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'Manufacturing or Services - That is (not) the Question'

THE ROLE OF MANUFACTURING AND SERVICES IN OECD ECONOMIES

Koen De Backer,

Isabelle Desnoyers-James,

Laurent Moussiegt



FOREWORD

Manufacturing features – again- high on the policy agenda within OECD countries; there is an ongoing debate about the arrival of a manufacturing renaissance in the United States and also in other OECD countries there is a renewed interest in the manufacturing sector among analysts and policymakers alike. While deindustrialisation and offshoring have dominated the news about manufacturing over the past decades, recent years have witnessed a number of examples of companies re-shoring activities back to OECD economies.

Accordingly, the discussion about the need for industrial policies in favour of manufacturing has gained importance in OECD economies in recent years. But policy discussions often seem to ignore the profound changes manufacturing has undergone in recent years; for example, manufacturing today is much more than the pure production of tangible things. This paper addresses this issue against the background of long-term structural change of OECD economies and discusses the changing role of manufacturing and services in OECD economies.

The OECD Committee for Industry, Innovation and Entrepreneurship (CIIE) has a long tradition of studying structural change and undertaking industrial analysis in OECD economies. This paper builds on the 2006 STI Working Paper on 'The Changing Nature of Manufacturing' (Pilat et al., 2006) and incorporates new insights on the manufacturing – services debate resulting from recent OECD work on Global Value Chains (OECD, 2013a) and Knowledge-Based Assets (OECD, 2013b).

The paper has benefitted from the financial support of the Australian government, which was granted to the OECD Science, Technology and Industry Directorate for the preparation of two reports: 'Australian manufacturing in the global economy' (OECD, 2013c) and 'Australian services in the global economy' (OECD, 2014).

This paper was written by Koen De Backer, Isabelle Desnoyers-James and Laurent Moussiegt of the OECD Secretariat.

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TABLE OF CONTENTS

FOREWORD 2

EXECUTIVE SUMMARY 4

1. Introduction 6
2. Structural change within OECD economies 7
   2.1 A long-term trend of deindustrialisation 7
   2.2 OECD economies in global manufacturing 12
   2.3 The growing tertiarisation of OECD economies 14
3. The traditional question: manufacturing or services? 16
   3.1 The case for manufacturing 16
   3.2 The rise of 'modern' services and the growing progressive character of services 19
4. Growing and complex interactions between manufacturing and services 29
   4.1 The blurring between manufacturing and services 29
   4.2 The servitisation of manufacturing 31
5. What does this mean for policy? 37

ANNEX 1: DATA ANNEX FIGURES 2 AND 4 42

ANNEX 2: INTERNATIONAL STATISTICS ON SERVICES TRADE 44

NOTES 47

REFERENCES 49

EXECUTIVE SUMMARY

In the aftermath of the financial/economic crisis of 2007/2008, the debate on the role of manufacturing and services has resurfaced more prominently on the policy agenda in OECD countries. The question is raised whether OECD economies can continue to grow without a solid manufacturing base (market and non-market services account for about three quarters of GDP in the OECD nowadays). The long-term process of deindustrialisation has irreversibly resulted in decreasing employment in manufacturing and a declining share of manufacturing in overall economic activity in OECD economies. Some commentators foresee in this downward trend a gloomy future for manufacturing industries in OECD economies, particularly in light of the growing competition of emerging economies. Due to the emergence of global value chains (GVCs), emerging economies have been able to integrate into the global economy faster and more deeply than in the past. China for example has become the largest manufacturer in the world because of its low labour costs, as well as its large and growing market.

The importance of OECD countries in global manufacturing has consistently dropped over past decades, but nevertheless OECD economies still accounted for almost 60% of world manufacturing value added in 2012. International production fragmentation in manufacturing has led to a division of labour where OECD countries have become increasingly specialised in upstream activities like R&D, design, innovation, etc. while some emerging countries have become more specialised in manufacturing and assembly activities. As a result, OECD countries specialise in the production of ideas, concepts and services (often higher value added activities), but less so in the production of physical goods.

The call for industrial policies in favour of manufacturing has gained importance in OECD economies in recent years. A number of OECD countries have launched industrial policy initiatives to support their manufacturing industries, some in response to the apparently successful policies of fast-growing emerging economies. The fear exists that the loss of certain manufacturing/assembly activities may result in a loss of innovative capabilities in the longer-term. This fear is compounded by the observation that OECD countries also face increasing competition from emerging economies in innovative, R&D, and higher value added activities. Further on, in a context of weak growth and high unemployment, the call for industrial policy also resonates with concerns that manufacturing competitiveness no longer comes with much employment; although it is very unlikely that manufacturing will again become the job creating machine (including for lower skilled people) it once was in OECD economies.

Several arguments have been put forward about the need for manufacturing; the rationale for policies aimed at the manufacturing sector is often based on the particular and strategic role of manufacturing because of its important spill-over effects to other sectors within national economies. On the one side, growing evidence strongly qualifies the arguments traditionally used in defence of 'progressive' manufacturing: innovation, productivity growth and international tradability in some services sectors is catching up rapidly. At the same time, services show growing and complex interactions with other sectors including manufacturing. But on the other side, evidence highlights the central role manufacturing still plays in OECD economies by orchestrating GVCs across different countries, sectors and products. The growing internationalisation of business services is to a large extent tied to the global reach of manufactured products; likewise, innovation in manufacturing and services becomes increasingly bundled in products and processes.

While defining and implementing industrial policies for specific sectors has always been a difficult exercise, it is clear that manufacturing is no longer the same as the production of goods. The policy discussion on manufacturing and services needs to take into account the changing characteristics of both sectors and thus needs to go beyond the traditional product definitions and statistical classifications. Manufacturing industries increasingly sell and buy services, while services industries have become very similar to manufacturing industries. A number of firms that are classified as services firms are in reality manufacturing firms that have re-organised their activities on an international scale within GVCs. The competitiveness of manufacturing firms in OECD countries is increasingly linked to 'intangible' services activities like design, R&D, sales, logistics, etc. The blurring boundaries between manufacturing and services make them that effective targeting of manufacturing has become increasingly difficult.

In recent years, the advent of a new industrial (or production) revolution is increasingly promoted in discussions on the future of manufacturing, since it is felt that this would generate new and important opportunities for OECD countries. Re-shoring (as opposed to offshoring) is argued to become increasingly important and expected to lead to a revival of manufacturing in OECD economies. While a number of companies (especially in the United States) have been reported to be increasingly considering bringing activities back, it is still unclear if this re-shoring will effectively turn in a broad trend of bringing manufacturing activities back home. Since reshoring is not feasible for every type of manufacturing operation – for example activities with a high labour content destined for emerging markets, its acclaimed employment gains (especially for lower skilled people) should be interpreted with care. The attractiveness of emerging countries like China for manufacturing activities is also due to their large and growing markets, in sharp contrast to the stagnating markets in OECD countries.

A number of technological advances across a broad range of domains is expected to change the outlook of global manufacturing drastically. Technological advancements in digital manufacturing, advanced robotics, bio- and nanotechnology, photonics, micro-and nano-electronics, new materials, etc. could indeed lead to a range of new business models for manufacturers in OECD economies. These profound changes and complex uncertainties in the manufacturing environment have implications for policy making. The ambition of further OECD work is to better understand the key structural changes that could occur and assess the implications these technological changes and the resulting business dynamics will have for a wide range of policies

'MANUFACTURING OR SERVICES: THAT IS (NOT) THE QUESTION'

THE ROLE OF MANUFACTURING AND SERVICES IN OECD ECONOMIES

1. Introduction

The role of manufacturing and services has been high on the policy agenda in OECD countries for many decades. OECD economies are characterised by a long-term process of deindustrialisation with continuously decreasing employment in manufacturing – very significantly in some countries like the United States and the United Kingdom - and a declining share of manufacturing in overall economic activity. Some commentators foresee in this downward trend a gloomy future for manufacturing industries in OECD economies, particularly in light of the growing competition of emerging economies. Over a relatively short period, countries like China have gained important market shares in global manufacturing, first in more traditional manufacturing industries, but in more recent years, increasingly also in higher technology industries.

International production fragmentation in manufacturing has led to a division of labour where OECD countries have become increasingly specialised in upstream activities like R&D, design, innovation, etc. while some emerging countries have become more specialised in manufacturing and assembly activities. As a result, OECD countries specialise in the production of ideas, concepts and services, but less so in the production of physical goods. The fear is that the loss of certain manufacturing/assembly activities may result in a loss of innovative capabilities in the longer-term. This fear is compounded by the observation that OECD countries also face increasing competition from emerging economies in innovation, R&D, and higher value added activities. The question more broadly is whether OECD economies can continue to grow without a solid manufacturing base; and whether the decline in manufacturing will threaten technological progress and innovation and thus the long-term future of OECD countries.

Policy makers still struggle to come to grip with the causes, the size and the effects of structural change in general, and the balancing between manufacturing and services in particular, within their national economies. Questions have been raised whether the preponderance of services in OECD economies is becoming a constraint on growth. Over the years, several arguments have been articulated about the need for manufacturing, and its positive effects on the rest of the economy. In contrast, services have traditionally attracted less attention, largely since many aspects of the role of services in the economy remain poorly understood. Numerous calls for government policies to support manufacturing have been raised during these discussions. The fact that the manufacturing success of some emerging economies is attributed to the implementation of active government policies, justifies - according to some – the claims for a new "industrial policy" to support manufacturing in OECD economies.

The financial/economic crisis of 2007/2008 has again revived the manufacturing debate as some OECD economies with a strong financial services sector were severely affected by the crisis, whereas some countries with strong and internationalised manufacturing sectors experienced more limited impacts from the crisis. Some interpret this as evidence of the importance of producing physical goods for national economies, although there are also examples of countries with a large share of manufacturing in the economy that are nevertheless performing badly in economic terms.

This paper seeks to help improve our understanding of this important but complex discussion by providing empirical evidence on the process of structural change in OECD economies and exploring possible causes and effects. The paper discusses the arguments that have been raised in defence of manufacturing and contrasts these with the changing structural characteristics of services, and particularly those which complement manufacturing. The paper also focuses on the growing and complex interactions between manufacturing and services as global value chains (GVCs) have become pervasive.

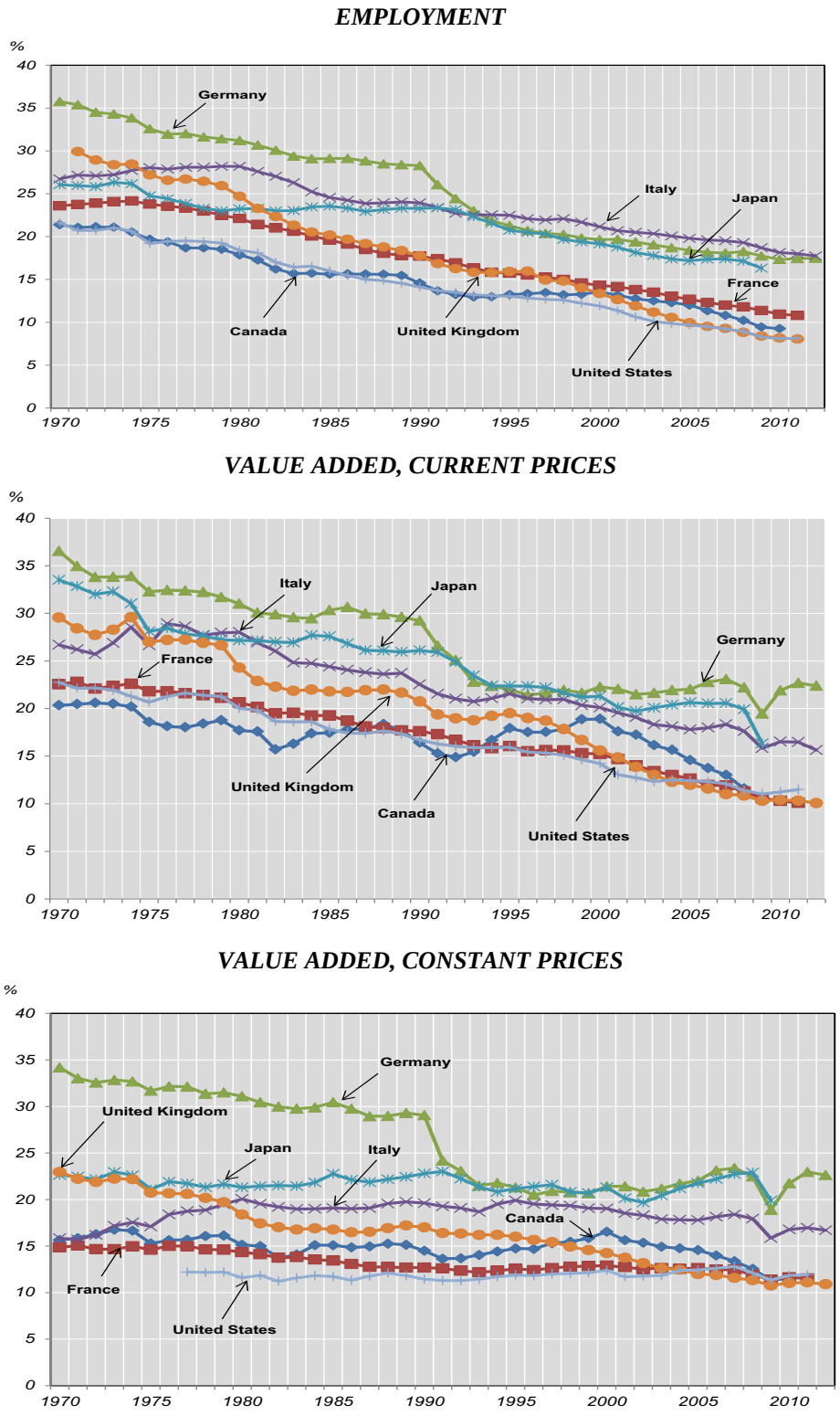
2. Structural change within OECD economies

2.1 A long-term trend of deindustrialisation

The structural composition of OECD economies has drastically changed during the past decades, moving first from agriculture to manufacturing and later to services within the process of structural change. In the initial stages of economic development, agriculture typically accounts for the bulk of GDP and employment, as is still the case today in many developing countries. In later stages, as economies industrialise, the share of agriculture in total value added and employment typically declines and the manufacturing sector grows.[1] Most OECD economies are beyond this stage now and are characterised by a long-term trend of de-industrialisation, i.e. a decreasing importance of manufacturing.

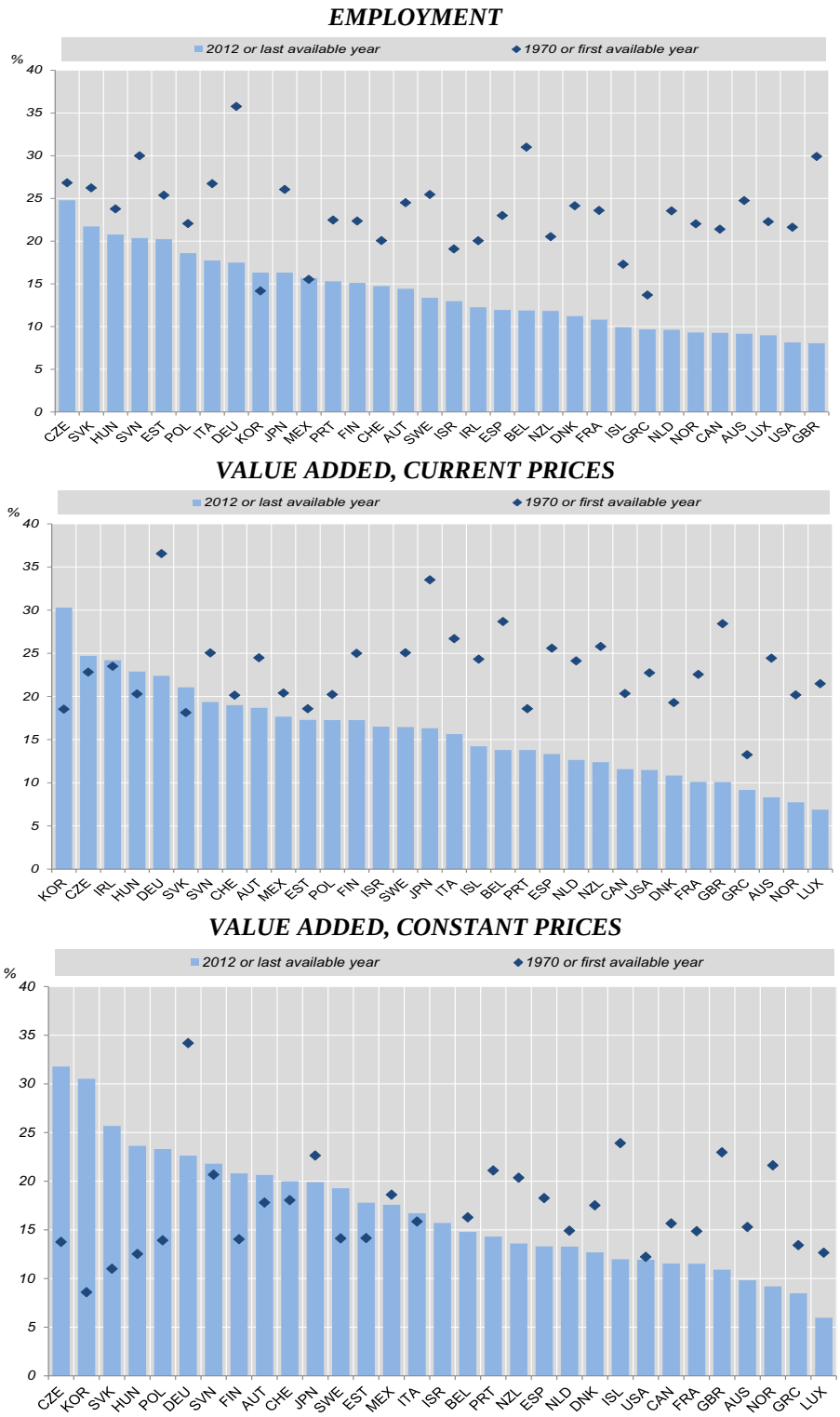
The steady decline of manufacturing is most prominent in terms of employment, explaining why the de-industrialisation debate in OECD countries often focuses on the loss of manufacturing employment.[2] The share of manufacturing in national employment has continuously - i.e. year after year - decreased since 1970 in the G7 countries (Figure 1). The experience is somewhat different for other OECD countries like Korea, Turkey, Mexico and Eastern European countries who have witnessed a period of strong manufacturing growth in employment in the 1970s and/or 1980s. However, even in these countries the share of manufacturing in total employment has been decreasing more recently. During the past decades, the share of manufacturing in total employment has significantly decreased in all OECD countries except for Korea and Mexico[3] (Figure 2).

Figure 1. Share of manufacturing in total employment and value added (current and constant prices), G7 countries, 1970-2012



Note: Germany = West Germany before 1991.
Source: OECD Structural Analysis (STAN) Database including provisional data.

Figure 2. Share of manufacturing in total employment and value added (current and constant prices), OECD countries, 1970 and 2012



Note: 1) Germany = West Germany before 1991.
2) See Annex 1 for more detail on the first and last available year for individual countries.
Source: OECD Structural Analysis (STAN) Database including provisional data.

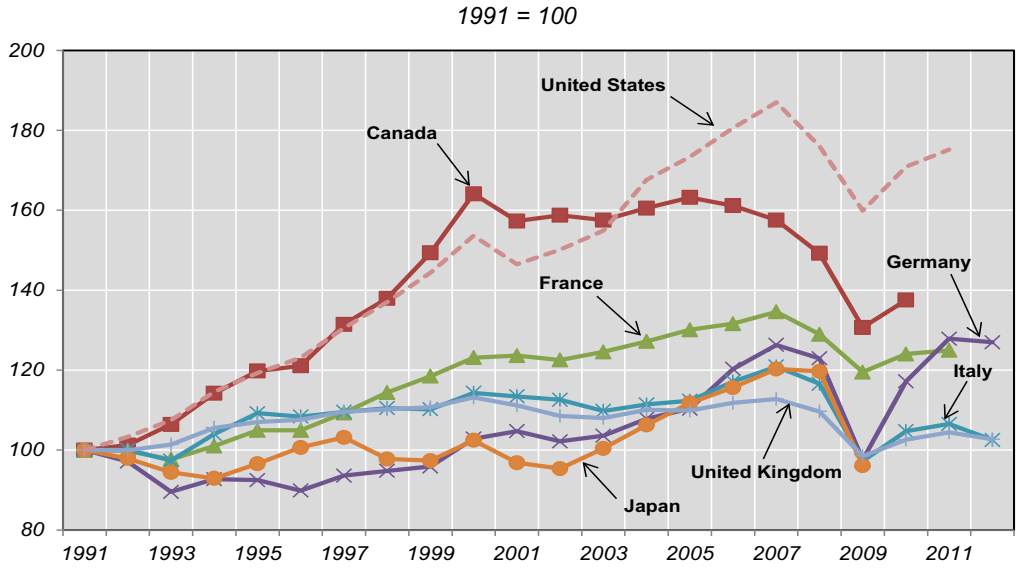
A long-term declining trend in manufacturing nominal value added is also observed, although manufacturing's share in value added (in current prices) seems to be relatively more volatile; in fact, in some G7 countries an increase in manufacturing's share has been observed for some years (Figure 1). Along the same lines, the share of manufacturing in value added has fallen between 1970 and 2012 in the majority of OECD countries; Korea, Hungary, Ireland, the Czech Republic and the Slovak Republic show however a higher share of manufacturing in value added in most recent years (Figure 2). Consistent with these observations, Fiorini et al. (2014) reported that for OECD economies as well as large emerging economies, an index of structural change – reflecting the percentage of economic activity that is being reshuffled across sectors, show smaller values in value added than in employment.

The share of manufacturing in value added in constant prices, i.e. value added in volume terms, however does not really display a significant trend in G7 countries; in countries like the United States, Canada and Japan, this share shows a remarkably stable pattern (Figure 1). Econometric analysis of structural change in 15 OECD countries also demonstrated that the share of manufacturing industries in value added (in constant prices) has not significantly decreased since 1970 (Imbs, 2014). In fact, there are quite a number of OECD countries who have witnessed an increase in the share of manufacturing in value added (in volume terms) between 1970 and 2012: in addition to the countries mentioned above like Korea, Hungary, the Czech Republic and the Slovak Republic, also Poland, Finland, Sweden, Slovenia, Switzerland, Estonia, Austria, etc. (Figure 2). The diverging evolution between value added shares in nominal and volume terms reflects two major trends: first, labour productivity has grown significantly faster in manufacturing than in the economy as a whole; and, second, the de-industrialisation of OECD economies is partially due to price effects with price levels increasing less in manufacturing than in other industries.

De-industrialisation reflects in essence the declining importance of manufacturing in national economies relative to other industries (i.e. services); but this does not mean that manufacturing production and value added have contracted in absolute terms. While it is true that manufacturing employment has fallen, the output of the manufacturing industry has continued to grow, reflecting strong productivity growth in manufacturing. Except for Japan and Greece, value added (in constant prices) has significantly increased in G7 and other OECD countries over the period 1991-2012, which illustrates the large and growing demand for manufactured products (Figures 3 and 4). For example, up to the financial/economic crisis of 2007/2008, manufacturing production almost doubled between 1991 and 2010 in the United States. The 2007/2008 crisis has abruptly stopped this growth process and a considerable drop in value added is observed in all G7 countries, although growth has picked up again since then.

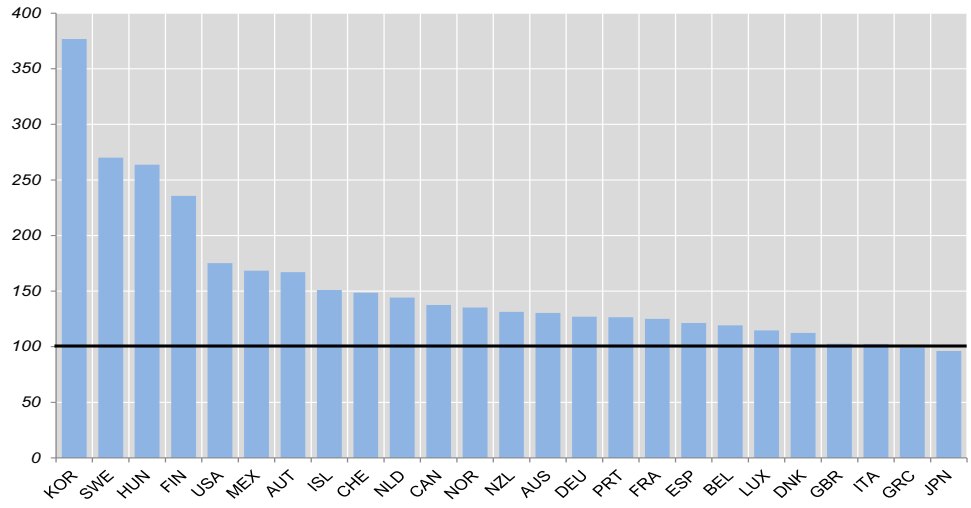
While overall manufacturing employment has declined, not all manufacturing industries have performed equally in OECD economies. Although there are significant differences across OECD countries (Pilat et al., 2006), higher technology intensive industries have typically fared better in OECD economies which largely reflects the shift in comparative advantage of OECD countries towards more knowledge and technology intensive industries. In contrast, lower technology intensive industries have witnessed major job losses in OECD economies, particularly during the most recent time period for which data are available (Figure 5), which may be linked to the growing importance of emerging economies like China.

Figure 3. Index of manufacturing value added (in constant prices), G7 countries, 1991-2012



Source: OECD Structural Analysis (STAN) Database including provisional data.

Figure 4. Index of manufacturing value added (in constant prices), OECD countries, 1991 and 2012



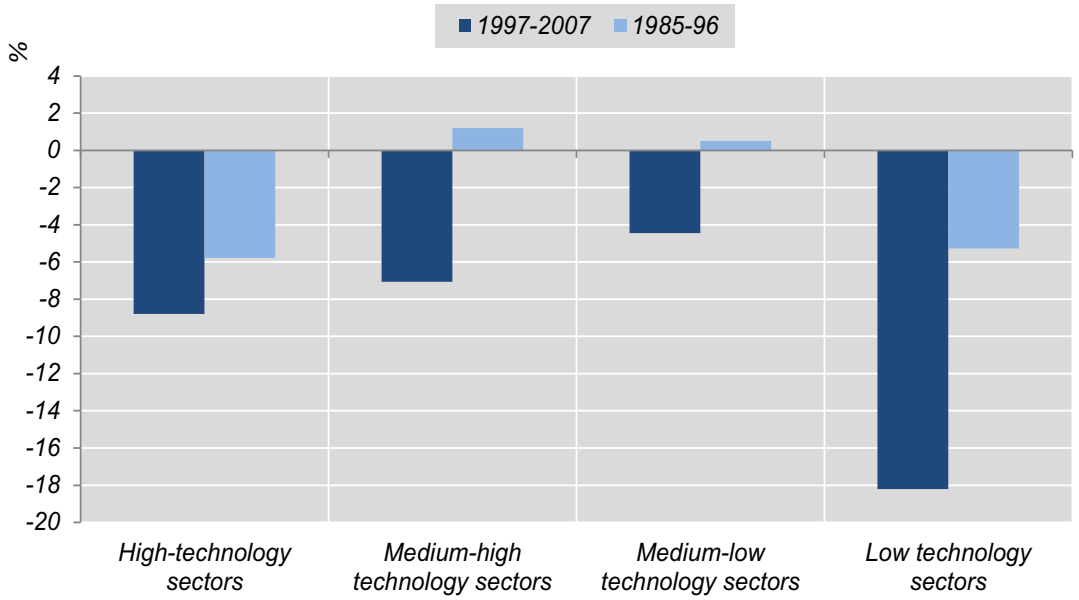
Note: See Annex 1 for the first and last available year for individual countries; given that years differs across countries, differences between countries should be interpreted with care.
Source: OECD Structural Analysis (STAN) Database including provisional data.

There is however no clear-cut shift from low- to high-technology industries, as higher technology intensive industries have also experienced employment losses in OECD economies. This is partially explained by the growing international fragmentation of production in Global Value Chains (GVCs), where production processes are increasingly unbundled, and different activities in the value chain are located in many countries. This slicing and dicing of production processes into GVCs has pushed the international division of labour one step further, with not only lower technology/labour intensive industries but also labour intensive activities (also within higher technology intensive industries) more and more undertaken in emerging economies. In the past decades, many (multinational) firms have often offshored

the most labour intensive industries and activities (like *e.g.* assembly) towards emerging countries in search of lower costs and higher efficiency.

In contrast, the creation and growth of value added and employment in OECD manufacturing is increasingly linked to innovation and knowledge. This is true of high- as well as low-technology intensive industries, as innovation allows manufacturing firms to compete on aspects other than costs alone. Broadly speaking, innovation stems from the accumulation of so-called intangible (or knowledge-based) assets, which can be categorised as computerised information, innovative property (including R&D) and economic competencies (including firm-specific capital and organizational capital). Investments in brand equity, design, organizational capital, business models etc. allow OECD manufacturers, typically operating in high cost environments, to compete on a global scale (OECD, 2013b).

Figure 5. Employment growth, manufacturing by technology intensity in selected OECD countries, 1985-1996 and 1997-2007



Note: *1985-1996: Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Korea, Spain, Sweden and the United States.*
1997-2007: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Portugal, Spain, Sweden and the United States.
Source: *OECD Structural Analysis (STAN) Database.*

2.2 OECD economies in global manufacturing

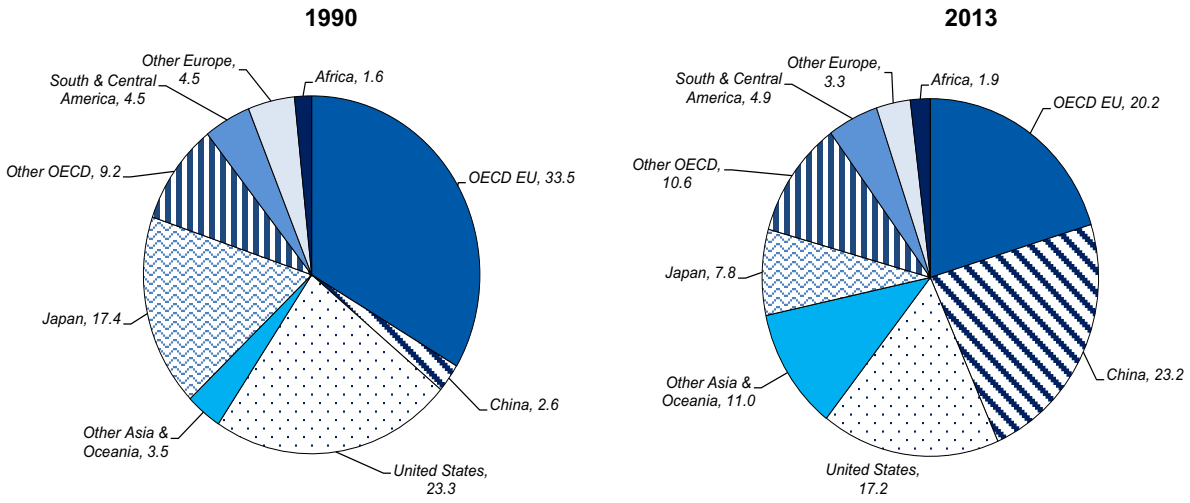
Due to the emergence of global value chains (GVCs), manufacturing has become increasingly fragmented internationally with subsequent stages of the production process located in a growing number of countries across the globe (OECD, 2013a). Emerging economies have been able to integrate into the global economy faster and more deeply than in the past; the strong manufacturing growth of Southeast Asia and China in particular is closely related to the growing importance of GVCs. While before countries had to develop a strong industrial base and build up whole value chains, they can now seek to join a global value chain by specialising in specific activities and start to export more quickly and at a lower cost (OECD, 2013a).

Emerging economies have been very attractive locations for production especially for more labour intensive activities, since their labour costs are a fraction of these of more developed economies (Pilat et al. 2006). Although labour costs account for only a fraction of total production costs (with considerable differences across industries), it is often one of the main factors that drive the location choices of firms, particularly in labour-intensive industries[4] (OECD, 2011). A recent study (Hepburn, 2011) documents that emerging regions have increased their share in value added especially in more traditional industries like Food and Beverages, Textiles and Apparel, Leather and Footwear, Paper, etc.

The attractiveness of countries like China, India and Brazil is not only determined by lower labour costs, but also by their large and rapidly growing home markets. China and India in particular, the two most populated countries in the world, are expected to quickly become important markets for manufacturing products as they experience fast economic advancements as reflected in their high GDP growth rates. Global consumer demand has so far been concentrated in (rich) OECD economies, but a new middle class[5] is rapidly emerging in Asia, particularly in China and India. While the size of the middle class could globally increase from 1.8 billion people to 3.2 billion by 2020 and to 4.9 billion by 2030, almost 85% of this growth is expected to come from Asia. In 2000, Asia (excluding Japan) only accounted for 10% of the global middle class spending, but this could reach 40% by 2040 to climb to almost 60% cent in the long-term (Kharas, 2010).

As a result, emerging economies have become important players in global manufacturing (Figure 6); China has become the largest manufacturer in the world and accounted for almost a quarter of global manufacturing's value added in 2013. Asia and Latin America account for most of emerging economies' manufacturing, but the growth in Asia has been four to five times faster than Latin America during the last decade; Africa accounted for only a small share of 1.9% in world manufacturing value added. The importance of OECD countries in global manufacturing has consistently dropped during the past decades; OECD economies accounted for 55% of world manufacturing value added in 2013 compared to 83% in 1990. Interestingly, this declining trend seems to have stopped in the most recent years at least in a number of OECD countries (e.g. the United States), which has been interpreted by some commentators as an indication of the growing importance of re-shoring manufacturing activities to OECD economies.

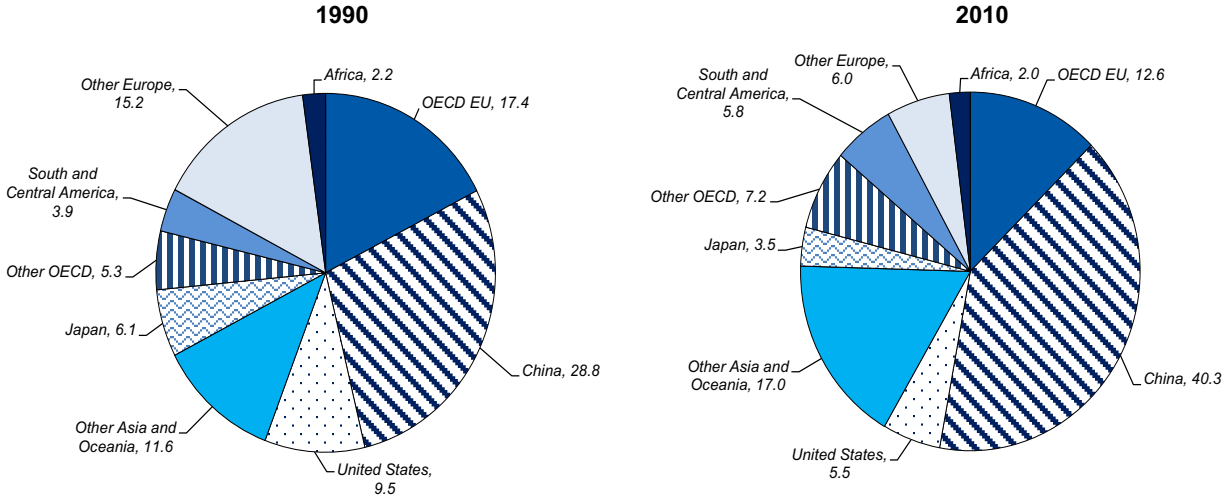
Figure 6. Share in world manufacturing value added (in %), 1990 and 2013



Source: United Nations Statistics Division.

The importance of emerging economies in global manufacturing is, not surprisingly, larger in terms of employment (Figure 7), illustrating in the first place the lower labour productivity of manufacturing activities in these countries. But the results in Figure 6 also reflect the broad specialisation along GVCs with developed economies often undertaking higher-value added activities while emerging economies specialise to a greater extent in lower-value added activities (e.g. assembly). Case studies for individual products, including the well-known studies of different Apple products,[6] have documented the differences in the capture of value added by countries within GVCs. Products are nowadays often designed and conceived in developed countries, manufactured in emerging countries like China, and with inputs sourced from other third countries. Some consider that because of GVCs there has been a tendency for the so-called 'smiley curve' to deepen, moving from relatively flat to U-shaped, with fabrication and assembly accounting for a much lower share of value added (see, for example, Baldwin, 2012).

Figure 7. Share in world manufacturing employment (in %), 1990 and 2012



Source: Calculations based on UNIDO.

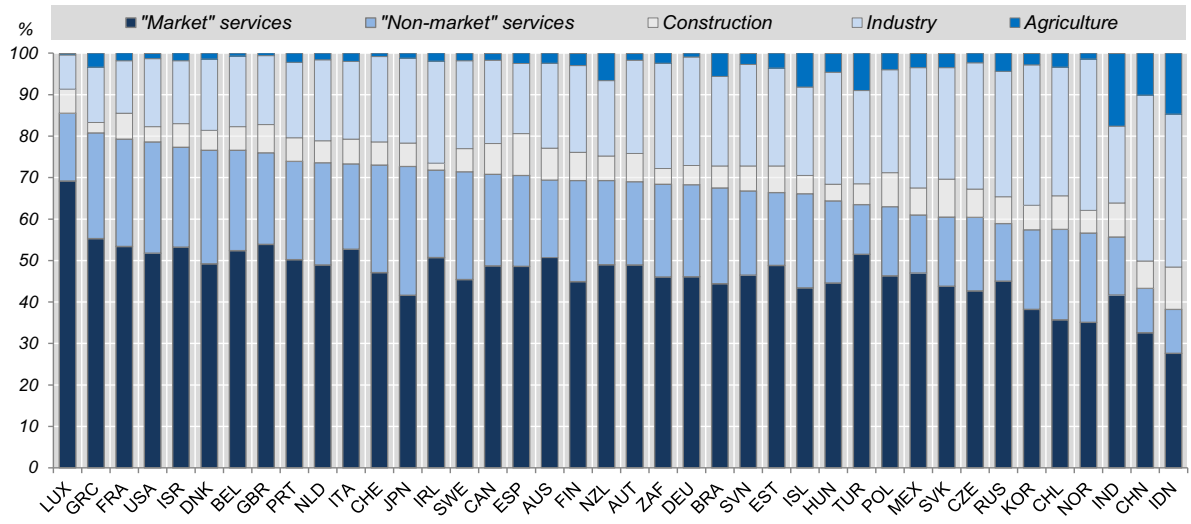
2.3 The growing tertiarisation of OECD economies

The declining presence of manufacturing has been accompanied by a rising importance of services in OECD economies, clearly indicating that deindustrialisation and tertiarisation of national economies are two sides of the same coin. OECD countries derive today most of their income and employment from services. Market and non-market[7] services account for about three quarters of GDP in the whole OECD area (Figure 8). The structure of emerging economies is relatively less oriented towards services; countries like India and China, which are going through an important industrialisation process, show growing shares of manufacturing in addition to agriculture.

A number of factors at the demand side as well as at the supply side explain the continuing tertiarisation of OECD economies. First, rising incomes have resulted in a growing final demand for services and significant shifts in private domestic consumption.[8] Demand for services has been shown to be income elastic, implying that an increase in incomes will lead to more than proportionate increases in the demand for services. 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, e.g. travel, that may contribute to an improved quality of life.

Figure 8. Composition of GDP in OECD and BRIICS countries, 2011

Value added of major activity groups as a percentage of total industry value added



Source: OECD (2013d), OECD Science, Technology and Industry Scoreboard 2013 based on OECD National Accounts (SNA) Database and Structural Analysis (STAN) Database, ISIC Rev.4; and national statistical institutes, June 2013. Doi: http://dx.doi.org/10.1787/888932890010.

Second, some services sectors are faced with growing demand due to factors other than incomes, e.g. demographic changes. Longer life expectancy in industrialised countries is resulting in a rapidly ageing population, so that demand for certain services (e.g. health and personal services) is rising. In addition, changes in life styles (hotels and restaurants, tourism, creative industries), growing participation of women in the workforce (personal services) or the growing use of the internet (computer services, telecommunications) have also been affecting final demand patterns for services. Lastly, 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).

Third, the growth of the services sector in national economies is also spurred by the growing intermediate demand for services, as services are increasingly used as intermediate inputs to other industrial activities (see below). Outsourcing of services activities is more common today than it was in the past, and this is not only confined to entire service functions, but also individual services tasks that have increasingly been outsourced (see Grossman and Rossi-Hansberg, 2008; Lanz et al., 2012, for work on the so called 'trade in tasks'). This directly means that the growing importance of services in national economies is partially due to a statistical artefact; for example in-house service activities that have been outsourced by vertically integrated manufacturing companies (cleaning, transport, etc.) are now better reflected in the available statistics on services, while before they were hidden in manufacturing data. 'The nature of the job hasn't necessarily changed, but the employer has.' (Fiorini, 2014). More generally and as will be discussed below in more detail, measurement (error) is a crucial issue when discussing manufacturing versus services.

On the supply side, differences in productivity growth between services and (especially) manufacturing helps to explain the structural shift towards services in OECD economies (in employment as well as value added in current prices). Outlined in Baumol's (1967) stylised model of unbalanced growth, differential productivity growth rates result in the re-allocation of resources (i.e. employment), towards the "stagnant' services sector. Because of the relatively high productivity growth in manufacturing – driven by technological change and globalisation, prices of manufacturing products tend to increase only

a little over time and may even fall. This contrasts with the experience of many parts of the services sector, where productivity growth has been slower and prices tend to go up more strongly over time (inter alia, because of lower (international) competition). Consequently, manufacturing products have become relatively cheap and therefore account for a smaller proportion of GDP than they did before (Pilat et al., 2006).

3. The traditional question: manufacturing or services?

3.1 The case for manufacturing

The tertiarisation of OECD economies raises questions among many policy makers and Baumol's 'cost disease' has – in some countries more than others – significantly influenced policy thinking about structural change in OECD economies. Discussions about the need for (re-)industrialisation have been taking place in many countries as manufacturing is, going back to the original work by Kaldor (1967), considered to be the engine of economic growth because of its contribution to rapid technical progress and strong economies of scale. The deindustrialisation of OECD economies is accordingly perceived as a negative factor for countries' growth and prosperity.

A long list of arguments has been put forward to support this point of view, based on a number of stylised facts about manufacturing relative to other sectors of the economy. The overall message is that manufacturing continues to play a large and central role in national economies, because of its direct and indirect contributions. The arguments can be grouped in three clusters:

Manufacturing drives productivity growth

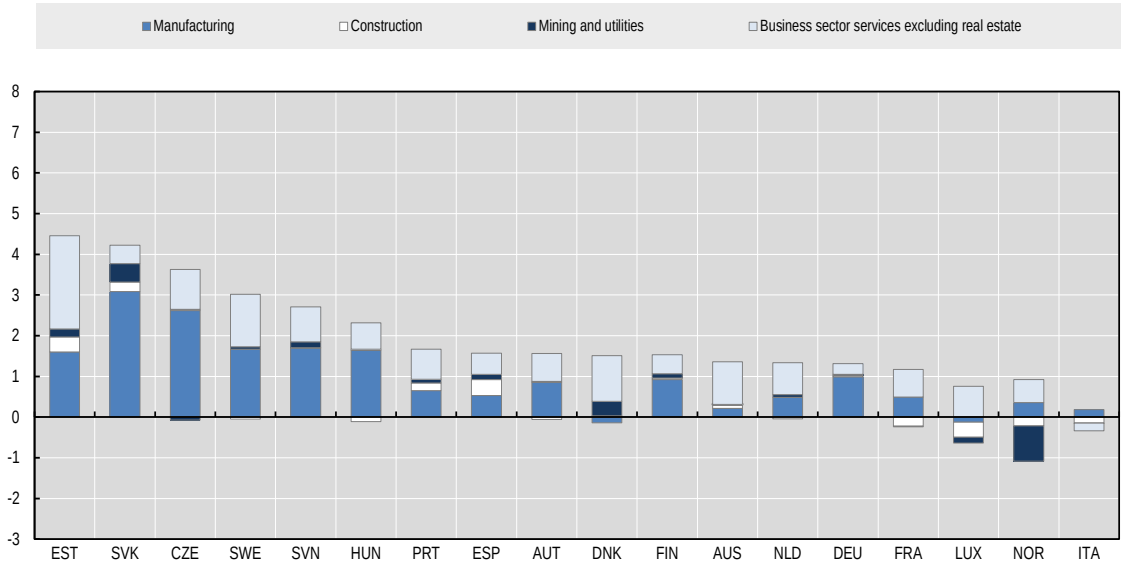
Empirical evidence shows that the manufacturing sector continues to make an important contribution to aggregate (labour) productivity growth, even when manufacturing accounts for a decreasing share in OECD economies (Figure 9). Nevertheless, the contribution of services to aggregate productivity growth has increased during the past decades (Imbs, 2014). As productivity growth in manufacturing is still higher than in other industries, a loss of manufacturing thus could directly impact on economic growth of OECD economies since productivity is the basis for long-term economic growth and high per capita income.[9]

Manufacturing's rapid productivity growth has been argued to be the reason for falling employment in manufacturing as fewer people are needed to produce the same level of output. But in theory, higher productivity in a competitive market also results in lower prices, boosting demand and motivating manufacturers to hire extra workers. The missing link in this argument is on the demand side. In general, high rates of productivity growth are associated with lower manufacturing employment when demand for manufactured products slows down; and this has been the case for some countries recently[10] (McKinsey Global Institute, 2012).

Because of higher productivity, manufacturing is able to pay higher wages, even for workers who might otherwise earn less. Controlling for differences in education and job characteristics, Helper et al. (2012) show that low-wage workers benefitted the most from US manufacturing jobs. At the same time however, the pay-premium for low skilled workers in manufacturing seems to have decreased over time (Romer, 2012).

Figure 9. Industry contribution to growth in real business sector value added per hour worked, 2001-2012

Percentage point contribution at annual rate



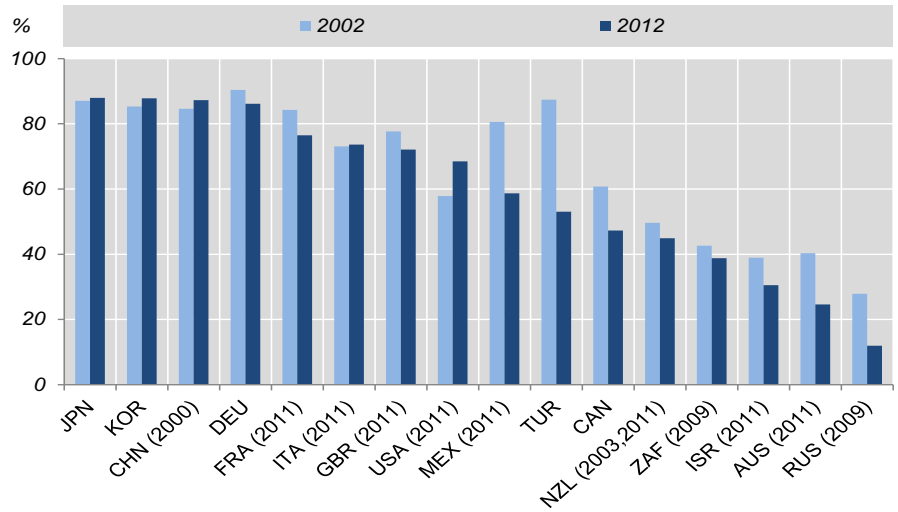
Notes: The business sector is measured as the non-agricultural business sector excluding real estate. It covers mining, manufacturing; utilities; construction; and market sector services. The latter cover distributive trade, repair, accommodation, food and transport services; information and communication; financial and insurance; professional; scientific and support activities.
Source: OECD (2013e), OECD Compendium of Productivity Indicators 2013.

Manufacturing is a major source of R&D and innovation.

Manufacturing is considered to determine countries' abilities to develop new technologies, as well as countries' absorptive capacities to assimilate foreign knowledge. The majority of investments in Research and Development (R&D) are still undertaken in manufacturing: 60% or more of business R&D investments are made by manufacturing firms in several OECD countries (Figure 10). Nevertheless, the share of manufacturing has declined over time due to a variety of factors, such as growing R&D investments in certain services sectors, the outsourcing of R&D to specialised laboratories that are classified in the services sector, as well as better measurement of R&D in services (Lopez-Bassols and Millot, 2013).

Investment in R&D and innovation is an important driver of the higher productivity growth in manufacturing; in addition, because of the existence of (knowledge and rent) spillovers, manufacturing R&D and innovation indirectly benefits innovation activities in other industries. The vast literature of empirical studies on spillovers indeed suggests that these externalities are in general positive, and that linkages between different industries (e.g. input-output links, technological cooperation, etc.) facilitate the transfer of these effects. Manufacturing has economy-wide linkages as it provides important inputs to other sectors of the economy and satisfies a broad range of final and intermediate demands.

Figure 10. Share of manufacturing in total business R&D (in %), OECD countries, 2002 and 2012



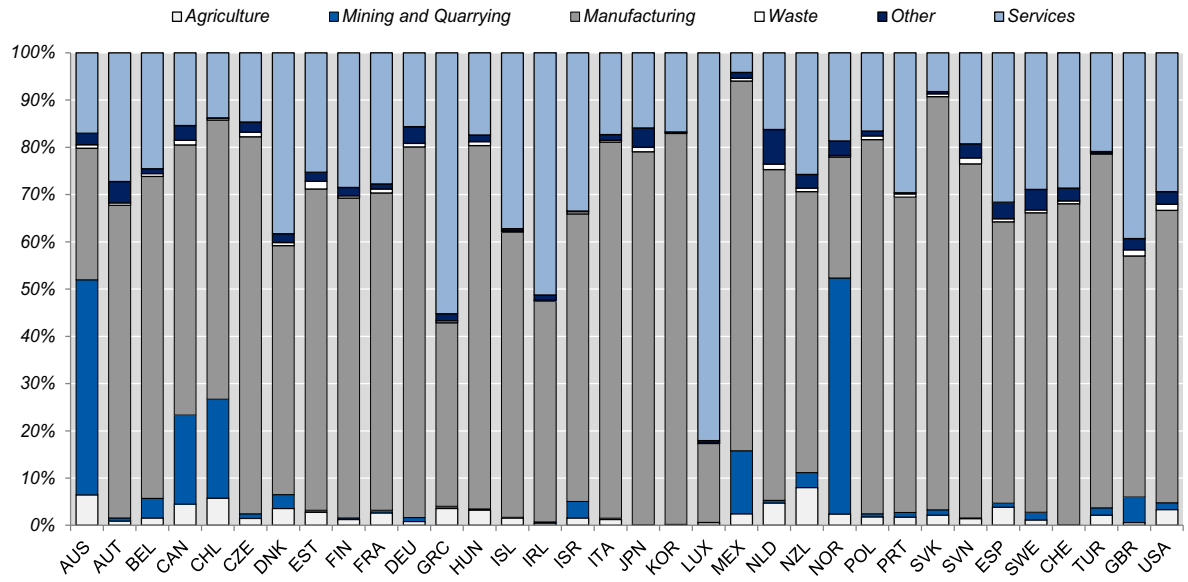
Source: OECD Analytical Business Enterprise Research and Development Database (ANBERD).

Manufacturing accounts for the majority of international trade

Manufactured goods make up the majority of exports (two thirds or more in most OECD countries) suggesting that a country' ability to export cannot be maintained without a manufacturing sector (Figure 11). The reasoning is that, if manufacturing is replaced by services, national economies will no longer export to the same extent and will have to import all of the products they consume (Fontagné et al., 2014). The foreign income received from manufactured exports is used to pay for imports; manufacturing is hence considered to be essential for reducing (maintaining) trade deficits (surpluses) of countries.[11]

Manufacturing plays an important role in the opening of economies and their integration in the global economy. Services, the argument goes, are more difficult to trade as they cannot be stored; many still require face-to-face contact between producers and consumers; and they are highly sensitive to cultural and language differences. While trade in services is rapidly growing (see below), it still represents only a small fraction of manufacturing trade.[12]

Figure 11. Share of manufacturing in total exports (in %), OECD countries, 2012



Source: OECD calculations based on OECD Bilateral Trade Database and Main Economic Indicators databases.

3.2 The rise of 'modern' services and the growing progressive character of services

While the progressive character of manufacturing in terms of productivity (as a source of economic growth), innovation (as a source of productivity) and international trade (as a source of export income and also productivity) has been stressed in policy discussions, services have traditionally been labelled as 'un-progressive'. The fact is, however, that services have dramatically changed over time; technological innovations combined with new business models have profoundly altered the nature of services provision and structure for certain categories of services. Baghwati (1984) described a process of splintering and disembodiment of services such that services initially embodied in the person providing them and thus requiring the physical presence of the service provider, have become increasingly disembodied as a result of technical progress. Important obstacles to the international delivery of services have been eliminated as new means of supplying services remotely have been developed (for example service provision via the internet).

Ghani and Karas (2011) argue that the so-called 3 T's (technology, transportability and tradability) have given rise to a category of progressive services labelled by Mishra et al. (2012) as 'modern' services. These modern services are more similar to manufacturing goods in the sense that they can be digitally stored and more easily traded. Technological progress particularly in ICT has increased the codifiability of certain services, giving them a physical and storable presence (e.g. financial products, telecommunications, data, etc.). Via ICT networks (telecom networks, internet, satellite, etc.), these services can be electronically transported over long distances in no time and without quality deterioration. The increased transportability has in turn thus rendered services more internationally tradable; services that were not traded at all are now more often exchanged across borders.

Higher productivity growth in services

The assertion that productivity improvements in services are harder to achieve than in goods producing industries is traditionally explained by the labour-intensive character of services and especially the face-to-face interaction necessary to deliver these services. But certain categories of services are

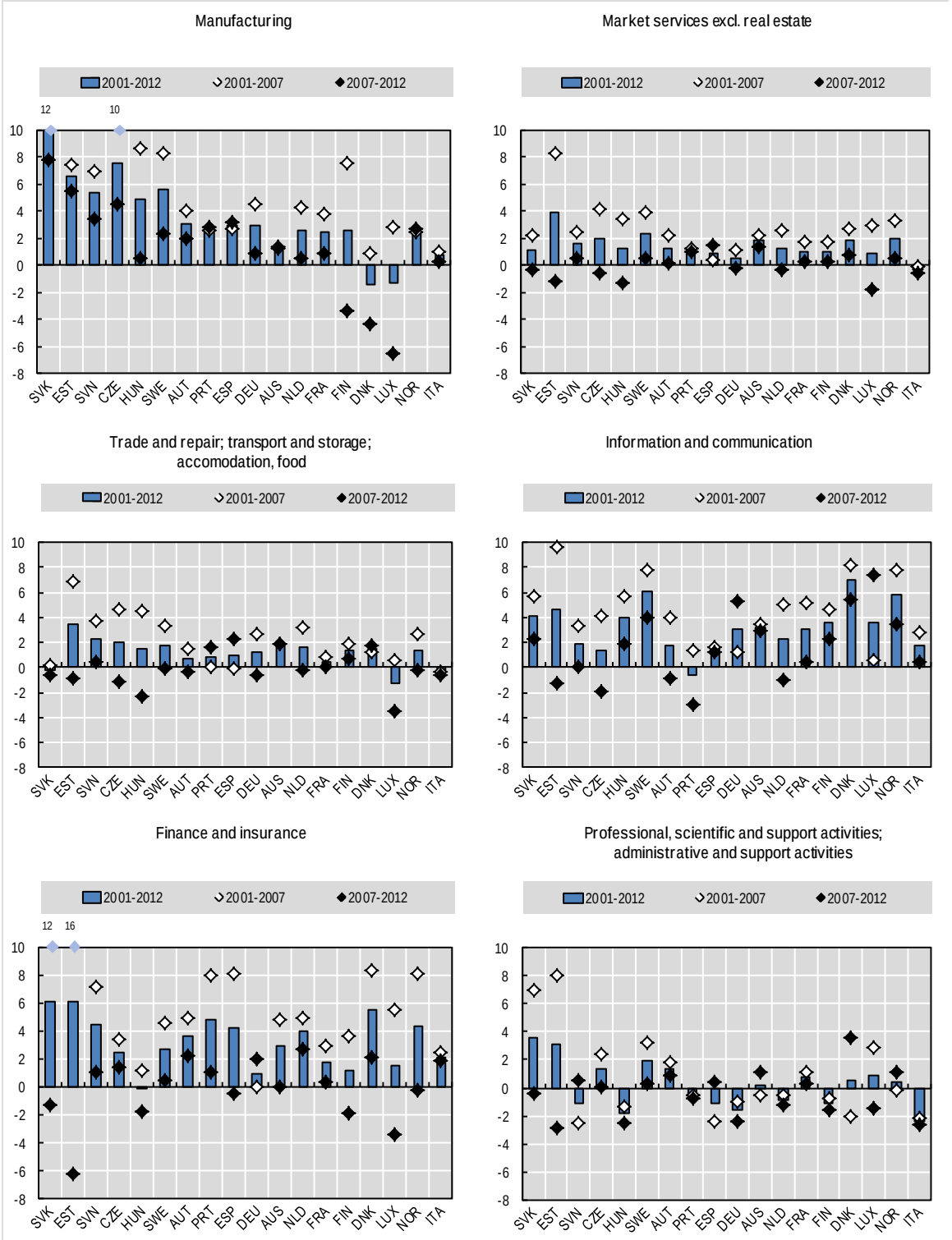
increasingly produced according to manufacturing methods including capital- and energy-intensive production processes, scale economies, strong use of technology, engagement in international trade, etc.

While manufacturing still shows the highest growth of labour productivity, 'modern' – typically more knowledge- and ICT-intensive - services such as information and communication and finance and insurance have also recorded high growth rates of labour productivity over the last 10 years (Figure 12).[13] In contrast, wholesale, retail and accommodation and transport and storage are characterised by relatively lower productivity growth within the group of market services.

In discussing the growth of (labour) productivity in the United States, Triplett and Bosworth (2003) showed that productivity in services also increased significantly and this was not confined to one or two services industries, which led them to claim that 'Baumol's diseases has been cured'. While the growth of services productivity has been slowed down somewhat in the second half of the 2000s, the productivity increases in (modern) services combined with their growing relative size has resulted in a growing contribution of market services to aggregate labour productivity growth. Services increasingly determine the overall labour productivity growth, and thus economic growth, in OECD economies (see also Figure 7 above).

Figure 12. Growth in labour productivity by sector

Percentage change at annual rate



Notes: Manufacturing refers to ISIC Rev.4 C.; Market services excl. real estate refers to ISIC Rev.4 G to N excl. L.; Trade; transport; accommodation, food refers to ISIC Rev.4 G to I; Information and communication refers to ISIC Rev.4 J; Finance and insurance refers to ISIC Rev.4 K.; Professional, scientific and support activities; administrative and support service activities refers to ISIC Rev. 4 M to N.
Source: OECD (2013e), OECD Compendium of Productivity Indicators 2013.

Growing internationalisation of services sectors

Technological progress, particularly in ICT, deregulation of previously closed service industries and multilateral efforts to liberalise service trade, have allowed services companies to enter new markets outside their home. On the demand side, the emergence of an exponentially growing middle class in emerging economies has opened up new markets for financial services, health, education and tourism (WTO, 2012). As a result, services sectors have become increasingly internationalised; in general, the internationalisation of services takes place through four different modes of supply, depending on the territorial presence of the supplier and the consumer at the time of the transaction (see Box 1 for definitions and examples). Only in Mode 1 ('cross-border supply'), services are transferred between countries; Modes 1 and 3 (respectively 'cross-border supply' and 'commercial presence') do not involve movement of people while Modes 2 and 4 (respectively 'consumption abroad' and 'presence of natural persons') do.

Box 1. Modes of supply in services trade

Cross-border supply (Mode 1) *takes place when a service is supplied into the territory of another country without anybody moving. This is similar to trade in goods where the product is delivered across borders and both the consumer and the supplier remain in their respective territories. Financial services or brokerage services across the border are typical examples of services traded predominantly through that mode.*

Consumption abroad (Mode 2) *occurs when the consumer moves to the territory of the supplier for the transaction to occur. Tourist services, education or persons travelling abroad to receive medical treatment are typical examples of that mode.*

Commercial presence (Mode 3), *takes place through established presence of the supplier to the territory of the consumer. This mode corresponds essentially to the establishment of facilities or permanent presence through Foreign Direct Investment. The value of trade corresponds to the value of sales by foreign affiliates. Typical examples of such presence are telecommunications and private banking.*

The presence of natural persons (Mode 4) *occurs when an individual (and not a firm like in mode 3) is temporarily present in the territory of an economy other than his own to provide a commercial service. Mode 4 is generally understood as covering contractual services of suppliers (such as self-employed, intra-corporate transferees, and foreign employees directly recruited by foreign established companies).*

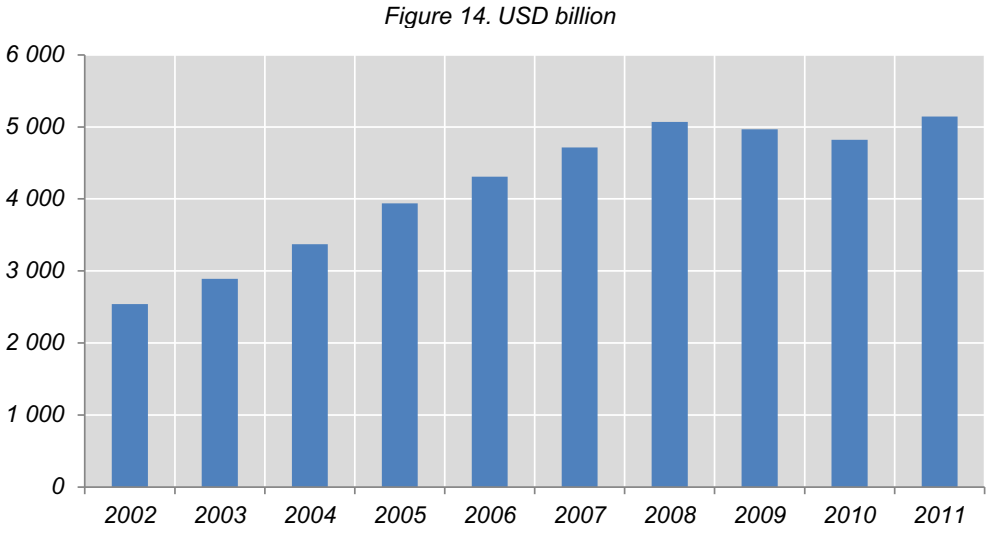
Statistics on the international supply of services (see Annex 2) show that commercial presence is the preferred mode of supply for services accounting for about 55% of total services supplied abroad (Table 1). This mode of supply of services abroad via foreign affiliates has significantly grown over the years: services sales of foreign affiliates abroad consistently increased up to the financial/economic crisis in 2008/2009 (Figure 13). Preliminary figures for 2011 and 2012 however suggest that services sales are on the rise again.

Table 1. The different modes of supplying services abroad, world, statistical approximation, 2005

	Percentage
Mode 1. Cross-border supply	*25-30*
Mode 2. Consumption abroad	*10-15*
Mode 3. Commercial presence	*55-60*
Mode 4. Presence of natural persons	*Less than 5*

Source: Maurer and Magdeleine (2011).

Figure 13. Turnover of affiliates abroad in the services sector, selected sample of OECD countries

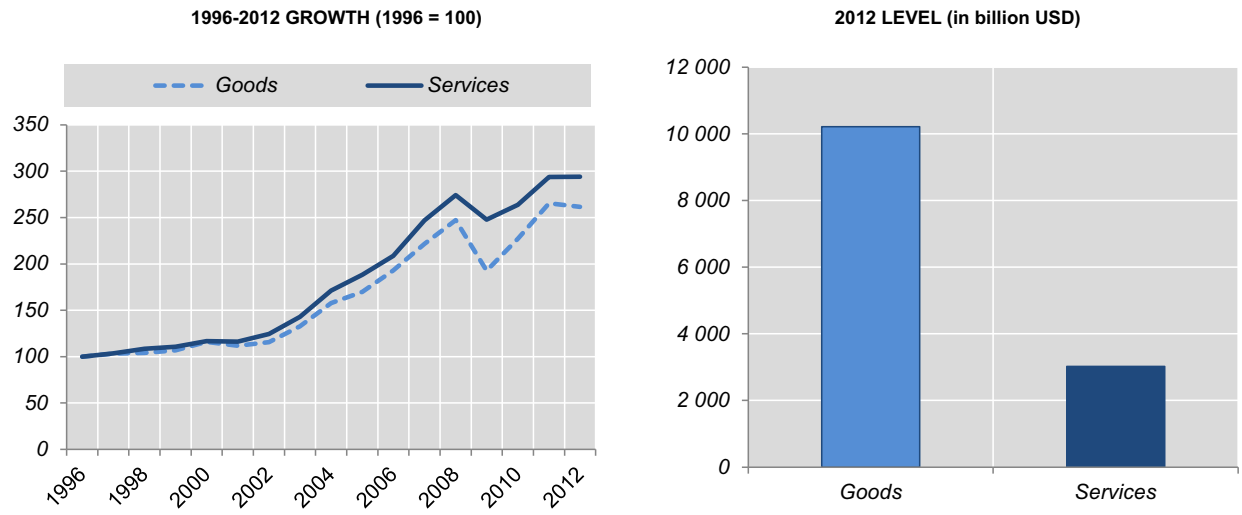


Note: Data for Austria, Belgium, Canada, Finland, Germany, Japan and the United States.
Source: OECD, Activities of Multinational Enterprises (AMNE) database.

Data on the exports of services, largely capturing Modes 1, 2 and 4, further show that services have become increasingly tradable across borders, with average annual growth rates of services exports close to 10% (which is slightly higher than growth in merchandise exports; Figure 14).[14] Nevertheless, services overall remain less traded than manufactured goods when looking at gross trade data. Indeed, for some services, production and consumption still coincide spatially and temporally and services seem overall to be more sensitive to cultural and language barriers than goods. Furthermore, regulatory frictions and state intervention still play a role in some services sectors, thereby limiting domestic and international competition(see Box 2 on OECD's Services Trade Restrictiveness Index).

It is for intermediate services where internationalisation is most prominent: the majority (more than 80%) of services exports are destined for intermediate use in other countries. The exports of business services, financial services and transportation services serve especially as services inputs in the production of goods and services in other countries. Less dependent on final consumer preferences and cultural barriers, they may be the vehicle for fast internationalisation in services.

Figure 14. Gross exports of goods and services



Source: IMF Balance of Payments.

Box 2. The OECD Services Trade Restrictiveness Index (STRI) - Engineering Services

While impediments to merchandise trade can be (relatively) easily measured in terms of trade barriers like tariffs and quotas, impediments to services trade are more complex and harder to measure. Tariffs are generally smaller or non-existent for services trade, but the scope of potential barriers to trade in services is broader than trade in goods. Services are traded in a variety of modes, output is much more heterogeneous, and regulation (covering both domestic and cross-country transactions) is much more complex.

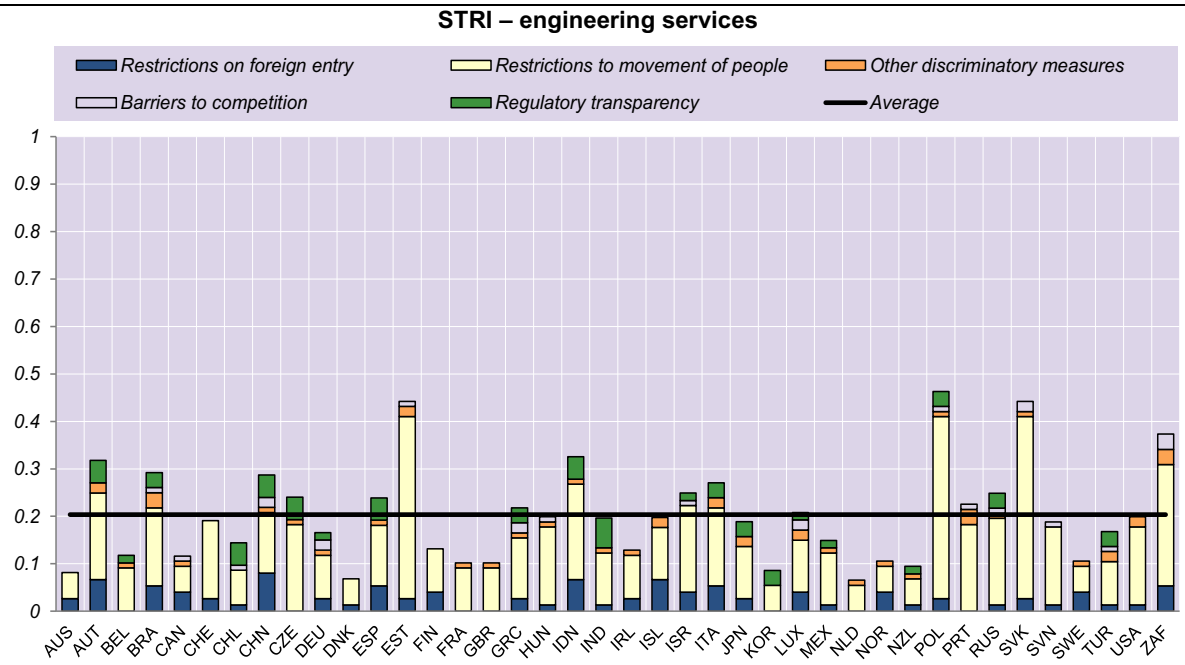
Some of the horizontal policies that restrict services trade include restrictions on market entry (such as equity limits, licensing requirements, or economic needs tests), restrictions to the movement of people, heterogeneous services standards, and competition regulation. Barriers may be discriminatory against foreign suppliers, but even when that is not the case, trade may be to a large extent restricted through domestic regulation that prevents entry and competition. Much of this regulation is sector-specific, e.g. a wide range of rules in telecommunication services concern access and interconnection, number portability, local loop unbundling and infrastructure sharing which will directly affect the decision of foreign providers to enter a market.

The STRI project was launched by the OECD Trade Committee in 2007 as a tool for quantifying barriers to trade in services at the sectoral level. Seven pilot sectors were covered at the beginning (computer services, construction, telecommunications, and professional services such as legal, accounting, architecture and engineering services), and 11 more sectors were added (3 audiovisual services, distribution, 2 financial services, courier and 4 transport services). The major outputs from the project include a regulatory database, providing detailed information on current laws and regulations affecting international trade in services, and trade restrictiveness indices which provide a snapshot of the trade policy stance at a particular point in time. The sources of information for the database are laws and regulation in each member country.

Five policy areas are covered by the index:

- *Restrictions on foreign ownership and other market entry conditions;*
- *Restrictions on the movement of people;*
- *Other discriminatory measures and international standards;*
- *Barriers to competition and public ownership;*
- *Regulatory Transparency and administrative requirement.*

Professional services are considered a highly restrictive services sector, while also offering opportunities for trade under multiple modes. It is therefore an interesting example to illustrate differences in regulations and potential barriers in different countries. Figure 1 takes the example of Engineering Services and presents STRI results broken down by category of restrictions (Geloso-Grosso and Lejarraga, 2012).



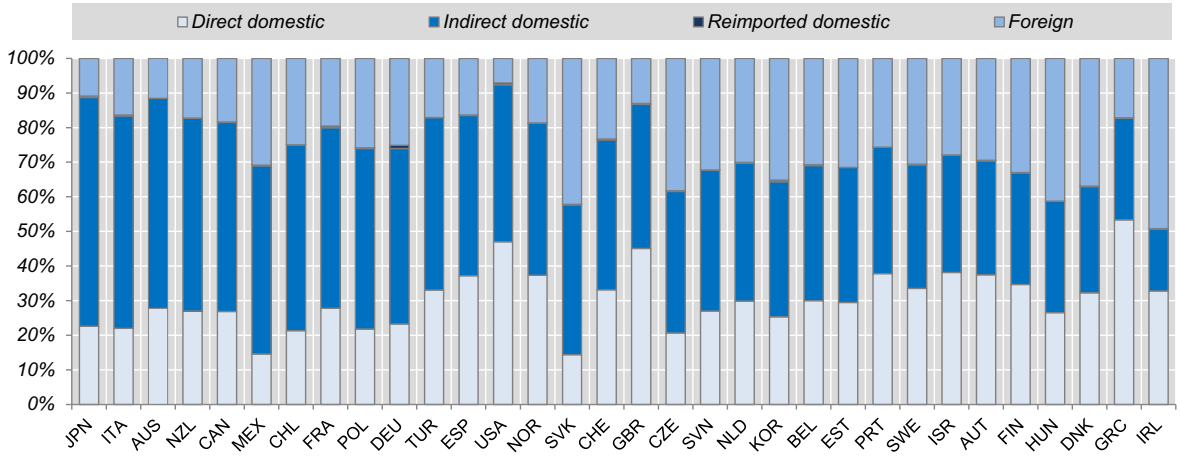
Source: OECD Services Trade Restrictiveness Index database (2014).
(http://www.oecd.org/tad/services-trade/services-trade-restrictiveness-index.htm).

Clearly, regulations concerning the movement of people are contributing the most to the level of restrictiveness in engineering services. The supply of engineering services relies heavily on the temporary movement of suppliers aboard. The most prevalent quantitative pre-conditions for entry are labour market tests, which are maintained by two-thirds of OECD countries. Many OECD countries also have licensing requirements to practice engineering in the country, but only in very few cases is licensing associated with a nationality requirement. Few OECD countries apply foreign equity restrictions to non-locally licensed engineers - the other important category of restrictions in the sector. Overall, there do not appear to be restrictions to legal form among OECD countries: engineers are generally free to organize their practice as sole practitioners, limited liability partnerships, public limited companies or private partners. Price control mechanisms influence the level of restrictiveness under the barriers to competition and public ownership, but in just less than a third of OECD countries, there are recommenced minimum and/or maximum fees.

Gross exports statistics underestimate the true 'exportability' of services. The value of a large number of (tangible) goods stems to a large extent from services; Bryson and Daniels (2010) put forward the argument that service functions, which are now increasingly outsourced, comprise 70-80% of the production costs of most manufacturing firms. Services value-added is to a large extent embodied into the output of other domestic industries (especially manufacturing), which is then subsequently more easily exported. These embodied services go unnoticed in international trade statistics of services as they are counted as manufacturing, agriculture or mining exports. Recent OECD work has demonstrated that on average around 45% of the value of exports in OECD countries is services value added– compared to the services share of 25% in gross trade (OECD, 2013a).

In fact, the largest part of the (domestic) services value added that is exported is indirect, i.e. services value added is included in exports of non-services industries like manufacturing, mining, etc. (Figure 15). The internationalisation of some of the less tradable services is more often realised via their intermediary inputs into other more tradable industries rather than through direct exports. Legal services, for example, that are relatively hard to sell directly cross-border, are used intensively within the domestic market by export-intensive firms in other industries. Value-added from legal services could hence be exported indirectly much more intensively than directly by law firms.

Figure 15. Composition of services value added exports: direct, indirect, re-imported and foreign, OECD countries, 2009



Note: The bars show the composition (in %) of services value added that is exported by countries: 'direct domestic' is services value added that is created domestically and is exported as services by the country in question; 'indirect domestic' is services value added that is created domestically and is included in the exports of non-services sectors (manufacturing, mining, agriculture, etc.) of the country in question; 'reimported domestic' is services value added that has been created domestically, was then exported and then re-imported in the country in question and is then again exported (in services and non-services exports) by that country; 'foreign' concerns services value added created abroad which has been imported in the country in question and is included in that country's exports.
Source: OECD Trade in Value-Added (TiVA) Database, May 2013.

Knowledge and innovation in services on the rise

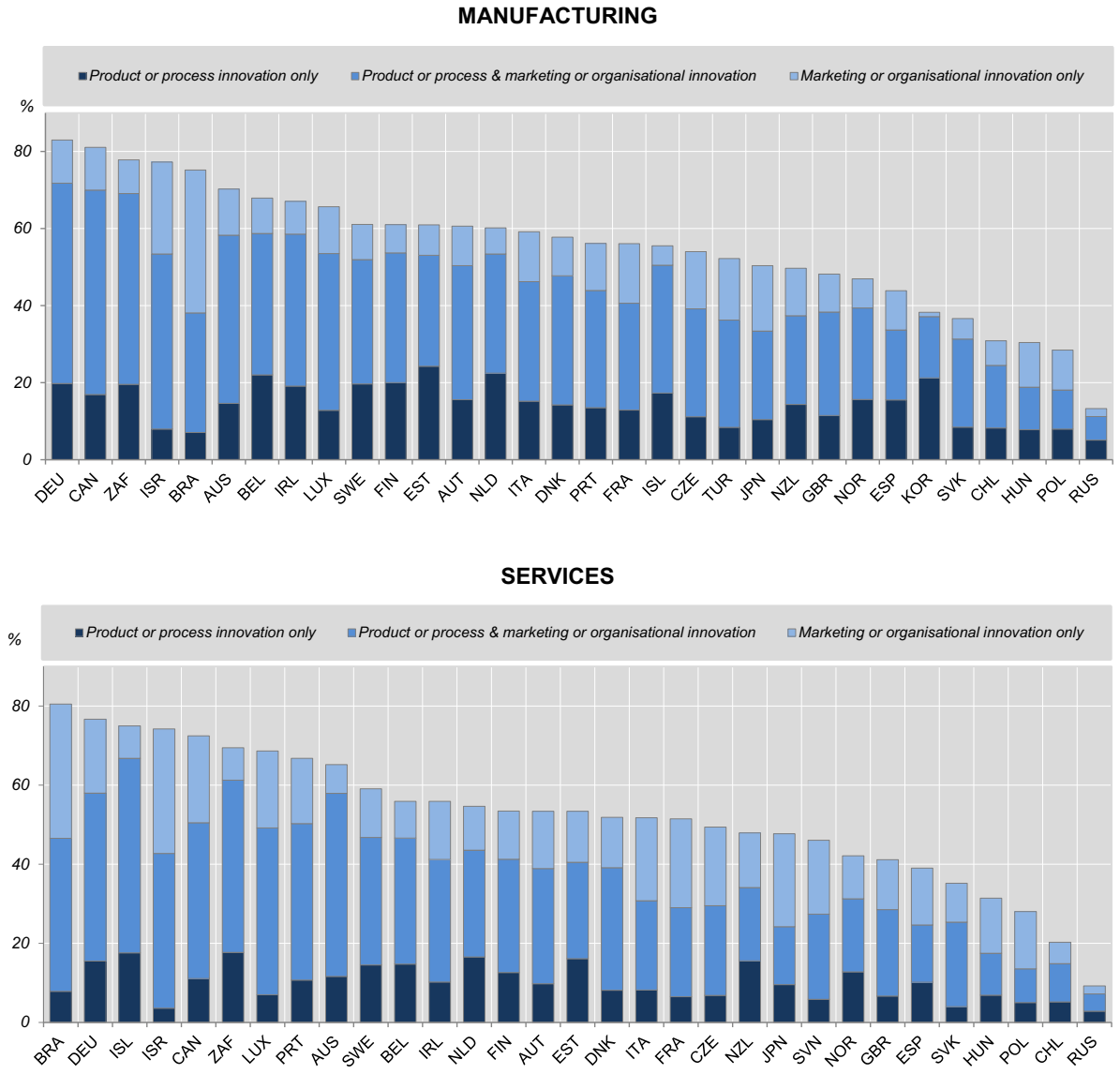
Services sectors have long been considered as innovation-laggards as one traditionally thinks of innovation in terms of R&D and technology. Data indeed show that the service sector accounts for a smaller share of business R&D, notwithstanding the services share has increased during the past decade (see also Figure 10). Likewise, services firms display overall lower R&D intensities compared to manufacturing firms and almost half of firms who introduce new services on the market do not carry out any internal R&D activities (Lopez-Bassols and Millot, 2013).

R&D however is only one source of knowledge for innovation; recent OECD work has shown the importance of investment in so-called knowledge-based capital for the innovation potential of firms and countries (OECD, 2013b). This is particularly true for services; the production and delivery of certain types of services are heavily based on intangible assets and knowledge-based capital. Knowledge embodied in data, design, brands, reputation, skills, know how, etc. are the common and core element of intangible assets and services. More broadly, the OECD undertook a project investigating the nature of R&D and innovation activities in services and its policy implications[15].

A much broader notion of innovation is warranted; services innovation embodies some technological (mainly ICT-related), but especially non-technological aspects. As product innovation (i.e. the introduction of a good that is new or significantly improved with respect to its characteristics or intended use)[16] is often associated with R&D, innovation strategies in services industries include more often marketing and organisational innovation (often called 'softer' innovation). Taking into account the fact that innovation in services is more likely to take forms other than R&D, service firms are much more innovative than traditionally thought. The shares of innovating firms are relatively similar across manufacturing and services firms in most countries (Figure 16); this has been confirmed by other empirical work focusing on individual countries (Sirilli and Evangelista, 1998; Pires et al., 2008).

Figure 16. Innovation in manufacturing and services, 2008-2010

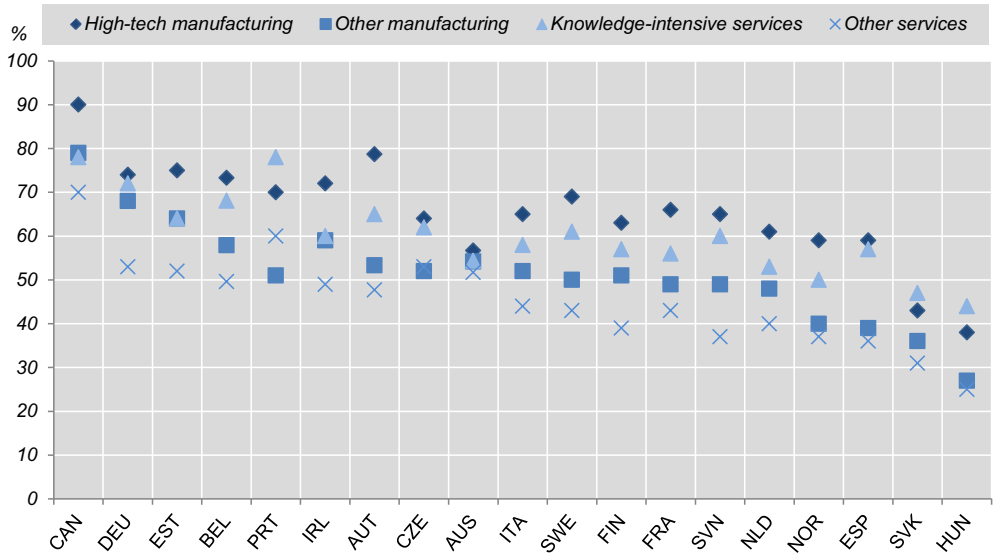
(As a percentage of all firms in the manufacturing and services sector respectively)



Source: OECD (2013d), OECD Science, Technology and Industry Scoreboard 2013 based on Eurostat (CIS-2010) and national data sources, June 2013. Doi: http://dx.doi.org/10.1787/888932892423 and Doi: http://dx.doi.org/10.1787/888932892442.

While services are more innovative than traditionally thought, services innovation is characterised by a large heterogeneity across industries and firms (Fitzsimmons, 1999; Miles, 2005; Thether et al., 2007). Some service industries are amongst the most innovative industries in OECD economies: innovation rates in knowledge-intensive services are almost comparable – in some countries even higher – to those in high-tech manufacturing sectors (Figure 17). High-tech manufacturing sectors show the highest rates of companies introducing new goods (more than 40%, based on 15 EU countries); for comparison, 30% of the firms in knowledge intensive services are found to introduce new services.

Figure 17. Share of firms introducing product, process, organisational or marketing innovation by sector category, 2006-2008



Note: 1) Observations are weighted by firm size. 2) High tech manufacturing includes chemicals and pharmaceuticals, electrical and electronic equipment, machinery and equipment and transport equipment including motor vehicles; knowledge intensive services include water and air transport, publishing, telecommunications, finance and services, and other business services.
Source: Lopez-Bassols and Millot (2013); OECD calculations based on CIS 2008 micro-data (Eurostat), 2012 and national innovation surveys from Australia, Austria, Belgium and Canada.

Despite the fact that the available evidence often looks at innovation through a manufacturing 'lens' (Zahler et al., 2014), more and more insights are gained on the specific nature of services innovation. For example, services innovation tends to be more driven by an external technological pull – i.e. consumer/client led – rather than an internal push – which is more science and technology led. Innovation in services is accordingly found to be somewhat more reliant on external inputs and/or developed outside the firm or jointly with other firms or institutions compared to innovation in manufacturing (Kanerva et al., 2006; Nijsen et al., 2006; Love and Mansury, 2007). Since innovations in services industries are often not patentable because of their intangible or non-technological nature, trademarks and to a lesser extent copyrights are the types of Intellectual Property Rights (IPR) used by firms in service sectors while patents are only rarely used.

Summarising

Services have traditionally been considered as a 'residual' sector, including everything that is not 'agriculture, manufacturing, construction and mining'. This 'residual' category of services is composed of a wide variety of different activities. Services sectors differ widely in their labour-intensity, knowledge intensity, etc.; they span both the public and the private sectors, and can be market and non-market in nature. Because of this strong heterogeneous character, services lack a widely accepted definition or classification and have in general been analytically and statistically elusive.

Better evidence has provided more detailed insights showing that services have dramatically changed over time. While the growth-enhancing potential of manufacturing cannot be questioned, so-called 'modern' services, often used in business to business interactions, are increasingly displaying the progressive characteristics of manufacturing and are characterised by high and growing productivity, knowledge-intensity and international tradability. Just like manufacturing goods, certain categories of services benefit from technological advances and specialisation through the division of labour, economies of scale and network effects (Mishra et al. 2012). Based on this, some analysis argues that services will be

the next growth escalator, including in developing economies (Ghani et al., 2011). Nevertheless, there is some discussion whether emerging economies can embark on a sustainable growth path driven by the services sector (Fiorini et al., 2014).

4. Growing and complex interactions between manufacturing and services

4.1 The blurring between manufacturing and services

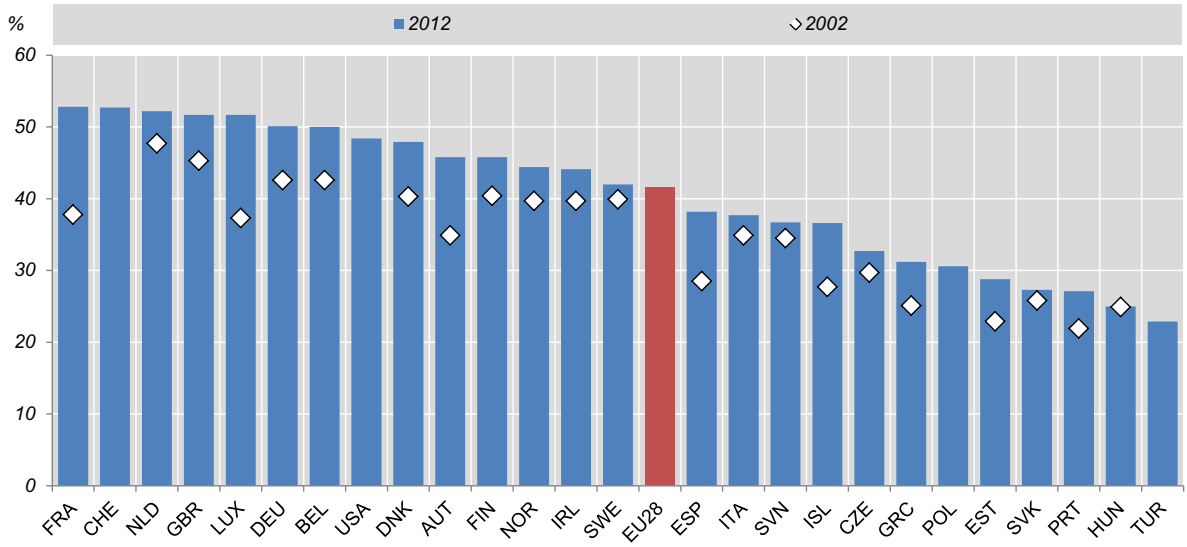
The underlying assumption in discussions about manufacturing and services is that a clear distinction can be made between the tangible goods producing manufacturing industry or firm at the one side, and the intangible services sector/firm at the other side. But the changing characteristics of manufacturing as well as services make the boundaries between both groups of industries and firms increasingly blurred. Many services firms are becoming more like manufacturing firms as outputs are mass produced service products rather than customised services experiences. Conversely, many manufacturing firms have been transformed into services firms (Bryson, 2007).

The fact that some services categories display manufacturing characteristics as discussed above is because these services are increasingly 'manufactured' like goods. As Fontagné et al. (2014) illustratively put it: "The most widely-known examples of services produced according to 'industrial' methods are those of data centres, search engines and cloud computing, all of which are energy intensive activities, requiring high levels of fixed assets (servers farms, cooling systems, secure sites, etc.), in no way inferior to those of traditional industrial sites, and for which costs rapidly decrease. While manufacturing factories no longer have chimneys, service producers have taken over: each Google data centre includes hundreds of thousands of servers which need to be cooled".

Further on, firms are increasingly structured around the close interaction of 'manufacturing' and 'services' activities, which makes it difficult to statistically assign firms exclusively to manufacturing or services industries.[17] Manufacturing firms do not only undertake pure manufacturing activities, nor do services firms undertake only services activities. While this has always been the case, empirical evidence shows that in-house/intra-firm activities of manufacturing companies display more and more services characteristics in recent times.[18] For example, jobs in manufacturing firms are no longer associated only with the pure production process (fabrication, assembly, etc.); instead an increasing number of employees in manufacturing are employed in occupations that can be considered as services-related, such as management, business, design, finance and legal professionals (Figure 18).

Figure 18. Services-related occupations in manufacturing, 2002 and 2012

As a percentage of total employment in manufacturing



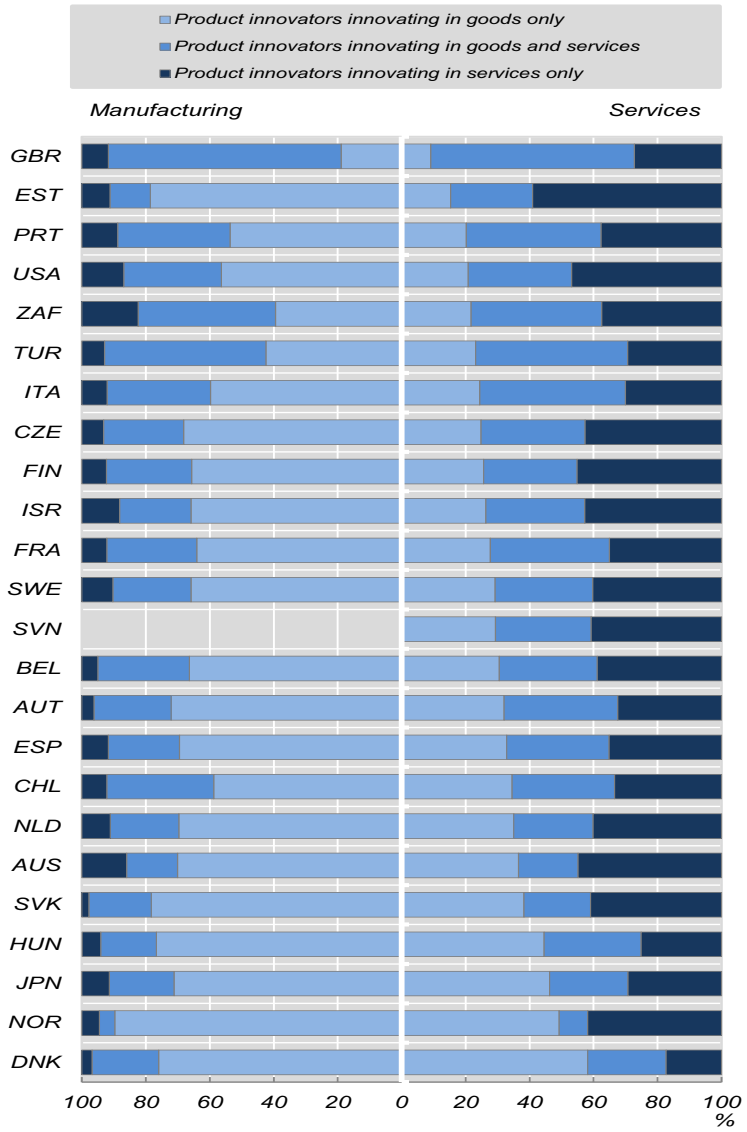
Note: 1) Services-related occupations correspond to ISCO-08 (2002: ISCO-88) major groups: 1) Legislators, senior officials and managers; 2) Professionals; 3) Technicians and associate professionals; 4) Clerks and 5) Service workers and shop and market sales workers.
2) Manufacturing refers to ISIC Rev.4 (NACE Rev.2) Divisions 10-33 (2002: ISIC Rev.3 / NACE Rev.1 divisions 15-37).
3) For the United States, data refer to March 2012, based on the Current Population Survey (CPS). CPS data were converted from US 2010 census codes to 1-digit ISCO-08 major groups via published correspondences with US 2010 Standard Occupational Classification (SOC) codes.
Source: OECD (2013d), OECD Science, Technology and Industry Scoreboard 2013 based on based on EU Labour Force Survey and US Current Population Survey, May 2013. Doi: http://dx.doi.org/10.1787/888932904127

Manufacturing companies no longer sell only physical goods, but instead sell bundles including design, development, marketing, warranties and after-sales care, etc. (see also below). Consumers are nowadays used to buying inseparable goods and services, sold by manufacturing or services firms. Xerox for example has restructured itself into a 'document solution' company, offering technology advanced printers systems but also services like document managing and consulting; in fact, services represent around 40% of Xerox's turnover and are soon expected to represent more than 50% (Benedettini et al., 2010).

As a direct consequence of this, product innovation in manufacturing industries increasingly includes innovation in services in addition to innovation in tangible goods (Figure 19). Several manufacturing firms innovating in products –almost one out of three in EU-15 countries– simultaneously introduce new goods and new services; in some cases manufacturing firms report introducing only new services. Typically, while firms are involved in both manufacturing and service activities, they are classified in only one industry. In addition, many services firms have introduced new goods such as Google in the markets for tablets and Amazon with its Kindle (Lopez-Bassols and Millot, 2013).

Figure 19. Firms innovating in goods and services, manufacturing and services, 2008-10

As a percentage of product innovative firms in each sector



Note: Data for Australia refer to financial year 2010/11.
Source: OECD (2013d), OECD Science, Technology and Industry Scoreboard 2013 based on Eurostat (CIS-2010) and national data sources, June 2013. Doi: http://dx.doi.org/10.1787/888932892461.

4.2 The servitisation of manufacturing[19]

Services inputs in manufacturing GVCs

Manufacturing has undergone profound changes in the organisation of production during the past decade(s). Within GVCs, production processes have become increasingly fragmented and different activities (including services activities) have been outsourced to independent suppliers and/or offshored to different locations (see Box 3). Technical progress, economies of scale, growing specialisation, lower production costs, etc. have motivated companies to outsource and offshore business-related services such as R&D, financing, logistics (i.e. modern services), but also more traditional services like cleaning. While this outsourcing/offshoring of service activities has resulted in important efficiency and productivity gains

as well as lower input prices for companies, it increasingly crosses the boundaries between manufacturing and services.

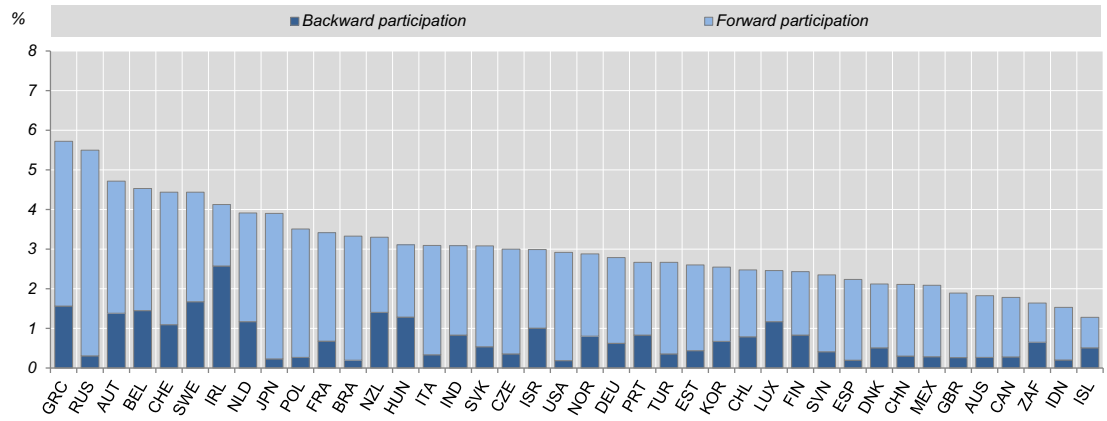
Box 3. GVCs in services industries

International fragmentation has not only taken place in manufacturing industries, but increasingly also in services. As services firms have redefined their boundaries and focused on their core competencies, an increasing number of business services previously supplied within companies have been outsourced and offshored to both developed and emerging economies. Gereffi and Fernandez-Stark (2010) discussed in detail the GVCs in business services by explicitly distinguishing between horizontal activities [i.e. services that are needed by any type of company like information technology services (e.g. software research and development, IT consulting), knowledge process outsourcing services (e.g. market intelligence, legal services), business process outsourcing services (e.g. accounting services, human resource management, supply chain management) and vertical activities [i.e. services that are part of a specific value chain in the manufacturing sector (e.g. clinical trials in the pharmaceuticals value chain) or in another services industry (e.g. private equity research or risk management analysis in the banking and insurance industries)].

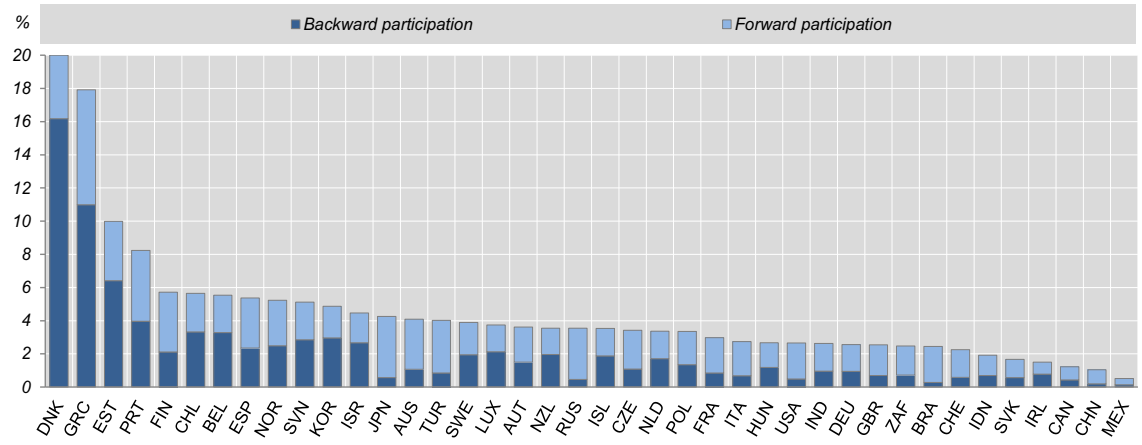
By mapping GVCs across different industries (including services), De Backer and Miroudot (2013) present a number of indicators on the participation and position of countries within GVCs. One indicator measuring the participation of countries in GVCs shows what percentage of a country's exports are part of GVCs: either because of upstream links – that is looking back along the value chain and measuring foreign inputs/value added included in a country's exports – or downstream links – i.e. measuring the domestic inputs/value added of the country contained in the exports of other countries by looking forward along the value chain.

The results for the individual categories of market services show an overall smaller GVC participation of countries in services, reflecting to a large extent the smaller share of services in countries' total exports.[20] The strong manufacturing (export) specialisation explains to a large extent the limited participation of some countries in services GVCs. A second general observation concerns the results mainly forward character of countries' participation in services GVCs, which illustrates the high use of services inputs in other countries' manufacturing and services industries. The sourcing of foreign inputs – i.e. backward participation – is on average much smaller in services industries than in manufacturing.

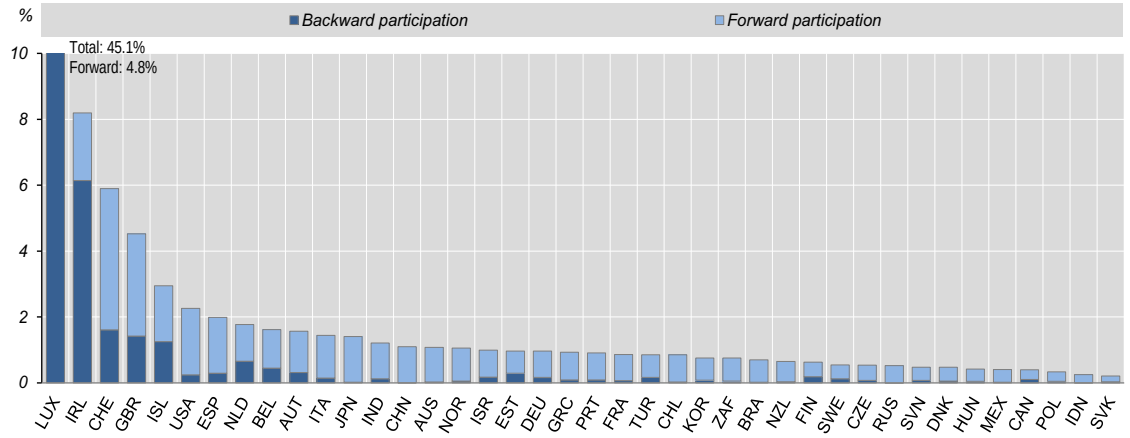
GVC participation: Wholesale & retail, hotels and restaurants



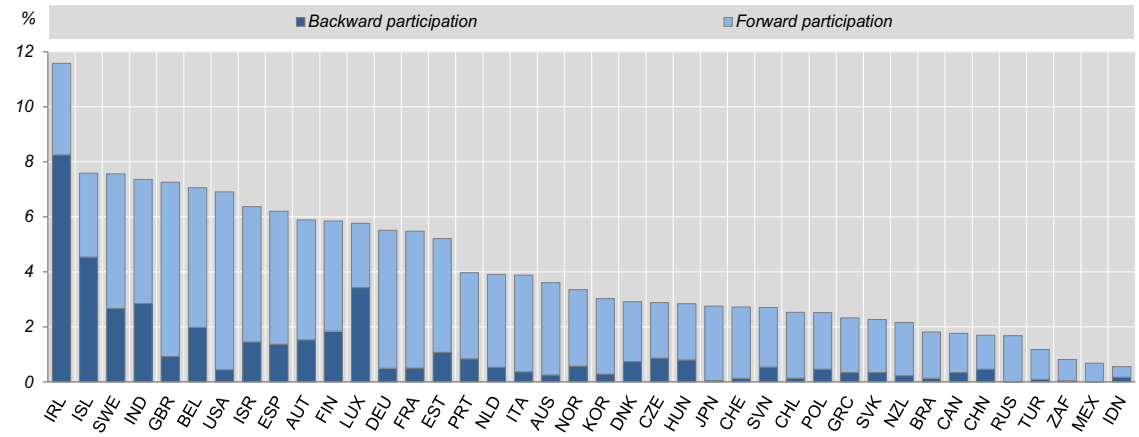
GVC participation: Transport, storage and communications



GVC participation: Financial intermediation



GVC participation: Business services

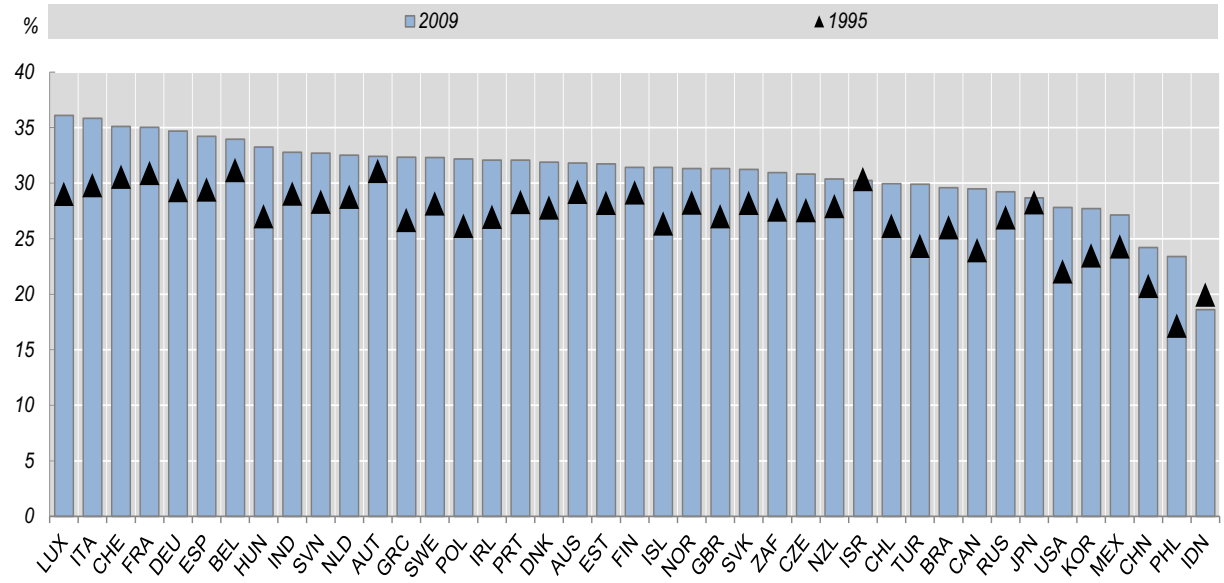


Source: OECD/WTO Trade in Value Added database, May 2013.

Services are increasingly involved in the production of intermediate inputs (Pilat and Wölfl, 2005); on average around 40% of gross output produced by OECD services industries is used as intermediate inputs by other industries. The past decades have clearly witnessed a growing interdependence between services and manufacturing industries as the share of services activities that is necessary for or complementary to manufacturing production has increased. Figure 20 measures the extent to which services contribute inputs to manufacturing production at any stage of the production process and shows that manufactured goods increasingly incorporate inputs and value added from services industries.[21] In the majority of OECD countries, about one-third of manufactured goods consisted of value added created in services industries in 2009. The services content of final demand for manufactured goods has risen in almost all countries since the mid-1990s.

Figure 20. Services value added in manufactured goods, OECD and BRIICS countries, 2009

as a percentage of total value added of manufactured goods in final demand

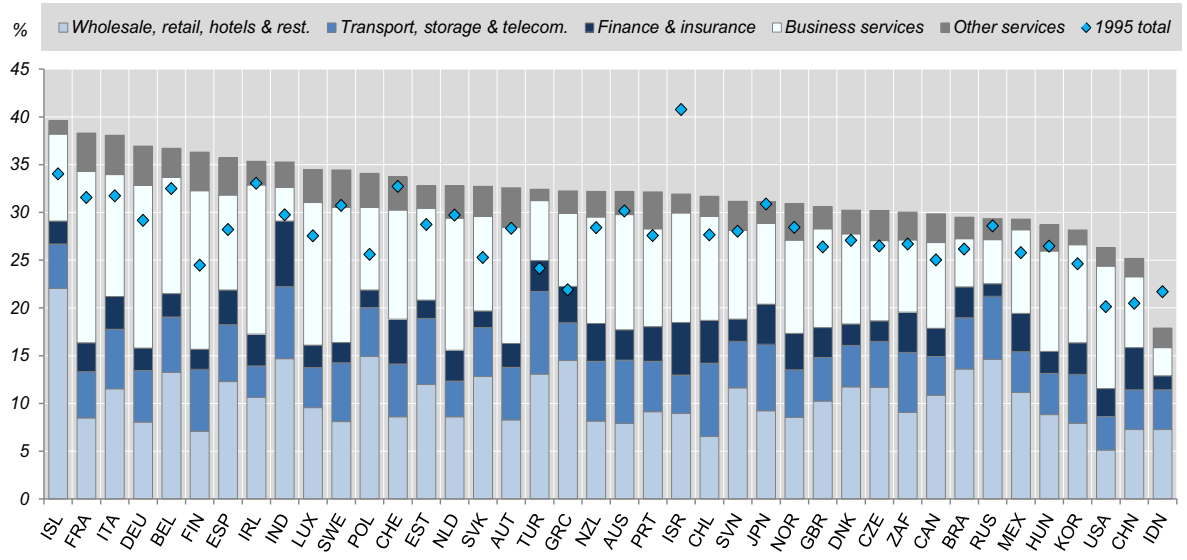


Source: OECD/WTO Trade in Value Added (TiVA) database, May 2013.

Likewise as discussed already above, manufacturing exports include more and more inputs from service industries: between 30% and 40% of manufacturing exports is actually value added that has been created within (domestic and foreign) services industries (Figure 21). The services value added content of manufacturing exports has increased in almost all countries between 1995 and 2009; the largest value added contributions comes from distribution (wholesale and retail) and business services and to a lesser extent from financial services and transportation/telecommunication services. Exports of services in engineering, design, etc. for example often follow from specific manufacturing activities; hence the tradability of these services is very closely linked to manufacturing.

Figure 21. Services value added in manufacturing exports, OECD and BRIICS countries 2009

as a percentage of total gross manufacturing exports



Source: OECD/WTO Trade in Value Added (TiVA) database, May 2013.

The growing shares of services inputs in manufacturing products is to some extent the result of statistical factors,[22] the outsourcing of services functions to independent suppliers helps to correct for the typical understatement of the role of services in firms and economies. Service activities performed within a manufacturing firm were previously automatically classified as part of that firm's manufacturing output; as these services are nowadays increasingly contracted out to specialised service providers (domestically or internationally) within GVCs, these services activities will now be categorised as 'services'. Nevertheless, the results in Figures 18 and 19 constitute a lower bound for the actual contribution of services to manufacturing as certain services activities (like R&D) are often performed in-house.[23]

Services as a source of competitiveness in manufacturing

Within manufacturing GVCs, services inputs play an increasingly important role both in co-ordinating value chain activities and adding value to manufactured products. First, logistics, communication services, business services etc. permit the efficient functioning of GVCs as they allow for the transfer goods, data, technology and (managerial) know how across borders, and the coordination of dispersed activities in a quick and smooth manner. Basically, transportation and communications networks form the backbone of GVCs and the provision of services to these networks directly benefit manufacturing activities. For example, implementing just-in-time organisation of production in GVCs requires effective and reliable transport and logistics services, but also technical testing, legal advice, ICT support and many other business services (Nordas et al., 2006).

Second, in addition to these embodied services, manufacturing companies increasingly use embedded services to gain a competitive advantage. Services help not only to raise productivity and efficiency of GVC activities, but also to differentiate, customise and up-grade their products and develop closer and more longstanding relationships with customers (Kommerskollegium, 2012). The bundling of goods and services as discussed above aims to create unique product characteristics and differentiate firms from their competitors. In addition, services make up an additional source of revenue and generate higher profit margins, which are perceived as more stable over time and in some cases counter-cyclical.[24] A large part

of the future growth in manufacturing is expected to come from so-called 'manu-services' which involves combining advanced manufacturing with a range of different services (Neely et al., 2012; Sissons, 2011).

A growing number of manufactured products today owe a large part of their success to their design and (modern) services associated with the product, like for example the broad range of applications linked to Apple's iPhone. In the automotive sector, the cost of developing new vehicles is increasingly dominated by software services; high-end vehicles rely on millions of lines of computer code and advanced on-board processors (OECD, 2013b). A company like Rolls Royce not only sells cars but 'solutions, outcomes or experiences' to better meet the needs of customers and to differentiate from competitors.

OECD manufacturing is nowadays much broader than the pure production of goods and includes several service-related activities in upstream as well as downstream stages. As pure production activities are increasingly located to emerging economies, manufacturers in OECD countries rely more on complementary non-production functions to create value. The highest level of value creation in a GVC is often found in certain upstream (concept development, R&D and engineering services, etc.) and downstream (marketing, branding, services after sales, etc.) service activities (e.g. the "smiley"-curve in electronics – Gereffi, 2010). Manufacturing companies increasingly develop competitive advantages in services activities closely linked or deriving from knowledge based assets like design, R&D, marketing, business models, organisational capabilities, etc. Manufacturing companies have nowadays often little or no manufacturing in-house; indeed, in some cases companies have completely abandoned the physical production of manufactured goods. Well-known examples of these so-called Factoryless Goods Producers are Apple, Dyson (i.e. the British appliance firm best known for its innovative vacuum cleaners), and different companies in the clothing and semiconductor industries (Bernard and Fort, 2013).[25]

A number of studies have documented the importance of services for manufacturing (export) competitiveness directly. Services are found to represent a growing share of the sales of Swedish manufacturing companies (Kommerskollegium, 2012) and service activities (developed in-house or bought in) are found for example to promote the export activities of manufacturing companies in Sweden (Lodefalk 2012). A Swedish machine tool manufacturer is reported to use 40 different services in its delivery chain and sell 15 different types of services to its customers (Rentzhog, 2010). Firm-level analysis for the United Kingdom and Germany also found that services account for a significant share of manufacturers (export) revenue (Breinlich and Criscuolo, 2011; Kelle and Kleinert, 2010). Crozet and Milet (2013) found that 83% of manufacturing firms in France reported strictly positive sales of services in 2007 and that 26% of the surveyed firms declared no sales of goods whatsoever; both shares have increased over the years.

By bringing policy variables into the analysis, Francois and Woerz (2008) showed that service sector openness (trade and Foreign Direct Investment (FDI)) has boosted the competitiveness of manufacturing industries with stronger services linkages across the OECD. Likewise, Arnold et al. (2011) showed that services liberalisation has benefitted manufacturing firms in the Czech Republic; opening services sectors to foreign providers is found to be a crucial channel through which services reform affects downstream productivity in manufacturing. Nordas and Kim (2013) show the importance of service performance (which itself is driven by policy measures such as barriers to (services) trade but also by investments in infrastructure) for manufacturing competitiveness across countries and industries. Variables on telecommunications density, interest spread between banks' deposit and lending rates, transport costs, time for exports and imports, etc. are found to have differential effects for manufacturing performance dependent on the income of the country and the technological character of the industry.

5. What does this mean for policy?

The call for industrial policies in favour of manufacturing has increasingly gained importance and a number of OECD countries (e.g. France, United States, etc.) have launched industrial policy initiatives in recent years to support their manufacturing industries (Warwick, 2013; Warwick and Nolan, 2014). Some of these policy measures came in response to the apparently successful policies of fast-growing economies.[26] In a context of weak growth and high unemployment, the call for industrial policy also resonates with concerns that manufacturing competitiveness no longer comes with much employment. As OECD countries have increasingly moved to producing ideas, concepts and services at the cost of physical goods, especially low-skilled and medium-skilled labour have lost out in OECD manufacturing. The discussions about 'making things instead of making ideas' reflect the fear among policy makers that manufacturing will in the future only create jobs for highly skilled persons. It is however very unlikely that OECD manufacturing will become again the job creating machine (including for lower skilled people) it once was.

Another argument for advocating a new 'industrial policy' to support manufacturing is the fear that upgrading of emerging economies in GVCs will threaten the long-term competitiveness of developed economies in manufacturing. This argument suggests that the loss of core manufacturing activities may set off a reaction, which will subsequently erode adjacent activities in the value chain, both upstream and downstream, including activities related to innovation and design, all of which could eventually weaken the competitiveness of OECD countries (Pisano and Shih, 2009; Berger, 2013; Locke and Wellhausen, 2014). An implication is that high-income countries may struggle to retain innovative, R&D-based and higher value-added activities if they rely on these areas alone: ceding capacities in manufacturing might result in the economy-wide loss of R&D and design capabilities in the longer term.

The rationale for policies aimed at the manufacturing sector is often based on the particular and strategic role of manufacturing because of its important spill-over effects to other sectors within national economies. On the one hand, the evidence in this paper strongly qualifies the arguments traditionally used in defence of 'progressive' manufacturing: innovation, productivity growth and international tradability in some services sectors is catching up rapidly. At the same time, services show growing and complex interactions with other sectors including manufacturing. But on the other hand, that same evidence also highlights the central role manufacturing still plays in OECD economies by orchestrating GVCs across different countries, sectors and products (Chang and Andreoni, 2014). The growing internationalisation of business services is to a large extent tied to the global reach of manufactured products; likewise, innovation in manufacturing and services becomes increasingly bundled in products and processes. While defining policies for specific sectors has always been a difficult exercise, it is clear that manufacturing is no longer the same as the production of goods.

While the importance of manufacturing for OECD economies should thus not be minimised – even after decades of deindustrialisation, implementing effective industrial policies has proven to be difficult for governments. While market failures provide the (theoretical) rationale for a government role and active industrial policies, in reality government failures often emerge. Governments typically lack the information and capability to design and implement effective industrial policies, resulting in rent seeking behaviour, etc. Various examples across several countries tend to demonstrate that government failures may be of a larger problem than market failures and that consequently industrial policy results in lower overall welfare[27]. Acknowledging the mistakes of old-fashioned industrial policy, which is typically rather selective and reactive (Warwick, 2013), a growing interest in new forms of industrial policy in OECD countries has been observed in recent years.

In discussing so-called 'new' industrial policy, Warwick (2013) refers to the emerging consensus that the risks associated with selective-strategic industrial policy can be minimised through a 'soft' form of

industrial policy, based on a more facilitative, coordinating role for government. So-called 'horizontal' measures are the preferred way forward, but it is increasingly recognised that there may be some aspects of policy where strategic choices need to be made. The goal of 'soft' industrial policy is to develop ways for government and industry to work together to set strategic priorities, deal with coordination problems, allow for experimentation, avoid capture by vested interests and improve productivity. Rodrik (2008) and Fontagné et al. (2014) stressed the importance of taking into account the political economy of industrial policies to better address government failures. While not immune to the dangers of government failure, such an approach, if carefully designed and implemented, has a much higher chance of success than the costly and distortionary selective-defensive industrial policy interventions of the past.

The analysis in this paper and in the OECD work on GVCs (OECD, 2013a) shows that industrial policy specifically targeting manufacturing faces additional layers of complexity. First, the degree to which policy makers can directly influence growth and job creation in manufacturing industries within their national borders becomes increasingly limited. Because of the growing interdependence between national economies within manufacturing GVCs, policies intended to promote domestic manufacturing activities may have important spillover effects in other countries. In a context of stringent budgetary constraints in many OECD countries, policy makers are increasingly looking for more effective and lower-cost policy interventions.

Second, a strong national focus of manufacturing policies may curtail the international engagement of local companies and negatively affect competitiveness. Defensive policies aimed at retaining industries at home (e.g. policy proposals in some countries to discourage manufacturing companies to relocate activities abroad) ignore the reality of today's global economy: in a world characterised by GVCs, firms require imports from abroad and may need to offshore some of their activities abroad so that they can remain competitive at home. The protection of a specific activity in the domestic economy can create cost disadvantages which will have up- and downstream effects throughout the economy that may harm the competitiveness of the whole value chain in the longer term.

Third, manufacturing in today's global and interconnected economy is much broader than the pure production of tangible 'things'; what are the manufacturing industries and firms industrial policies one should focus on? The current (statistical) classifications do not capture the changing characteristics of manufacturing and services sufficiently. Manufacturing industries increasingly sell and buy services, while services industries have become very similar to manufacturing industries. A number of firms that are classified as services firms are in reality manufacturing firms that have re-organised their activities on an international scale within GVCs. The competitiveness of manufacturing firms in OECD countries is increasingly linked to 'intangible' services activities like design, R&D, sales, logistics, etc. The blurring boundaries between manufacturing and services mean that effective targeting of manufacturing has become increasingly difficult.

Fourth, policies that focus exclusively on manufacturing ignore the growing importance of services for value creation in manufacturing GVCs. The value of manufactured products increasingly reflects services inputs as services are sold together (embedded or embodied) with the goods, resulting in greater efficiency, lower costs, increased competitive positioning and additional revenue. To support their manufacturing industries then, OECD policy makers may actually need to focus more on services industries. Government policies have until now devoted less attention to services, notwithstanding the growing progressive characteristics of certain categories of services. In order to tap the growth-potential of (modern) services, existing government policies will need to adapt to the specific characteristics of services, for example taking into account the differences in innovation between manufacturing and services.

This is not to say that governments cannot play a useful role in maintaining manufacturing capabilities, as manufacturing is still important for OECD economies because of its direct and indirect effects discussed above. Strategies and policies that support the building of new capabilities including skills, infrastructure and research, provide a way forward for ensuring the future of manufacturing in OECD economies. These investments are expected to "stick" relatively more to the domestic economy in contrast to investments in production factors which have become increasingly footloose in an era of pervasive GVCs. Also services are still – at least for now – less susceptible to being relocated abroad; turning innovation and knowledge into jobs is more likely to happen in services than in manufacturing.

Above all, an integrated view on manufacturing and services in policy discussions is necessary for going beyond traditional product definitions and statistical classifications. But the policy debate focuses too often on what distinguishes manufacturing, while it would instead greatly benefit from highlighting the growing similarity and complementarity of both groups of sectors in OECD economies. Productivity, innovation, economic dynamism, etc. are what matters for the creation of jobs and economic growth, irrespective if these happen in manufacturing, services or other sectors.

In recent years, the advent of a new industrial (or production) revolution - or should one rather say evolution?- is increasingly promoted in discussions on the future of manufacturing, since it is felt that this would generate new and important opportunities for OECD countries. While manufacturing has been shifting across locations for a long time, the change from an integrated production process at one place to the dispersed production networks within GVCs has pushed manufacturing industries and activities to emerging economies. Some commentators argue that re-shoring (as opposed to offshoring) is becoming increasingly important and may lead to a revival of manufacturing in OECD economies (Anderson, 2012; Marsh 2012). A number of companies (especially in the United States) have been reported to increasingly consider bringing activities they off shored to China back to the United States (Boston Consulting Group, 2011), but it is still unclear if this re-shoring will effectively turn in a broad trend of bringing of manufacturing activities back home.

Aggregate data do not (yet) show real evidence of re-shoring back to the United States, except maybe in a number of energy-intensive industries which itself may be linked to the sharp rise in output of shale gas (Diez and Gopinath, 2014). It is clear however that reshoring is not feasible for all manufacturing activities and that consequently its acclaimed employment gains (particularly for lower skilled people) should be interpreted with care. Operations manufacturing products with a high labour content and destined for Asian markets are unlikely to come back. As discussed above, the attractiveness of emerging countries like China is also due to their large and growing markets, in sharp contrast to the stagnating markets in OECD countries.

There are a number of explanations why re-/back- or near-shoring may become more attractive in the near future, including the changing cost structure of production in emerging economies countries. Countries like China have witnessed average hourly wage increases of 15-20% per year which have eroded its cost advantage in labour-intensive activities. While the average hourly wage in emerging economies was estimated to be around 2% of the Unites States average in 2000, this is expected to rise to 9% in 2015 (World Economic Forum, 2012).

Another reason favouring re-shoring is that companies aim to better balance cost savings and risk dispersion in GVCs in the aftermath of natural disasters, like the March 2011 Tohoku earthquake/tsunami in Japan and the severe flooding in Thailand in the second half of 2011. These events have shown that some supply chains have become too complex and extensive, implying that a breakdown in one part of the chain may quickly have detrimental effects throughout the supply chain. To diversify the risks inherent in their supply chains, companies increasingly consider alternative GVCs for the same product. In addition to

GVCs in low cost countries, companies may set up (often shorter) GVCs in higher cost countries close to their major markets

More importantly, a number of technological advances across a broad range of domains may contribute to this trend. While the speed of this technological progress is the subject of large discussion, there is a growing consensus that the outlook of global manufacturing might change drastically. The development of digital manufacturing is expected to result in smarter products as well as smarter production processes in smart factories (World Economic Forum, 2012). For example, rapidly reprogrammable machines should be able to manufacture multiple products according to different specifications based on digital modelling and simulation capabilities. The Internet of Things could lead to a range of new business models for manufacturers in OECD economies. Advanced robotics will increasingly allow for the substitution of labour in more tasks; smarter robots are expected to make labour costs in the total cost structure of new products and production processes less important, hence making the offshoring of manufacturing activities to low labour cost regions less attractive. But it would be wrong to assume that these developments will exclusively benefit OECD economies, as reports show that Chinese companies (e.g. Foxconn) confronted with rapidly rising labour costs, are planning major investments in robotics to modernize their production process.

Digital manufacturing, in which the growing collection and use of data flows helps to drive better communication, co-ordination and control, is expected to give manufacturing a more adaptable and flexible character. Some predict the shift from a push-driven model to a pull-driven model, with the consumer becoming much more of a driver in the manufacturing value chain. The reason for this is that digital technology is expected to lower the cost of producing smaller batches of a wider variety; hence as scale economies decrease, 'manufacturing on-demand' is expected to become (more) economically feasible. Additive manufacturing, such as 3-D printing, builds products from successive layers of material and allows products to be tailored to individual customers' needs. While mass-produced products will continue to be manufactured according to more traditional - albeit more automated and flexible - methods, these new ways of manufacturing will gradually enter the production methods of more advanced products.

But Information and Communication Technologies (ICT) are not the only key enabling technologies that will change the future of manufacturing and the production of goods and services in general. While bio- and nanotechnology, photonics, micro-and nano-electronics have been around for some time and great progress has been made in research and development, more and more efforts are underway to translate these research results in commercially viable products. These technologies will enable the development of new – most of them still unknown today - goods and services; product engineering increasingly begins at the nanoscale, and nanotechnology is already used to enhance some products. Furthermore, materials research and manufacturing technologies are increasingly done simultaneously, and the emergence of novel materials is expected to significantly reshape a number of production processes in manufacturing.

Advances in these general purpose technologies will also help the transformation of manufacturing towards higher energy-efficiency and more sustainability. New technologies are considered to be crucial for addressing the environmental imperative. The future scarcity and rising costs of key materials can also be expected to favour strategies of re-use and re-manufacturing and may force companies to focus more on associated services offered in combination with manufactured products. In addition to green growth, ageing as another megatrend is expected to increasingly impact – via demand and supply effects- manufacturing industries in OECD economies.

These profound changes and complex uncertainties in the manufacturing environment have implications for policy making. Benefitting from these new technological trends is dependent on a broad range of policy drivers, hence fostering a productive manufacturing sector for the future poses important policy challenges, in particular to the highly global context of this sector. At the same time it is clear that

while governments have a number of policy levers at their disposal, they cannot shape manufacturing alone. Many of the pre-conditions need to be provided in concert with efforts among stakeholders in industry, education, research, etc.

Further OECD work, in particular a horizontal project on the Next Production Revolution in 2015-2016, will analyse how new and converging technologies (industrial biotechnology, nanotechnology, machine-to-machine communication and other ICT technologies, 3D printing and other advanced manufacturing technologies) could dramatically change the nature of manufacturing and related services and affect the location of different production stages and activities. The ultimate ambition of further OECD work is to better understand the key structural changes that could occur and assess the implications these technological changes and the resulting business dynamics will have for a wide range of policies, including trade, competitiveness, technology policies, skills, employment, income distribution, etc.

ANNEX 1: DATA ANNEX FIGURES 2 AND 4

	EMPLOYMENT	
	last available year	***first available year***
CZE	*2012*	*1993*
SVK	*2011*	*1995*
HUN	*2011*	*1992*
SVN	*2010*	*1995*
EST	*2011*	*1989*
POL	*2012*	*1994*
ITA	*2012*	*1970*
DEU	*2012*	*1970*
KOR	*2009*	*1970*
JPN	*2009*	*1970*
MEX	*2009*	*1995*
PRT	*2011*	*1977*
FIN	*2011*	*1970*
CHE	*2010*	*1991*
AUT	*2011*	*1976*
SWE	*2011*	*1970*
ISR	*2008*	*1995*
IRL	*2009*	*1970*
ESP	*2012*	*1980*
BEL	*2011*	*1970*
NZL	*2011*	*1989*
DNK	*2011*	*1970*
FRA	*2011*	*1970*
ISL	*2008*	*1991*
GRC	*2012*	*1993*
NLD	*2012*	*1970*
NOR	*2011*	*1970*
CAN	*2010*	*1970*
AUS	*2009*	*1971*
LUX	*2011*	*1985*
USA	*2011*	*1970*
GBR	*2011*	*1971*

	VALUE ADDED - CURRENT PRICES	
	last available year	***first available year***
KOR	*2010*	*1970*
CZE	*2012*	*1993*
IRL	*2009*	*1986*
HUN	*2011*	*1991*
DEU	*2012*	*1970*
SVK	*2011*	*1993*
SVN	*2010*	*1995*
CHE	*2012*	*1990*
AUT	*2011*	*1976*
MEX	*2011*	*1970*
EST	*2011*	*1993*
POL	*2012*	*1995*
FIN	*2011*	*1970*
ISR	*2008*	*1970*
SWE	*2011*	*1970*
JPN	*2009*	*1970*
ITA	*2012*	*1970*
ISL	*2010*	*1973*
BEL	*2011*	*1970*
PRT	*2011*	*1977*
ESP	*2012*	*1980*
NLD	*2012*	*1970*
NZL	*2009*	*1971*
CAN	*2008*	*1970*
USA	*2011*	*1970*
DNK	*2011*	*1970*
FRA	*2011*	*1970*
GBR	*2012*	*1971*
GRC	*2011*	*1993*
AUS	*2010*	*1970*
NOR	*2011*	*1970*
LUX	*2011*	*1985*

VALUE ADDED - CONSTANT PRICES

	last available year	***first available year***
CZE	*2012*	*1993*
KOR	*2010*	*1970*
SVK	*2011*	*1993*
HUN	*2011*	*1991*
POL	*2012*	*1995*
DEU	*2012*	*1970*
SVN	*2010*	*1995*
FIN	*2011*	*1970*
AUT	*2011*	*1976*
CHE	*2012*	*1990*
JPN	*2009*	*1970*
SWE	*2011*	*1970*
EST	*2011*	*1995*
MEX	*2011*	*1970*
ITA	*2012*	*1970*
ISR	*2008*	*1970*
BEL	*2011*	*1970*
PRT	*2011*	*1977*
NZL	*2008*	*1977*
ESP	*2012*	*1980*
NLD	*2012*	*1970*
DNK	*2011*	*1970*
ISL	*2010*	*1973*
USA	*2011*	*1977*
CAN	*2010*	*1970*
FRA	*2011*	*1970*
GBR	*2012*	*1970*
AUS	*2010*	*1989*
NOR	*2011*	*1970*
GRC	*2011*	*1970*
LUX	*2011*	*1985*

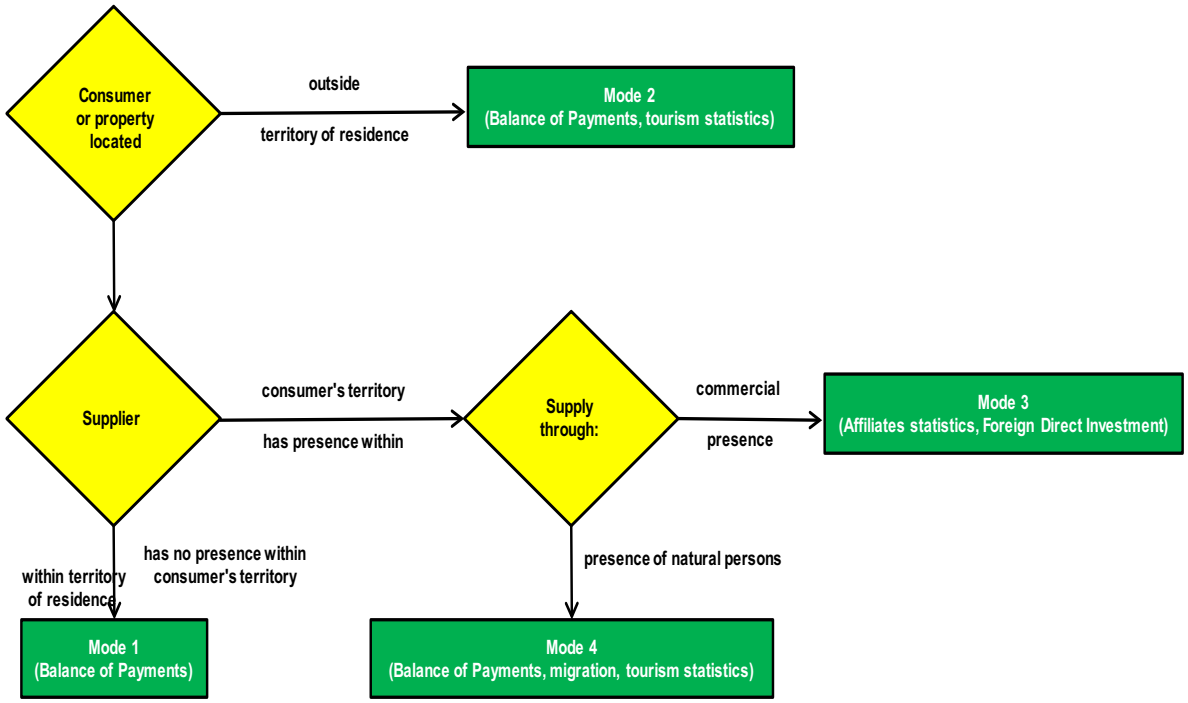
INDEX VALUE ADDED - CONSTANT PRICES

	last available year
KOR	*2010*
SWE	*2011*
HUN	*2010*
FIN	*2011*
USA	*2011*
MEX	*2011*
AUT	*2011*
ISL	*2010*
CHE	*2012*
NLD	*2012*
CAN	*2010*
NOR	*2011*
NZL	*2008*
AUS	*2010*
DEU	*2012*
PRT	*2011*
FRA	*2011*
ESP	*2012*
BEL	*2011*
LUX	*2011*
DNK	*2011*
GBR	*2012*
ITA	*2012*
GRC	*2011*
JPN	*2009*

ANNEX 2: INTERNATIONAL STATISTICS ON SERVICES TRADE

Upon conclusion of the General Agreement on Trade in Services (GATS) and the definition of international trade of services encompassing four modes of supply, the Task Force on Statistics of International Trade in Services, which is now composed of seven international organisations (including OECD, WTO and IMF), started to develop recommendations for methodologies on measuring trade in services. The Manual on Statistics of International Trade in Services (MSITS 2002, 2010) provides guidelines to develop statistics on the international supply of services abroad, providing statistical criteria to develop statistics for the four modes of supply (see figure below).

Figure: Modes of services provision abroad: statistical simplified criteria



Source: Maurer and Magdeleine (2011).

Data on services sales by foreign affiliates – commercial presence (Mode 3) are collected within the Survey of Multinational Enterprises (MNEs), particularly in the EU and the United States. Australia conducted a survey on MNEs in 2002-2003 and more recently, a new survey was undertaken in 2008/2009 focusing exclusively on the sector of financial services. A lot of countries however do not collect statistics on this Mode 3; FDI statistics are often used as a proxy for affiliates sales for countries where no MNE data are available, although this has some drawbacks (e.g. FDI is a financial concept which does not necessarily measure 'real' investment as it is increasingly affected by the activities of Special Purpose Entities (SPEs)). UNCTAD reports that the share of services in outward FDI has consistently increased over the years and accounts for almost 70% of world FDI stock.

Exports and imports of services are provided within the Balance of Payments (BOP) statistics and cover Modes 1, 2 and 4. Data on trade in services are not as widely available as on trade in goods; for example, the HS classification for trade in goods includes around 5300 products/articles (6-digit, although some countries have more detail on 9 and even 12 digit- level). Data on services trade under the latest Balance of Payments Manual sixth edition (BPM 6), more specifically in the Extended Balance of Payments Services (EBOPS – 2010) classification) counts around 140 services categories. Australia being the first OECD country to implement BPM6, releases 7000 disaggregated trade categories for goods and 70 service trade categories for trade with partner country (Drake-Brockman, 2011).

As international transactions may be composed of several modes of supply, the different modes of supply (1, 2 and 4), cannot be distinguished in the exports and imports reported within BOP. Derived from the definitions of the GATS, the MSITS 2010 proposes a simplified allocation of the EBOPS-2010 services categories across the different modes of supply. Transport (except supporting and auxiliary services to carriers in foreign ports, which should be allocated to Mode 2), insurance and pension services, financial services, telecommunication services and information services and to a certain extent charges for the use of intellectual property are deemed to be predominantly provided via Mode 1 (Cross-border supply). Services recorded under manufacturing services on physical inputs owned by others, maintenance and repair services n.i.e. and travel (i.e. excluding goods) should be allocated to Mode 2 (consumption abroad). Combined Modes 1 and 4 transactions are often found in computer services, other business services (research and development services, professional and management consulting services etc.) and personal, cultural, and recreational services; construction services recorded in BOP may be provided through Mode 3 and Mode 4 (see figure below).

Figure: Simplified allocation of MNE and EBOPS data to different modes of services provision abroad



Source: Maurer and Magdeleine (2011).

NOTES

1 However, some countries may 'leapfrog' in services thereby foregoing deep industrialisation (The Economist, 2011; Ghani et al., 2011)

2 The most frequently discussed reasons for the strong decline in manufacturing are the offshoring of manufacturing jobs to emerging economies and technological change that is labour saving (see also OECD, 2013a).

3 Most recent data for Korea and Mexico refer to 2009.

4 Labour costs should however be examined relative to a country's level of productivity in the manufacturing sector. High labour costs can only be supported if they coincide with a high level of labour productivity; conversely, countries with low levels of labour costs typically have low levels of labour productivity.

5 The global middle class is defined as all those living in households with daily per capita incomes of between USD 10 and USD 100 in PPP terms (Kharas, 2010).

6 Linden et al. (2009) showed that of the Apple iPod's USD 144 (Chinese) factory-gate prices, less than 10% represented Chinese value added; the bulk of the components (about USD 100 in value added) were imported from Japan and much of the rest came from the United States and Korea. Taking into account wholesale/retail costs and Apple's margin, the Chinese value added represented about 2% of the final sales price of an iPod sold on the US market.

7 Non-market services are provided either free of charge or at prices that are not economically significant, meaning in practice prices that cover less than half the cost of production. Government services constitute the bulk of non-market services, but there are others, such as services provided by non-profit organisations.

8 Early work by Kuznets (1957) and Fuchs (1968) established that the services share of GDP tended to rise with GDP per capita, a fact that was attributed to high income-elasticity of demand for services relative to other sectors. This explanation was challenged later by researchers, although the empirical fact of a disproportional rise in services output at later stages of development remains solid.

9 Nobel laureate Krugman famously put it as 'Productivity isn't everything, but in the long run it is almost everything'.

10 Nevertheless, discussion has recently emerged on the productivity – employment puzzle in US manufacturing. Nordhaus (2005) and Helper et al. (2012) suggest that major losses of manufacturing jobs are very difficult to attribute to productivity gains. Most of the reported productivity in US manufacturing is actually offshoring and quality improvements in computers, and hence it is particularly the lack of productivity growth that explains the huge job losses in US manufacturing.

11 Manufacturing also accounts for the majority of imports and some countries run trade deficits in manufacturing (like e.g. the United States and the United Kingdom) while others (e.g. Germany) run manufacturing trade surpluses.

12 Services trade might however be underestimated as the quality of statistics of international trade in goods is higher than that of services.

13 In comparing productivity across countries and industries, the problems of calculating (labour) productivity growth should be kept in mind; particularly, the measurement of output and productivity growth in services sectors is not straightforward.

14 Lipsey (2009) however notes that growth figures in services trade have to be interpreted carefully, particularly if they go back a long time; not only is the number of countries reporting services trade is increasing, but the number of services categories reported on has increased over time.

15 Innovation in services: the role of R&D and R&D policies (INNOSERV); OECD project supported by the EU 7th Framework Programme. www.oecd.org/sti/innoserv.

16 Definition from the Oslo Manual on Innovation.

17 In the majority of industrial databases, firms are assigned to the industry of their main activity.

18 And this even after manufacturing firms have outsourced/offshored a lot of service activities to independent service suppliers.

19 Other terms used are servicification, servicisation (Kommerskollegium, 2012).

20 The indicator is expressed relative to countries' total exports - instead of industry exports - in order to take into account the importance of the industry in the total export composition of countries

21 For example, a car manufacturer might subcontract specific services such as logistics to a specialised services producer; in addition, the car is made up of many inputs that are produced in other manufacturing industries (such as wheels, steel, rubber, etc.) which may also have bought services from a specialist service producer. In the framework of Input-Output Tables, the calculation of so-called backward multiplier effects allows for the calculation of the different services inputs in manufacturing.

22 See also Pilat et al, 2006; Rowthorn and Ramaswamy, 1998; The Economist, 2011.

23 The results in Figures 25 and 26 are based on national/international Input-Output Tables, hence they only include contracted and traded services – see also Figure 16.

24 Nevertheless, there is a discussion in the management literature that manufacturing firms' performance can deteriorate after servitisation due to the higher costs and unfamiliarity of manufacturing firms with services provision.

25 Bernard and Fort Teresa (2013) show that the reclassification of such companies from wholesale to manufacturing industries would result in an increase of at least half a million manufacturing jobs.

26 Nevertheless, there is a large discussion on the 'success' of industrial policy in emerging economies; see Nolan (2014) for a discussion on China.

27 A lot of controversies exist around the word 'industrial policy', reflecting the different views on the desirability, use and outcomes of industrial policies across countries and industries.

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