..	..
United States	1.3	1.5	3.5	3.5	0.6	1.6	1.5	2.5	..	..	..	..	3.0	2.9	1.8	0.0

Sources: OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A6a. **Growth in value added per employed person in selected services industries, 1980-90**

Annual average percentage growth rates

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Commu-nication	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	0.6	-0.8	-0.7	-1.1	2.7	2.0	5.1	-1.1	2.4	..	..	..	..	..	0.2	0.3	-0.3	0.1	1.2
Austria	2.2	1.9	2.5	0.0	2.6	1.9	4.1	1.4	2.3	3.0	7.5	1.5	-3.7	0.4	-0.2	1.1	-0.8	-0.5	-1.0
Belgium	1.5	-0.3	-0.3	1.1	3.3	..	..	1.0	..	..	..	..	..	..	0.0	..	..	..	..
Canada	0.8	0.5	1.0	-1.7	2.2	1.3	3.1	-0.1	0.9	-0.9	..	..	..	..	0.0	1.3	-1.0	0.3	0.3
Denmark	1.3	0.7	0.9	-0.1	2.7	2.3	3.8	0.3	2.6	-2.9	4.4	4.9	1.3	3.2	0.3	0.2	0.3	-0.1	1.7
Finland	2.4	2.9	3.0	1.8	2.9	2.4	5.6	0.2	4.4	1.9	-3.6	-1.8	1.0	-1.4	0.5	0.8	0.0	0.6	0.6
France	2.1	2.4	3.7	-3.2	4.0	2.6	6.5	0.5	3.6	-0.6	..	..	..	..	0.7	0.9	-0.5	1.6	0.0
Germany	1.7	0.8	1.3	-2.1	2.2	1.3	3.5	1.0	1.4	0.9	7.5	4.2	-0.3	0.0	-0.2	0.6	0.0	-1.7	0.7
Greece	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hungary	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Italy	0.6	0.1	0.6	-1.9	3.1	2.5	6.0	-2.3	0.3	..	..	..	..	..	-0.9	1.8	-1.2	-0.1	-1.8
Japan	4.4	3.9	..	..	3.8	3.0	7.9	4.0	6.5	-0.5	..	..	..	..	-0.8	1.7	1.4	2.3	-1.7
Korea	4.6	5.4	..	..	3.9	..	..	-0.3	..	..	..	..	..	..	-0.3	..	..	..	..
Luxembourg	3.9	4.9	4.8	4.3	10.3	..	..	-1.1	-0.3	-2.4	11.4	1.6	..	0.1	4.2	5.9	6.0	9.4	-7.4
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	-0.3	1.4	0.2	-2.0	2.6	2.8	3.0	-1.5	-2.2	-1.7	7.8	-1.1	1.1	0.5	0.3	1.3	0.2	-0.9	0.0
New Zealand	1.3	-1.4	-1.0	-5.4	8.2	..	..	1.4	2.2	..	..	..	..	..	0.4	-1.7	-3.2	5.5	-0.7
Norway	1.2	1.1	2.0	-6.3	3.0	2.5	4.9	-1.2	-0.5	-3.0	1.6	0.2	-0.4	-0.8	0.3	0.9	0.1	-0.1	0.2
Poland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Portugal	2.0	0.7	0.9	0.1	4.8	2.8	10.5	1.4	7.4	..	..	..	..	..	1.2	0.3	0.7	-0.1	4.2
Slovak Republic	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Spain	0.9	-0.1	-0.3	-0.2	2.2	2.0	1.8	0.5	4.2	-0.4	..	..	..	..	0.2	0.3	0.4	-0.1	-0.3
Sweden	0.9	..	2.2	..	..	..	..	-2.0	1.6	..	..	..	..	..	0.4	..	..	..	..
United Kingdom	1.4	2.0	..	..	3.5	..	..	-0.5	..	..	..	..	..	..	-0.5	..	..	..	..
United States	0.8	1.8	1.8	-0.3	1.7	1.6	2.1	-1.2	-1.1	0.8	..	..	..	..	0.0	0.6	-0.5	-1.8	0.9

Sources: OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A6b. **Growth in value added per employed person in selected services industries, 1990-2001**

Annual average percentage growth rates

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Communi cation	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	2.3	2.4	2.8	0.5	4.6	3.4	7.0	0.9	3.6	..	..	..	..	..	0.7	1.7	0.3	1.1	0.0
Austria	1.3	0.9	1.2	0.2	2.1	0.5	6.2	0.2	3.0	-0.4	4.1	-0.4	4.1	0.3	-0.8	0.5	-0.9	-1.4	-1.4
Belgium	0.9	1.0	1.3	-0.3	0.9	..	..	-0.1	-1.6	..	..	..	..	..	0.3	0.4	0.0	-1.3	-0.9
Canada	1.8	2.1	2.6	-0.1	2.5	1.8	3.3	0.7	2.4	0.0	5.3	..	..	..	0.1	1.8	-0.3	-0.3	0.2
Denmark	1.5	2.0	2.4	-0.9	4.0	3.2	5.9	-0.1	2.0	0.3	0.8	5.8	-0.6	-1.6	0.6	1.3	1.2	0.4	-0.2
Finland	2.3	1.5	1.6	1.0	4.5	2.8	9.4	0.9	2.5	2.8	1.3	0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.1
France	0.2	0.5	0.8	-1.4	2.6	1.3	4.6	-1.2	-1.0	2.0	-2.1	0.3	-1.4	-1.5	0.4	1.3	0.9	0.7	-2.3
Germany	1.4	-0.5	0.3	-4.5	7.3	3.7	12.2	-0.9	3.2	-2.3	0.3	3.5	1.5	-2.6	0.3	1.6	0.1	0.8	-1.1
Greece	2.7	3.0	3.2	2.1	8.3	7.9	7.2	-0.8	5.5	-7.9	6.6	12.4	4.5	-1.8	1.3	1.4	-0.4	0.9	5.5
Hungary	1.3	0.6	0.9	-1.3	3.0	..	..	-0.6	0.6	..	..	..	..	..	2.5	2.2	2.2	2.9	2.3
Italy	0.6	0.8	1.3	-1.2	3.4	1.3	9.1	-1.3	1.7	-0.3	..	1.0	..	0.0	0.2	1.5	-0.4	0.5	-0.1
Japan	2.0	1.6	..	..	1.4	-1.5	9.5	2.4	4.0	1.9	..	..	..	..	-0.5	0.7	0.8	1.0	-2.0
Korea	2.5	1.9	3.2	0.5	6.0	..	..	-1.0	4.4	..	..	..	..	..	-0.3	-1.4	-0.9	-3.4	-0.1
Luxembourg	0.5	1.5	2.4	-2.2	7.0	..	..	-2.8	0.2	-3.2	1.6	-4.9	..	-4.2	-0.2	-0.2	-0.3	2.5	-2.8
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	0.5	0.6	1.0	-1.8	2.6	1.0	5.6	-0.4	0.6	-1.1	0.2	-0.4	-2.7	0.7	-0.2	1.0	0.4	-1.1	-0.4
New Zealand	1.1	0.9	1.6	-1.6	5.9	..	..	-0.7	5.6	..	..	..	..	..	0.3	1.1	-0.1	1.4	1.0
Norway	2.7	4.8	5.4	0.5	3.1	1.2	9.5	-0.2	5.4	-5.6	1.3	-2.1	0.5	-0.4	0.4	1.4	0.5	-0.3	2.0
Poland	2.2	2.9	3.0	2.5	5.5	..	..	-2.0	11.0	..	..	..	..	..	0.8	-0.7	0.9	0.4	0.1
Portugal	1.6	1.3	1.4	0.3	4.9	3.9	10.3	-1.0	7.8	..	..	..	..	..	-0.2	0.4	-0.6	-0.6	0.1
Slovak Republic	2.5	-2.0	-3.4	10.0	1.2	..	..	10.5	-6.3	..	..	..	..	..	6.0	3.4	-6.6	9.8	17.3
Spain	0.0	-0.1	0.2	-1.0	2.3	1.7	4.2	-1.8	-0.7	-2.0	0.6	2.1	-3.2	-0.4	0.6	1.3	0.6	0.8	-0.4
Sweden	1.9	3.3	3.3	2.4	3.9	2.2	7.0	-0.1	3.2	1.4	5.0	-2.6	..	-0.9	0.5	..	..	..	..
United Kingdom	2.3	2.1	..	..	4.3	..	..	1.2	..	..	..	..	..	..	1.0	..	..	..	..
United States	2.3	3.6	3.8	0.5	2.7	1.3	4.2	0.8	3.6	1.4	..	..	..	..	-0.4	0.1	-0.7	-1.0	-0.5

Sources: OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A7. **Growth in employment in broad sectors, 1980-90 and 1990-2001**

Annual average percentage growth rates

	Grand Total		**Total manufacturing**		**Total services**		**Non-agriculture business sector**		**High-technology industries**		**Medium-high technology industries**		**Medium-low technology industries**		**Low-technology industries**	
	01-99		15-37		50-99		10-74		353,2423,30,32,33		31,34,24 excl. 2423,352+359,29		351,25,23,26,27,28		36-37,21-22,15-16,17-19,20	
	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001	1980-1990	1990-2001
Australia	2.1	1.5	-0.8	-0.4	3.2	2.1	2.5	1.4	-0.3	-0.5	-1.7	-1.0	-1.5	-0.4	0.0	0.0
Austria	0.2	0.4	-1.3	-1.3	1.6	1.6	0.1	0.5	-0.5	-0.8	-0.2	-0.2	-1.7	-0.7	-1.8	-2.2
Belgium	0.1	0.6	-1.7	-1.5	1.1	1.1	..	..	..	2.4	..	-0.7	..	-0.4	-1.6	-1.9
Canada	1.9	1.3	-0.2	0.6	2.5	1.7	1.8	1.5	2.1	-0.1	-0.1	0.4	-0.8	1.3	-0.3	0.5
Denmark	0.3	0.3	-0.3	-1.2	1.0	0.9	0.1	0.3	2.1	0.2	-0.1	-0.6	-0.4	-0.7	-0.6	-2.0
Finland	0.5	-0.5	-1.4	-0.9	2.0	0.4	0.5	-0.7	3.2	6.0	-0.5	-0.7	-0.9	0.3	-2.5	-2.7
France	0.3	0.7	-1.7	-1.2	1.7	1.6	0.0	0.5	0.0	-0.8	-2.1	-1.2	-2.3	-1.0	-1.6	-1.5
Germany	1.0	0.1	0.0	-2.6	2.1	1.6	0.8	-0.1	0.8	-3.7	0.9	-2.4	0.0	-2.2	-1.2	-2.9
Greece	..	0.4	..	-1.0	..	1.4	..	0.9	..	1.5	..	0.8	..	-0.6	..	-1.2
Hungary	..	-0.4	..	-0.9	..	0.8	..	..	..	..	..	..	..	..	..	..
Italy	0.6	0.5	-1.1	-0.6	2.7	1.2	..	0.7	0.2	-0.5	-2.1	-0.6	-0.8	-0.2	-0.9	-1.0
Japan	0.9	0.1	0.9	-2.1	1.8	1.2	0.8	-0.1	0.7	-1.6	1.9	-1.1	-0.3	-2.1	0.4	-2.3
Korea	2.8	1.5	5.1	-1.4	5.1	4.1	..	..	9.5	-1.3	10.8	0.4	5.7	-0.2	2.8	-5.4
Luxembourg	3.1	3.5	-0.2	-0.5	4.0	4.7	3.5	3.6	..	..	..	..	..	..	1.1	2.1
Netherlands	0.7	1.9	-0.7	-0.5	1.5	2.6	3.3	2.2	..	..	..	..	..	..	-0.9	-0.4
New Zealand	-2.2	2.0	-5.6	0.1	-0.6	2.5	..	..	..	..	..	..	..	..	..	..
Norway	0.6	1.0	-2.4	0.0	1.7	1.6	0.0	1.0	0.5	1.3	..	..	..	..	-2.3	-0.3
Poland	..	0.1	..	-1.9	..	1.5	..	..	..	..	..	..	..	..	..	..
Portugal	0.2	0.6	-0.5	-1.0	1.9	2.2	..	..	-1.9	0.2	0.4	-0.4	-1.7	-0.4	-0.3	-1.3
Slovak Republic	..	1.4	..	0.5	..	2.8	..	..	..	..	..	..	..	..	..	..
Spain	1.1	1.4	-0.5	0.6	2.8	2.2	1.1	1.6	0.9	0.3	0.2	0.9	-0.8	1.5	-0.9	0.2
Sweden	0.7	-0.4	-0.9	-1.6	1.5	0.1	..	1.3	-0.3	1.1	0.1	-1.0	-2.0	-1.9	-1.0	-2.5
United Kingdom	0.7	0.2	-2.7	-2.1	1.8	1.1	..	..	..	..	..	..	..	..	-2.0	-2.0
United States	1.8	1.4	-0.6	-0.8	2.5	1.8	1.8	1.3	0.3	-1.4	-1.1	0.3	-1.4	0.4	-0.2	-1.1

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A8a. **Growth in total employment in selected services industries, 1980-90**

Annual average percentage growth rates

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Commu-nication	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	3.2	2.7	2.4	4.1	1.4	1.0	2.3	5.8	3.6	..	..	..	..	..	3.1	2.3	2.9	4.2	2.1
Austria	1.4	1.1	0.9	1.6	0.7	0.8	0.3	2.9	1.7	0.8	1.8	8.1	3.6	4.2	2.0	0.7	2.0	3.5	2.4
Belgium	0.8	0.2	-0.1	1.5	-1.1	..	..	3.1	..	..	..	..	..	..	1.5	..	..	..	..
Canada	2.7	2.2	2.0	2.8	1.4	0.9	2.4	4.1	2.9	4.7	..	..	..	..	2.2	0.3	2.4	3.3	2.5
Denmark	0.8	0.1	-0.1	1.7	0.6	0.6	0.6	2.2	1.1	3.8	4.2	6.2	0.1	2.2	1.1	0.2	0.6	1.9	2.0
Finland	1.8	1.0	0.9	1.6	0.8	0.7	1.2	4.3	1.9	1.4	2.2	7.8	3.9	7.4	2.2	1.3	1.8	2.8	3.1
France	1.6	0.9	0.5	2.5	0.6	0.6	0.4	3.0	1.2	3.5	..	..	..	..	1.8	1.6	1.9	2.3	1.2
Germany	2.0	1.6	1.2	3.4	1.1	1.1	1.0	3.5	1.9	3.3	3.2	5.4	2.9	4.6	2.2	0.8	1.4	3.5	3.1
Greece	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hungary	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Italy	2.7	1.8	1.6	2.8	0.4	0.3	0.7	6.6	2.8	..	..	..	..	..	2.7	1.3	1.8	1.8	4.3
Japan	0.9	0.6	0.6	..	0.5	1.0	-1.1	2.1	1.9	4.4	..	..	..	..	3.0	-0.2	0.4	1.5	4.3
Korea	4.8	4.0	..	..	4.0	..	..	10.5	..	..	..	..	..	..	5.7	..	..	..	..
Luxembourg	4.7	1.7	2.3	-0.2	4.3	..	..	9.3	9.6	7.4	5.8	19.6	..	8.7	2.7	-0.6	1.3	6.9	6.7
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	1.9	1.1	4.0	6.2	0.6	0.7	0.5	3.6	2.1	..	5.6	10.5	1.6	7.3	1.1	0.3	0.2	2.1	3.3
New Zealand	-1.8	-0.6	-0.7	-0.2	-6.3	..	..	-1.7	-2.6	..	..	..	..	..	1.5	2.6	6.2	-2.6	0.9
Norway	1.2	0.5	0.1	3.2	0.5	0.0	2.0	3.6	2.7	5.2	0.7	6.8	1.0	4.2	2.2	1.6	2.1	2.6	2.4
Poland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Portugal	1.5	1.3	0.8	3.0	-0.1	0.0	-0.5	3.9	0.8	..	..	..	..	..	2.4	2.4	4.1	3.8	0.4
Slovak Republic	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Spain	2.0	2.0	1.6	3.4	0.3	-0.3	2.8	3.6	0.5	3.2	..	..	..	..	4.0	5.5	4.0	5.8	5.4
Sweden	2.0	1.0	0.4	4.3	0.8	0.8	0.8	4.8	2.7	..	..	..	..	..	1.2	..	..	..	..
United Kingdom	2.0	1.4	..	..	-0.2	..	..	4.0	..	..	..	..	..	..	1.5	..	..	..	..
United States	2.8	2.3	2.3	2.3	1.2	1.6	0.5	4.6	2.7	2.0	..	..	..	..	2.1	1.2	3.0	4.5	2.7

Sources : OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A8b. **Growth in total employment in selected services industries, 1990-2001**

Annual average percentage growth rates

	Business sector services	Wholesale & Retail Trade, Hotels & Restaurants			Transport, Storage & Communication			Finance, Insurance, Real Estate & Business services							Community, Social & Personal Services				
		Total	Trade	Hotels & Rest.	**Total**	Transp. & Storage	Communi cation	**Total**	Financial Intermedi-ation	Real Estate	Renting of mach. & equip.	Compu-ter rel. activ.	Res. & Develop.	Other bus. activities	**Total**	Public admin. & defense	Educ.	Health	Other com. & soc. serv.
	50-74	50-55	50-52	55	60-64	60-63	64	65-74	65-67	70	71	72	73	74	75-99	75	80	85	90-93
Australia	2.0	2.4	2.8	0.5	4.6	3.4	7.0	0.9	3.6	..	..	..	..	..	0.7	1.7	0.3	1.1	0.0
Austria	1.5	0.9	1.2	0.2	2.1	0.5	6.2	0.2	3.0	-0.4	4.1	-0.4	4.1	0.3	-0.8	0.5	-0.9	-1.4	-1.4
Belgium	1.2	1.0	1.3	-0.3	0.9	..	..	-0.1	-1.6	..	..	..	..	..	0.3	0.4	0.0	-1.3	-0.9
Canada	2.0	2.1	2.6	-0.1	2.5	1.8	3.3	0.7	2.4	0.0	5.3	..	..	..	0.1	1.8	-0.3	-0.3	0.2
Denmark	1.0	2.0	2.4	-0.9	4.0	3.2	5.9	-0.1	2.0	0.3	0.8	5.8	-0.6	-1.6	0.6	1.3	1.2	0.4	-0.2
Finland	-0.1	1.5	1.6	1.0	4.5	2.8	9.4	0.9	2.5	2.8	1.3	0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.1
France	1.6	0.5	0.8	-1.4	2.6	1.3	4.6	-1.2	-1.0	2.0	-2.1	0.3	-1.4	-1.5	0.4	1.3	0.9	0.7	-2.3
Germany	1.9	-0.5	0.3	-4.5	7.3	3.7	12.2	-0.9	3.2	-2.3	0.3	3.5	1.5	-2.6	0.3	1.6	0.1	0.8	-1.1
Greece	1.5	3.0	3.2	2.1	8.3	7.9	7.2	-0.8	5.5	-7.9	6.6	12.4	4.5	-1.8	1.3	1.4	-0.4	0.9	5.5
Hungary	1.3	0.6	0.9	-1.3	3.0	..	..	-0.6	0.6	..	..	..	..	..	2.5	2.2	2.2	2.9	2.3
Italy	1.5	0.8	1.3	-1.2	3.4	1.3	9.1	-1.3	1.7	-0.3	..	1.0	..	0.0	0.2	1.5	-0.4	0.5	-0.1
Japan	0.7	1.6	..	..	1.4	-1.5	9.5	2.4	4.0	1.9	..	..	..	..	-0.5	0.7	0.8	1.0	-2.0
Korea	4.4	1.9	3.2	0.5	6.0	..	..	-1.0	4.4	..	..	..	..	..	-0.3	-1.4	-0.9	-3.4	-0.1
Luxembourg	5.1	1.5	2.4	-2.2	7.0	..	..	-2.8	0.2	-3.2	1.6	-4.9	..	-4.2	-0.2	-0.2	-0.3	2.5	-2.8
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	3.3	0.6	1.0	-1.8	2.6	1.0	5.6	-0.4	0.6	-1.1	0.2	-0.4	-2.7	0.7	-0.2	1.0	0.4	-1.1	-0.4
New Zealand	2.4	0.9	1.6	-1.6	5.9	..	..	-0.7	5.6	..	..	..	..	..	0.3	1.1	-0.1	1.4	1.0
Norway	1.5	4.8	5.4	0.5	3.1	1.2	9.5	-0.2	5.4	-5.6	1.3	-2.1	0.5	-0.4	0.4	1.4	0.5	-0.3	2.0
Poland	2.0	2.9	3.0	2.5	5.5	..	..	-2.0	11.0	..	..	..	..	..	0.8	-0.7	0.9	0.4	0.1
Portugal	2.0	1.3	1.4	0.3	4.9	3.9	10.3	-1.0	7.8	..	..	..	..	..	-0.2	0.4	-0.6	-0.6	0.1
Slovak Republic	3.4	-2.0	-3.4	10.0	1.2	..	..	10.5	-6.3	..	..	..	..	..	6.0	3.4	-6.6	9.8	17.3
Spain	2.3	-0.1	0.2	-1.0	2.3	1.7	4.2	-1.8	-0.7	-2.0	0.6	2.1	-3.2	-0.4	0.6	1.3	0.6	0.8	-0.4
Sweden	0.6	3.3	3.3	2.4	3.9	2.2	7.0	-0.1	3.2	1.4	5.0	-2.6	..	-0.9	0.5	..	..	..	..
United Kingdom	1.2	2.1	..	..	4.3	..	..	1.2	..	..	..	..	..	..	1.0	..	..	..	..
United States	1.9	3.6	3.8	0.5	2.7	1.3	4.2	0.8	3.6	1.4	..	..	..	..	-0.4	0.1	-0.7	-1.0	-0.5

Sources: OECD STAN Database and OECD STAN Indicators Database, 2004.

Table A9. **Percentage share of selected services in total gross fixed capital formation**[1]

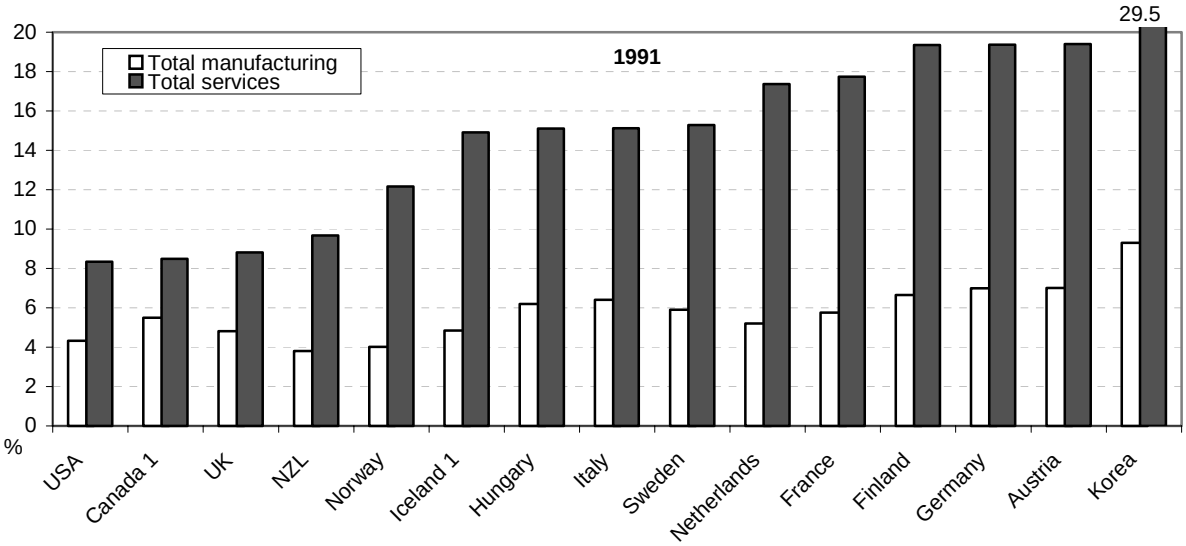
	50-52		55		60-63		64		65-67		70		71-74		80		85	
	Wholesale & Retail trade		Hotels & Restaurants		Transport & Storage		Post & Tele-communication		Financial intermediation		Real Estate		Renting machinery; business services		Education		Health & social work	
	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
Australia	5.9	5.8	2.0	1.6	8.6	8.1	3.7	4.5	5.6	3.8	22.6	25.2	6.1	5.8	3.1	3.0	3.2	3.1
Austria	6.8	6.8	2.5	2.3	8.6	9.2	4.4	3.3	2.5	3.1	29.5	32.9	4.6	7.5	1.9	1.1	2.4	3.7
Belgium	10.0	8.8	2.1	1.3	..	..	..	..	5.3	4.1	..	..	..	..	1.1	1.0	2.7	2.0
Canada	4.6	6.3	1.8	0.8	7.4	7.4	5.7	7.0	6.3	9.6	6.1	1.5	4.0	7.2	3.4	3.2	2.0	2.6
Finland	7.5	4.5	1.1	0.4	8.0	8.9	2.5	3.5	2.3	1.8	34.7	37.4	1.9	3.3	3.3	2.9	3.2	2.9
France	4.9	5.3	1.9	1.5	6.2	5.6	3.2	2.5	4.8	3.9	29.8	32.8	7.0	10.3	2.2	2.8	3.2	3.4
Germany	4.9	4.4	0.7	0.6	5.1	5.7	4.1	2.8	2.3	2.3	26.2	29.6	11.8	16.5	2.0	1.9	4.4	5.0
Greece	..	9.6	..	5.0	..	9.1	..	4.0	..	1.2	..	0.2	..	2.1	..	3.5	..	2.0
Hungary	5.4	8.0	1.9	1.0	..	..	..	..	3.7	1.9	..	..	..	..	1.7	2.2	2.4	1.8
Ireland	..	8.0	..	1.6	11.9	..	3.3	..	3.3	3.0	..	..	..	..	1.4	1.8	1.3	3.0
Italy	5.8	7.9	1.4	2.2	..	..	..	..	2.4	1.3	..	..	..	..	1.3	1.6	2.8	2.1
Netherlands	7.2	6.8	0.9	0.9	7.9	..	2.6	..	6.1	7.8	24.9	27.3	6.0	8.3	1.3	1.0	3.1	2.5
Norway	3.3	3.7	0.8	0.8	12.7	9.7	2.4	3.9	2.0	2.3	15.2	..	1.7	..	2.7	3.1	4.1	5.1
Poland	..	11.6	..	1.2	..	..	..	..	..	5.6	..	..	..	..	..	3.5	..	2.1
Sweden	6.3	6.9	1.2	1.1	9.5	11.2	3.1	5.0	2.0	2.0	..	17.3	..	8.8	..	3.1	..	2.9
United Kingdom	8.4	..	2.2	..	6.9	..	4.2	..	10.2	..	..	..	..	..	2.4	..	3.2	..
United States	12.7	12.8	1.0	0.9	3.5	4.9	6.2	8.7	9.8	11.5	8.7	6.7	4.6	6.6	0.1	0.1	1.6	1.8

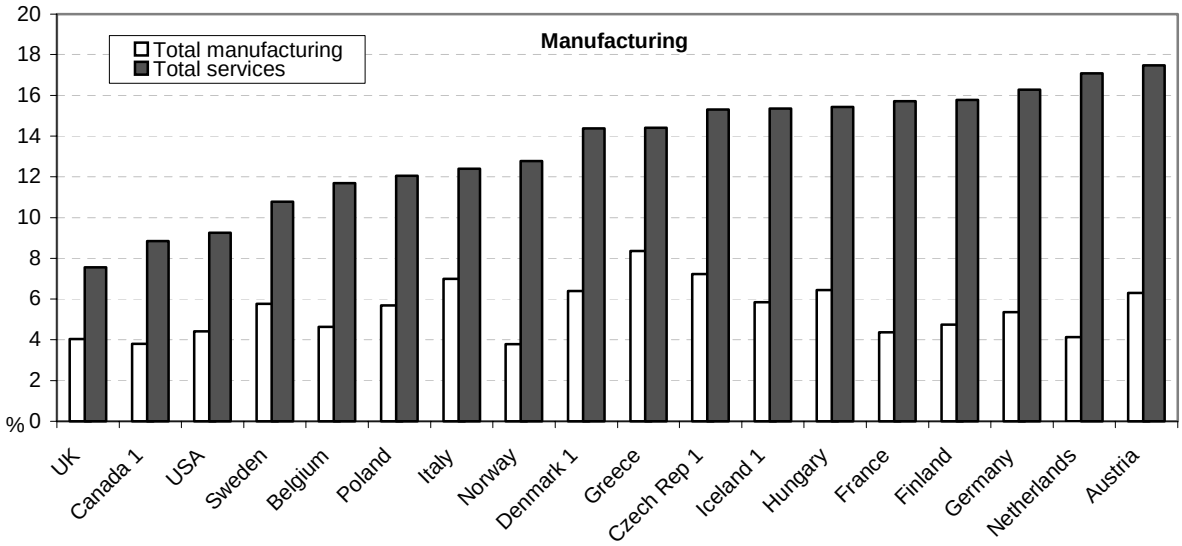
1. Or nearest available year. Large cross-country differences in certain industries, *e.g.* real estate and education may be due to differences in statistical treatment.

Source : OECD STAN Database, 2004.

Figure A2. **Investment intensity for manufacturing and services, 1991 and 2001**[1]

Total GFCF as a percentage of gross output





1. Or nearest available year.

Source : OECD STAN Database, 2004.

Table A10. **Investment intensity for broad services groups**[1]

Total GFCF as a percentage of gross output

	50-52 Wholesale & Retail Trade		55 Hotels & Restaurants		60-63 Transport & Storage		64 Post & Telecommunication		65-67 Financial Intermediation		71-74 Renting of Machinery; Business Services		80 Education		85 Health & Social work	
	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001	1991	2001
Austria	14.3	13.1	9.3	8.2	24.0	22.3	40.5	16.9	7.1	7.4	14.3	13.6	7.6	4.4	8.6	10.7
Belgium	..	9.0	..	6.8	..	..	..	..	..	8.5	..	..	..	3.2	..	4.2
Canada [1]	8.7	8.1	6.0	2.6	17.2	16.7	21.6	23.8	9.3	13.5	7.9	10.7	7.0	7.6	3.8	5.7
Czech Rep [1]	8.1	11.0	..	4.5	..	24.7	..	39.3	..	5.2	..	6.9	..	13.9	..	13.7
Denmark [1]	11.5	11.9	..	6.6	..	17.0	..	12.5	..	6.1	..	10.2	..	8.2	..	4.4
Finland	13.9	10.8	6.4	2.6	18.0	16.6	21.8	15.3	9.7	7.3	6.2	6.1	11.7	10.1	6.9	6.1
France	12.5	11.3	9.2	6.7	19.4	13.9	25.9	13.9	12.4	9.3	8.9	9.6	9.6	10.2	9.0	8.1
Germany	13.6	11.7	5.4	4.3	16.3	14.6	36.8	15.6	6.9	5.5	21.0	19.2	10.6	8.7	14.4	12.2
Greece	..	16.0	..	10.3	..	30.2	..	24.1	..	4.3	..	12.2	..	18.9	..	8.1
Hungary	9.8	10.7	11.3	6.8	..	..	..	..	12.7	7.3	..	..	6.3	9.1	8.8	6.7
Iceland [1]	11.6	13.0	..	8.1	11.1	..	20.7	..	..	1.9	..	..	..	0.1	..	1.9
Italy	11.7	10.5	5.6	6.8	..	..	..	..	6.0	2.5	..	..	4.7	5.9	6.6	4.5
Korea	17.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	12.0	12.0	5.7	5.0	19.9	15.3	20.6	31.8	18.8	17.0	10.2	10.0	5.8	5.2	7.7	7.4
New Zealand	8.0	..	4.5	..	6.6	..	19.8	..	3.1	..	..	..	10.5	..	5.0	..
Norway	11.5	11.0	5.2	5.7	13.8	10.3	15.5	13.7	5.8	10.0	4.4	3.7	9.6	10.3	8.3	9.1
Poland	..	10.6	..	11.6	..	..	..	..	..	23.7	..	..	..	13.6	..	8.3
Portugal	12.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sweden	12.0	9.2	..	6.1	15.9	15.5	17.8	18.6	..	6.8	..	7.7	..	7.4	..	4.0
United Kingdom	7.9	6.7	6.1	7.3	..	11.7	..	26.4	13.0	5.1	..	..	5.7	6.3	4.8	2.3
United States	7.4	8.4	9.2	9.2	7.2	11.7	15.9	19.4	11.2	11.9	5.3	6.0	1.1	1.3	2.1	2.5

1. Or nearest year available.

Source : OECD STAN Database, 2004.

Table A11. **Percentage share of selected services in total business expenditure on R&D**

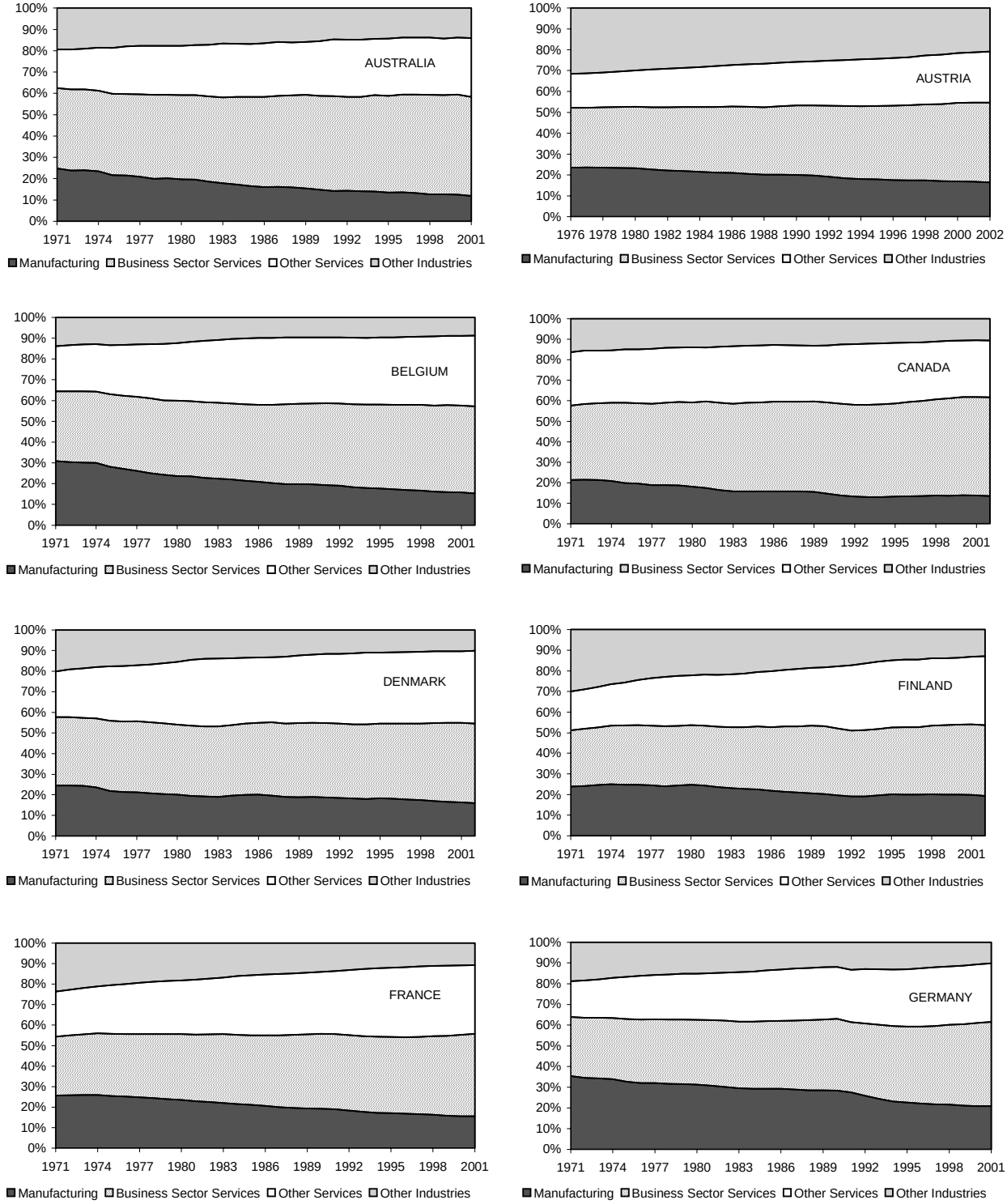
	Wholesale & Retail trade; Repairs		Transport & Storage		Post & Telecommunication		Financial Intermediation		Computer & Related Activities		Research and Development		Other business activities	
	50-52		60-63		64		65-67		72		73		74	
	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001	1995	2001
Australia [1]	0.1	..	..	..	..	..	0.1	..	17.6	22.6	..	..	..	..
Belgium	1.6	1.0	0.1	1.0	0.6	1.5	2.4	0.7	4.3	3.9	0.4	0.2	4.5	5.0
Canada	6.9	4.4	0.2	0.3	2.7	0.5	3.5	1.6	6.8	7.9	9.2	8.7	2.8	3.1
Czech Republic	0.0	1.2	0.0	0.8	0.0	0.1	0.0	0.0	0.0	2.5	21.2	19.5	0.9	1.8
Denmark [2]	5.0	7.5	..	..	2.4	6.8	..	2.2	7.6	9.8	3.0	7.1	13.2	5.6
Finland	0.0	0.1	0.5	0.5	3.3	5.9	..	..	3.9	4.5	..	..	0.7	0.5
France [1]	..	0.0	3.0	5.2	..	..	..	..	2.5	2.6	..	..	1.6	2.9
Germany [2]	0.1	0.4	0.7	1.2	..	..	0.1	0.0	0.4	2.6	0.7	2.6	1.4	1.3
Ireland [2]	0.0	0.0	0.1	0.0	3.2	9.2	0.9	0.0	4.5	11.5	0.3	2.3	0.6	1.5
Italy	0.2	0.6	0.2	0.1	1.5	0.1	0.0	2.5	1.3	2.6	6.5	11.8	0.9	2.2
Japan	..	0.4	0.2	0.2	..	..	..	0.0	..	1.6	..	4.8	..	0.2
Korea	..	0.4	..	0.0	..	3.0	..	0.0	..	6.4	..	0.3	1.3	2.1
Netherlands [1]	3.5	4.0	..	0.6	2.8	1.9	0.3	2.2	0.9	5.4	0.8	2.5	3.1	3.1
Norway [3]	0.6	..	0.5	..	6.8	..	1.1	..	6.5	..	21.2	..	4.0	..
Poland	0.2	0.3	1.7	2.6	3.0	5.1	0.0	0.1	0.4	0.1	5.1	3.3	0.0	0.1
Spain	0.1	0.7	0.4	0.2	3.5	8.6	0.0	0.6	3.1	6.2	0.2	16.7	5.1	3.9
Sweden	0.2	0.1	..	0.0	2.5	1.3	..	1.1	1.5	5.0	5.0	3.5	0.6	0.3
United Kingdom	..	0.4	..	0.1	4.5	5.8	..	..	7.4	5.7	2.7	3.9	2.9	2.7
United States [1]	..	12.6	..	0.1	..	..	..	2.0	4.9	7.4	3.5	7.0	..	..

1. Data refer to 2000.
2. Data refer to 1999.
3. Data refer to 1998.

Source : OECD ANBERD Database, 2003.

Figure A3. **Structural change over time**

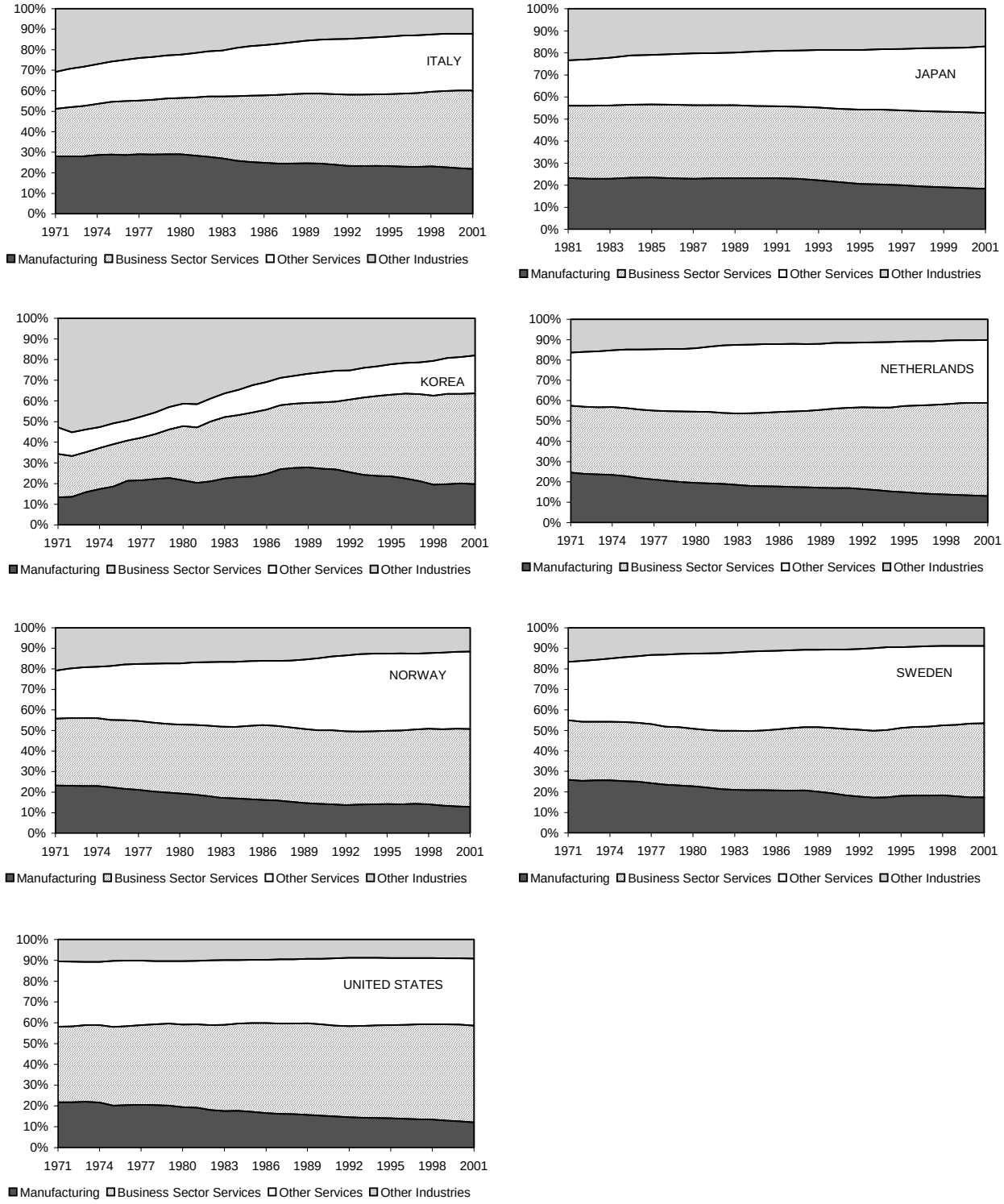
Employment per broad industry group as a percentage of total employment, 1980-2002



Source : OECD STAN Database, 2004.

Figure A3. *(contd.)* **Structural change over time**

Employment per broad industry group as a percentage of total employment, 1980-2002



Source: OECD STAN Database, 2004.