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Productivity, Performance, and Progress

Germany in International Comparative Perspective

Englischsprachige Langfassung einer Studie von The Conference Board im Auftrag der Friedrich-Ebert-Stiftung

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Englischsprachige Langfassung einer Studie von
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Bart van Ark
Kirsten Jäger
Vlad Manole
Andreas Metz

Diese Studie wird von der Abteilung Wirtschafts- und Sozialpolitik der Friedrich-Ebert-Stiftung veröffentlicht. Die Ausführungen und Schlussfolgerungen sind von den Autorinnen und Autoren in eigener Verantwortung vorgenommen worden.

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Vorbemerkung

Die vorliegende Studie untersucht die Wachstums- und Beschäftigungsentwicklung sechs großer Volkswirtschaften während der vergangenen 50 Jahre: Deutschland, Frankreich, Großbritannien, Niederlande, Schweden und USA. Diese Länder wurden danach ausgewählt, inwieweit sie für Deutschland partiellen Vorbildcharakter haben können. Die von der Friedrich-Ebert-Stiftung im Herbst 2007 in Auftrag gegebene Studie von The Conference Board unternimmt im Rahmen ihres internationalen Vergleichs eine genauere Analyse der Faktoren des Wohlstandswachstums und ihrer unterschiedlichen Zusammensetzung. Durchgeführt und im Herbst 2008 abgeschlossen wurde sie von einem Team unter der Leitung des Chefökonomen und Vizepräsidenten von The Conference Board, Prof. Dr. Bart van Ark.

Der Fokus der Studie liegt auf der Produktivität, weil von ihrer Entwicklung die Lösung zentraler Probleme abhängt, mit denen (nicht nur) die deutsche Gesellschaft konfrontiert ist. Hohes Produktivitätswachstum eröffnet Verteilungsspielräume, sichert die internationale Wettbewerbsfähigkeit, erlaubt die Finanzierung eines hohen Niveaus öffentlicher Vorsorge und erleichtert die Versorgung einer wachsenden Zahl älterer Menschen, ohne dass sich die aktive Bevölkerung zu sehr einschränken müsste. Die aktuelle Krise belegt aber auch, dass nur eine auf gerechter Verteilung beruhende stabile Nachfrage die Wachstumspotenziale ausschöpft, die der Produktivitätsfortschritt ermöglicht.

Zunächst analysiert die Studie die Entwicklungen der Produktivität pro geleisteter Arbeitsstunde (Stundenproduktivität) und ihr Verhältnis zur Entwicklung der Arbeitsstunden pro Kopf der Bevölkerung. Besonders erfolgreich sind Länder, denen es gelingt, hohe Wachstumsraten der Stundenproduktivität mit einer Zunahme des Arbeitsinputs zu verbinden. Langfristig entscheidet jedoch die Produktivitätsentwicklung über die Wachstumsrate, da der Steigerung des Arbeitsinputs biologische und gesellschaftliche Grenzen gesetzt sind.

Kern der Studie ist daher die Analyse der jeweiligen Quellen des Wachstums der Stundenproduktivität. Dazu zählen insbesondere die Investitionen in reales Sach- und Humankapital, in Informations- und Kommunikationstechnologien, sowie in immaterielles Kapital, die in den hier untersuchten Ländern und in verschiedenen Phasen teilweise sehr unterschiedlich ausgefallen sind. Dementsprechend weisen sie auch unterschiedliche Entwicklungen der Stundenproduktivität in ihren jeweiligen Wirtschaftssektoren und Branchen auf. Die Analyse dieser Unterschiede und ihrer Ursachen erlaubt es, Ansatzpunkte für eine Steigerung der Produktivität zu identifizieren. Davon sollte vor allem Deutschland profitieren, dessen Wachstum in den letzten fünfzehn Jahren relativ schwach ausgefallen ist. Das neue Verhältnis von Markt und Staat bietet Chancen, diese Ansatzpunkte für eine längerfristig erfolgreiche Wohlstandsentwicklung zu nutzen.

Eine deutschsprachige Zusammenfassung von René Bormann, Michael Dauderstädt, Michael Fischer und Markus Schreyer ist unter dem Titel „Wohlstand durch Produktivität: Deutschland im internationalen Vergleich; Ergebnisse einer Studie von The Conference Board im Auftrag der Friedrich-Ebert-Stiftung“ als WISO-Diskurs erschienen und ist als PDF-Dokument im internet unter www.fes.de/zukunft2020 zu finden.

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Michael Dauderstädt
Leiter der Abteilung
Wirtschafts- und Sozialpolitik

THE CONFERENCE BOARD

Productivity, Performance, and Progress

Germany in International Comparative Perspective

March 2009

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Authors

Bart van Ark, Kirsten Jaeger, Vlad Manole, and Andreas Metz

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212 759 0900 / www.conference-board.org
The Conference Board Europe Chaussée de La Hulpe 130, box 11, B-1000 Brussels, Belgium
+ 32 2 675 54 05 / www.conference-board.org/europe.htm
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Productivity, Performance, and Progress: Germany in International Comparative Perspective

by Bart van Ark, Kirsten Jaeger, Vlad Manole, and Andreas Metz

Introduction and Story Line[1]

The Need to Create Productive Jobs

Prosperity—economic growth, social development and improvements in living standards—depends on two key factors: labour productivity, measured as output per hour worked, and labour input growth, measured as total working hours. Since 1995, both Europe and the United States have seen about two-thirds of their GDP growth generated by labour productivity, and about one-third by an increase in working hours.

This study argues that the key to a successful and sustainable growth strategy for any time and place is to find the optimal balance between labour productivity growth and labour input growth. In other words, economies need to create more productive jobs that will lead to an improvement in average living standards. Productive jobs are also the primary mechanism by which the gains from productivity growth can be widely distributed across the economy—to consumers through lower prices and to workers as higher rewards. These same gains provide the resources for new investments and a sustainable growth path.

Unfortunately, there is no silver bullet to create productive jobs that can be universally applied irrespective of time and place. In fact, there are strikingly large differences between countries in their ability to simultaneously raise productivity and employment, especially since 1995. Germany, for example, has experienced moderate productivity growth (1.4 percent) and virtually no growth in hours, at least until the middle of the current decade. Sweden has grown productivity about twice as fast as Germany and combined that growth with a small but significant increase in labour inputs (0.6 percent) over the same period. Since 1995, the Netherlands increased working hours at double the Swedish rate, but productivity fell between that of Germany and Sweden.

[1] We are grateful to Janet Hao who contributed substantially to Chapter 6 and to Andrew Tank for the support and coordination of this project.

How can such large differences in contributions of productivity and labour input to GDP growth arise among countries with relatively similar living standards? The past is an important guide, as the balance between productivity and labour growth is largely made up by differences in the way economies are organized and managed. The past also provides a guide to the future, as institutional-path dependency determines the pattern and pace by which changes can take place. At the same time, however, shocks to the local, national or global economic system can either speed up or slow down adjustments in the contribution of productivity and hours intensity to growth (measured as the average working hours per head of the population) and their distribution.

This report provides a detailed comparison of the growth performance and strategies of six advanced economies over the past 40 years, with an emphasis on comparing Germany with the five other countries (France, the Netherlands, Sweden, the United Kingdom and the United States). More specifically, this report focuses on the following fundamental questions:

- How does productivity translate into improved living standards and income?
- What are the sources of productivity growth?
- Who has benefited from productivity growth? How are the benefits distributed among capital and labour and among different groups in society?
- What have been the mechanisms behind the distribution of productivity gains?
- How has the process changed over time under the influence of globalisation, technological progress and innovation?

Chapter 1 provides the conceptual framework for wealth creation used for this study. It views the increase in GDP as the result of productivity growth, which in turn depends on capital, innovation and structural change, and an increase in hours intensity. The chapter discusses the historical dynamics of rapid growth until the 1970s, the slowdown and structural transition during the 1970s and 1980s, and the growth recovery since the mid 1990s. It documents Germany's slowing productivity growth and shows that newly created jobs are, to a large extent, low productivity jobs.

Chapter 2 addresses the trade-off between employment and productivity growth that exists in many countries, particularly in the short run. Germany compares unfavourably to other countries. The decline in hours intensity since the 1970s was related to a decline in hours per worker that was not made up for by an increase in participation. While manufacturing has increased the trade-off with more productivity and job losses, the recent increase in job growth in Germany has mainly taken place in the services sector, which has been the slowest in productivity growth. As a result, higher hourly productivity contributed less to higher incomes and generated less demand effects in Germany than elsewhere.

Chapter 3 provides growth accounts that decompose the growth of GDP and of major industries into the contributions from various sources of growth, including the quantity and quality (i.e., gender, age and skill mix) of labour input, the quantity and quality of capital input (notably the mix of information and communications technology, or ICT, that is part of that input), and the efficiency by which these inputs are used, which is called multifactor productivity. The chapter traces the slowdown for most European countries, and especially for Germany, to multifactor productivity growth in services. There is not much evidence that Germany's strong export orientation and tendency to offshore have created additional negative effects from either a productivity or employment viewpoint. Finally, Chapter 3 also provides a decomposition of demand growth, showing the negative contribution of demand to output growth since 2000.

Chapter 4 focuses on the distributional effects from the productivity gains, which result from lower prices, the distribution among labour and capital income, and the impact of productivity on personal income distribution. The labour income share in most countries, especially in Germany, since 2000 has declined significantly, the result more of falling real wages than weakening productivity growth. This again can be mainly traced to the services sector. Strikingly, the inequality in market income in Germany is not any lower than in the United States, although the inequality for all income is less than in the United States because of a more intense secondary redistribution.

Chapter 5 looks at the impact of regulatory change on productivity through the lenses of competition and innovation. It shows that the translation of innovation into productivity is in part complicated by a lack of competition and slow progress in product market reforms, particularly in several services industries. Because of substantial differences between industries, the chapter looks at how reforms in different countries are related to performance variables, including output, employment, productivity growth and specific measures of innovation.

While innovation is driven in part by investments in tangible inputs, such as high-tech machinery and equipment, **Chapter 6** focuses on the intangible investments that are needed to create productive jobs. Intangible investment reflects some of the key "human capital" inputs required to sustain innovation and productivity growth, primarily through education, training and increased skills of workers. But intangibles also reflect the process of business and societal innovations, including the improvement of organisational processes, as well as the social, cultural and natural environment.

The study concludes that the optimal balance between productivity and hours intensity depends on many factors, and that some policy measures may strengthen rather than weaken the trade-off. Some factors, such as the increased competition from low-wage economies and the rise of services in advanced economies, may not appear to be under the direct control of policymakers. However, incentives for individuals, business strategies and government policies towards investments in ICT, human capital and other kinds of intangible capital can make a large difference in raising the productivity of jobs. The efficiency (multifactor productivity) with which the high-potential sources of growth are used also depends on attitudes and policies towards international competitiveness (notably in manufacturing), product market development (notably in services), labour market co-ordination and flexibility, and other regulatory changes concerning competitiveness and innovation. Productive jobs are also the most important vehicle to distribute the gains among broader sections of the population and generate a dynamic source of domestic demand for goods and services.

While lessons can be learned from successes and failures, any "cherry-picking" of good practices from individual countries must be considered cautiously in light of the characteristics of each country's institutional environment at any time. However, a strong focus on innovation and education, an emphasis on competition for scarce resources and a carefully managed reform agenda that rewards winners and eases the exit of losers, or at least compensates them, are important and well-tested building stones for creating productive jobs.

Chapter 1—Introduction and Historical Overview

1.1 Introduction: Growth and Distribution

Economic slowdown brings importance of productivity to foreground

The economic slowdown of the past year, which followed more than a decade of rapid growth, has raised serious concerns about the overall growth potential of the world economy. The credit crunch and financial market crisis has left its marks around the world. The economic crisis has deeply eroded the potential for further acceleration of the world's real GDP. Emerging economies, which will continue to grow at three or four times the average rate of advanced economies, are also suffering from the global slowdown, the result of an environment of reduced potential for trade and investment.

Still, while world economic growth in 2009 and 2010 will fall far below the 4-5 percent growth rates of the early 2000s, the prospects for the next decade remain reasonably optimistic for at least two reasons. First, the weight of emerging economies in total GDP has increased by so much over the past decade that these countries are contributing significantly to keep the world GDP engine running in the medium and longer term. Second, much of the past decade's growth has been driven by productivity growth. While world employment increased at about 2 percent per year on average between 2000 and 2006, productivity growth increased at a rate of 2.6 percent. Productivity provides fundamental strength to firms and organisations to sustain the growth process, even in more difficult times, as it creates potential for restructuring, development of new products and services and more efficient production processes.

Technology and innovation are critical to productivity growth...

The exceptionally rapid growth of productivity is in part the result of rapid adoption of new technologies in emerging economies, and the increased pace of innovation and technological change globally, but especially in advanced economies. The production and, in particular, the more efficient use of information and communication

technology (ICT), together with an increase in the skill level of the labour force, have driven much of the acceleration in productivity in recent years.

For example, the combined contribution from improvement in the "quality of labour" investment in ICT and the higher efficiency with which these inputs have been used contributed 1.1 percentage points out of the 1.5 percent labour productivity growth in the market economy of the EU-15 1995 and 2005. In the United States, the contribution of these factors added 2.6 percentage points out of 3 percent productivity growth in the market economy (see Chapter 3).

… but there are differences in how productivity translates into sustainable growth

A "receptive" economic environment is the key to translating technological change and innovation into sustainable economic growth. What constitutes a receptive environment for productivity growth combined with labour input growth is the main topic of this report. In recent decades, there have been major attempts in many countries to improve the institutional and market environment for a faster reallocation of resources—such as labour, capital and other inputs—in the production process to more productive uses. Experiences across advanced countries, and even within Europe, have been very different. Also, concerns about how productivity growth affects the creation of jobs and wages, how gains from productivity are distributed and how this affects the demand for new goods and services have been the subject of many debates.

Productivity has been a major source of long-run growth in per capita income

Whatever the possible downsides of rapid productivity gains to job creation in the short run (see Chapter 2), in the long run there is ample evidence that productivity has been the key not only to economic growth, but also to social development and improvements in living standards in a broader sense—all of which are the result of innovation and a more efficient use of resources. Those economies that today are characterised by the highest incomes per capita are also those that have shown the most impressive increase in labour productivity growth over the past two centuries. For example, between 1870 and today the twelve core countries of Western Europe increased per capita income close to tenfold. Labour productivity, measured as GDP per hour, increased almost 18 times. In the United States, which became the world's

productivity leader by the end of the 19th century, per capita income increased more than eleven times and labour productivity increased 15 times.[2] Germany increased per capita income by twelve times and productivity by 17 times.

As the economy grows, productivity creates job losses and job gains

Over the long term, productivity growth has generally been faster than the increase in per capita income. This has fuelled concerns that increasing productivity is bad for job creation. Job losses surely are a concern when an economy is transitioning from old to new industries and activities, but from a long-term perspective the dominant role of labour productivity for wealth creation becomes clear. As the economy develops, due to restructuring and reallocation of resources, new and more productive jobs are created, workers can produce more output for each hour of work provided and that often translates into higher wages and higher GDP per capita. At the same time, however, the preference for more time not working increases. This is true not just for social and cultural reasons, but also for a simple economic reason: as the opportunity cost of time spent not working increases, people value that time more, whether they use it for leisure, education, child care, or retirement. In the long run, hours intensity, measured as hours worked per head of the population, is therefore falling across advanced economies.

On the one hand, the increased time not working may add to living standards (though not always, as in the case of involuntary unemployment) but on the other hand it also offsets the contribution of productivity gains to per capita income. The degree to which this offsetting effect occurs varies over time and differs between sectors of the economy (notably between manufacturing and services) and among groups in the society. It also depends on distributional and demand effects, which in turn relate to the economic policy environment in which these transitions take place.

Understanding the differences in productivity and per capita income …

The main aim of this study is to document cross-country differences in the trajectories of productivity, labour input growth and per capita income growth. It also analyses which paths are more or less sustainable in the longer run, and what can be learned

[2] See Maddison (2001, 2007).

from different countries to improve living standards by balancing productivity and hours intensity. This requires a better understanding of the underlying sources of growth: the contributions of the inputs (in particular capital and labour) to output growth, and those of domestic and foreign demand expenditure. One also must learn more about the way markets and institutions are organised to allocate resources so that productivity growth and income increases can be sustained in the longer run.

… and the distribution of the gains …

Despite the undisputed contributions of productivity to economic growth, there have been continuous concerns about the distribution of the productivity and welfare gains from growth within and between countries. For example, while the differences in productivity levels between countries rapidly declined from 1960 to 1973, the between-country distribution of productivity has stalled since 1973. The overall variation in labour productivity growth rates between advanced Organisation for Economic Co-operation and Development (OECD) economies has not changed much over more than three decades.

Also, while there is little doubt that economic and social progress have brought increased welfare to the average population in countries that have undergone these transformations, this process creates both winners and losers. Personal income inequality has increased in several countries, but is quite varied. For example, the greater role of capital in the economy, the rise of the scale and scope of economic activity, and the increased exposure to global economic and financial forces have often been seen as major threats to the effective use and appropriate rewarding of human effort in the production of goods and services. The interesting question, one that has been the theme of much scholarly work, is whether any systematic pattern can be found in terms of specific country groups that are characterised by more or less inequality occurring during the process of transformation. Many of the concerns are fed by the possible negative impact of structural changes, albeit often temporary, on the standard of living.

…are studied in an international comparative perspective

This study aims to shed light on the causes of income and productivity growth differentials and divergence between Germany and five other advanced countries

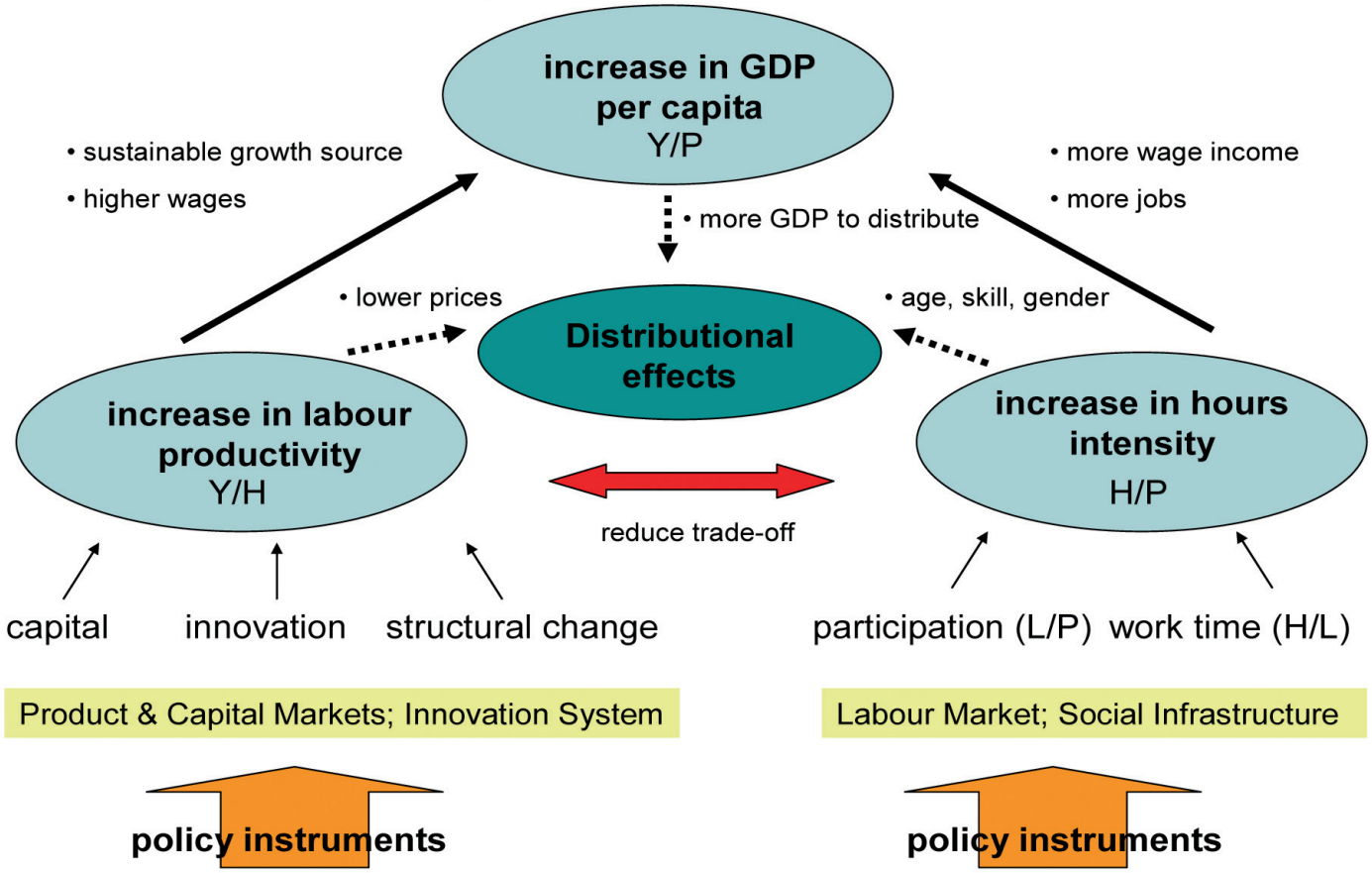
(France, the Netherlands, Sweden, the United Kingdom, and the United States) during recent decades. With specific attention paid to Germany, the comparative framework should help illuminate the challenges and constraints for economic policy making and aid in the creation of a conducive business environment that supports a sustainable improvement in GDP per capita through productivity growth. The report does not intend to express a preference for any specific development model; it aims to help readers understand what caused the differences between countries in their attempts to promote structural transformation and sustainable economic and social development. An important concern is how productivity growth has trickled down to let either the whole population or only limited parts of it share in the gains of production and consumption of wealth.

1.2 A Framework to Identify the Factors for Wealth Creation

As the framework below shows, productivity growth provides a sustainable foundation for per capita income growth that originates from investment, innovation and structural change. This lowers prices and raises wage income through higher hours intensity (more hours worked relative to population) in a growing economy, bringing about demand effects that provide incentives for businesses to expand and create more value. But per capita income growth is also supported through an increase in hours intensity, which is measured as hours worked per head of the population. Two conflicting interests play an important role: On the one hand, the preference for time not working typically increases in a more advanced economy, while on the other hand jobs are still the most important source of income and demand. Hence a balance must be found between seeking more output per hour (labour productivity growth) and cutting hours worked (reducing hours intensity) that optimally contributes to an increase in per capita income.[3]

[3] Note that while this study uses the narrower concept of welfare, defined as gross domestic product per capita, as is conventionally measured across nations, it explicitly recognizes the broader concept of welfare, which also reflects higher "quality" jobs through higher educational attainment levels and female participation, increased time off-work (reflected by lower hours per job), and even a more equal distribution of the gains from productivity, and generally an effective innovative and social infrastructure.

Framework: Important Factors of Wealth Creation



The ultimate balance between productivity and hours intensity and their impact on growth also depends on several distributive mechanisms. The gains from productivity and employment growth can be distributed in different ways. One distributional effect of productivity growth is the extent to which consumers benefit through lower prices. Another distributional effect is how the returns on production are distributed across the owners of capital (through higher profits) and labour (through higher wages or investment in intangible capital which strengthens labour's capabilities). The returns on increased hours intensity also may differ across age, skill and gender groups. Some of these distributional effects depend on the dynamics of the economy, such as structural changes affecting different industries and skill categories. But they also depend on policy choices aimed at influencing innovation, competition and labour markets. The policy framework may also affect the degree of trade-offs between employment and productivity growth, which are not insurmountable.

The remainder of this chapter reviews the post-war performance of the (Western) European economy, with some emphasis on the five countries that are at the core of our analysis, and the United States. Chapter 2 zooms in on the relative contributions of productivity and hours intensity to per capita income growth since 1980. Chapter 3 then focuses on the sources of growth from both a supply side and a demand side perspective, while Chapter 4 looks at the distributional aspects of productivity on the consumer by way of lower prices, the owners of labour and capital, and income inequality. Chapter 5 focuses on the role of markets and institutions driving productivity and innovation, and Chapter 6 looks at how social and human capabilities sustain innovation, primarily through education, training and increased skills.

1.3 European and U.S. Aggregate Income and Productivity Trends: 1950–2007

Europe's growth performance relative to the United States since 1950 can be usefully divided into three periods: 1950–1973, 1973–1995, and 1995–2007 (Table 1.1). The comparative European experience in terms of levels of GDP per capita and in GDP per hour is illustrated in Table 1.2. The measures are compared relative to the United

States and are adjusted for differences in relative price levels using the GDP-based purchasing power parities for 2005 from the OECD.

Catching up (1950–1973)

After the immediate reconstruction efforts from the damage of World War II between 1945 and 1950, European countries set off on a prolonged path of rapid growth in per capita income and labour productivity. Much of this growth reflected a process of catching up with the United States, which had emerged as the world economic leader during the first half of the 20th century. The reasons for the strong European catch-up phase have been extensively discussed in the literature and can broadly be divided into two groups: technology imitation and the creation of new institutions.[4]

Imitation of technology and incremental innovation allowed European countries to speed up growth and productivity quite rapidly after the Depression of the 1930s and the devastation of Europe's economies during World War II. Many European countries could draw upon their legacies as industrializing nations during the nineteenth and early twentieth century. Compared with other parts of the world, Europe after World War II already had a relatively well-educated population and a strong set of institutions for generating human capital and financial wealth, which allowed a rapid recovery of investment and absorption of new technologies developed elsewhere, notably in the United States.

This process was strengthened by the emergence of a new set of institutions in the area of wage bargaining (Eichengreen, 2007). Although there were important differences between countries, these arrangements essentially consisted of limiting wage demands in exchange for a rapid redeployment of profits for investment[5]. Through this arrangement, a consensus was developed between workers and capitalists that benefited productivity and per capita income. In addition, European capital markets favoured the emergence of large "national champion" companies, while at the same time (notably in Germany) a strong system of small- and medium-sized enterprises emerged. In several northwest European countries, the education

[4] See, for example, Boltho (1982); Crafts and Toniolo (1996); Eichengreen (2007). For Germany, see, for example, Giersch, Paque and Schmeding (1994).
[5] Especially in countries like Germany, Sweden and the Netherlands.

systems tended to emphasize technical and vocational training. These characteristics of European institutions largely lasted until the end of the 1960s, after which labour markets became increasingly tight, leading to substantially higher wage demands.

Table 1.1: Average Annual Growth rates of GDP, GDP per Capita, GDP per Hour Worked, GDP per Person Employed and Total Annual Hours Worked, 1950-2007.
(Annual average growth, in percent)

	GDP	GDP per Capita	GDP per Hour Worked	GDP per Person Employed	Total Annual Hours Worked
1950-1973					
Germany*	5.8	4.9	5.7	4.6	0.1
France	4.9	4.0	5.0	4.5	-0.1
Netherlands	4.6	3.4	4.3	3.3	0.4
Sweden	3.7	3.0	4.0	3.1	-0.3
United Kingdom	2.9	2.4	2.8	2.4	0.1
United States	3.9	2.4	2.5	2.3	1.3
EU-15	4.7	4.0	4.7	4.1	0.1
1973-1995					
Germany*	2.5	1.2	1.9	1.0	0.6
France	2.1	1.6	2.7	1.7	-0.6
Netherlands	2.3	1.6	1.8	0.8	0.4
Sweden	1.6	1.2	1.4	1.4	0.2
United Kingdom	1.9	1.7	2.4	1.8	-0.5
United States	2.8	1.8	1.2	1.1	1.6
EU-15	2.3	1.7	2.4	1.7	-0.1
1995-2007					
Germany	1.5	1.4	1.6	1.0	-0.1
France	2.2	1.7	1.6	1.2	0.6
Netherlands	2.8	2.2	1.3	1.2	1.4
Sweden	3.0	2.8	2.4	2.2	0.6
United Kingdom	2.8	2.5	2.2	1.9	0.6
United States	3.0	2.0	2.1	1.8	1.0
EU-15	2.3	2.0	1.4	1.1	0.9

Note: * Growth rates for Germany and EU-15 prior to 1991 use West Germany.
See also Table A.3 in the background document to this report for 1970–1980, 1980–1995, 1995–2000, and 2000–2007.
Data Source: The Conference Board, Total Economy Database, January 2009, (www.conference-board.org/economics).

Table 1.2: Levels of Income, Productivity, Labour Intensity, Relative to United States*(in percent)*

	1950	1973	1995	2007
Germany*				
GDP per Hour Worked	35.4	72.6	99.5	94.1
GDP per Capita	44.7	78.8	79.9	74.5
Hours worked per Capita	122.6	105.1	80.4	79.2
France				
GDP per Hour Worked	43.2	75.7	103.8	98.0
GDP per Capita	55.4	78.9	76.2	73.1
Hours worked per Capita	128.3	104.2	73.4	74.6
United Kingdom				
GDP per Hour Worked	62.9	67.0	87.2	89.0
GDP per Capita	74.1	73.5	72.8	77.1
Hours worked per Capita	117.8	109.8	83.4	86.7
Netherlands				
GDP per Hour Worked	63.9	95.1	108.3	99.3
GDP per Capita	68.4	85.9	83.3	85.0
Hours worked per Capita	107.1	90.3	76.9	85.6
Sweden				
GDP per Hour Worked	58.4	81.9	84.7	87.7
GDP per Capita	72.4	83.1	73.7	81.4
Hours worked per Capita	124.0	101.4	87.1	92.8
EU-15				
GDP per Hour Worked	42.7	70.4	95.1	88.0
GDP per Capita	49.8	72.0	73.4	73.1
Hours worked per Capita	115.6	101.3	77.3	83.0

Data Source: The Conference Board, Total Economy Database, January 2009 (www.conference-board.org/economics).

West Germany experienced a particularly rapid catch-up after World War II, and was starting from much lower levels of per capita income and productivity, compared with the Netherlands, the United Kingdom and Sweden (France still had a much larger agricultural sector in 1950, causing lower productivity levels than the other countries, except Germany). Germany also profited from strong international assistance through the Marshall Plan and other types of international support. Thanks to the emergence of a stable economic-political system based on co-operation between the financial sector, industry and worker movements, the West German economy developed rapidly into a strong, modern manufacturing nation, with a comparative advantage in medium-tech manufacturing. The economy became characterised by a mix of large

firms that strongly interacted with the financial system to facilitate financial flows, and a well-developed small and medium size industry ("Mittelstand") that had developed as the backbone of a well functioning supply chain. Indeed per capita income and productivity growth turned out to be among the fastest in Europe. Between 1950 and 1973, productivity growth increased at a rate of 5.7 percent per year on average, more than twice as fast as in the United States (Table 1.1).

The productivity slowdown (1973–1995)

The "golden age" of post–World War II growth came to an end rather abruptly in the early 1970s, followed by a period of significantly slower growth lasting almost two decades on both continents (Maddison, 1987). Table 1.1 shows that while U.S. GDP growth slowed from 3.9 percent, on average, per year, in the period 1950–1973 to 2.8 percent in the period 1973–1995, EU-15 growth slowed substantially more from 4.7 percent in the period 1950–1973 to only 2.3 percent in the period 1973–1995. However, average growth rates of per capita income between the United States and the EU-15 became quite similar at 1.8-1.7 percent between 1973 and 1995.[6]

A striking observation resulting from Table 1.2 is that while per capita income in Europe hovered between 72 percent and 73 percent of the U.S. level between 1973 and 1995, the productivity gap between Europe and the United States continued to narrow. Indeed, average annual labour productivity growth in the EU-15 was still double that in the United States, at 2.4 percent in the EU-15 against 1.2 percent in the United States from 1973 to 1995. Thus, the labour productivity gap virtually closed from 30 percentage points in 1973 to only 5 percentage points in 1995 (Figure 1.1a). In some European countries, including France and the Netherlands, GDP per hour worked was even above the U.S. level in 1995. In Germany, labour productivity was also about the same as in the United States in 1995. In Europe, the combination of an unchanged gap in per capita income and a narrowing gap in labour productivity was related—by accounting identity—to a decline in labour force participation rates and a fall in working hours per person employed. Working hours per capita in the European

[6] Further details on the growth slowdown during this period are provided by Crafts and Toniolo (1996), Baily and Kirkegaard (2004) and Eichengreen (2007).

Union countries declined from above the U.S. level in 1973 to only 77 percent of the U.S. level by 1995.[7]

Figure 1.1a: Relative Levels of per Capita Income (GDP per Head of Population) and Labour Productivity (GDP per Hour), EU-15 as Percent of United States.

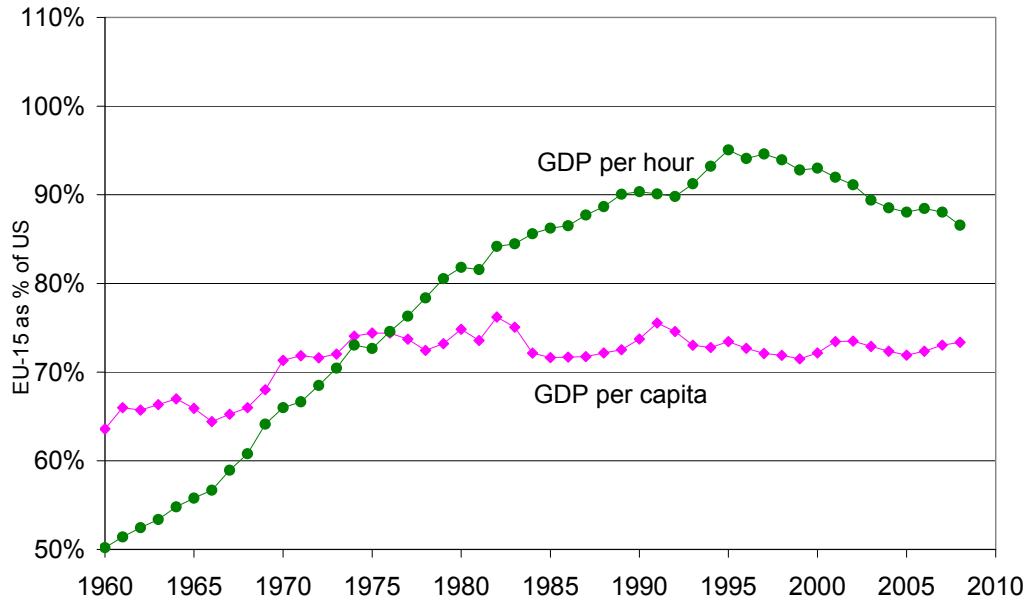
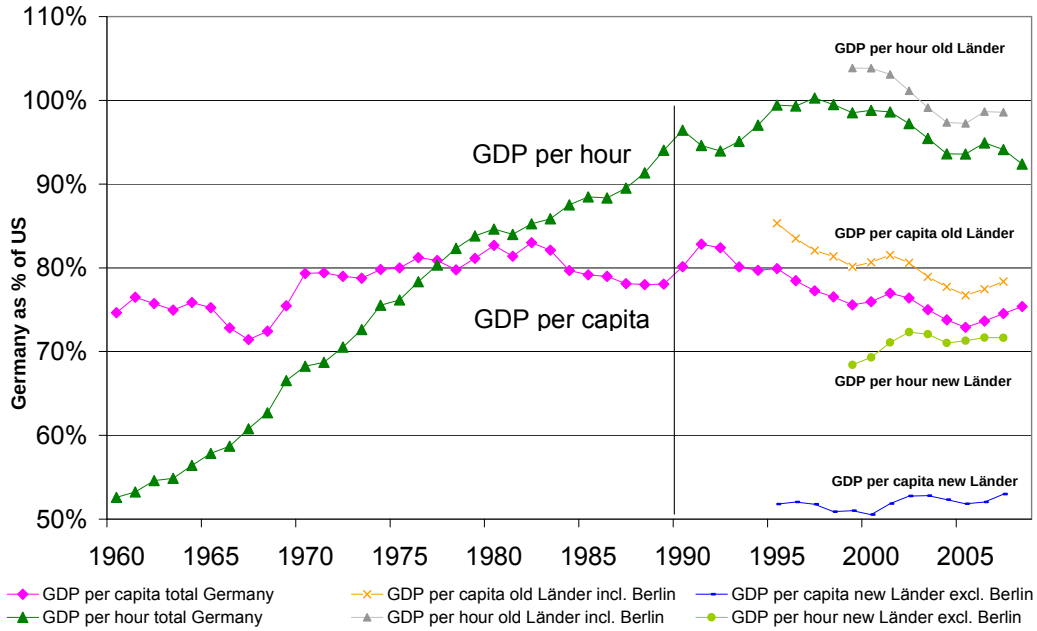


Figure 1.1b: Relative Levels of per Capita Income (GDP per Head of Population) and Labour Productivity (GDP per hour), Germany as Percent of the United States.



Note: See also Figures C1.1-C1.4 for France, Netherlands, Sweden, and United Kingdom.
Data sources: The Conference Board, Total Economy Database, January 2009 (www.conference-board.org/economics). Regional data: Statistical office Baden-Württemberg, Stuttgart, 2008.

[7] Chapter 4 deals in more detail with the issue of the impact of European labour market institutions on the relationship between productivity, income and labour force participation.

While Germany's per capita income growth was about the same as the U.S. (and the European) average during this period, productivity growth rates were substantially higher than in the United States, leading to a strong catch-up phase in terms of GDP per hour worked. Meanwhile the economic debate in Germany increasingly focused on inherent weaknesses related to slowing investment, falling productivity and 'sclerosis' in Germany's institutional structures around capital and labour markets. Some, however, argued that Germany's strength in vocational education and high labour force skills kept the country at the competitive edge, particularly in the medium high-tech segment of manufacturing (Carlin and Soskice, 1997, 2007).

The most important event during this period was the re-unification of West and East Germany in 1990. The opening of markets in Central and East Europe, as well as the "New Economy Boom", were seen as conducive to the convergence of the productivity gap between East and West Germany and the potential boost to German welfare. But after the immediate euphoria that created a boom in construction and a boost in GDP, per capita income showed a more decisive slowdown relative to the United States and the rest of the European Union since the early 1990s. Figure 1.1b shows that this slowdown was not primarily related to East Germany, but in fact to West Germany.[8] Strong productivity increases for East Germany were only observed during the first five years of the transformation process, and were strongly related to a decline in employment due to the rationalisation of inefficient enterprises.

One result of Europe's slowing growth in labour input during the 1970s and 1980s was a rapid increase in capital intensity, as the rise in wages led to the substitution of capital for labour. Timmer and van Ark (2005) show that Europe's capital stock per hour worked was at 82 percent of the U.S. level in 1973, but reached almost equality with the U.S. level by 1995. Some European countries, including France, Germany, and the Netherlands, had a capital stock per hour worked more than 10 percent above the U.S. level in 1995. The growth in multifactor productivity in the EU-15, and in many of the individual countries, was much lower than labour productivity growth. Hence high labour productivity growth did not necessarily entail a more efficient use

[8] A further, more detailed account of the relative productivity performance of East and West Germany is given in Appendix A1.

of capital and labour. It was not as much the result of catch-up, access to superior technology, or even faster innovation relative to the United States, but may be primarily attributed to an overshooting of capital intensity (capital per unit of labour) in a market environment in which labour became relatively expensive.

Falling behind (1995–2005)

Since the mid 1990s, the patterns of productivity growth between Europe and the United States changed dramatically. In the United States, the average annual labour productivity growth accelerated from 1.2 percent during the period 1973–95 to 2.0 percent during 1995–2007. Comparing the same two time periods, annual labour productivity growth in the European Union declined from 2.5 percent to 1.4 percent. By 2007, GDP per hour worked in the EU was about 12 percentage points below the U.S. level.

The slowdown in labour productivity may in part be related to an improvement in employment growth in many European countries (see Chapter 2). Hours worked per head of population in the EU-15 as a whole improved from 77 percent to 83 percent of the U.S. level between 1995 and 2007. In this light, the slowdown in productivity growth since 1995 suggests the possibility that just as limited employment growth accompanied higher labour productivity in Europe in the 1973–1995 period, that pattern may have been reversing itself in the more recent time period.

When put in comparative perspective, the productivity slowdown in Europe is all the more disappointing as U.S. productivity growth accelerated beginning in the mid 1990s. The causes of the strong U.S. productivity resurgence have been extensively discussed. In the mid 1990s, there was a burst of higher productivity in industries producing information and communications technology equipment, and a capital-deepening effect from investing in information and communications technology assets across the economy (Jorgenson, Ho, and Stiroh, 2008). In turn, these changes were driven by the rapid pace of innovation in information and communications technologies, fuelled by the precipitous and continuing fall in semiconductor prices. With some delay, arguably due to the necessary changes in production processes and organisational practices, there was also a multifactor productivity surge in industries using these new information and communications technologies, particularly in market

services industries (Triplett and Bosworth, 2006). In Europe, the advent of the knowledge economy, especially the application of ICT, has been much slower than in the United States.

Germany has been a particular drag on aggregate growth performance of the EU since 1995. Except for Italy, GDP growth since 1995 was the lowest of the EU-15. The continued deceleration in labour intensity, measured as hours worked per head of population (which is a combination of hours worked per employed person and the employment rate in the population) has significantly reduced Germany's capability to increase per capita income. Per capita income growth in Germany remained well below the EU-15 growth rate from 1995 to 2007 (i.e., 1.5 percent vs. 2.0 percent). While productivity growth remained somewhat ahead of the EU-15 average, the gap widened relative to some of the most productive countries in Europe (including Sweden and the United Kingdom). It may be argued that reunification has to some extent created a drag on West Germany's growth. But it is necessary to investigate the extent to which a slow adjustment of labour market institutions may have contributed further to a strong decline in hours intensity through a rapid fall in hours worked per person employed that has not been compensated by an increase in the employment rate (Chapters 2 and 4).

An early, choked recovery? (2006-2008)

The past two to three years have seen a trend reversal, which seemingly points towards a recovery in growth among European countries. In 2005, the productivity growth rate of the EU-15, compared with the United States, narrowed significantly to only 0.5 percentage points (Table 1.3), and in 2006 EU-15 productivity growth even exceeded that of the United States by 0.5 percentage points. Still it would be too early to argue that this reversal is a definitive structural improvement. Part of the productivity recovery seems to be strongly cyclical as labour input growth also accelerated. The other side of the coin is that there are signs of a structural slowdown of U.S. productivity relative to the very high productivity growth rate since the mid 1990s. Figure 1.2 shows that the structural trend in the United States has remained about 0.5 percentage points higher than in the European Union.

Germany showed a substantial recovery in labour input growth from negative 0.6 percent in 2005 to a positive 0.5 percent growth in total hours in 2006, and a further acceleration to 1.8 percent growth in 2007. Particularly in 2006, a strong boost to productivity growth given as output growth recovered even faster than labour input growth. In 2007, however, growth in total hours had caught up to some extent with output growth, so that aggregate productivity slowed. These short-term movements point in the direction of strong cyclical effects in Germany related to an acceleration in investment.

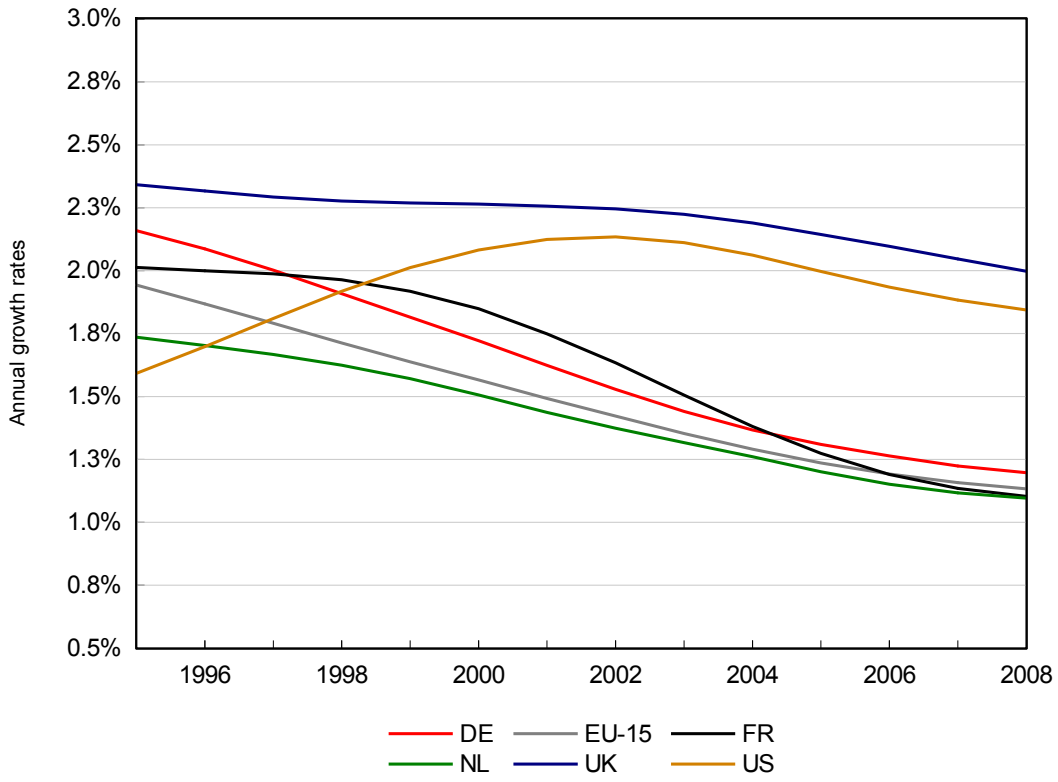
Table 1.3: Labour Productivity Growth (GDP per Hour worked) and Total Hours Worked, 2000–2008 and Preliminary for 2008

	2000-2008	2005	2006	2007	*2008 preliminary*
Labour Productivity Growth (GDP per hour, annual average, percent)					
European Union (EU-15, old)(a)	1.1	0.9	1.4	1.1	0.0
France	1.0	1.5	0.0	1.3	-0.6
Germany	1.1	1.4	2.4	0.6	-0.1
Netherlands	1.0	0.1	0.8	0.6	0.7
Sweden	2.0	3.1	2.7	-0.4	-0.4
United Kingdom	2.0	0.9	2.8	2.6	0.2
European Union (EU-27)(b)	1.5	1.0	1.8	1.3	0.2
United States	2.0	1.4	0.9	1.5	1.7
Total hours worked (annual average, percent)					
European Union (EU-15, old)(a)	0.8	0.9	1.5	1.6	1.0
France	0.7	0.4	2.1	0.9	1.5
Germany	0.0	-0.6	0.5	1.8	1.4
Netherlands	0.9	1.9	2.6	2.8	1.5
Sweden	0.6	0.2	1.3	3.2	1.2
United Kingdom	0.3	0.9	0.1	0.4	0.6
European Union (EU-27)(b)	0.7	1.1	1.5	1.8	1.2
United States	0.2	1.5	1.8	0.7	-0.6

(a) referring to membership of the European Union until 30 April 2004
(b) referring to all members of the European Union including Bulgaria and Romania
Source: The Conference Board, Total Economy Database, January 2009 (www.conference-board.org/economics).

One peculiarity of Germany's recent recovery, however, is the strong contribution to output and productivity growth coming from the external sector. Domestic consumption remained slow for 2006, and showed some improvement only by 2007 (see Chapter 2). The dynamics of the recovery seem to have created a somewhat dual structure in the German economy, with an imbalance in growth performance between the external and the domestic sector of the economy and, when translated to the industry composition of the economy, between a dynamic (but declining) manufacturing sector and a stagnant (and growing) service economy (see Chapter 3 for more detail).

Figure 1.2: Structural Trend of Labour Productivity Growth in EU-15 Countries and the United States, 1995-2007



Note: structural trend obtained on the basis of a Hodrick-Prescott filter with λ=100
Data Source: The Conference Board, Total Economy Database, January 2009 (www.conference-board.org/economics).

The year 2008 showed a significant turnaround in economic performance in both the United States and Europe. The United States had already entered into recession by end of 2007, but moderately positive growth during the first half of the year kept the annual growth rate of GDP at 1.1 percent, despite a strong decline in GDP during the second half of the year. Productivity is typically procyclical—it increases during upswings but slows, or even declines, in a downturn because labour and capital inputs are worked harder during booms than busts. Nevertheless, productivity growth in the United States increased slightly from 1.5 percent in 2007 to 1.7 percent in 2008, the result of a decline in hours worked (rapid layoffs are one cause) that exceeded the slowdown in GDP growth. But it also reflects the relative productivity strength built up by many U.S. companies over the past decade.

Recession signals started to emerge in Europe by the middle of 2008, but annual GDP growth was still 1.5 percent for the European Union (which consists of 27 member states). Europe also still enjoyed solid employment growth, at least during the first half of 2008. But as output growth slowed from the second quarter onward, labour productivity growth in the European Union ended up at only 0.2 percent for the whole of 2008, down from 1.3 percent in 2007. This raises the question of whether the recovery of productivity in some European countries has indeed been more cyclical than structural, especially when compared with the United States.

Appendix to Chapter 1

A1. The East German productivity gap and its implication for Germany as a whole

Although the productivity gap between East and West Germany has narrowed since reunification, a significant gap has remained in recent years. Figures A1.1a and A1.1b show that the labour productivity in the New Länder (former East German states) increased from roughly 40 percent of the German average shortly after reunification to approximately 80 percent in 2007 (see also Figure 1.1b in the main text). Strikingly, several West German Länder (Saarland, Schleswig-Holstein, Rheinland-Pfalz, and Niedersachsen) also exhibited a below average labour productivity level in 2007. This indicates that the regional dimension of productivity differentials it not just an East-West divide.[9]

Figure A1.2 compares estimates of GDP per hour worked between Länder for 1998 and 2007. The results are similar to those obtained from Figures A1.1a and A1.1b. The gross-value-added per hour worked in East Germany is considerably lower than in West Germany in 2007, and the East-West German productivity gap is clearly visible. None of the New Länder was able to reach Western levels, as none of them exhibited GDP per hour worked above 30.28€ in 2007. In the same year, productivity per hour was 6.25€ lower than in the worst-performing western state of Niedersachsen (Lower Saxony). Besides the East-West productivity gap, a tendency towards higher productivity numbers in the Hanseatic cities and South Germany can be observed in Figure A1.2 at both points in time.

[9] It should be stressed that the measures in the figures are not corrected for differences in relative price levels between Länder, which may be somewhat lower in East Germany than in West, hence somewhat exaggerating the differences in relative productivity levels.

Figure A1.1a: Gross Value Added per Employee 1991

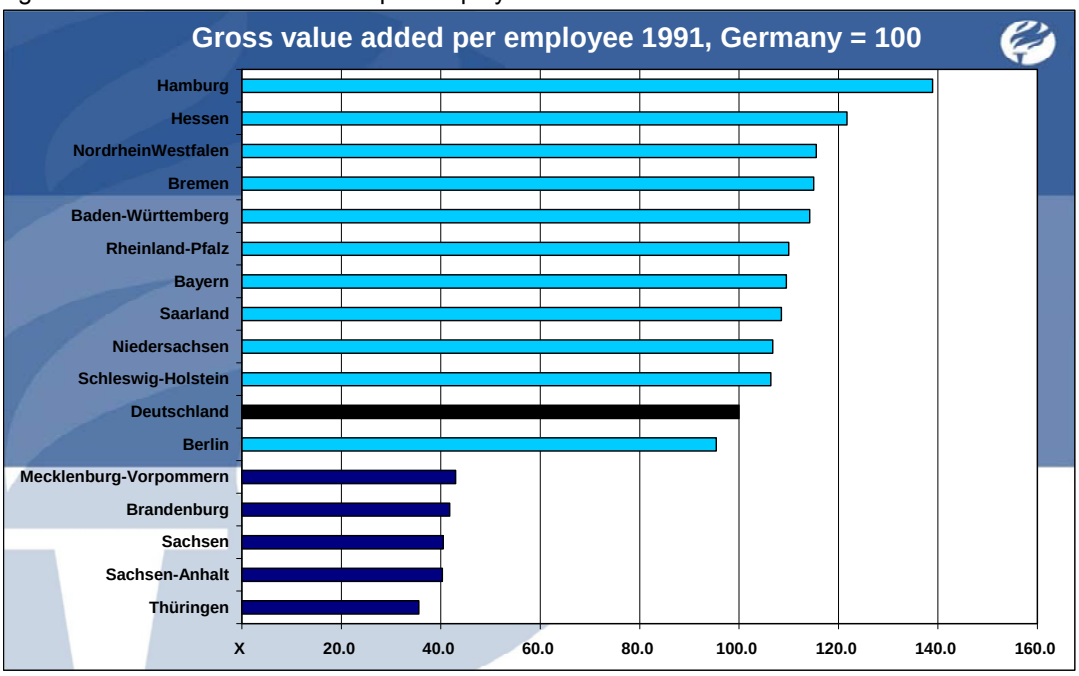
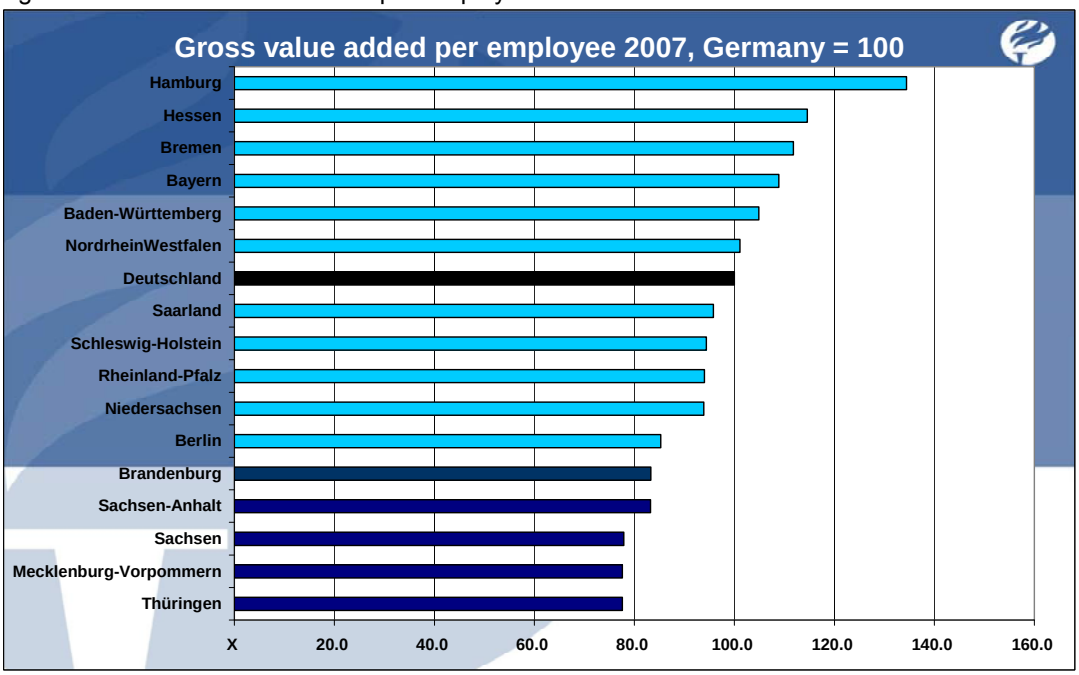
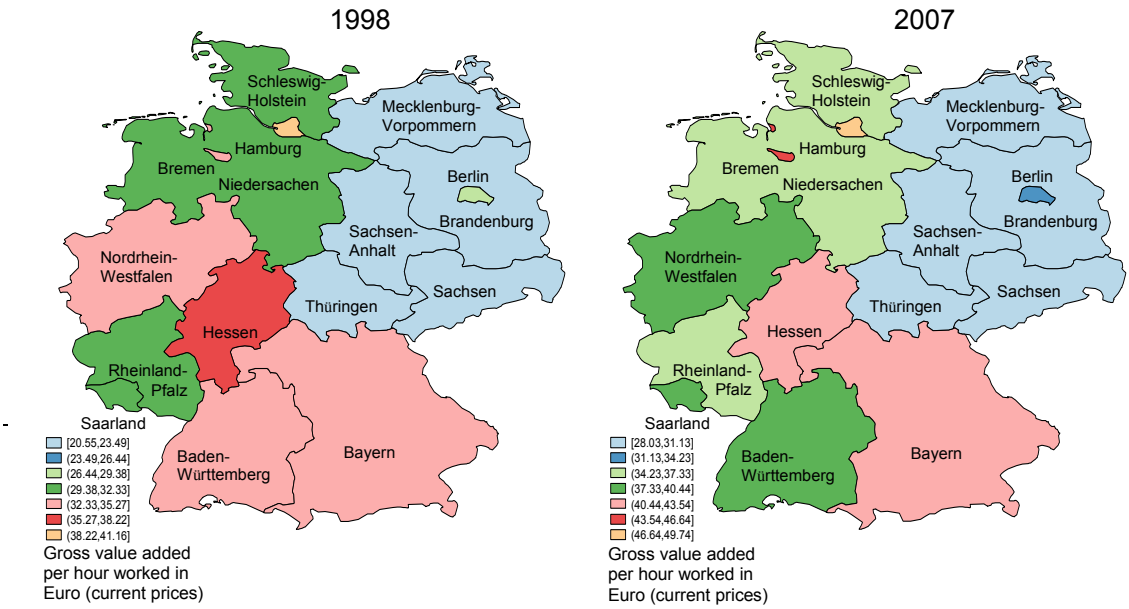


Figure A1.1b: Gross Value Added per Employee 2007



Data source: Statistical office Baden-Württemberg, Stuttgart, 2008.

Figure A1.2: Gross Value Added per Hour Worked in Germany 1998 and 2007



Data source: Statistical office Baden-Württemberg, Stuttgart, 2008.

There are several factors that hamper productivity growth in East Germany, and thus the convergence towards West German productivity levels. East German wages have increased much faster than the region's labour productivity. The underdeveloped infrastructure, lower capital endowment, the unfavourable educational status of the younger cohorts, and high unemployment rates in the New Länder and the migration of workers to West Germany are substantial impediments for the decline of the productivity gap.[10] Since reunification, the German government has aimed to speed up convergence between East and West Germany by various policy instruments. But even with substantial economic support, East Germany still has many hurdles to overcome to increase its productivity and to reduce its negative impact on the overall German productivity performance.

[10] In a recent study, Ragnitz (2007) emphasizes that the relatively high overall capital productivity figures for East Germany today (97 percent of the West level) mostly stem from the higher level of public infrastructure in West Germany. Excluding public infrastructure, capital productivity in the manufacturing and construction sector of East Germany is only 70 percent of the West German level.

B1. What does productivity measure?

Labour productivity provides a simple but powerful indicator of economic efficiency. Labour productivity measures how much output is obtained per hour of work and provides a connection to living standards as measured by per capita income—the higher the relative level of productivity, the higher per capita income is, and the greater the chance for economic expansion. Moreover, labour productivity is a principal source of economic growth since labour productivity times total hours worked in the economy equals GDP. The "sources of growth" or "growth accounting" model, discussed below, results in a more sophisticated productivity measure called multifactor productivity (MFP). This represents output over all inputs in the production process, not just labour. MFP growth measures the growth in output that is not accounted for by the joint contribution of capital, energy, materials and labour. MFP is a reasonably good proxy of the "real" efficiency of the production process, looking at output "quantities" over input "quantities". These may also be called "real" cost reductions, and may be contrasted to "nominal" efficiency measures, which are used more regularly in business, that simply look at cost over sales or margins. For example, an increase in output value, adjusted for inflation, relative to the rise in the numbers of workers, is a real cost reduction. In contrast a cut in wages, without a change in the real numbers of workers, is a nominal efficiency gain but does not represent a productivity increase.

C1. Appendix figures

Figure C1.1: Relative Levels of per Capita Income (GDP per head of population) and Labour Productivity (GDP per hour), France as Percent of United States

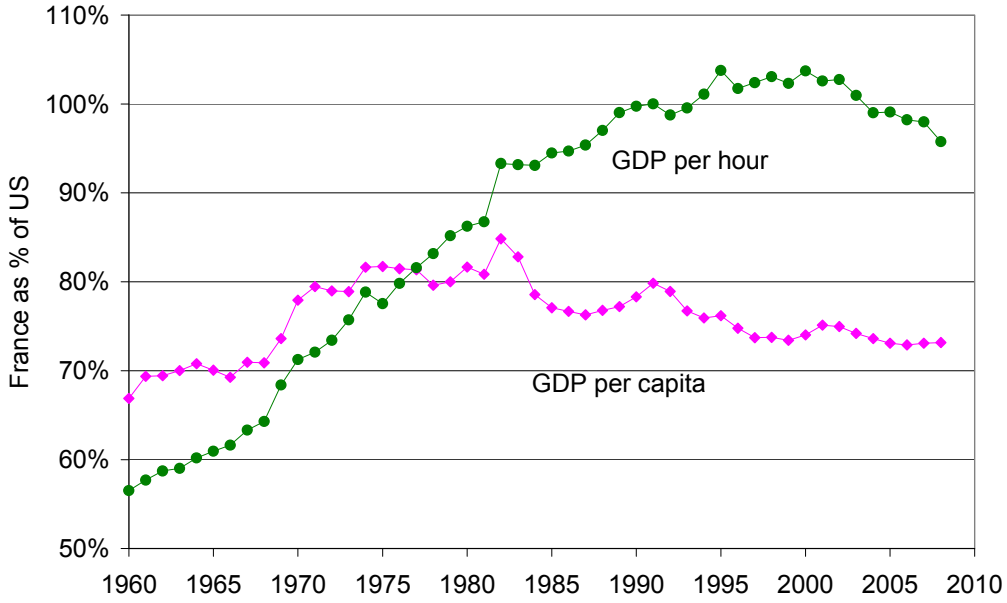


Figure C1.2: Relative Levels of per Capita Income (GDP per Head of Population) and Labour Productivity (GDP per Hour), Netherlands as Percent of United States

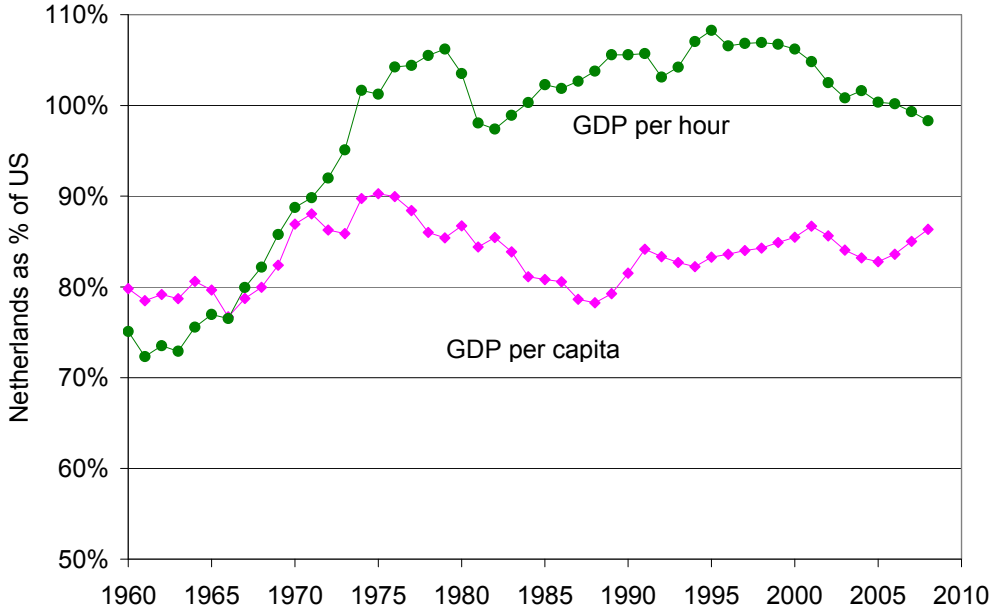


Figure C1.3: Relative Levels of per Capita Income (GDP per head of population) and Labour Productivity (GDP per Hour), Sweden as Percent of United States

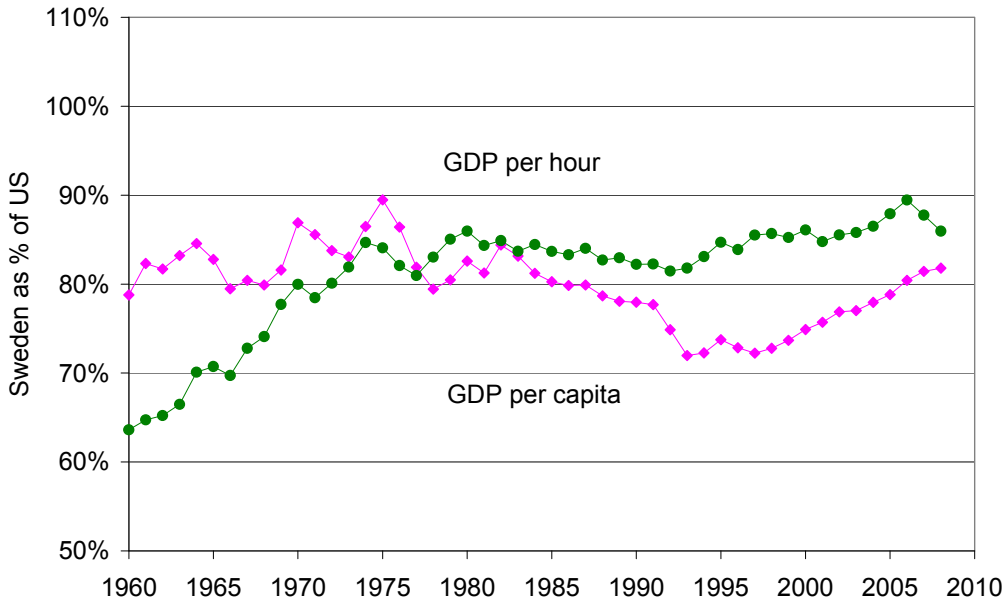
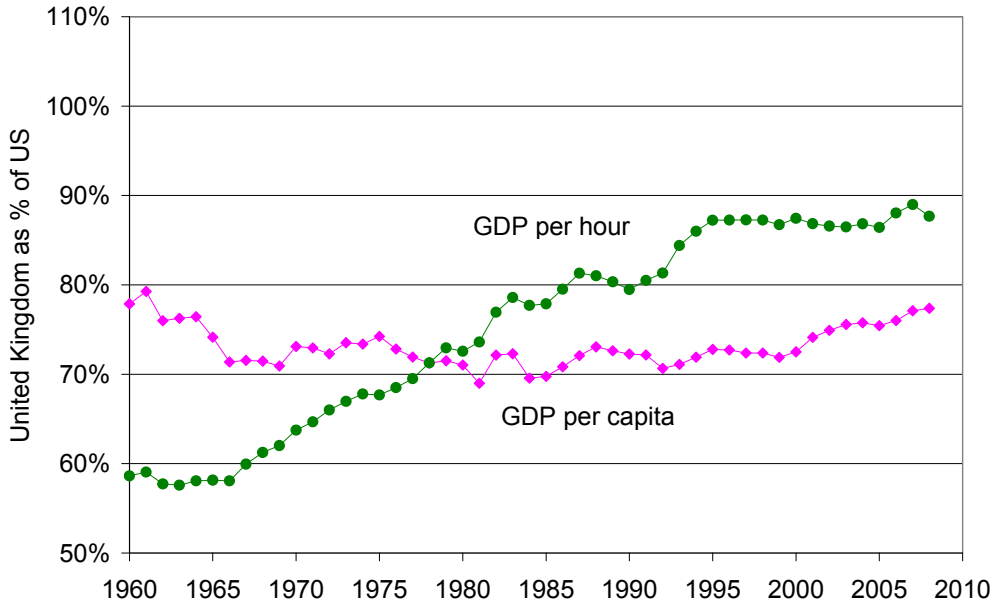


Figure C1.4: Relative Levels of per Capita Income (GDP per head of population) and Labour Productivity (GDP per hour), United Kingdom as Percent of United States



Data sources: The Conference Board, Total Economy Database, January 2009 (www.conference-board.org/economics).

Chapter 2—Productivity and Labour Force Participation

2.1 Introduction

Chapter 1 identified productivity as the main source of per capita income growth. However, it also noted that productivity growth may go together with a decline in labour intensity, which is the result of at least two forces. First, to the extent that productivity results from restructuring of economic activity, lost jobs may not be compensated by a same amount of newly created jobs, at least in the short run. Second, as productivity drives per capita income, the appetite for leisure and other non-work activities increases the opportunity cost of labour and leads to a decline in hours intensity. How these factors affect the relationship between productivity, participation and per capita income depend on a multitude of factors, including the sector structure of the economy, the potential and realisation of technological change and innovation, and the characteristics of labour market policies in different countries.

This chapter addresses the imbalances in employment and productivity growth by focusing on the trade-off between the two. While hours intensity has declined sharply in many advanced economies since the 1970s, much of this was related to a decline in hours per worker, which was not compensated by an increase in participation. As a result, the increases in productivity often did not contribute to higher incomes and greater demand effects.

Since the mid-1990s the situation has changed drastically, as many European countries turned themselves into job creating machines. However, the recent increase in jobs in many European countries appears mainly to have taken place in service industries, which have exhibited the slowest productivity growth. However, there are large differences between countries in how productivity gains have reduced the traditional trade-off, particularly in services. In several countries, for example, the supply of low-skilled and low-paid workers has much increased, which may have

created additional negative effects on demand. Finally, this chapter also looks at the role of age and gender effects in the trade-off between participation and productivity.

This report finds that, while participation factors have accounted for much of the trade-off before 1995, they played no role after 1995. Other factors affecting supply and demand of labour have begun to account for a larger portion of the way in which employment and productivity interact, leading us back to the role of technology and innovation and skill levels of the labour force. Policy reforms that may help to reallocate labour input to more productive uses are analysed in more detail in Chapter 5.

2.2 Reconciling Per Capita Income and Productivity Performance

Differences among countries in terms of growth or relative levels of per capita income and labour productivity can be reconciled by the number of annual working hours per person employed and the share of the population at work. For example, even when two countries have the same productivity levels, a less intensive use of labour (e.g., fewer hours of work, more unemployment, and/or lower labour participation rates) can cause one country to have lower per capita income than the other. This relationship can be conveniently expressed by way of a decomposition linking differences in per capita income and productivity. First, the relative difference in per capita income (*Y/P*) between two countries (*X* and *US*) is expressed as the relative difference in labour productivity times the relative difference in labour input per head of the population, what we call "hours intensity" (*H/P*):

$$Y/P^{\,x\text{-}us} = (Y/H)^{\,x\text{-}us} * (H/P)^{\,x\text{-}us} \qquad (1)$$

Then, differences in hours intensity can be decomposed into differences in hours worked per person employed *(H/E)* and the share of employment in the total population (*E/P)*:

$$H/P^{\,x\text{-}us} = (H/E)^{\,x\text{-}us} * (E/P)^{\,x\text{-}us} \qquad (2)$$

The employment/population ratio *(E/P)* can be further broken down into the number of persons employed relative to the total labour force *(E/L)* (i.e., employed persons

plus registered unemployed persons), the ratio of the labour force to all persons aged 15 to 64 ($L/P1564$) (i.e., the working-age population) and the share of the working-age population in the total population ($P1564/P$) (see van Ark and McGuckin, 1999):

$$(E/P)^{x\text{-}us} = (E/L)^{x\text{-}us} * (L/P1564)^{x\text{-}us} * (P1564/P)^{x\text{-}us} \qquad (3)$$

Table 2.1: Reconciliation of GDP per Capita and GDP per Hour (U.S. = 100.00) Through Effects of Working Hours and Labour Force Participation, 1970-2007

Country	GDP per hour worked as percent of the U.S.	Effect of working hours on per capita income level relative to U.S.	GDP per person employed as percent of the U.S.	Effect of Employment Share in Total Population				GDP per capita as percent of the U.S.
				Effect of Unemployment	Effect of labour force as percent of active population (15-64 years)	Effect of active population (15-64 years) as percent of total population	Total Effect of Labour Force Participation	
Germany								
1970	68.25	0.91	69.16	1.52	1.75	6.91	10.18	79.34
1980	84.64	-4.32	80.32	2.71	-3.82	3.47	2.36	82.68
1995	99.45	-16.21	83.24	-2.42	-6.80	5.89	-3.33	79.91
2000	98.81	-20.34	78.47	-0.16	-6.15	3.80	-2.52	75.95
2007	94.28	-18.21	76.07	-2.58	0.33	0.85	-1.40	74.67
United Kingdom								
1984	77.71	-3.38	74.32	-5.59	0.97	-0.12	-4.75	69.58
1995	87.23	-7.85	79.38	-5.02	-1.06	-0.51	-6.59	72.79
2000	87.45	-9.53	77.92	-3.16	-0.79	-1.46	-5.41	72.51
2007	88.89	-8.20	80.69	-2.43	1.06	-2.05	-3.42	77.27
France								
1970	71.26	6.59	77.85	-1.80	-2.09	3.97	0.08	77.93
1980	86.26	2.12	88.37	-1.86	-4.95	0.10	-6.72	81.66
1995	103.78	-10.29	93.49	-7.71	-11.18	1.59	-17.30	76.18
2000	103.71	-14.73	88.98	-4.95	-10.03	0.03	-14.95	74.02
2007	98.15	-11.42	86.73	-6.45	-6.15	-0.92	-13.52	73.21
Netherlands								
1971*	89.84	-1.21	88.63	-2.54	-4.38	6.35	-0.57	88.06
1980	103.53	-7.88	95.65	-1.43	-11.72	4.22	-8.93	86.72
1995	108.28	-22.25	86.03	-1.71	-7.42	6.38	-2.75	83.27
2000	106.22	-24.04	82.18	1.29	-3.08	5.08	3.29	85.47
2007	99.81	-19.25	80.56	1.17	1.70	1.71	4.58	85.14
Sweden								
1970	79.98	-7.49	72.49	-0.86	6.35	8.94	14.42	86.91
1980	85.95	-13.98	71.97	1.54	9.39	-0.30	10.62	82.59
1995	84.69	-8.87	75.82	-3.90	2.42	-0.60	-2.07	73.75
2000	86.09	-9.88	76.21	-2.10	1.57	-0.79	-1.32	74.89
2007	87.82	-7.97	79.85	-3.77	5.36	0.12	1.71	81.57

* Not all data available before 1985 (United Kingdom) and 1971 (Netherlands)
Data Sources: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics and OECD Labour Force Statistics.

Higher productivity levels in Europe relative to United States are offset in part by lower hours intensity

Table 2.1 shows the reconciliation of labour productivity levels and per capita income levels into the effects of working hours and labour force participation in Germany, United Kingdom[11], France, Netherlands, and Sweden relative to the United States in the years 1970, 1980, 1995, 2000, and 2007.[12] The estimates show that the labour productivity performance of European countries relative to that of the United States was much better than the per capita income levels suggest, especially in Germany, France and the Netherlands, but less so in Sweden and the United Kingdom. This is in part due to the substantially lower number of working hours per employed person, especially in Germany and the Netherlands. The lower ratio of employed persons relative to the total population plays an important role, especially in France.[13]

But productivity growth and higher labour intensity jointly contribute to sustainable growth

The development of Sweden is quite contrary to the other continental European countries, with the former having a much higher rate of labour participation and higher hours per employee. For example, in 2007, average working hours in Sweden were 1,615 hours against 1,570 hours in France and 1,433 hours in Germany. Labour force participation in 2007, measured as the proportion of the population aged 15–64 that is economically active, was 82 percent in Sweden compared to 70 percent in France and 77 percent in Germany. Despite lower productivity levels in Sweden than in France, Germany and the Netherlands, Swedish per capita income levels in 2006 were higher than in the other countries, with the exception of the Netherlands. In other words, high productivity is not always the only route to higher living standards; participation rates play an important role as well. More importantly, the productivity-participation trade-off is not a given fact, not even in the European context. An optimal balance between productivity and employment performance is the key to sustaining the process in the longer run (see below).

[11] OECD Labour Force Statistics for United Kingdom are not available before 1984.
[12] The estimates are converted on the basis of purchasing-power parities, which take account of differences in relative price levels across countries.
[13] In the Netherlands, low working hours per employee are in part due to the high share of part-time employment (this refers to persons who usually work less than 30 hours per week in their main job), which makes up 35 percent of total employment. This is not the case for Germany, where part-timers only account for about 20 percent of all employment (OECD, Employment Outlook 2007a).

When taking a time perspective, it becomes even clearer that per capita income can only be sustained through a balanced growth of productivity and improved labour market performance.

Table 2.2 shows the contributions of trends in hours per person, unemployment, labour force participation and the young and old age dependence ratios to reconcile the per capita income and productivity trends for the periods 1970-1980, 1980-1995, 1995-2000, and 2000-2007[14]. The table shows that many other European countries have not been able to compensate for their decreasing productivity trend sufficiently by improved labour market performance to prevent GDP per capita growth from continuously slowing during the period 1970 to present.

For example, during the 1980s and early 1990s, productivity growth in Germany increased 0.8 percentage points faster than per capita income. This was particularly due to the continuous slowdown in working hours per person employed, which was not offset by any increase in labour force participation. The picture has changed somewhat since 1995, and particularly since 2000: The growth rates of both productivity and GDP per capita were lower than in any other period. The effect of a further decline in working hours on per capita income growth fell to only −0.4 percentage points between 2000 and 2007, but was not offset by a sufficient increase in the employment/population ratio (E/P), which generated a positive effect on per capita income of less than 0.2 percentage-points. The latter is the result of countervailing effects: while the per capita income contribution of labour force participation increased to 0.88 percentage points between 2000 and 2007, it was offset by a rise in unemployment, contributing −0.46 percentage-points to the gap between the productivity and per capita income growth rates (see also Figure 2.1a). Finally, Germany (together with the Netherlands) was relatively strongly affected by the aging of the population: the share of working population to total population in these two countries contributed negatively to per capita income growth between 2000 and 2007, whereas the opposite was true for the United States, the United Kingdom, France and Sweden.

[14] Data for the Netherlands in 1970 and the United Kingdom from 1970 to 1984 were not available.

Figures 2.1a to 2.1f show in more detail the factors that explain the divergent developments of per capita income and labour productivity in the six sample countries since 1970, except for the United Kingdom, for which developments since 1985 are considered.

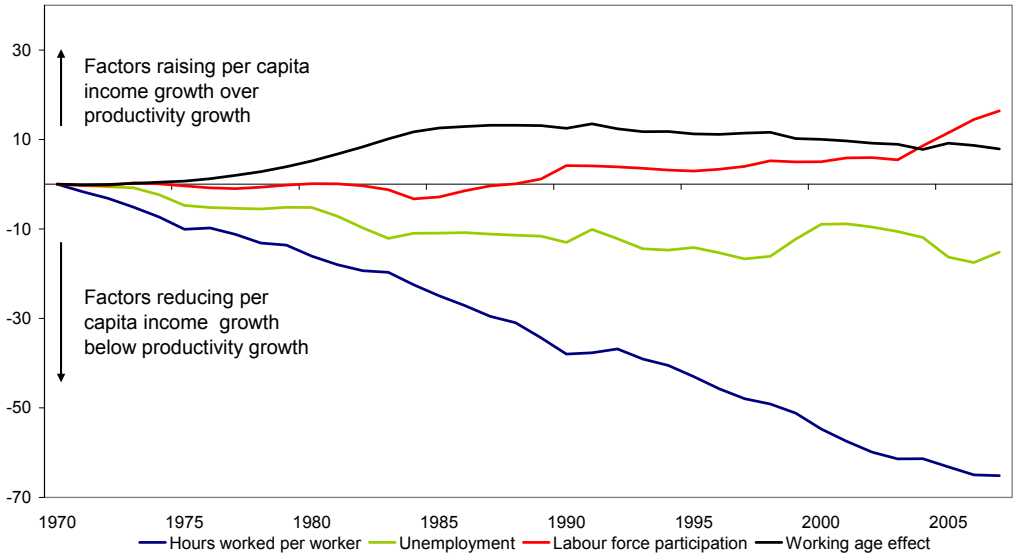
Table 2.2: Reconciliation of Labour Productivity and GDP per Capita Growth through Effects of Working Hours and Labour Force Participation, 1970-2007

Country	Growth GDP per hour worked	Effect of working hours	Growth GDP per person employed	Effect of Employment Share in Total Population				GDP per Head of Population
				Effect of Unemployment	Effect of % Labour Force to Active Population (15-64 years)	Effect of % Active Population (15-64 years) to Total Population	Total Effect of Labour Force Participation	
Germany								
1970-1980	3.70	-1.18	2.52	-0.41	0.01	0.41	0.01	2.53
1980-1995	2.41	-0.76	1.65	-0.32	0.12	0.20	0.00	1.65
1995-2000	1.99	-0.81	1.18	0.74	0.20	-0.27	0.67	1.86
2000-2007	1.33	-0.39	0.94	-0.46	0.88	-0.23	0.19	1.12
United States								
1970-1980	1.55	-0.52	1.03	-0.53	0.73	0.89	1.09	2.12
1980-1995	1.33	0.08	1.41	0.10	0.40	-0.03	0.46	1.87
1995-2000	2.12	0.24	2.36	0.19	0.08	0.23	0.51	2.87
2000-2007	2.00	-0.62	1.38	0.00	-0.36	0.34	-0.01	1.37
United Kingdom								
1985-1995*	2.35	-0.38	1.97	0.27	0.08	-0.17	0.18	2.14
1995-2000	2.17	-0.18	1.99	0.67	0.16	-0.03	0.80	2.79
2000-2007	2.23	-0.35	1.88	0.16	-0.01	0.25	0.40	2.28
France								
1970-1980	3.46	-1.16	2.29	-0.51	0.42	0.38	0.29	2.59
1980-1995	2.57	-0.78	1.78	-0.34	-0.14	0.10	-0.37	1.41
1995-2000	2.11	-0.73	1.37	0.77	0.34	-0.18	0.92	2.30
2000-2007	1.21	-0.19	1.01	-0.28	0.32	0.16	0.20	1.21
Netherlands								
1971-1980*	2.91	-1.22	1.69	-0.24	-0.07	0.60	0.29	1.98
1980-1995	1.63	-0.93	0.70	0.06	0.67	0.17	0.90	1.60
1995-2000	1.74	-0.29	1.45	0.91	1.18	-0.14	1.95	3.39
2000-2007	1.11	-0.01	1.10	-0.01	0.48	-0.24	0.22	1.31
Sweden								
1970-1980	2.27	-1.31	0.96	-0.20	1.08	-0.23	0.65	1.61
1980-1995	1.24	0.52	1.76	-0.40	-0.19	-0.06	-0.64	1.12
1995-2000	2.45	0.02	2.47	0.69	-0.16	0.19	0.71	3.18
2000-2007	2.28	-0.23	2.05	-0.29	0.32	0.51	0.54	2.59

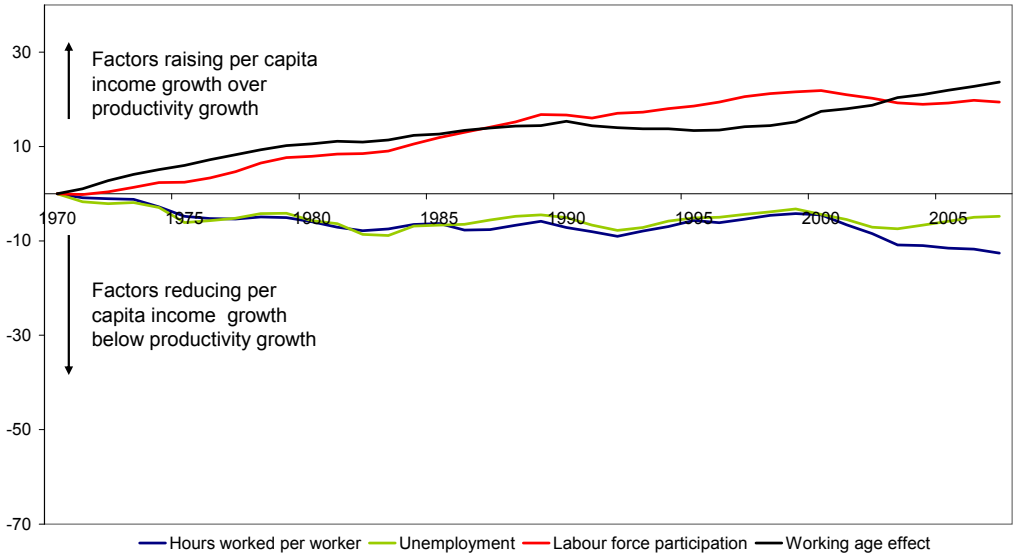
* Not all data available before 1985 (United Kingdom) and 1971 (Netherlands)
Data Sources: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics and OECD Labour Force Statistics.

Figures 2.1a to 2.1f:

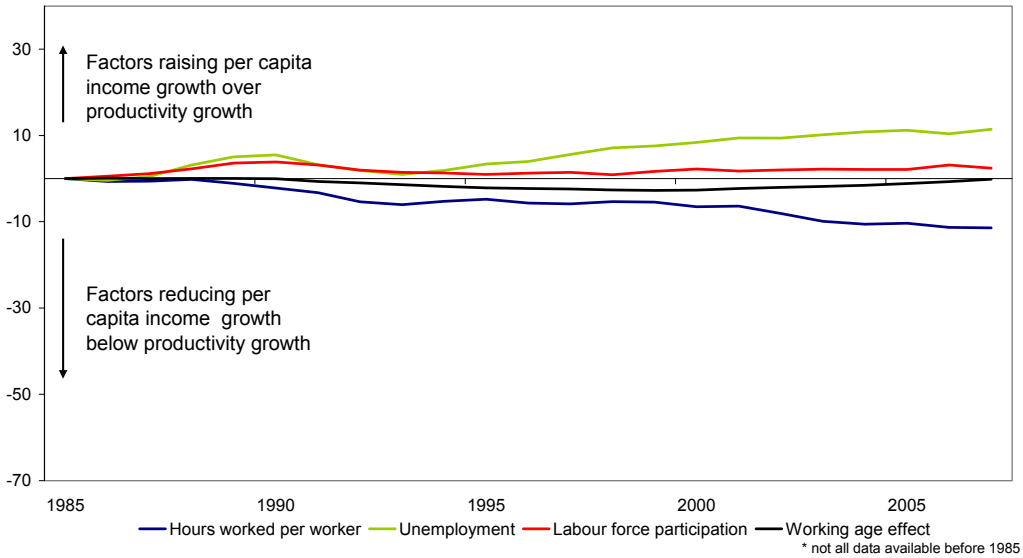
Effect of labour market factors on difference between labour productivity and per capita income growth 1970-2007, Germany



Effect of labour market factors on difference between labour productivity and per capita income growth 1970-2007, United States

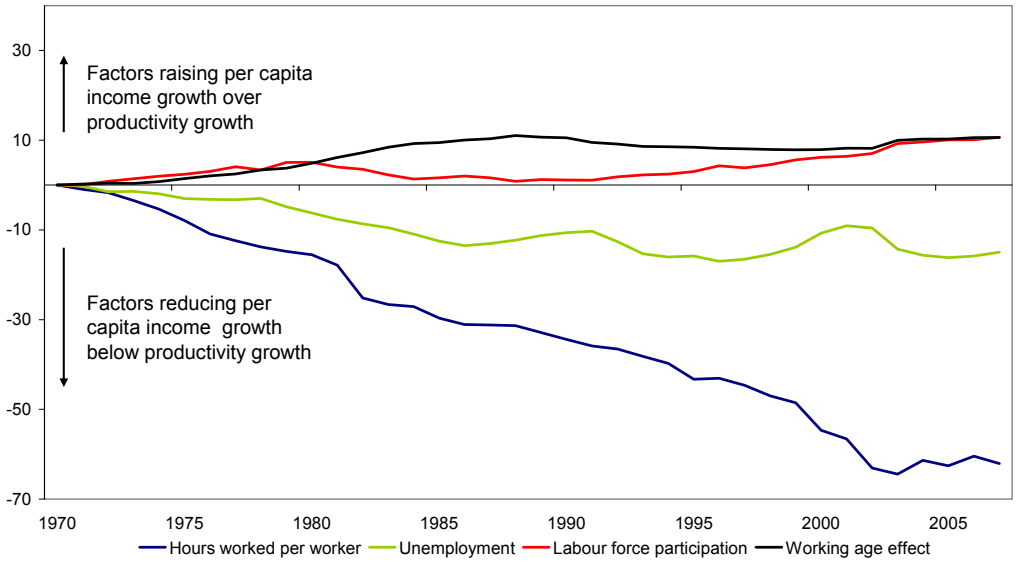


Effect of labour market factors on difference between labour productivity and per capita income growth 1985-2007*, United Kingdom

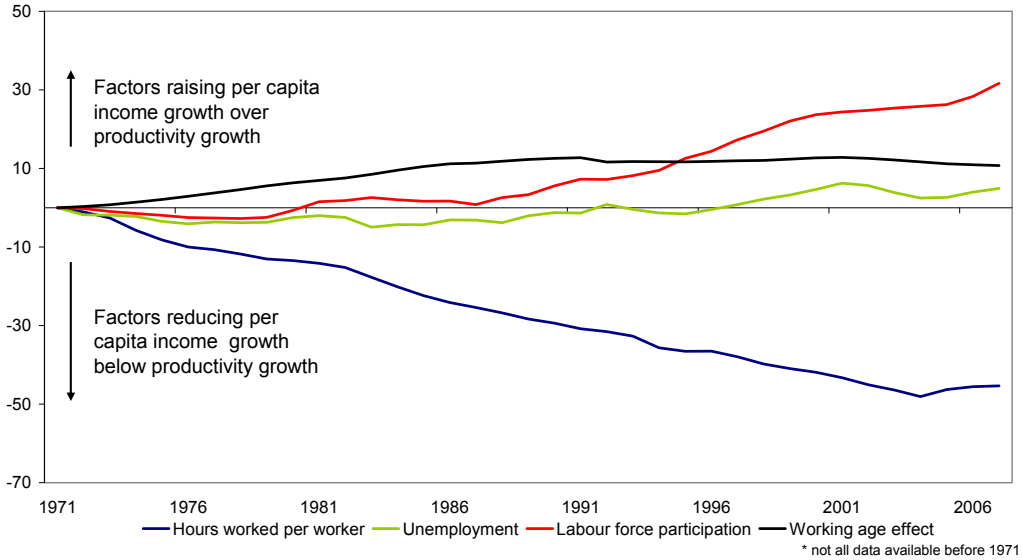


* not all data available before 1985

Effect of labour market factors on difference between labour productivity and per capita income growth 1970-2007, France

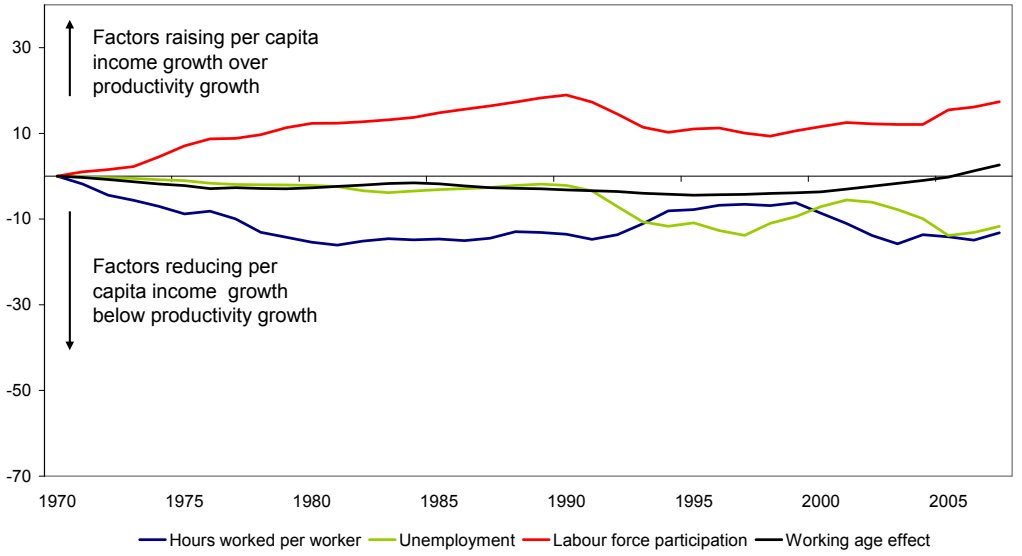


Effect of labour market factors on difference between labour productivity and per capita income growth 1971-2007, Netherlands



* not all data available before 1971

Effect of labour market factors on difference between labour productivity and per capita income growth 1970-2007, Sweden



Data Sources: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics and OECD Labour Force Statistics.

Many explanations for differences in labour market performance suggest no silver bullet

There have been a range of explanations for the differential labour market performance in various European countries. For example, according to Blanchard (2004) and Gordon (2004), the European preference for more leisure (either through fewer hours or through lower participation) is offset against a lower level of per capita income. Moreover, Gordon argues that a significant portion of higher American GDP per capita is required to create decent living conditions in a much harsher natural environment (requiring a greater use of energy for heating and air-conditioning), to fight crime, and to travel longer distances across huge metropolitan areas. Prescott (2004) argues that tax systems explain most of the differences in labour supply between Europe and the United States by making work more costly relative to leisure. Alesina et al. (2005) explain Europe's preference for leisure being incentivised through work sharing agreements in declining industries, which have not created more employment but have increased returns to longer vacations through a social multiplier effect. Unlike Prescott (2004), Faggio and Nickel (2007) stress that low taxes, weak unions, and unregulated labour markets are not essential for sustaining high levels of labour input. They cite as examples Nordic countries, such as Sweden, that do not show this nexus. These economies have generous but work-friendly benefit systems but eschew policies that reduce labour supply in response to adverse shocks.

2.3 Is the Productivity – Participation Trade-off Being Tackled?

Before proceeding on what can be done to raise productivity in conjunction with better labour market performance, the question of how much increases in labour force participation itself may negatively affect productivity advances must be addressed. For example, it has been argued that as labour markets become more flexible, the increased inflow of low-skilled workers (in part related to age, gender or immigrant status) and the rise of low-productivity industries (e.g., personal services or customized business services) will have a negative effect on productivity growth.

This question is particularly relevant because many European countries have realized large gains in labour participation since the mid-1990s. These increases in participation might imply that European countries have done much to strengthen labour's contribution to growth. Instead, they may be seeing offsetting productivity losses caused by, for example, bringing more low-skilled people into the labour force. In addition, counteracting effects have been seen in some non-European countries, notably the United States, where productivity growth has occurred simultaneously with slow employment growth for significant periods of time.

There are specific questions that must be answered before jumping to the conclusion that participation-productivity trade-offs are a fact of life. How should one understand this trade-off between productivity and participation growth? Is it credible to argue that increased participation has lasting negative effects on productivity, where training, education and on-the-job learning are meant to improve worker skills? How does the effect of a rise in the employment rate relate to an increase in hours per person? What is the role of age and gender cohorts in this trade-off? Are there differences across industries?

From a cross-country perspective the trade-off has strengthened

The simplest way to determine whether growth rates in productivity and employment are negatively related is to examine the relationship between the two variables in a cross-section of countries, comparing the periods 1995–2000 and 2000–2006. Figure 2.2a includes 38 countries, most of which are OECD members. In both figures and periods, a negative relationship between productivity and employment growth can be clearly distinguished even though goodness of fit is relatively low in both periods. The trade-off appears to have strengthened, as indicated by the steeper slope of the regression line in 2000–2006 compared with 1995–2000. However, the negative relationship in Figure 2.2a is in part driven by the inclusion of East European economies, which exhibit strong trade-offs related to large shutdowns of unproductive enterprises. This becomes clear if one looks at Figure 2.2b, which excludes the group of East European countries. The negative relationship between productivity and employment growth is still visible, but weaker. The slope of the regression line is less steep for the smaller sample of countries (-0.4) compared with Figure 2.2a for 38 countries (-0.7) in 2000-2006, but the R^2 improved from 0.148 to 0.215. Moreover,

most of the countries are in the northeast quadrant of the diagram, exhibiting both productivity and employment growth. However, due to low growth rates in GDP per person employed and employment growth in 1995-2000 and 2000-2006, Germany is in both periods below the predicted regression lines, even though countries like Italy, Portugal and Spain are positioned even lower. Indeed the latter countries may largely account for the steeper trade-off since 2000 than was seen between 1995 and 2000.

EU compares favourably with Germany in combining productivity and employment growth

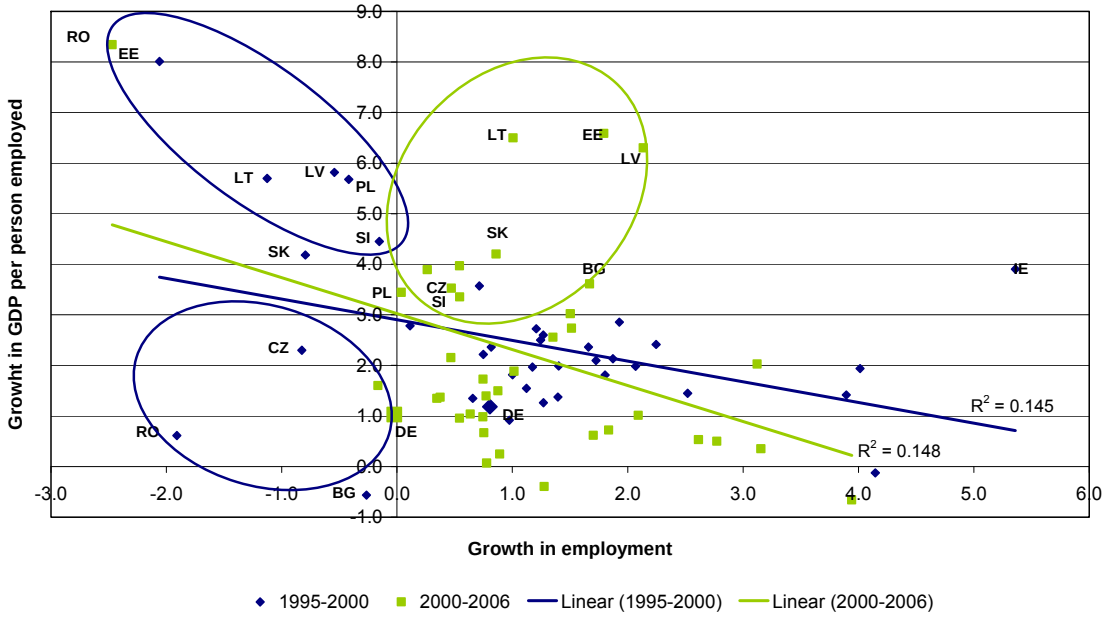
The results from the previous section provide an indication that not all countries experience the productivity-participation trade-off to the same extent, if at all. While the trade-off between productivity and participation was relatively strong in East European countries in the post-1995 period, it declined particularly in Germany, France, Netherlands and the United Kingdom at the same time.

Figures 2.3a to 2.3c compare the relationship between labour productivity and total hours worked in Germany, the EU-15, and the United States respectively from 1970 to 2007 using five-year moving averages[15]. Despite the cyclical variations, both Germany and the EU-15 as a whole have more or less moved out of the northwest quadrant of absolute trade-offs between productivity growth and employment declines that were so characteristic of the period before 1995. However, since the mid 1990s the stronger increase in total hours growth in the EU-15 countries relative to Germany indicates that the latter fell behind in creating jobs to overcome the high unemployment numbers from the previous decade. Indeed the slowdown in productivity growth started well before the acceleration in employment growth in Germany finally took off in the early 2000s.

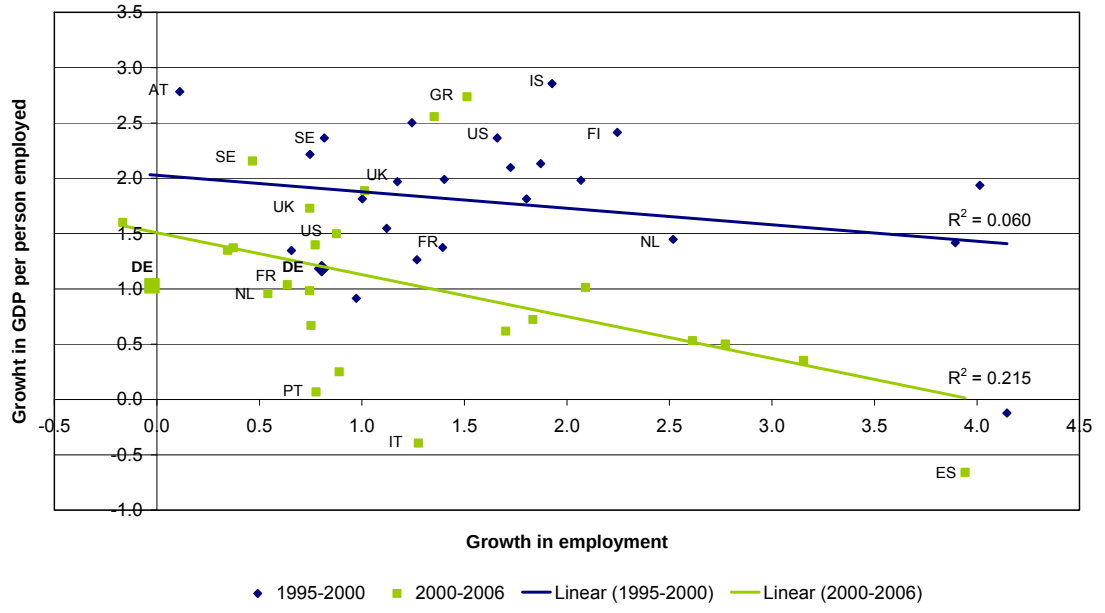
[15] For example, the five year moving average for the year 2005 represents the growth rate 2003-2007. Corresponding figures for France, Sweden, the Netherlands and the United Kingdom are shown in Tables A.1-A.4 in the background document to this report. Strikingly, the Swedish performance (Table A.4) represents an outlier relative to the rest of Europe, as both productivity and employment growth strongly accelerated since the mid-1990s. This development is strongly related to the rise of ICT production, and in particular the production of communication equipment and telecom services, in Sweden which created a technology and employment boom.

Figure 2.2a to 2.2b

Relation between Growth Rates of Employment and Labour Productivity, including Central and East European Economies



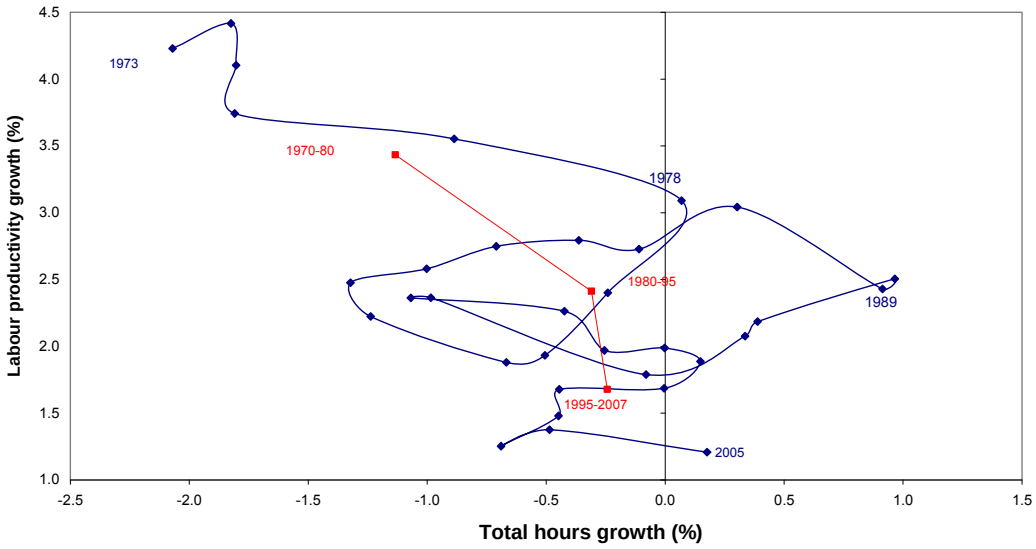
Relation between Growth Rates of Employment and Labour Productivity, excluding Central and East European Economies



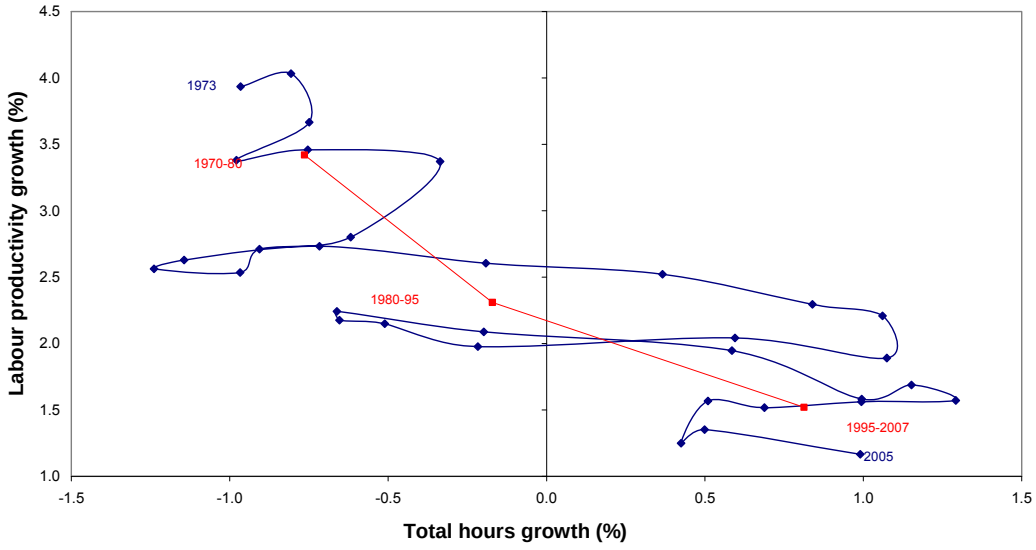
Note: Legend for the countries: RO=Romania, JP=Japan, DE=Germany, CZ=Czech Republic, SE=Sweden, PL=Poland, KR=Korea, SL=Slovenia, NO=Norway, CH=Switzerland, NL=Netherlands, US=United States, FR=France, SK=Slovakia, UK=United Kingdom, TR=Turkey, IS=Iceland, MT=Malta, AT=Austria, DK=Denmark, FI=Finland, PT=Portugal, IT=Italy, BE=Belgium, LT=Lithuania, GR=Greece, CA=Canada, AU=Australia, MX=Mexico, LV=Latvia, BG=Bulgaria, HU=Hungary, EE=Estonia, NZ=New Zealand, LU=Luxembourg, IE=Ireland, CY=Cyprus, ES=Spain.
Data Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics.

Figures 2.3a to 2.3c

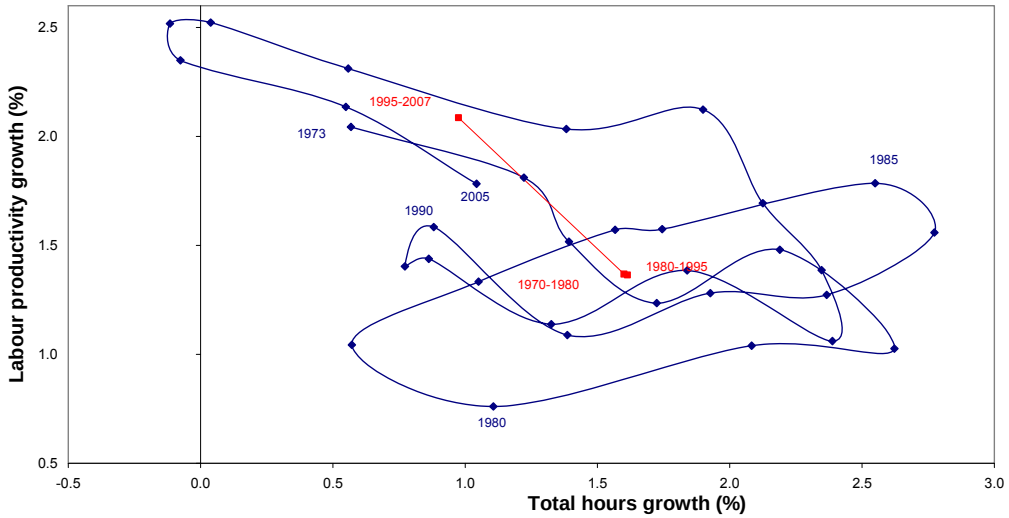
Relationship between labour productivity and total hours worked growth, Germany, 1970-2007, 5 year moving averages



Relationship between labour productivity and total hours worked growth, EU-15, 1970-2007, 5 year moving averages



Relationship between labour productivity and total hours worked growth, United States 1970-2007, 5 year moving averages



Note: See Appendix Figures A2.1-A2.4 for United Kingdom, France, Netherlands, and Sweden.
Data Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics

Productivity growth in United States was accompanied by jobless growth

Strikingly, the United States showed an opposite pattern, compared to Europe, over the past decade or so. Whereas most European countries improved their labour market performance with a weakening productivity growth, U.S. productivity accelerated in conjunction with rapid labour input growth during the mid- and late 1990s, but then entered a period of slow employment growth while productivity accelerated further during the early 2000s. However, this development has been hiding a lot of the underlying dynamics in individual sectors. Indeed, while many jobs were lost in the manufacturing sector in the United States, many jobs were created in the services sector, a trend studied in more detail below.

Trade-offs between productivity and employment are primarily a short-run issue

The analysis above suggests that there are important differences between countries in the amount that one additional person or hour of labour input contributes to labour productivity growth. But what is causing these differences? Why do some countries or sectors undergo stronger trade-offs than others? And what does this mean for the long growth performance of the economy? And is there a role for differences in composition of the labour force in explaining the different contributions?

Following earlier work by McGuckin and van Ark (2005), we measure the elasticity of an increase in working hours and the employment rate on productivity. For this purpose we econometrically estimate this relationship. By changing the time period over which we analyze the data, we look at both the short-term relationship (the "immediate" trade-off) and the pattern of the observed trade-offs over longer periods up to 10-year time spans (the "dynamic" trade-off). The idea is that any trade-off between participation and productivity should be greatest initially and then diminish over time. An increase in participation initially lowers aggregate productivity growth because the new workers may be less skilled or in other ways less productive than existing workers, but on-the-job learning and training tends to reduce these differences as they relate to workplace performance. Thus the relationship for any group of new participants in the labour market should be temporary and weaken over time. In turn the observed trade-off should diminish when the measurement interval is extended.

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BOX:

Measuring the Impact of Participation on Labour Productivity

For this purpose we estimated the following empirical model:

$$\Delta \log \frac{Y}{H} = \alpha_0 + \alpha_1 \Delta \log \frac{E}{P} + \alpha_2 \Delta \log \frac{H}{E} + c * D_j + d * \frac{Y}{H_{j,t0}} + \varepsilon \qquad (4)$$

Where the α's are constant parameters and the residual of this equation approximates the per capita income growth, j stands for country and the t stands for the time span over which the growth is measured. D_j stand for country fixed effects, which provide a way to factor in country-level differences in the trade-off, and there is control for the initial productivity level of each country. Estimation was carried out using a set of panel regressions of labour productivity growth on participation with the variables measured over varying time intervals: annual, two year, three year, five year and, for completeness, seven year and 10 year. While we estimate the model for the longer

periods, we caution that the longer the interval the more likely other factors, such as technological and policy changes, will tend to dominate the relationships.[16]

Extending the analysis to examine the role of age and gender on the productivity-participation trade-off, we used the same specifications as above but used their specific employment rates as the dependent variable.[17] Our estimation is based on a data set for 36 countries, which includes all present OECD member states and some of the new member states of the EU that are not members of OECD. This part of the database, which is obtained from the TCB Total Economy Database (www.ggdc.net/dseries), includes measures of GDP, population, employment and working hours. We cover the period 1970–2006, and do a separate analysis for 1995–2006, the most recent period. For the purposes of this project, the TCB/GGDC database was supplemented with information on population and employment by age and gender from numerous sources, mainly from OECD and Eurostat.

END OF BOX

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Table 2.3 provides the estimated elasticities for the change in the employment rate (measured as employment per population) on the growth in labour productivity (measured as value added per hour worked) for two periods (1970–1995 and 1995–2006) and all 36 countries for which there is data.[18] The first two columns provide the results for all workers. Between 1970 and 1995, there is significant evidence of a negative relationship between the change in participation and the growth in labour productivity. But the initial negative, significant trade-off weakens over time and turns positive after 10 years, implying that increased participation raises rather than reduces productivity after 10 years. Between 1995 and 2006, the one-year growth rate shows a somewhat larger trade-off coefficient than between 1970 and 1995, but it is

[16] Unfortunately, estimating the model with the hours worked included raises an important econometric problem. The change in hours worked per person is directly related to the changes in per capita income, and those are represented by the residual in equation (4). This strong correlation between the hours variable and the error term makes the interpretation of the coefficient of H/E on productivity impossible. So most of our discussion of the model focuses on a restricted version of Equation (4), one in which we set the coefficient on hours worked per person equals to zero.

[17] The interpretation of the regressions must be undertaken with some care since the dependent variable is aggregate productivity, not productivity for the female, young or old workers as there are no data that provide productivity for any of the gender and age decompositions of employees.

[18] 36 countries: AU, AT, BE, CA, CY, CZ, DK, EE, FI, FR, DE, GR, HU, IE, IT, JP, IS, LV, LU, MT, MX, NL, NZ, NO, PL, PT, SK, ES, SE, CH, TR, UK, US, LT, KR, SL.

statistically not as strong and even disappears (or is statistically insignificant) for the longer time spans.

Table 2.3: Effects of Change in Employment/Population Ratios on Value Added per Hour Growth (Random-Effects Estimates)

	All age groups		15-24 years old		55-64 years old		Females	
	1970-95	**1995-06**	**1970-95**	**1995-06**	**1970-95**	**1995-06**	**1970-95**	**1995-06**
Annual	-0.279	-0.753	-0.068	-0.006	-0.122	-0.098	-0.135	-0.15
	(-4.32)**	(-1.90)$^{+}$	(-2.57)*	(-0.04)	(-4.54)**	(-0.49)	(-2.18)*	(0.33)
2-year	-0.16	-0.704	-0.008	0.018	-0.094	0.011	-0.222	0.003
	(-2.64)**	(-1.60)	(-1.05)	(0.14)	(-3.37)**	(-0.05)	(-6.02)**	(0.01)
3-year	-0.112	-0.85	-0.008	-0.022	-0.086	-0.011	-0.183	-0.326
	(-1.83)	(-1.73)	(-1.48)	(-0.16)	(-2.96)**	(-0.04)	(-5.28)**	(0.49)
5-year	-0.046	-1.444	-0.005	-0.135	0.009	0.276	-0.105	-0.804
	(-0.79)	(-1.91)	(-1.09)	(-0.60)	(0.35)	(-0.69)	(-3.23)*	(0.81)
7-year	-0.045	-1.577	-0.003	0.039	0.036	0.131	-0.102	0.495
	(-0.71	(-1.10)	(-0.77)	(0.15)	(1.53)	(0.18)	(-2.87)*	(0.25)
10-year	0.752	-8.784	0.020	-0.369	0.318	-2.01	0.756	-4.568
	(2.82)**	(-1.25)	(0.71)	(-0.62)	(2.16)*	(-0.98)	(2.81)*	(-1.17)

Absolute value of t statistics in parentheses
$^{+}$ significant at 10%, * significant at 5%; ** significant at 1%
Data Sources: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics and OECD Labour Force Statistics.

Age affected trade-off before 1995, but not since

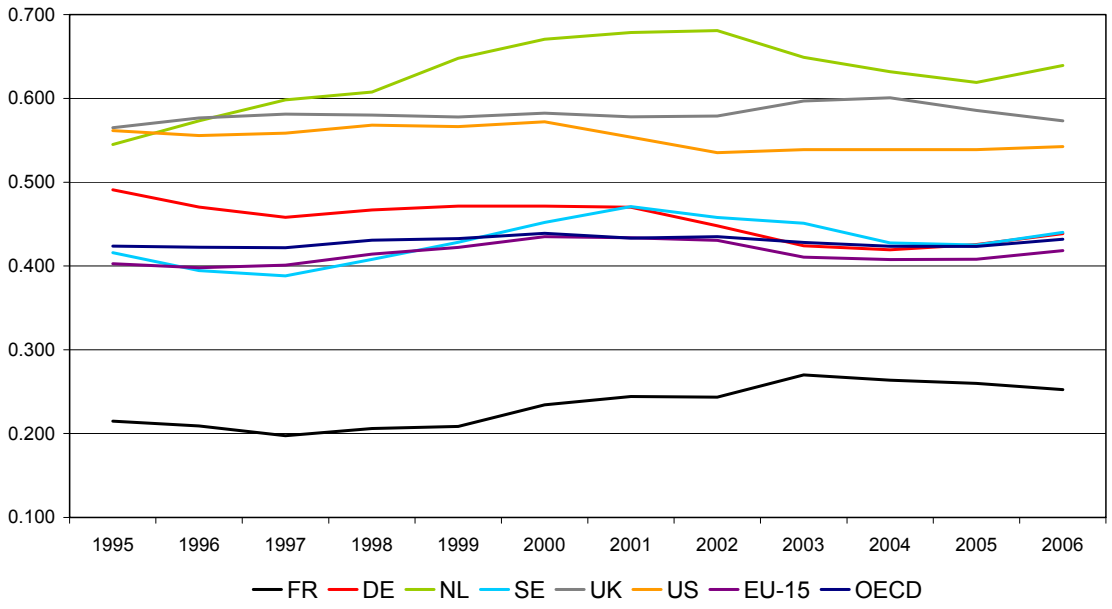
The effects from changes in the composition of the labour force in terms of age and gender have often been identified as one source of the productivity/participation trade-off observed above. Even though there are substantial differences among countries (Figure 2.4a), the analysis shows only small and insignificant effects of age in terms of a productivity trade-off for the younger workers (columns 4 and 5 in Table 2.3). Only in columns 6 and 7 is there a larger impact on growth from an increase in employment/population ratios of older workers (age 55-64), at least for the period up to 1995. However, the results turned insignificant after 1995, as all countries were showing similar upward trends (Figure 2.4b).

Indeed, the impact of age on productivity is ambiguous. The older and younger age cohorts are often thought to be less productive than the middle-age category, the older because their skills are out of date and they may be less able to keep up because of declining stamina and related characteristics, the younger for lack of training and experience. However, there may be equally good arguments to assume the opposite: the older workers have accumulated more human capital and have gained more experience, while the younger workers will have acquired the latest, most up-to-date skills. Keeping the younger people out of the labour force may also have positive effects in the longer run, as they usually receive more schooling and are therefore more productive later.

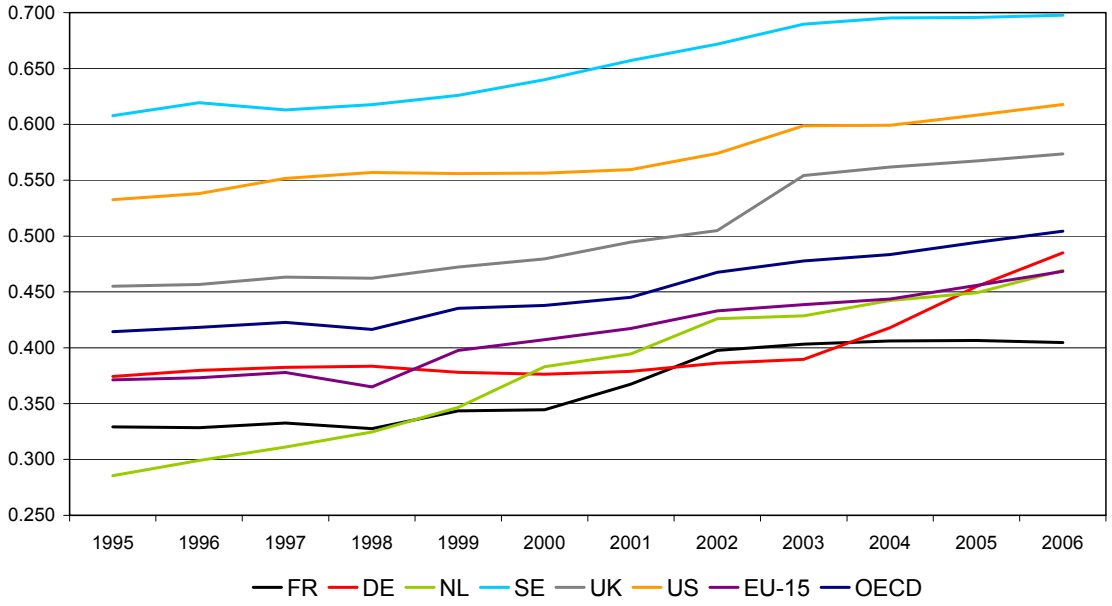
A calculation of the productivity impact from different age-productivity profiles by the OECD shows that the productivity effects of ageing may in the worst case lead to, at most, a 2.5 percent decline in the productivity level and in the best case have no effect whatsoever. In fact, the productivity effects in Germany and France may be smaller (about -1 percent of the level) than in the United States, as the latter will experience a bigger effect from a decline in its relative younger population and a larger share of elderly people still in the workforce: "In this context, concerns about the current 'greying' of the labour force have to be seen as a rebound from a previous sharp decrease in the average age of the labour force, the 'rejuvenating' shock that took place during the 1970s, from which OECD economies are just recovering" (Oliveira Martins et al., 2005, p. 17).

Figures 2.4a and 2.4b:

Employment / population ratio, 15-24 years old, 1995-2006



Employment / population ratio, 55-64 years old, 1995-2006



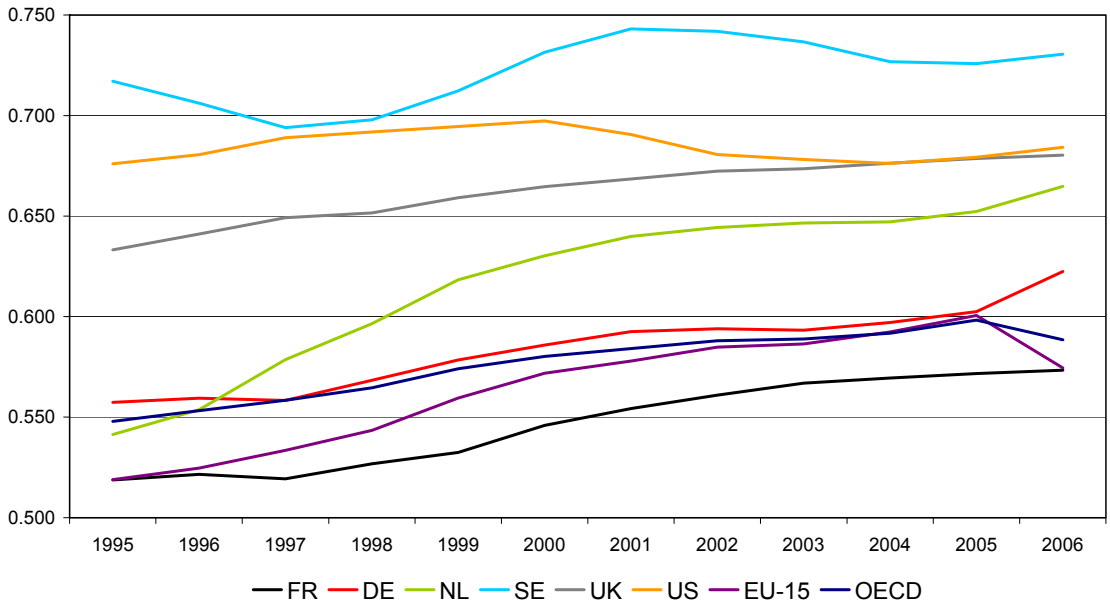
Data Source: OECD Labour Force Statistics.

Less unequal distribution of women between high and low productivity industries

There have been discussions about the impact of increased female participation on the average skill level of the labour force, and the overrepresentation of this group in low-productivity industries. Figure 2.4c shows substantial variation in the female trends in labour force. Sweden and the United States already exhibited high employment-population ratios for females in the mid-1990s and did not show the rise in female participation found in the other sample countries. The latter countries show the highest share of both females and of persons in the age group 55-64 employed per population. Columns 8 and 9 in Table 2.3 show that the trade-off coefficients remain somewhat stronger than those for the age effect, which suggests that much of the trade-off is associated with increases in female participation. Moreover, the trade-off is significant for all time spans in the 1970–1995 period. This suggests that the productivity losses have been biggest due to increased participation of female workers. This effect is largely related to the fact that females have been more often employed in industries characterized by relatively low-productivity activities, such as service activities. Again, the effects from participation on productivity disappear after 1995, probably implying that women were unequally spread across low- and high-productivity industries than before 1995.

Figure 2.4c

Employment / population ratio, Females, 1995-2006



Data Source: OECD Labour Force Statistics.

2.4 Shift towards Service Industries Has Reduced Trade-off to Different Degrees

Strengthening trade-off in manufacturing...

Changes in the sectoral composition of the economy also affect the relationship between productivity and total-hours-worked growth respectively. Table 2.4 breaks down aggregate economy estimates for each of the countries into measures for the aggregate market economy, the ICT-producing industries, and other manufacturing and market services. The estimates including employment growth are reproduced in Figures 2.5a–2.5d.

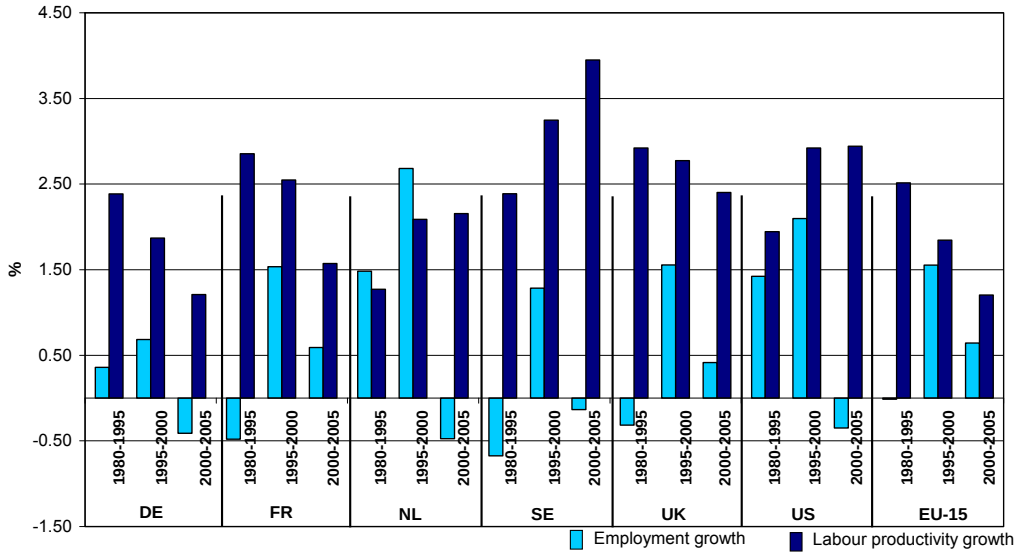
Table 2.4: Total Hours Worked and Labour Productivity Growth in Four Sectors, 1980-1995, 1995-2000, and 2000-2005

		Growth of total hours worked			Growth of labour productivity		
		1980-1995	1995-2000	2000-2005	1980-1990	1995-2000	2000-2005
DE	**MARKET ECONOMY**	-0.5	-0.1	-1.0	2.4	1.9	1.2
FR		-1.1	0.7	0.0	2.9	2.5	1.6
NL		1.0	2.5	-1.1	1.3	2.1	2.2
SE		-0.3	1.2	-0.6	2.4	3.2	3.9
UK		-0.4	1.0	0.2	2.9	2.8	2.4
US		1.4	2.2	-0.9	1.9	2.9	2.9
EU-15		-0.5	1.2	0.2	2.5	1.8	1.2
DE	**ICT SECTOR**	-1.7	-2.6	-2.0	4.4	6.9	4.7
FR		-1.0	-0.2	-1.4	4.5	7.7	6.8
NL		-1.2	2.8	-3.7	4.1	9.2	7.0
SE		-0.3	1.9	-4.8	4.8	14.6	16.7
UK		-2.1	1.3	-3.7	6.7	10.8	3.8
US		-0.4	2.1	-4.9	5.9	10.3	9.8
EU-15		-1.3	0.3	-2.1	4.9	7.8	5.1
DE	**Manufacturing**	-2.1	-1.4	-1.8	2.6	2.4	2.3
FR		-2.5	-1.2	-2.1	3.3	4.0	2.7
NL		-0.7	0.0	-2.5	3.0	2.8	3.5
SE		-1.1	0.2	-1.4	3.3	3.8	3.8
UK		-2.9	-1.0	-4.5	3.9	0.9	4.5
US		-0.3	-0.2	-4.3	2.1	1.6	4.1
EU-15		-2.0	-0.3	-1.9	3.2	1.8	2.1
DE	**Market Services**	1.1	1.7	0.2	2.1	0.8	-0.1
FR		0.8	2.2	0.9	1.5	1.5	0.8
NL		2.3	3.2	-0.5	0.4	2.5	1.7
SE		0.9	2.1	0.0	1.2	2.1	3.1
UK		1.3	2.0	1.7	2.1	2.9	2.4
US		2.4	2.8	-0.1	1.5	3.2	2.8
EU-15		1.3	2.3	1.3	1.4	1.3	0.6

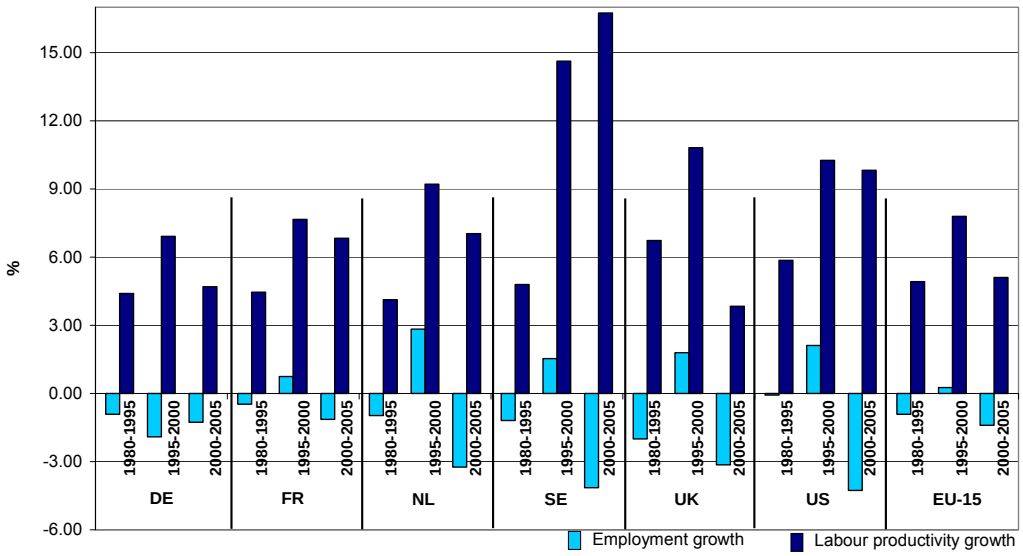
Data source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics. See appendix to chapter 3 for an exact definition of these four sectors.

Figures 2.5a to 2.5d:

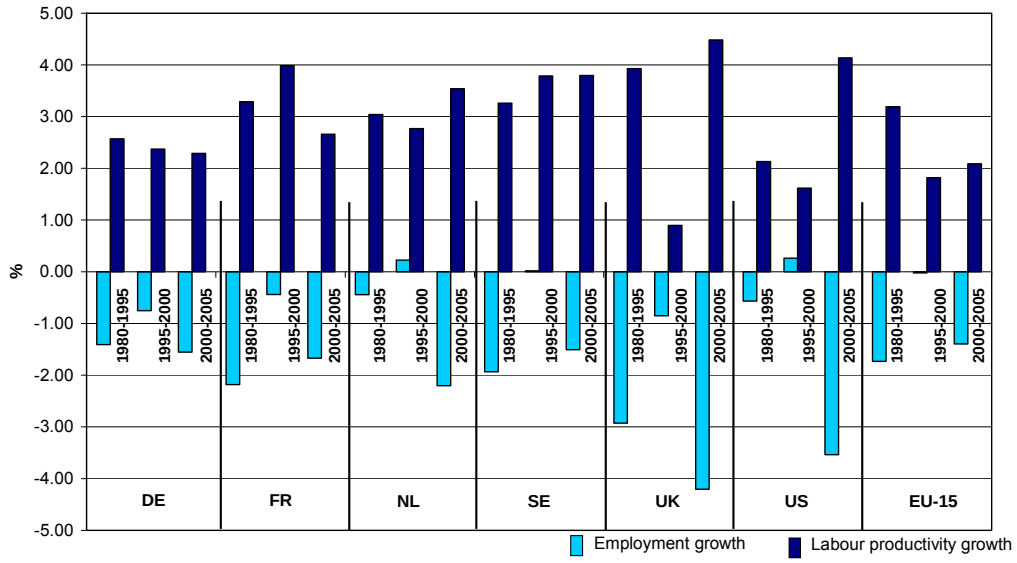
Labour Productivity and Employment Growth in the Market Economy



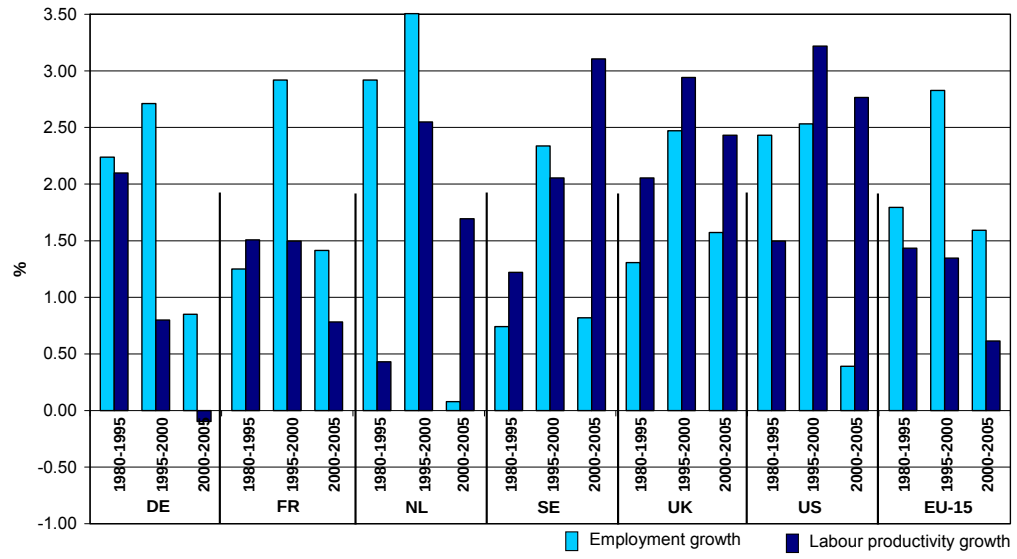
Labour Productivity and Employment Growth in the ICT sector



Labour Productivity and Employment Growth in Manufacturing



Labour Productivity and Employment Growth in Market Services



Data source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics.

The estimates show that the trade-off between labour productivity and employment growth is strongest in manufacturing, particularly for the post-2000 period. In Germany, however, the trade-off in manufacturing weakened somewhat as the decline in manufacturing employment softened, whereas productivity growth remained strong. This may be related to Germany's relative strength in benefiting from inward foreign direct investment (FDI) and foreign trade effects on productivity. In ICT production, the trade-off has generally been much weaker than in manufacturing.

… and weak productivity-employment nexus in services

Since 2000, employment growth in services weakened or stabilized everywhere (except for Sweden) and productivity growth hardly improved (except for the Netherlands). Notably in Germany, the average productivity growth in services fell back to zero from 2000 to 2005, while employment growth showed a meagre 0.7 percent increase per year on average.

From trade-off to an upward spiral of productivity and employment growth

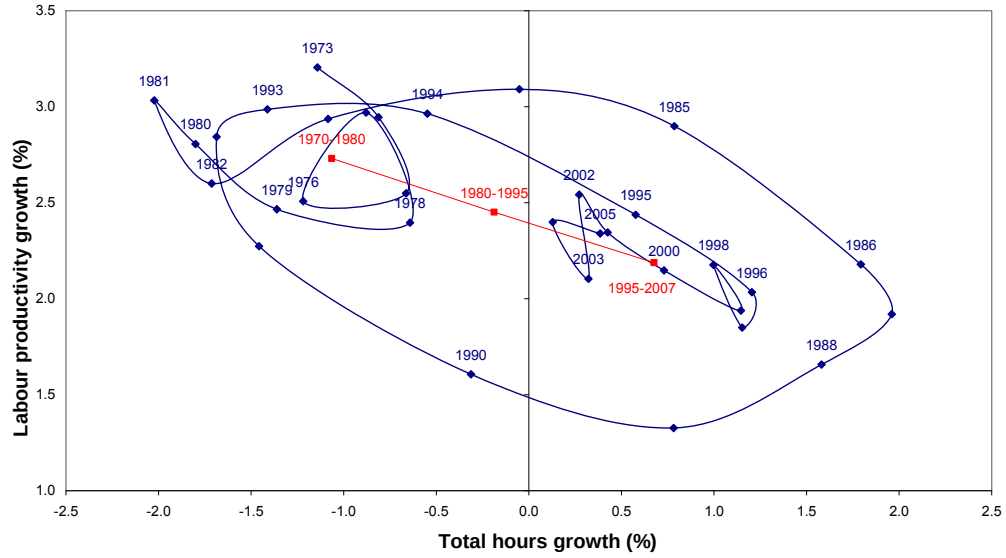
The analysis above suggests that the recent shift to a services economy has put several continental European countries, in particular France and Germany, in a situation in which neither productivity nor employment growth show much improvement. In addition, manufacturing has only sharpened the employment-productivity trade-off, although less so in Germany than elsewhere.

It is not straightforward to draw immediate policy lessons from the experiences of different countries on how to turn the traditional trade-off into an upward spiral of employment and productivity growth. The services sector plays a crucial role in this respect, as it is the main explanation for the acceleration of productivity growth in the United States. A better understanding of the reasons new technology and innovation have been translated into productivity growth so differently across services is required, and this will be discussed in greater detail in Chapter 3. There are also signs that distribution policies directed to supporting human capital development can help to strengthen the creation of productive jobs in services (Chapters 4 and 6). Finally, there is a role for regulatory change to jointly support competition and innovation in product, labour and capital markets (Chapter 5).

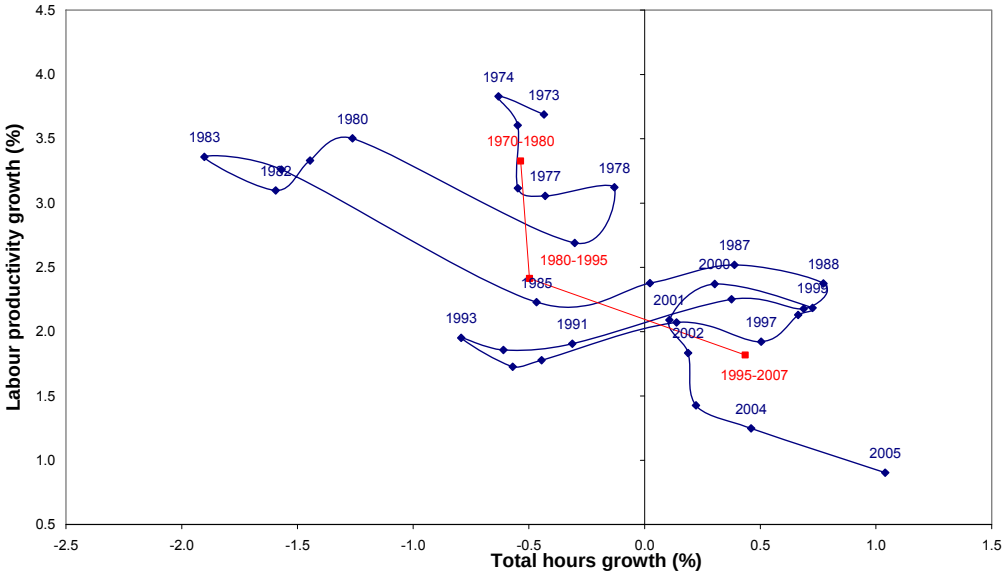
Appendix to Chapter 2

Figures A2.1 to A2.4

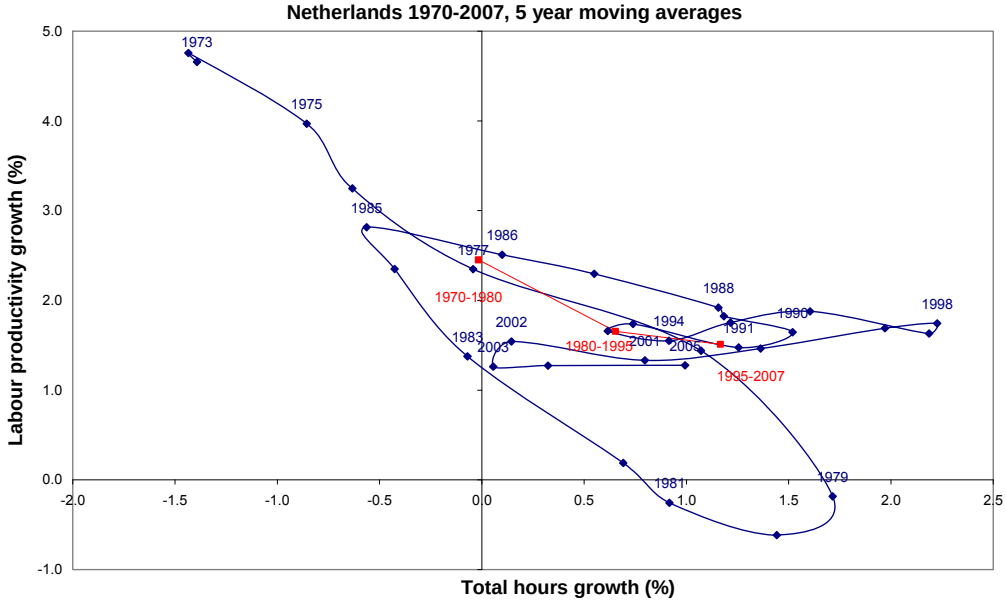
Relationship between labour productivity and total hours worked growth, United Kingdom 1970-2007, 5 year moving averages



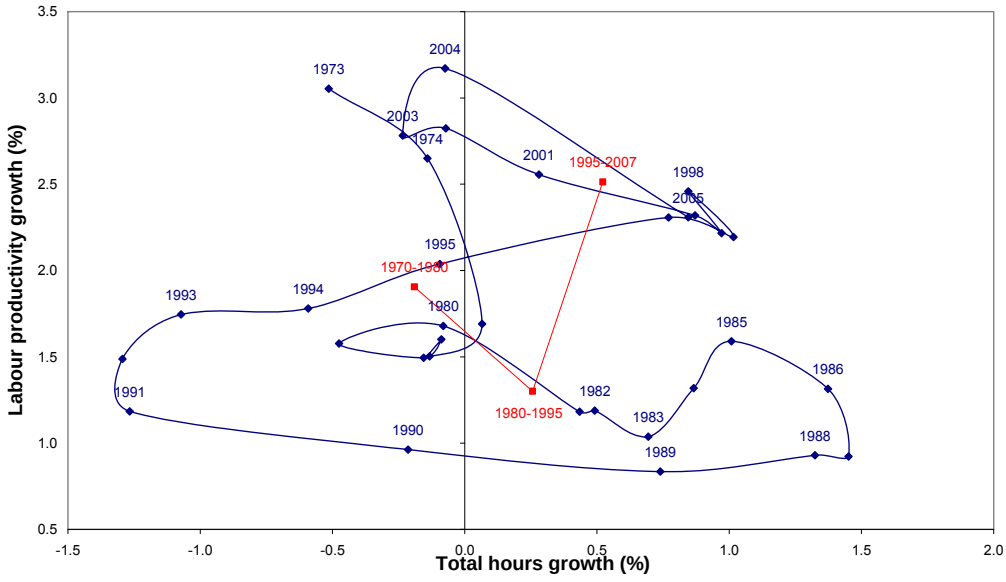
Relationship between labour productivity and total hours worked growth, France 1970-2007, 5 year moving averages



Relationship between labour productivity and total hours worked growth, Netherlands 1970-2007, 5 year moving averages



Relationship between labour productivity and total hours worked growth, Sweden 1970-2007, 5 year moving averages



Data Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics

Note Appendix Tables A2.1, A2.2, A2.3, and A2.4 are available from The Conference Board on request.

Chapter 3—Sources of Growth: Structural Change, Foreign Trade and Investment, and Demand

3.1 Introduction

Productivity is the key to better jobs supported by innovation and human skills

Productivity is important for economic growth, social development and improvements in living standards. Over the past two centuries, productivity has shown an extraordinary acceleration in what are today's advanced economies. It has been driven by investments in capital, notably machinery and equipment and, more recently, by computers, software and telecommunication equipment. The productive use of these assets is ultimately determined by the pace of technological change and innovation and by increases in education, leading to an improvement in skill levels that creates the foundation for building a high-performing knowledge economy. Innovation and skills unlock the potential for the creation of better jobs that are more productive in terms of raising output per unit of labour input, that are better paid, and that provide security to people to provide themselves with an adequate income.

Structural change creates winners and losers

The process of structural change in the economy that underlies productivity growth has surely created winners and losers among the owners of both labour and capital. As far as the latter is concerned, productivity growth is strongly related to the increased entry of new firms and the exit of older firms. For labour, investment in capital and increases in capital intensity have often been seen as a major threat, leading to efficiency gains that caused job losses and created pockets of low income inside and outside the labour market—typical of the traditional trade-off between productivity and employment described in the previous chapter. More recently, a surprising number of low-productive jobs have been created, especially in the service sector of the economy. But, as shown in Chapter 2, the trade-off has basically fallen apart, as there are substantial differences between countries regarding the extent by which they have generated productive jobs in services.

This chapter looks in more detail at the sources of output and productivity growth in the market economy in Europe and the United States, and especially among the six sample countries selected for this study. It first uses a growth accounting decomposition method to identify the contributions of quantities and quality of labour and capital to aggregate growth in the market economy of selected countries. This analysis is then refined by looking at sectoral productivity performance, especially in manufacturing and service industries. The chapter then focuses on two major factors that have played an important role in recent debates on productivity: foreign trade and offshoring of economic activities. The final section of this chapter turns to an alternative decomposition that decomposes GDP growth in sources of demand (i.e., consumption and exports). The findings point to the limited contribution of consumption to growth in Germany, leading into the discussion in Chapter 4 of the distribution effects of the productivity gains.

3.2 Growth Accounts

Growth accounts decompose output into contribution of inputs and productivity

To measure the sources of growth from the supply side of the economy, this report's main tool is the growth accounting framework. This framework is rooted in a traditional growth accounting framework, highlighting the role of labour input, physical capital input and multifactor productivity, but with several crucial extensions. It separates growth into the contributions of labour input by its components (age, gender and skill levels) and those of tangible capital in ICT and non-ICT capital. The final chapter of this study (Chapter 6) extends the investment concept even further by measuring the contributions of intangible capital items, including knowledge capital and organizational capital. The ultimate result of these investments, and especially their optimal interaction, is an increase in multifactor productivity (rather than just labour productivity).

Multifactor productivity (MFP) may be defined as the efficiency with which the invested resources are transformed into output growth. From a macroeconomic viewpoint, MFP growth refers to the increase in output relative to the rise in the combination of joint inputs. MFP is a reasonably good proxy of the "real" efficiency

of the production process, looking at output "quantities" over input "quantities". This may be contrasted to "nominal" efficiency measures, which are used more regularly in business, that simply look at cost over sales or margins. For example, an increase in output value, adjusted for inflation, relative to the rise in the numbers of workers is a real efficiency gain. In contrast a cut in wages, without a change in the real numbers of workers, is a nominal efficiency gain but does not represent a productivity increase. Multifactor productivity is determined by a wide range of factors, many of which are addressed in this and subsequent chapters, including technological change, innovation and institutional factors, such as the functioning of markets.

Table 3.1 compares the contributions of factor inputs and multifactor productivity growth to value-added growth from 1980 to 1995, 1995 to 2000 and 2000 to 2005. Our growth decompositions are based on the March 2008 release of the EU KLEMS database. This new database provides harmonised measures of economic growth, productivity, employment creation, and capital formation at a detailed industry level for European Union member states, Japan and the United States from 1980 onwards. The focus of the analysis in this chapter is exclusively on the market economy, for which more reliable measures of output are available than for the public sector. This means that the analysis excludes health and education services, as well as public administration and defence.[19]

Output growth accelerated after 1995 except in Germany

When comparing the period before and after 1995, the annual growth rate of output in the European Union accelerates, but the growth differential relative to the United States increases from 1.1 percentage points (2.1 percent in Europe versus 3.2 percent in the United States) from 1980 to 1995 to 2.1 percentage points (3.0 percent in Europe versus 5.1 percent in the United States) from 1995 to 2000. After 2000, output growth fell below that of the 1980–1995 era in both Europe and the United States, but the growth rate differential narrowed to 0.8 percentage points. Strikingly, Germany did not show the acceleration from 1995 to 2000 that was seen in the other countries,

[19] See appendix below on public sector. This exclusion implies a faster acceleration of output growth in both the European Union and the United States since 1995 than for the total economy reported in the previous section, but the general difference in pace of acceleration between the two regions does not change.

and market economy growth after 2000 fell to the lowest level among the countries shown in Table 3.1.

Table 3.1: Contributions of Factor Inputs and Multifactor Productivity Growth to Market Economy Output, 1980-1995, 1995-2000 and 2000-2005

	DE	FR	UK	NL	SE*	EU-15**	US
1980-1995							
GROSS VALUE ADDED GROWTH	1.9	1.8	2.5	2.3		2.1	3.2
Contribution of							
.. Labour input growth	-0.2	-0.1	-0.3	0.9		0.0	1.1
….Total hours worked	-0.4	-0.5	-0.6	0.7		-0.3	0.8
….Labour composition	0.2	0.4	0.3	0.2		0.3	0.2
. Capital input growth	1.2	0.7	1.2	1.1		1.1	1.4
….ICT capital	0.3	0.2	0.6	0.5		0.4	0.8
….Non-ICT capital	0.9	0.4	0.7	0.6		0.7	0.6
.Multifactor productivity growth	0.8	1.2	1.5	0.3		1.0	0.8
1995-2000							
GROSS VALUE ADDED GROWTH	1.7	3.3	3.8	4.6	4.4	3.0	5.1
Contribution of							
.. Labour input growth	-0.3	1.1	1.2	2.1	1.1	0.9	1.8
….Total hours worked	-0.2	0.6	0.7	1.7	1.0	0.8	1.5
….Labour composition	-0.1	0.5	0.5	0.3	0.1	0.2	0.3
. Capital input growth	1.4	1.0	2.0	1.6	2.3	1.5	2.4
….ICT capital	0.7	0.5	1.2	0.9	0.8	0.8	1.5
….Non-ICT capital	0.8	0.5	0.8	0.7	1.5	0.7	0.9
.Multifactor productivity growth	0.6	1.1	0.5	0.9	1.0	0.5	1.0
2000-2005							
GROSS VALUE ADDED GROWTH	0.2	1.6	2.6	1.1	3.3	1.4	2.2
Contribution of							
.. Labour input growth	-0.6	0.3	0.4	-0.2	0.1	0.3	-0.3
….Total hours worked	-0.7	0.1	0.0	-0.8	-0.4	0.0	-0.7
….Labour composition	0.2	0.3	0.4	0.5	0.5	0.3	0.4
. Capital input growth	0.6	0.8	1.0	0.2	1.2	0.9	0.8
….ICT capital	0.3	0.3	0.7	0.3	0.4	0.4	0.6
….Non-ICT capital	0.3	0.5	0.3	-0.1	0.8	0.5	0.2
.Multifactor productivity growth	0.2	0.5	1.2	1.1	2.1	0.2	1.7

* Sweden: No EU KLEMS data available before 1993
** Data for European Union refers to ten countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, and the United Kingdom.

Note: "ICT" is information and communications technology

Source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics

While hours improved in EU-15 as a whole, Germany stayed behind

As described in the previous chapters, hours worked in the European Union grew rapidly after 1995, to some extent making up for the shortfall in the earlier period. The acceleration was particularly rapid in the Netherlands from 2000 to 2007, less in France and the United Kingdom. Germany, however, remained in the negative territory of labour input growth throughout the period under consideration, although it

improved during 2006 and 2007 (see table 1.3 in Chapter 1). In contrast, the growth in hours worked slowed very substantially in the United States, especially after 2000.

Labour composition suggest high skills dominate everywhere

Table 3.2 shows that changes in labour composition contributed 0.2–0.3 percentage points to output growth in the European Union and the United States during this entire period. Even though this contribution is small, its positive sign implies that the process of transformation of the labour force to higher skills has proceeded at roughly equal rates in Europe and the United States, implying that neither Europe nor the United States has raised the number of low-skill workers enough to offset a larger contribution from an increased overall skill level of the labour force. In fact, the upward trend in the skill content of employees shows that newcomers to the labour market have had on average more schooling than the existing labour force. Even in Germany, where many of the recent additions to the labour force have been low-skilled workers, the aggregate effect shows that a negative contribution of labour composition between 1995 and 2000 turned into a positive contribution since.[20]

Capital contribution, including ICT, to growth slowed in many European countries

Concerning the total contribution of physical capital to output growth in the market sector, measured by capital services per hour, Table 3.1 shows somewhat larger differences between the European Union and the United States compared to labour composition. The capital contribution increased more slowly in Europe than in the United States from 1980 to 1995 and 1995 to 2000, but it also declined much less after 2000. The increase in the specific contribution of ICT capital in Europe has been lower than in the United States, and, since 1995, it has accelerated more slowly (Timmer and van Ark, 2005).

MFP is the Achilles' heel of Europe's growth, especially in Germany

The largest difference between the European Union and the United States is in the contribution of multifactor productivity growth. Whereas MFP in the United States accelerated by 0.2 percentage point from 0.8 percent from 1980 to 1995 to 1 percent

[20] Most of the increase in low-skilled labor has probably been feeding through to growth in recent years only, as the labor reforms of 2004 have been crucial for creating more low-wage jobs in Germany (see Chapter 5).

from 1995 to 2000, it slowed by 0.5 percentage point in Europe. After 2000, the gap in MFP growth between the EU-15 and the United States increased to 1.5 percentage points. Germany has shown the largest fall in MFP growth: from 0.8 percent (1980–1995) to 0.6 percent (1995–2000) to 0.2 percent (2000–2005).

It is difficult to interpret the precise meaning of increases or declines in multifactor productivity. MFP growth ultimately is a residual representing the growth of output over inputs. In theory, MFP growth may be related to technological change and innovation. The slowdown in MFP in Europe since 2000 would therefore suggest that European countries, and especially Germany, have slowed in innovation since 2000. However, one should be cautious in interpreting such a statement purely based on theory. While low MFP growth may be due to a slowdown in technological change, it could also mean that while appropriate investments have been made in new technology, such as ICT, these are not easily translated into more efficient business process and successful marketization of new products and service. In a less than perfectly competitive environment, there may be rigidities in product, labour and capital markets, as is the case in many European countries, causing delays in making effective use of new technology. These observations have been an important motivation for European Union member states to pursue the Lisbon Agenda devised by the European Commission. The issue of regulatory change, competition and innovation will be discussed in more detail in Chapter 5.

Alternatively, while investment in tangible assets is one part of the innovation story, the other part concerns investment in intangible assets, such as human capital, innovative property and business competency ("economic competencies"), such as organizational change or a strengthening of brand equity. The issue of intangibles is addressed in Chapter 6.

3.3 Sectoral Shifts and Structural Transformation

Aggregate labour productivity is in part driven by shifts of resources from sectors with either low productivity levels and/or low productivity growth rates to sectors with high productivity levels and/or high productivity growth rates. Shifts of productivity resources from agriculture to industry were prominent during the first two decades after World War II. More recently important shifts occurred within manufacturing, from manufacturing to services, and also within the services sector. Particularly noteworthy have been the movements of labour towards more productive service industries, both in consumer and producer services.

The impact of sectoral shifts on productivity growth has not been the same everywhere, however, and depends on factors such as the size of the country (and the related openness of the economy), relative factor endowments (labour, capital and natural resources) and demand factors, such as changes in foreign trade, income distribution, consumer and social preferences. The importance of such factors has also changed over time, depending on the nature of technological change, the globalization of the world economy (particularly in terms of increased capital flow) and changes in consumer preferences.

Figure 3.1 compares the contribution by major sector to aggregate labour productivity from 1995 to 2005, using the EU KLEMS database. While this database provides a disaggregation of the economy into over 30 sectors, this study uses six major market economy sectors. These include the ICT sector (producers and services), manufacturing other than ICT, other industries related to the goods sector (including agriculture, mining, construction and public utilities), distribution (retail and wholesale trade and transportation), financial and business services, and personal, social and community services.[21]

[21] For a full overview of industry sectors, see Appendix to Chapter 3.

Figure 3.1a

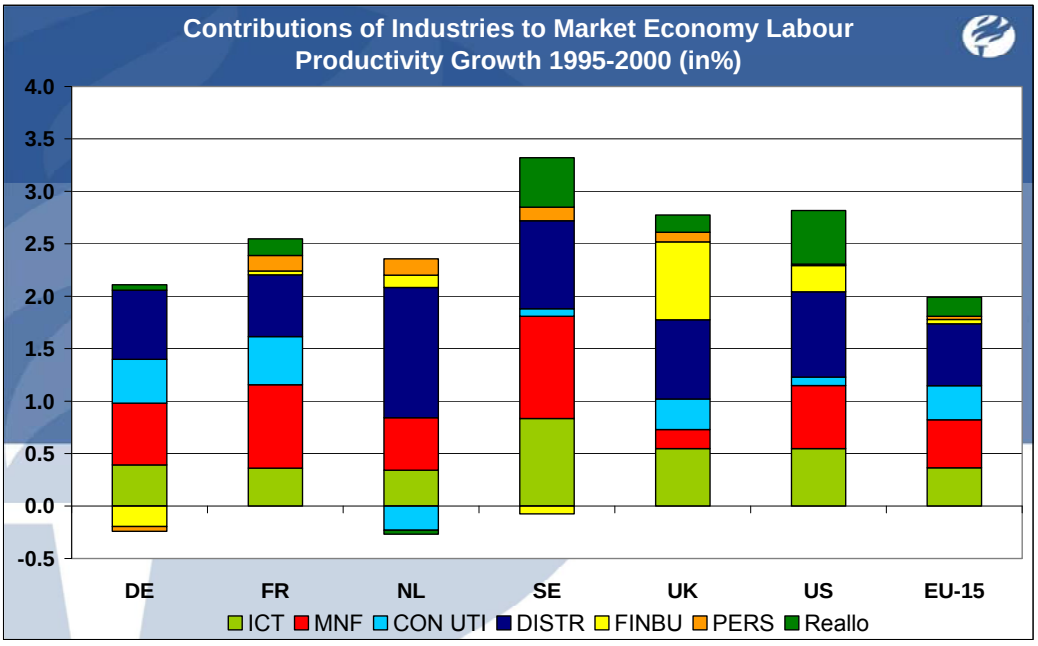
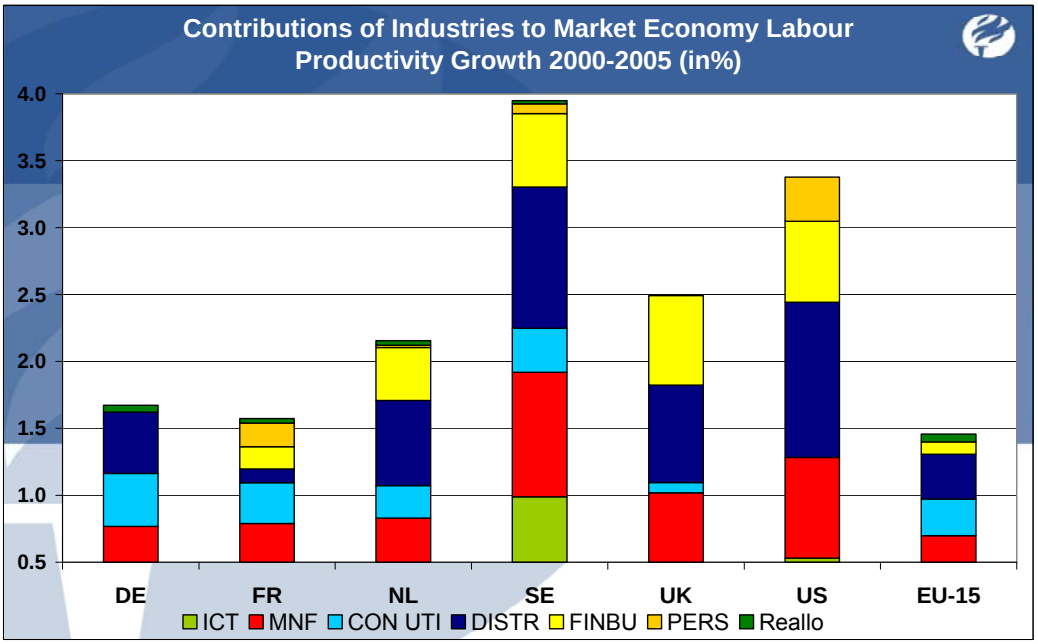


Figure 3.1b



Note: USA estimates based on Standard Industrial Classification.
ICT = Electrical machinery, post and communication services; MNF = Manufacturing; CON UTI = Other; production; DISTR = Distribution; FINBU = Finance and Business except real estate; PERS = Personal services; Reallo = Reallocation of labour effects.
Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics).

Manufacturing productivity in Germany holds up but is not outstanding

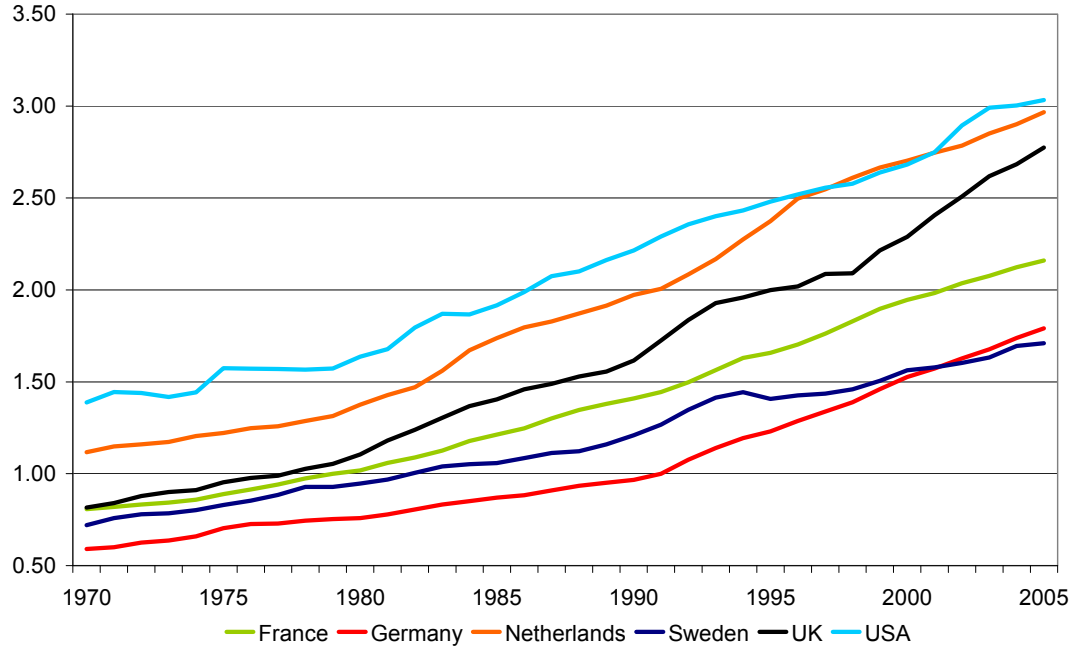
The role of the manufacturing sector in Germany has been relatively strong. Even though manufacturing accounted for slightly more of the total employment in Germany than in most other countries, the contribution of manufacturing to aggregate productivity was not significantly different across countries. Only in Sweden did both ICT and manufacturing contribute more than elsewhere. But compared with other sectors in the economy, manufacturing productivity has held up reasonably well in Germany. The latter has added to the relatively large dichotomy between manufacturing and services in Germany.

Shift towards services has been ubiquitous

Europe and the United States have experienced a major shift of production and employment from manufacturing and other goods-producing industries—such as agriculture and mining—towards services. Market services include a wide variety of activities, ranging from trade and transportation services to financial and business services, as well as hotels, restaurants, and personal services. In the past 40 years, these services have gained an increasingly large share of employment in developed economies, replacing the manufacturing sector. Figure 3.2 shows that, relative to manufacturing, the United States and the Netherlands have the largest share of employment classified as market services industries—up to four times the share in manufacturing by the middle of the present decade. Germany started with lower employment in services than in manufacturing in 1970 and even by 2005 had only 1.8 times more employees in services than in manufacturing.[22]

[22] There has been a traditional argument that German manufacturing firms typically included more services occupations than in other countries. However, with the large amount of outsourcing in recent years, this difference may not be as large anymore, so that the observed difference mainly relates to the larger employment size of the manufacturing sector.

Figure 3.2: Ratio of Employment in Market Services to Manufacturing



Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics).

Higher incomes, marketization of household production and outsourcing are driving growth of services

The growing importance of market services is the result of a number of interacting forces (Schettkatt and Yocarini, 2006). Higher per capita income leads to higher demand for services. There is also an increasing marketization of traditional household production activities, including services like dining outside the home, cleaning and providing care to the elderly and infirm. The latter may be related to the level of education, thus raising the opportunity cost of working at home, the wage and tax incentive structure for female labour force participation and the possibility to realize economies of scale through marketization of services, as opposed to households whose size is decreasing.

Finally, many manufacturing firms are outsourcing aspects of business services, trade, and transport activities. Economies of scale and specialization are important arguments for outsourcing services (Schettkat and Russo 2001). Indeed, it can be argued that outsourcing of services has both a job creation and job destruction effect. On the one hand, outsourcing to more efficient market service providers may decrease

labour input in services. On the other hand, the reduction of the cost of services may increase the demand for them, thereby increasing employment in the sector.

Service sector productivity growth differs between countries

Whatever the underlying causes of the shift from manufacturing to services, it has important implications for productivity growth. Traditionally, manufacturing activities have been regarded as the locus of innovation and technological change, and thus the central source of productivity growth. For example, more productive manufacturing was the key to post–World War II growth in Europe through a combination of economies of scale, capital intensification, and incremental innovation. More recently, rapid technological change in computer and semiconductor manufacturing has reinforced the predominance of innovation in the manufacturing sector.

In contrast, the increasing weight of services in output was thought to slow aggregate productivity growth. Baumol (1967) called this the "cost disease of the service sector." The diagnosis of the disease argues that productivity improvements in services are less likely than in goods-producing industries because most services are inherently labour intensive, making it difficult to substitute capital for labour. Baumol originally mainly referred to services activities such as education, health and public services, but this syndrome was widely believed to hold for many other services sectors as well. This hypothesis has subsequently been disputed in the literature (for example, Triplett and Bosworth, 2006) and, as the following discussion will show, is indeed not supported by the recent empirical evidence, although there are large differences between countries.

Market services contribute as much to productivity as manufacturing...

Figure 3.1 shows that, in most countries, the market services sector contributes about as much to labour productivity growth as manufacturing and ICT together. In particular, in the Netherlands, the United Kingdom and the United States, services (and particularly the distribution sector) contribute more to labour productivity than manufacturing.

… but market-services output and productivity growth remains slow in Germany

Figure 3.3a through Figure 3.3c show the contributions of factor inputs and MFP to the growth of the aggregate market economy, each of the six sectors and market services (which combines the three services sectors) for the EU-15 (defined as in Table 3.1), the United States and Germany from 1995 to 2005. The figures clearly show that slow productivity growth in market services is not a universal given, even among advanced countries with large service sectors. First, productivity growth in market services has been much faster in the United States than in Europe. In Europe, market services output increased at only 2.8 percent from 1995 to 2005. In contrast, value added in market services increased at almost 6 percent in the United States. In Germany, market services output grew at only 1.3 percent during this period, and labour productivity increased at 0.4 per cent.

Productivity growth in U.S. market services has also been quite rapid, at 3 percent from 1995 to 2005. Within Europe, two countries — the Netherlands and the United Kingdom — also showed rapid productivity growth in market services from 1995 to 2005 at 2.1 and 2.7 percent respectively. In contrast, Germany showed a much lower labour productivity growth in market services, at only 0.4 percent from 1995 to 2005. Drilling more deeply into the data, it turns out that for both sectors, multifactor productivity, not factor intensity, was the key to the productivity growth differential between Europe and the United States.

Figure 3.3a

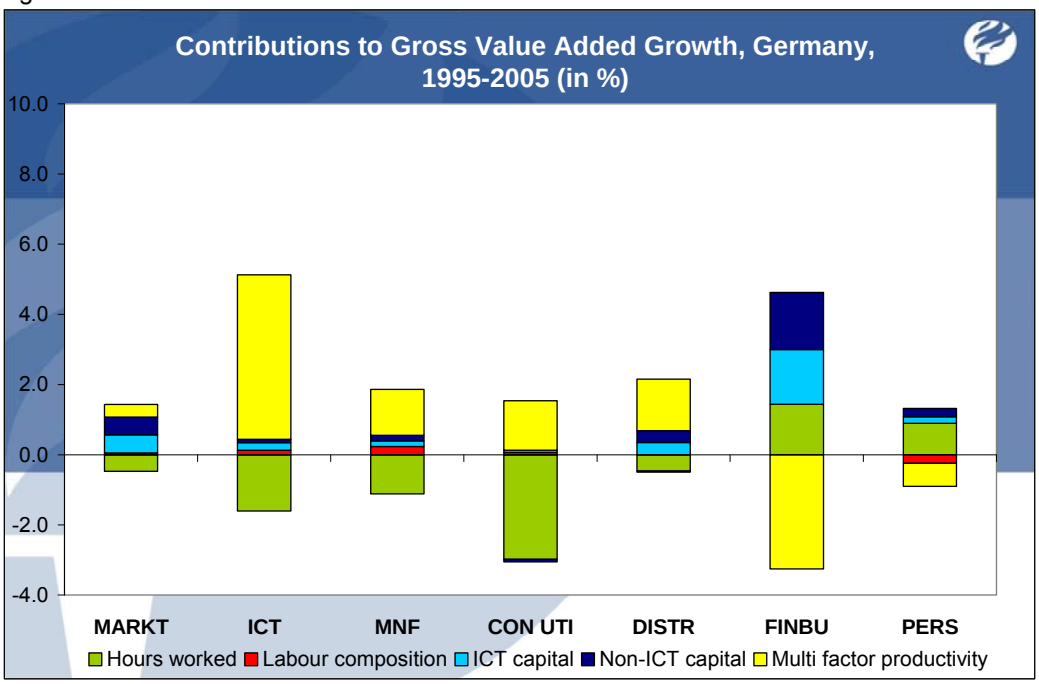


Figure 3.3b

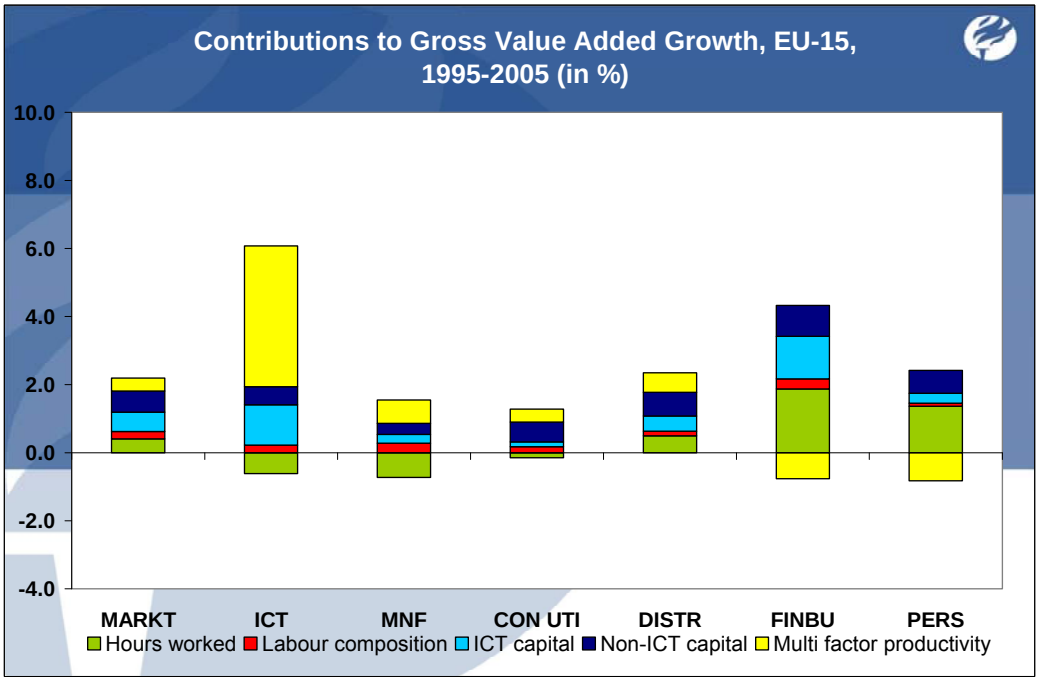
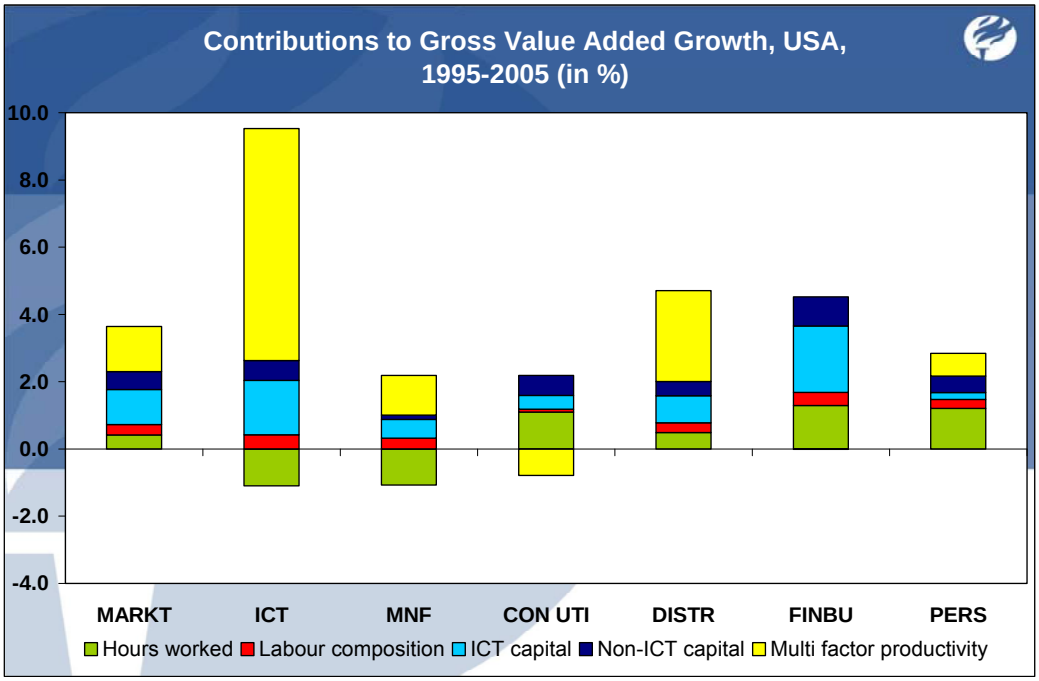


Figure 3.3c



Notes: see Table 3.1. Definition of sectors, see Appendix C3.1
Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics).

Table 3.2: Contributions of Factor Intensity and Multifactor Productivity Growth to Labour Productivity Growth in ICT, Other Manufacturing and Market Services, 1995-2005

	DE	FR	UK	NL	SE	EU-15**	US
ICT AND COMMUNICATION (INCL. POST)							
Labour productivity growth	5.8	7.2	7.3	8.1	15.7	6.5	11.9
Contribution of							
….Labour composition	0.1	0.3	0.5	0.4	0.6	0.2	0.5
. Capital intensity	1.0	1.0	2.9	2.8	2.4	2.1	2.8
….ICT capital	0.4	0.7	2.7	1.2	0.8	1.3	1.6
….Non-ICT capital	0.6	0.3	0.2	1.6	1.6	0.8	1.2
.Multifactor productivity growth	4.7	5.9	4.0	4.9	12.7	4.2	8.6
OTHER MANUFACTURING							
Labour productivity growth	2.3	3.3	2.7	3.2	3.8	2.0	4.0
Contribution of							
….Labour composition	0.2	0.5	0.7	0.5	0.3	0.3	0.3
. Capital input growth	0.7	1.0	1.0	0.8	2.0	0.9	1.4
….ICT capital	0.2	0.3	0.6	0.3	0.5	0.3	0.4
….Non-ICT capital	0.5	0.7	0.5	0.5	1.6	0.6	1.0
.Multifactor productivity growth	1.4	1.8	1.0	1.9	1.4	0.8	2.3
MARKET SERVICES							
Labour productivity growth	0.4	1.1	2.7	2.1	2.6	1.0	2.6
Contribution of							
….Labour composition	-0.1	0.4	0.4	0.4	0.3	0.2	0.3
. Capital input growth	1.3	0.8	1.5	0.8	1.6	1.0	1.2
….ICT capital	0.7	0.4	1.0	0.7	0.7	0.7	0.9
….Non-ICT capital	0.6	0.4	0.5	0.1	0.9	0.4	0.3
.Multifactor productivity growth	-0.9	0.0	0.8	1.0	0.7	-0.2	1.1

Rows may not add up due to rounding
** Data for European Union refers to ten countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, and the United Kingdom.

Note: "ICT" is information and communications technology

Source: EU KLEMS database, March 2008 (www.conference-board.org/economics).

Multifactor productivity, not factor intensity," caused growth gaps in market services

Differences in factor intensity, which includes the total contribution from changes in labour composition and deepening of all types of capital, appear very small between countries. For the EU as a whole, factor intensity in market services contributed 1.2 percentage points from 1995 to 2005, which was more than aggregate labour productivity growth at 1 percent. In Germany, factor intensity in market services was also 1.2 percent, even though aggregate labour productivity growth was only 0.4 percent due to strong negative MFP growth. In the United States, the factor intensity contribution was 1.5 percentage points out of 2.6 percent labour productivity growth.

The fuelling of U.S. multifactor productivity growth by trade, finance, and business services is confirmed in studies by Jorgenson, Ho, and Stiroh (2005) and Triplett and

Bosworth (2006). The United States showed a comparatively high multifactor productivity growth rate of 1.1 percent from 1995 to 2005. In contrast, multifactor productivity growth in market services fell by -0.2 for the EU-15, and by -0.9 percent for Germany. In France MFP growth in market services was stagnant. It increased by 1 percent on average in the Netherlands, 0.8 percent in the United Kingdom and 0.7 percent in Sweden. Hence, it is necessary to search for the sources of differences in multifactor productivity growth to better understand the growth differentials between countries.

In sum, since the mid 1990s, the European Union has experienced a significant slowdown in productivity growth at a time when productivity growth in the United States significantly accelerated. The resurgence of productivity growth in the United States appears to have been a combination of high levels of investment in rapidly progressing information and communications technology in the second half of the 1990s, followed by rapid productivity growth in the market services sector of the economy in the first half of the 2000s.

Conversely, the productivity slowdown in European countries is largely the result of slower multifactor productivity growth in market services, particularly in trade, finance, and business services. While this pattern holds true for Europe as a whole, there are large differences between many individual European countries. Whereas the Netherlands and the United Kingdom did well, Germany has been strongly affected by slow productivity growth in service industries, with the notable exception of the distribution sector. Most jobs, especially in recent years, have been created in low productive service activities while the more productive sectors of the economy (notably manufacturing) have shed jobs at a relatively rapid rate.

3.4 The Role of Trade and Foreign Direct Investment

The role of international business in the growth of advanced economies has been greatly strengthened during past decades, and many alternative ways for multinational enterprises (MNEs) to serve foreign markets have evolved. A diversity of vehicles, in addition to foreign trade, emerged. These ranged from foreign direct investment, arms-length outsourcing or offshoring and foreign licensing of technology to the emergence of vertically integrated global production processes within firms. Moreover, the globalisation of the capital market has facilitated cross-border mergers, take-overs and other transactions, so that businesses have become more footloose compared with the past. In the following discussion, this report concentrates on the importance of offshoring and trade for productivity growth, in theory, and takes an additional look at the performance of sample countries in these respects.

Openness explains part of productivity effect from offshoring

Offshoring and outsourcing help raise productivity by increasing the efficiency with which inputs are used.[23] Thus, if a company shifts comparatively inefficient and expensive production processes or services to external providers and specialises in areas where the company has comparative advantages, outsourcing boosts the productivity. Openness seems to play an important role. Olsen (2006) emphasizes that smaller countries, which are more open in terms of trade-to-GDP ratios, might also show larger effects on productivity from offshoring than larger countries or economic regions such as the European Union or the United States.

Direct benefits from inward FDI through more efficient resource use …

Offshoring was originally associated with Foreign Direct Investment (FDI). A large literature has developed on the effects of inward FDI on home productivity.[24] Inward FDI may have multiple effects on domestic productivity, e.g. by increasing an industry's production base beyond employment growth, thereby creating scale

[23] The terms outsourcing and offshoring are not well standardized in the literature. Outsourcing refers in general to the relocation of input factors or services to external domestic or international providers (Olsen, 2006). Offshoring is generally seen as a more radical transfer of all or part of the production of goods and services abroad through foreign direct investment or subcontracting (Yeaple, 2006).
[24] See for example Barrel and Pain (1997), Blomström and Kokko (1998), Caves (1974), Driffield and Munday (1998), Kokko (1996), and Haskel et al. (2007).

advantages. MNE's are often expected to have superior know-how, management strategies, production techniques, or other firm specific assets (see for example Bloom, Sadun and Van Reenen, 2007). These comparative advantages allow MNEs to compete with domestic firms that may have their own competitive advantages, such as superior knowledge of customer preferences, local markets and business practices.

… and indirect benefits through horizontal and vertical spillovers

In addition to direct benefits from inward FDI, there can also be substantial horizontal and vertical productivity spillover from foreign MNEs to domestic firms. The entry or presence of MNEs might strengthen competition in the host economy, forcing local companies to use their resources more efficiently. Local enterprises might also increase their productivity by copying technologies from MNEs, or by searching for new and more efficient technologies under the competitive pressure (Blomström and Kokko, 1998). However, MNEs also have an incentive to prevent spillover and technology leakage, for example by paying comparatively high wages to minimise labour transfer to local firms, through better protection of intellectual property (patents, licensing, etc.), or by choosing to operate in countries or industries where local companies have relatively limited imitative capacities (Javorcik and Spatareanu, 2005)

Home country productivity effects from outward FDI are less clear

In addition to host country productivity effects of FDI, there may also be domestic productivity effects of outward FDI, but the impact is generally not very clear-cut. It depends on the kind of activities the MNEs concentrate on at home and the degree of internationalisation of the MNE (Blomström and Kokko, 1998; Damijan et al, 2007). FDI may lead to economies of scale for the home country, as the MNE can increase its size of operations. MNEs investing abroad may also benefit from being exposed to international competition and best practices (Bitzer and Görg, 2005; Van Pottelsberghe de la Potterie and Lichtenberg, 2001). On the other hand, outward FDI may have negative effects on domestic productivity. Only the most productive MNEs tend to serve foreign markets via foreign affiliates, while less productive firms choose to export. Consequently the relocation of the most productive firms to foreign countries might reduce the productivity in the home country (Bitzer and Görg, 2005; Helpman et al., 2004; Svensson, 1996).

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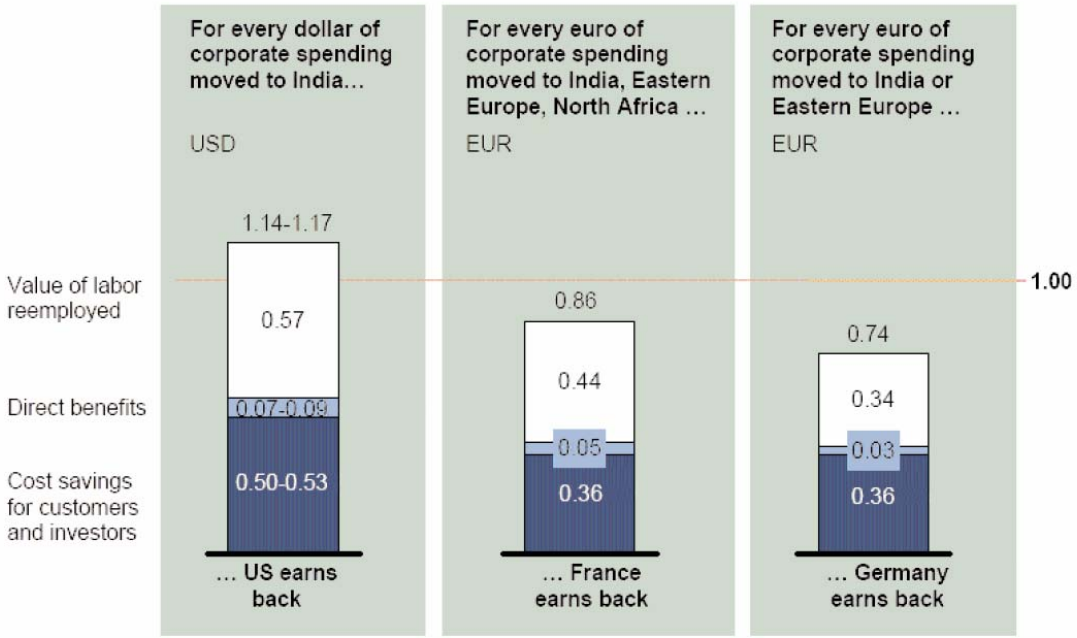
BOX

Offshoring of Services

An important recent trend has been the increase in the offshoring of services. While firms benefit directly from offshoring, as the activities may be carried out at lower cost, this trend has entailed a major debate about the extent to which it affects wealth creation for the offshoring economy as a whole. A recent study by the McKinsey Global Institute (2005) aimed to measure the economywide effects from offshoring of service activities. Exhibit A shows substantial differences in economic benefits ranging from 0.74 € per one € of outsourcing in Germany to about $ 1.15[25] for every dollar of corporate spending outsourced by U.S. companies, with France in between at 0.86 € per € (MGI, 2004). Differences in the economywide return on offshoring stem partly from the degree of cost savings passed on to consumers and investors. In addition, German companies offshore relatively many services (and products) to East European countries instead of India, where wages are much lower compared with East European wages. Other reasons for lower benefits are the expenses incurred by German (and French) firms to overcome language differences, and the fact that less than 40 percent of workers who become unemployed due to offshoring in Germany find a new job within three months, which leads to a lower re-employment value of workers (0.34€).

[25] $ 1.15 was equal to approximately 0.96€ in mid June 2005.

Exhibit A: Economic Impact of Offshoring of Services in the United States, Germany and France



Source: MGI (2005).

END OF BOX

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Germany shows the largest overall net outward foreign direct investment

Even though inward and outward FDI flows slowed in almost all developed countries immediately after the bursting of the new economy bubble and the fall in share prices in the early 2000s, the trend has remained upward over the whole decade 1995-2005. The United States continues to occupy a dominant position as foreign investor and as recipient of direct investment among the six sample countries, followed by the United Kingdom.

It is clear from Figure 3.4[26] that, before 2005, the European Union and each of the six sample countries, were net senders of FDI, with Germany's share of outward and inward FDI in GDP being the second lowest in the sample (following the United

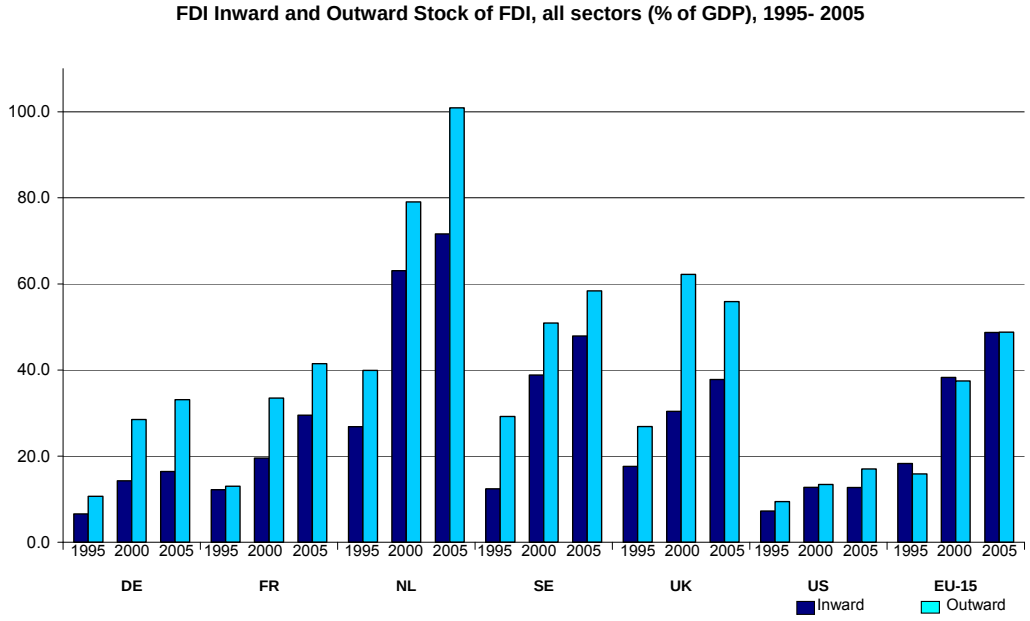
[26] In this section, we consider FDI stocks rather than flows. FDI inflows and outflows increased tremendously at the turn of the century. OECD (2003), p. 158 stress that the peak in FDI inflows and outflows coincided with the sharp equity-price increase in the late 1990s and therefore a significant part of it may reflect a pure valuation phenomenon. The marked slowdown of flows at the beginning of the new decade mostly reflected a correction to more sustainable levels rather than a reversal of a trend.

States). Germany's outward FDI stocks are concentrated in Europe (slightly less than 50 percent of total FDI in 2004) and the United States (30 percent). German firms are the most important investors in many small economies, such as some transition economies in Central and Eastern Europe (Buch et al., 2005). Small- and medium-sized German companies have taken particular advantage of the opening of Eastern Europe after the fall of the Iron Curtain by investing in relatively small foreign affiliates. The Netherlands exhibits relative high levels of inward and outward FDI as a share of GDP, as it has a less restrictive regime towards inward FDI than other countries. Consequently, there is a strong presence of MNEs in the Netherlands and Dutch firms have a strong presence abroad, allowing the Netherlands to benefit from intra-firm technology transfers (OECD, 2008b).

Germany is big net receiver of FDI in services, notably in financial services

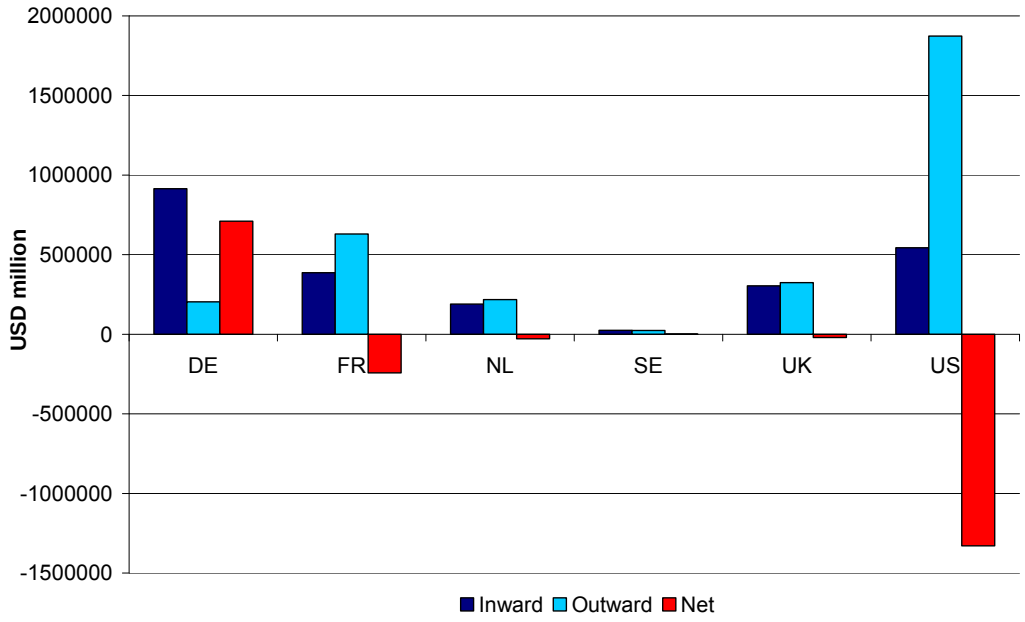
Over the past quarter century, there has been an important change in the sectoral pattern of FDI away from manufacturing and natural resources and towards the service sector. Figure 3.5 illustrates inward and outward market service sector FDI flows in the countries of interest from 2000 to 2006. The main receivers of FDI into their service sector are the countries that receive prominent FDI flows overall. Over the years, all countries except Germany have been major net senders of FDI in the service sectors to the rest of the world.

Figure 3.4: FDI Inward and Outward Stock of FDI, All Sectors (% of GDP): 1995-2005.



Note: EU-15 average includes intra-EU flows
Data source: UNCTAD

Figure 3.5: FDI Inward and Outward Flows of FDI, Service Sector (million US-$), 2000- 2006.



Note: Sweden 2000-2003 due to data availability.
Data Source: OECD.stat

The largest share of FDI inflows to Germany in 2006 came from France, Denmark and the United States and went particularly to the banking and insurance sector (UNCTAD, 2007). Outward FDI activities in the manufacturing sector accounted for roughly 25 percent outward FDI in 2004 and were led by the chemical industry and the car sector. In services, outward FDI from Germany is concentrated in the United States, followed by EU-15 countries.

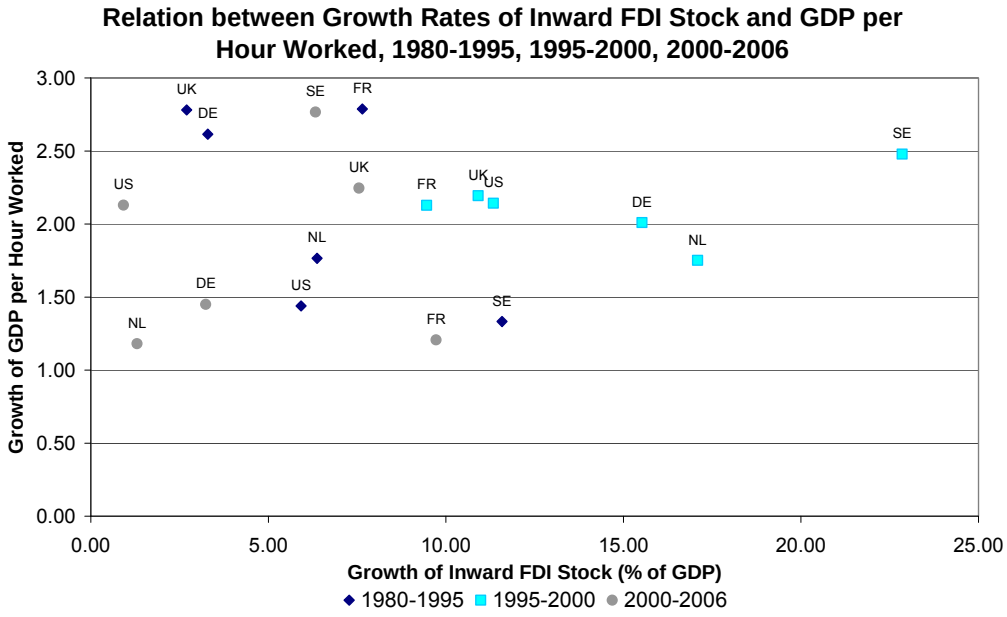
There is no straightforward relationship between inward FDI and productivity

Despite the positive impact of inward FDI on home productivity assumed in the literature, the evidence in practice is far from conclusive. This also is evident by comparing the growth rates of FDI inward stocks and GDP per-hour-worked for the three sub-periods between 1980 and 2006, which show no clear pattern (Figure 3.6).[27] Generally, as all six sample countries are developed countries, the productivity-enhancing potential of FDI inflows are probably lower than in developing countries, for which the larger distance to the technological frontier bears a higher potential for productivity-boosting effects of inward FDI. It is also conceivable that the effects from inward FDI on domestic productivity depend to a large extent on the policy environment in which the multinationals operate, and on host country and host industry characteristics, which have not been controlled for (Driffield and Love, 2007).[28] For example, Aitken and Harrison (1999) emphasize that positive spillover effects from inward FDI might be offset by market-stealing effects to some extent. A technologically superior MNE might absorb market shares from domestic enterprises, forcing them to produce at lower output levels with higher unit costs. When the productivity-spillover effect is lower than the market-stealing effect, a reduction in domestic productivity may result. Driffield et al. (2005) see the motivation of FDI as another explanation for the variation in results from empirical studies.

[27] Simple OLS and panel regressions also indicate that the relationship between inward FDI and labour productivity has neither been negative nor positive in the periods under consideration, even though all growth rates have a positive signs. A deeper investigation with more sophisticated empirical methods, more control variables for a large sample size might be necessary to draw reliable conclusions.

[28] Further analysis on sector level was not possible due to the lack of data for some countries and industries.

Figure 3.6:



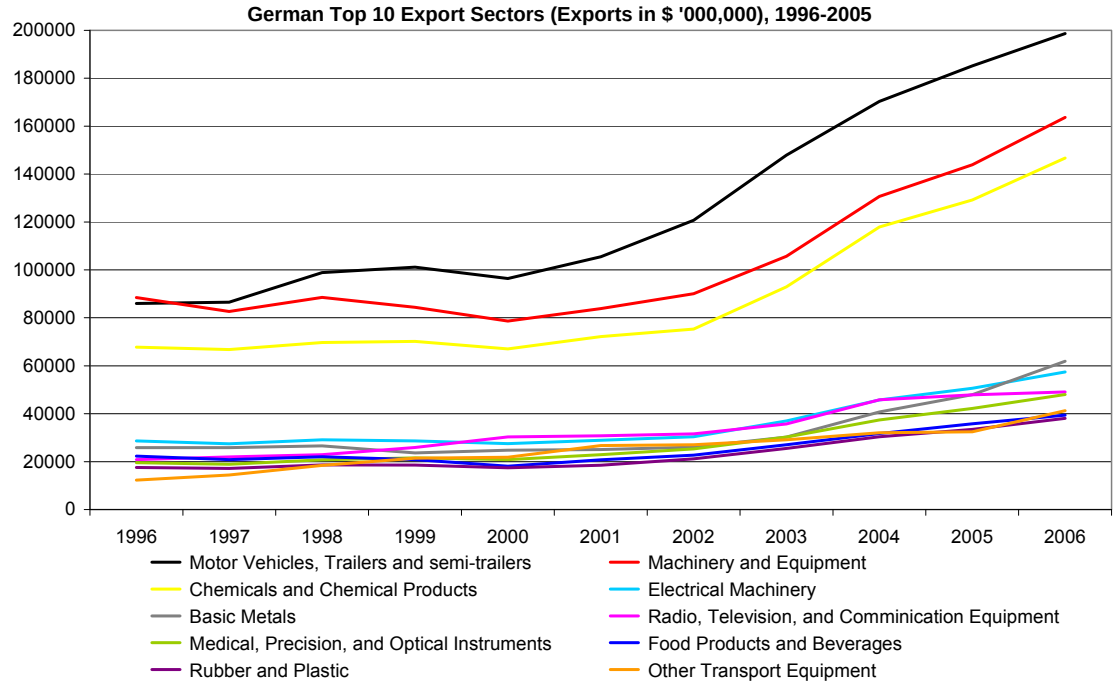
Data Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, September 2008, http://www.conference-board.org/economics; FDI data stem from UNCTAD.

Germany's exports depend on global business cycles

Figure 3.7 illustrates the annual growth rates of the top 10 export sectors (ISIC 3 classification) in Germany between 1996 and 2006. Strong growth in Germany's major export markets--such as central European countries, oil exporters, and developing countries—have fostered this growth. Germany's export strength clearly lies in capital goods, such as machinery, motor vehicles and chemicals; only capital goods and intermediate goods together account for about three quarters of total German exports. As the demand for these goods depends on global business cycles, exports depend strongly on demand effects and do not appear to have suffered much from the appreciation of the euro exchange rate.[29] Even though chemicals, machinery, and motor vehicles seem to dominate export markets in the countries under consideration in this report, the German export shares in these three industries are outstanding[30]. Exports of food and beverages are ranked highest in the Netherlands, even though the share in total exports has been falling continuously since 1996. Coke and refined petroleum product exports experienced high growth rates, especially in the Netherlands, but also in Sweden and the United Kingdom since 2000.

[29] See also OECD (2008a) for further explanation.
[30] See also Table A3.4 in the Appendix for further details.

Figure 3.7:



Note: Values were deflated using the OECD export deflator.
Data source: World Bank.

Openness and lower trade distortion strengthen the impact of trade on productivity

International trade is often seen as an important driver of economic growth (see, for instance, Alcalá and Ciccone, 2004; Badinger and Breuss, 2008, Frankel and Romer, 1999). Trade is also considered to have a positive influence on multifactor productivity. Many of the reasons resemble those discussed in the section on FDI above. Notably higher competition in export markets is assumed to lead to externalities and (technology) spillover-effects. Openness and lower trade distortions are important determinants of the impact on productivity, which may come through two channels. First, firms become more productive as lower trade barriers lead to increasing exports. Accordingly, greater openness may lead to greater efficiency in the use of factors of production. Second, increasing openness could initiate a process in which resources are re-allocated to exporting firms that are more productive than non-exporting firms (Dar and Amirkhalkhali, 2003; Arnold and Hussinger, 2005).

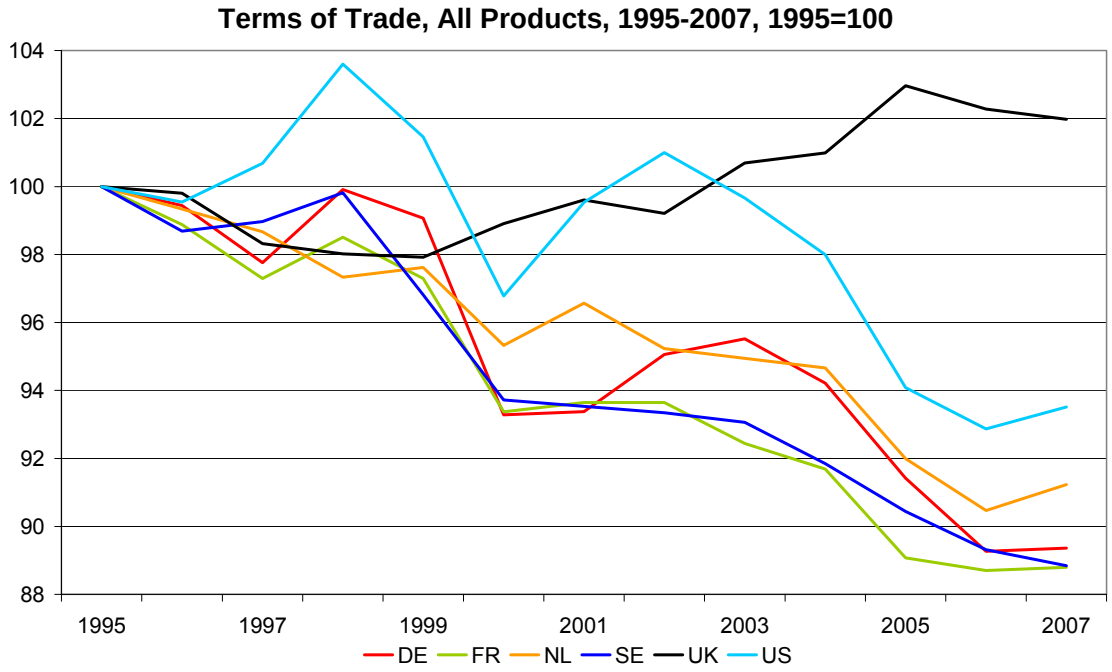
Terms of trade improvements impact on living standards

Trade may improve domestic welfare not only as a result of improvements in productivity growth, but also from higher terms of trade, measured as the price of exports relative to the price of imports. An improvement in terms of trade affects nominal GDP in much the same way as a gain in productivity (Diewert and Morrison, 1986; Kohli, 2004). Either an increase in the price of an exported good or a decrease in the price of the imported good cause an exogenous change in the value of output that is potentially available, based on the same levels of inputs and domestic prices. Through this terms-of-trade-effect, domestic production can be reallocated from exports to capital formation or consumption. Consequently, an improvement in the terms of trade increases real income, real value added, and welfare.

Falling terms of trade reflect increases in energy and food prices

Figure 3.8 compares the development of terms of trade in the countries of interest since 1995. All countries except the United Kingdom exhibit falling terms of trade, especially since 2003. At no point did export prices exceed import prices compared with the 1995 benchmark. Terms of trade in the United Kingdom are increasing because the country imported goods that have experienced the largest price declines while being a leading services exporter for which prices are rising. In addition, the United Kingdom is nearly self sufficient in oil and therefore has not been much affected by higher world oil prices (OECD, 2007b). OECD (2008a) sees the falling terms of trade in Germany, but also in the other European countries, as a consequence of increasing energy and food prices that result in higher real product wages measured as compensation of employees. But decreasing export goods prices, and thus falling terms of trade, are also a reflection of productivity growth in the sample countries. The falling terms of trade in the United States stem largely from the depreciation of the U.S. dollar in recent years. The cyclical variations are also strongest in the United States.

Figure 3.8



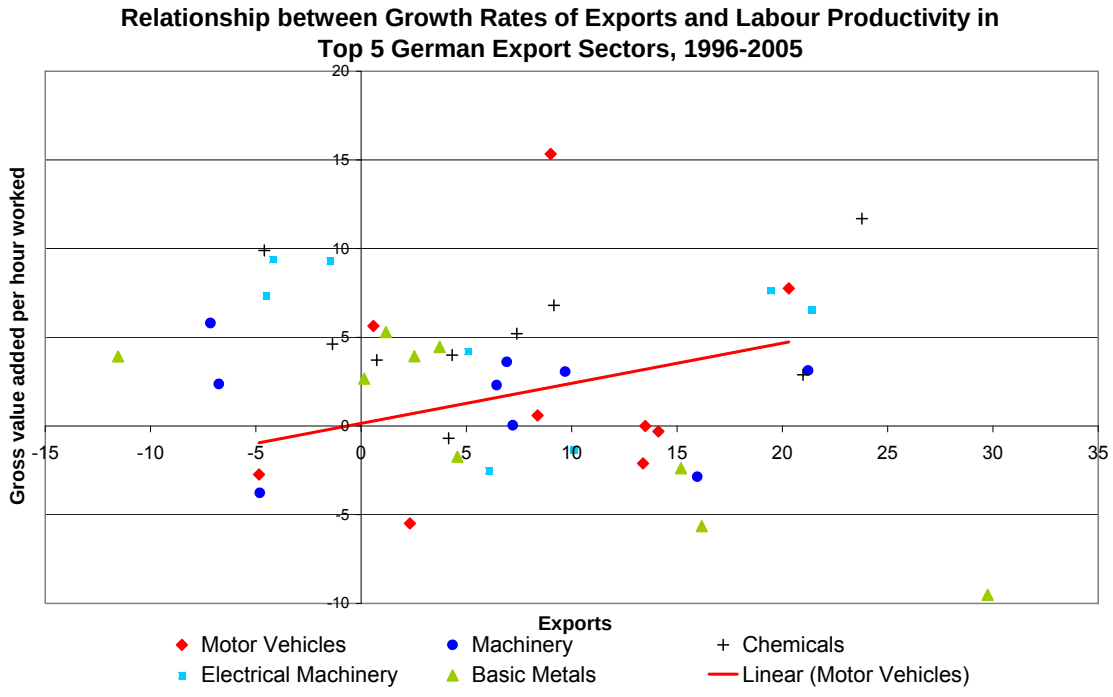
Data source: Eurostat.

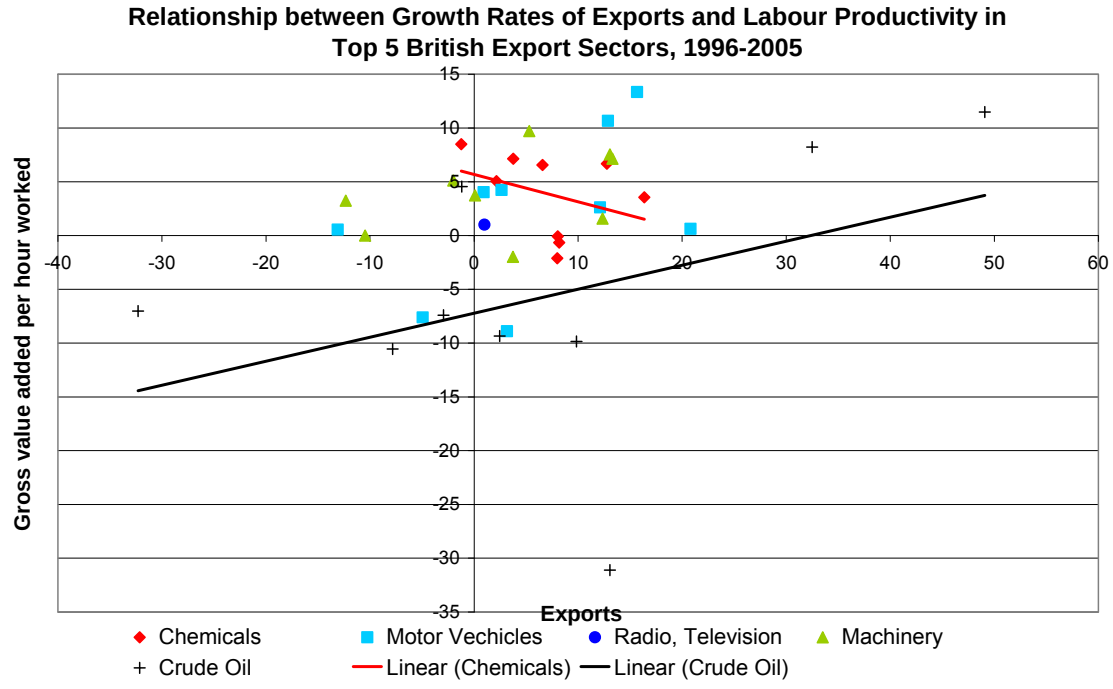
Leading exporting sectors correspond well with most productive sectors

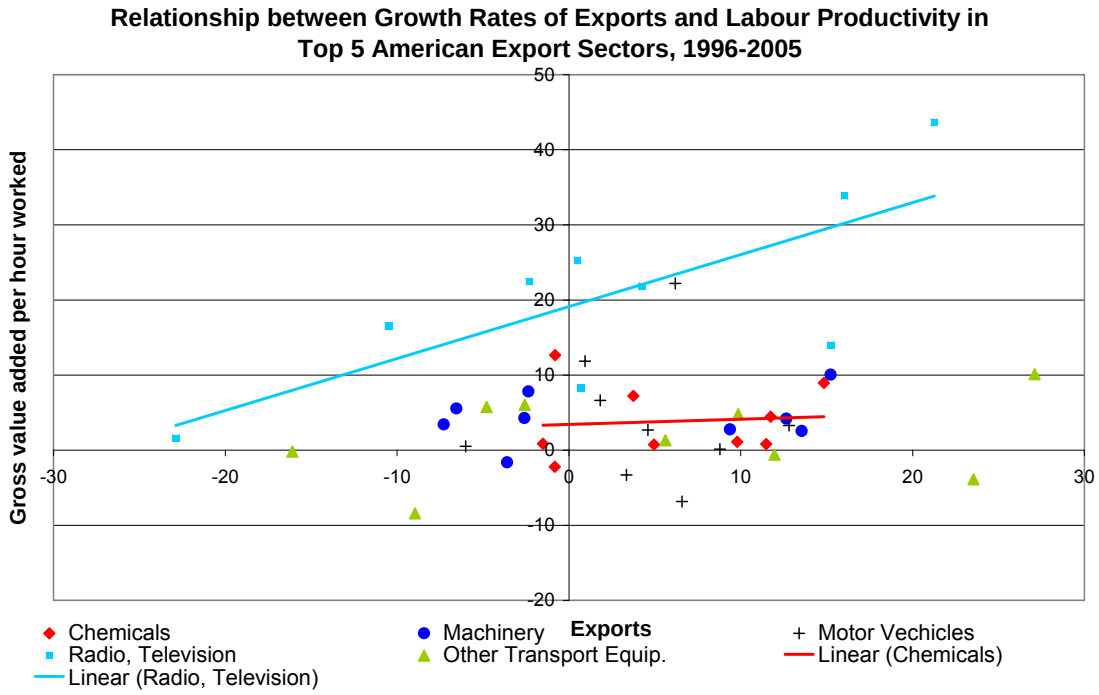
Exports are correlated with higher productivity growth in Germany, the United Kingdom, and the United States. Figures 3.9a to 3.9c, which plot the growth rates of exports in the top five sectors of each country against their growth of labour productivity, correspond quite often with the most productive sectors.[31] The red regression lines indicate the correlation of trade and productivity in each country's leading sectors. If trade had a stronger positive impact on labour productivity in one other of the top five sectors, a second line is inserted. This suggests that there is a clear positive correlation between growth in exports and growth in labour productivity in some sectors and countries, such as motor vehicles, trailers, and semi-trailers in Germany, extraction of crude oil in the United Kingdom, and radio, television, and communication equipment in the United States.

[31] A deeper investigation with more sophisticated empirical methods and more control variables for a large sample size would be necessary to draw reliable conclusions. We focus our attention on the export performance, rather than on terms of trade, because export prices and import prices are not available for all sector levels, years, and countries.

Figures 3.9a to 3.9c







Data source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics and World Bank.

Exporting companies tend to be more productive than non-exporters

Trade can also have a strong impact on the average productivity of an individual firm via so-called selection effects (Melitz, 2003; Bernard et al., 2003). There are two not mutually exclusive hypotheses in the literature to explain why exporters are expected to be more productive than their counterparts:[32]

Self-selection of more productive firms into export markets

Selling goods in foreign markets implies extra costs, such as distribution, marketing or transportation costs, and costs for adapting products to new standards, quality upgrading, etc. Only the more productive firms are able to overcome these entry barriers. The desire to export in the future may be a further incentive to improve the firm's performance today to be competitive on foreign markets tomorrow.

[32] Since the seminal papers from Bernard et al. (1995) and Bernard and Jensen (1999), researchers have analyzed causes and consequences of export activities on firm and country level.

Learning-by-exporting

Export-oriented firms benefit from competition and learning effects. Firms that trade in international markets are forced to improve faster because they are exposed to more intense competition than non-exporters that only have to deal with the conditions of domestic markets. In addition, knowledge-flows from international competitors and buyers also improve the performance of exporters.

Wagner (2007) summarizes the findings of 54 econometrical studies with data from 34 countries that were concerned with the relationship between exporting and productivity on an individual level.[33] Even though the approach used in the papers differs in details, one clear message emerges: exporting companies tend to be more productive with higher average growth rates than non-exporters. The World Bank (2007) arrives at the same conclusions using identically specified empirical models for 14 countries on a micro level.

Positive indirect effects from offshoring may offset negative direct effects on employment

The net effect of offshoring on employment and growth is ambiguous. While the impact of offshoring on employment is often direct and negative in the short run, the gains could indirectly lead to the creation of jobs in the longer run. Hijzen and Swain (2007) and Amiti and Wei (2006) distinguish different channels through which offshoring affects employment figures. The technology effect reflects job losses in the short run, which occur when companies relocate parts of their production overseas. If offshoring boosts productivity, companies are able to produce a given amount of output with fewer inputs. Thus, on the one hand, offshoring might lead to a lower demand for labour and higher unemployment figures.

On the other hand, offshoring could also result in higher demand for labour due to scale effects. Scale effects capture the creation of new jobs following the increase in industry output caused by productivity gains from offshoring. Increasing productivity could also lead to lower prices, generating additional demand for labour and output.

[33] See Appendix table A1 in Wagner (2007).

Eurofound (2005) evaluated job losses due to offshoring in Europe by analysing data from national correspondents. Table 3.3 reveals that the greatest loss of jobs due to offshoring in relative terms in the five European sample countries of this study occurred in Germany, followed by Sweden and France. Interestingly, countries which are considered to be destination countries for offshoring within Europe, such as Slovakia, Slovenia, or Ireland, have lost jobs due to offshoring themselves in the short run as a result of moving their own activities to other countries. The sectors whose employment figures were hardest hit by offshoring are business services, such as computer services, textiles and chemicals. However, it is not assured in this analysis that indirect employment effects are taken into consideration as well.

Table 3.3: Total Job Losses Due to Offshoring Announces, by Country, in 2005

	Total job losses	Job losses due to offshoring	Offshoring as % of total
Germany	108233	7765	7.2
France	45405	2080	4.6
Netherlands	22111	160	0.7
Sweden	16691	904	5.4
United Kingdom	200706	6764	3.4

Data source: Eurofound (2005).

OECD (2007c) emphasises that the long-term gains from offshoring do not directly concern the people whose jobs have been affected in the short run and are not immediately observable. The positive effects on employment are often not associated with offshoring and only the negative effects are directly related to it. There is a consensus in the literature that the impact of offshoring on labour markets tends to vary by industry, origin and host economy.[34]

A large number of studies have evaluated the impact of trade on employment[35]. The Heckscher-Ohlin-Samuelson (H-O-S) framework is one of the most cited theories in the literature on how trade affects employment. According to this theory, the import

[34] See for example Amiti and Wei (2006), Hijzen and Swain (2007), Mullen and Williams (2005).
[35] See for example Abraham and Brock (2003), Greenaway et al. (1999), Hoekman and Winters (2005).

substitute sector contracts when trade barriers are reduced while exports expand. Consequently, employment in the former sector declines and increases in the export sector. A redistribution of employment away from the import substitute sector and towards the export sector takes place (Greenaway et al., 1999). Amongst others, Abraham and Brock (2003) expand the H-O-S framework for industrialised countries and consider two types of labour: skilled and unskilled. Two effects of trade on employment are conceivable from a sectoral perspective: the export demand effect and the import competition effect. Increasing trade leads to a higher demand for goods in the export sector. Thus, the export demand effect leads to the creation of new jobs—a stimulation of economic growth. On the other hand, the import competition effect is often blamed for deteriorating labour demand and increasing unemployment. The import-competing sector experiences stronger competition from countries with cheap and abundant labour.

Ludwig and Brautzsch (2008) found a positive and increasing net effect of trade on employment, value added, and wages in the period 1985 to 2002 using input-output tables (see Table 3.4). The strong rise in exports led to an extension of employees since the mid-1990s, which clearly exceeded the job losses due to increasing import numbers. A total of 8.2 million people were in paid work in the export sector in 2002, whereas 6.5 million jobs were lost through imports. Compared with a net gain of employees of 0.4 million people in 1995, the balance increased to 1.2 million employees in 2002.

Table 3.4: Net Effects of Trade on Value Added, Employment, Wages in Germany, 1985-2002,

Value added Mrd. €					**Employees** 1000 Persons					**Wages** Mrd. €				
1985	**1991**	**1995**	**2000**	**2002**	**1985**	**1991**	**1995**	**2000**	**2002**	**1985**	**1991**	**1995**	**2000**	**2002**
Gains due to exports														
206.8	269.3	291.2	400.0	459.4	5729	7004	6082	7520	8202	139.3	186.1	208.5	282.0	313.2
Losses due to imports														
176.5	253.9	257.6	366.8	360.2	4746	6976	5659	6735	6562	104.8	171.8	180.8	242.9	234.3
Net effect = export effect minus import effect														
30.3	15.4	33.6	33.2	99.2	983	28	423	785	1640	34.5	14.3	27.7	39.1	78.9

Source: Ludwig and Brautzsch (2008).

3.5 The Role of Domestic Consumption

Despite the rapid recovery of output growth in the German economy in recent years, there are signs that much of the revival is due to a strong performance of the external sector of the German economy. While the external sector has traditionally been the engine of German growth, the most recent growth episode has failed to produce the expected increase in domestic consumption.

Weak demand performance has been a recurring theme in the context of the debate on slow growth and productivity in Germany. One of the traditional arguments has been that restrictive monetary and fiscal policies in Germany have been an important source of weakness in aggregate demand. Others have argued that there are additional reasons for weak growth in demand. For example, Carlin and Soskice (2007) argue that that flexibilisation of labour markets has led to the creation of low-productivity jobs in Germany (Carlin and Soskice, 2007).

To establish the small role of demand for output growth, we provide an alternative decomposition method to the supply-side decomposition above. Following Kubo, Robinson and Syrquin (1986) we decompose the change in gross output into the contribution of domestic final demand and exports, assuming a fixed import and technology structure, plus a term that measures the effects of changes in the input-output matrix resulting from technological change, and a final term that captures the effect of the variation of import ratios.

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BOX:

Decomposition of output growth to demand components

We start from an accounting identity, expressing the vector of gross output (X) as the sum of vectors of domestic final demand (D), intermediate demand (W) and net export demand (E-M, where E stands for export and M for import).

$$X = D + W + E - M \quad (3.1)$$

We can introduce import ratios as the share of imports in total domestic demand $m_i = M_i / (D_i + W_i)$. We can also use the input-output matrix (A) to express the vector of intermediate demand as a function of output (W = AX). Therefore we eliminate M and W and we can write the output as a function of final demand, export demand, import ratios and input-output matrix.

$$X = (I - (I-m)A)^{-1} ((I-m)D + E)$$

With some assumptions and some algebraic manipulations the growth of output (ΔX) can be decomposed into domestic demand expansion (DD), export expansion (EE), changes in input-output coefficients (IO) and changes in import substitution (IS).

$$\Delta X = DD + EE + IO + IS$$

The first two terms affect output growth through the expansion of domestic demand and exports with a fixed import structure. The third term measures the effects of changes in the input-output matrix resulting from technological change. The last term captures the effect of the variation of import ratios.

Source: Kubo, Robinson and Syrquin (1986)

END OF BOX

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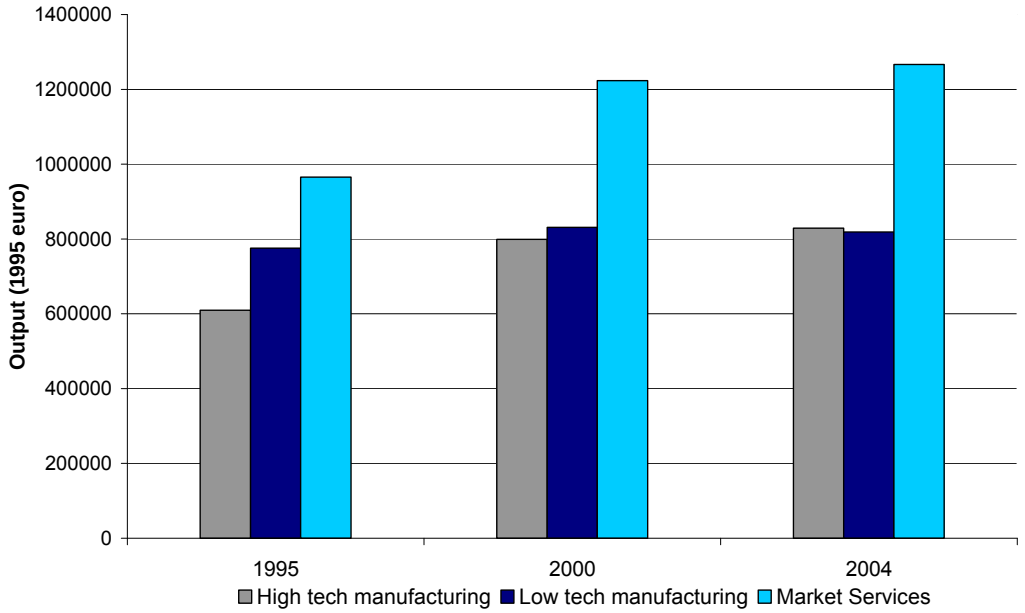
We use this decomposition of demand for the growth of output in high- and low-tech manufacturing sectors and for services for the periods of 1995-2000 and 2000-2004 (Appendix Table C3.2).[36] In Figure 3.10 we present the evolution of these sectors between 1995 and 2004 for Germany. The output of high-tech manufacturing increased by 36 percent between 1995 and 2004, with a lower increase for the service sector (31 percent) and only a 6 percent increase for the low-tech manufacturing sector. For all sectors, the largest gains by far were obtained from 1995 to 2000.

Figure 3.10: The Increase in Output for High- and Low-Tech Manufacturing Sectors and Services (Constant 1995 euro), 1995-2004.



Source: Authors' computations based on Eurostat data.

Domestic demand collapses as a source of growth in Germany after 2000

Table 3.5 shows a decomposition of output growth for Germany and France for the periods 1995–2000 and 2000–2004 and for the United States for 2000–2004. The table shows that growth of output in Germany is largely export driven, in particular in the high-tech sector, with a 31 percent increase in output in the period 1995-2000 and 12 percent growth in the period 2000-2004. Even the low-tech sector's export contribution to growth amounts to 12 percent in the first period and 6 percent in the second period. The domestic demand still contributes significantly to the expansion of

[36] We use a somewhat different breakdown of major sectors and a different data source (Eurostat) than above for EU KLEMS, as the latter does not include any variables on the demand side and no input-output tables that could be directly applied for this purpose.

output in the first period, by 7 percent in manufacturing and 15 percent in services. However, since 2000 domestic demand has hurt the growth of output. Strikingly, the service sector is shown as the only sector that has technological change contributing appreciably to output growth, which is most likely related to the introduction of computers. At the same time, the increased use of imports affects the growth of German output, especially before 2000.

For the first period, the decomposition of output growth for France is similar to Germany's decomposition, although there is a larger domestic demand, relatively lower export expansion and smaller impact of imports on the growth of outputs. In the second period, the French economy shows a more resilient domestic demand, still contributing positively to the growth of output. On the other hand, exports and imports have a slight negative contribution to the growth of output.

The decomposition of the output growth in the United States between 2000 and 2004 shows a significant increase in imports, especially in the low-tech sector, leading to a negative effect on output growth (−22 percent). In contrast, the expansion of domestic demand makes a large contribution to output growth, especially in the low-tech and services sectors (16 percent and 14 percent respectively).

Table 3.5 Decomposition of Output Growth (% from base year) for Germany, France and the USA, 1995-2004

Country/ Sector	Domestic Demand (%)	Export (%)	Technological Change (%)	Import Substitution (%)	Output Growth (%)
Germany					
1995-2000					
High tech manufacturing	7	31	2	-10	31
Low tech manufacturing	7	12	-3	-9	7
Market Services	15	11	16	-15	27
2000-2004					
High-tech manufacturing	-2	12	0	-6	3
Low tech manufacturing	-4	6	0	-3	-2
Market Services	-2	3	11	-8	4
France					
1995-2000					
High tech manufacturing	10	28	3	-8	33
Low tech manufacturing	8	8	-1	-5	10
Market Services	12	7	9	-1	28
2000-2004					
High tech manufacturing	0	-2	-3	-1	-5
Low tech manufacturing	2	-1	-2	-1	-2
Market Services	7	-2	4	1	10
USA					
2000-2004					
High tech manufacturing	7	0	1	-11	-3
Low tech manufacturing	16	-1	2	-22	-6
Market Services	14	0	3	-9	8

Source: Authors' computations based on EUROSTAT and BEA data.

Note: No data is available for the USA until 1998.
Due to different classifications of industries (NACE for EUROSTAT and NAICS for BEA), there are slight differences in the aggregation of industries in the tree sectors.

Low wages may have played a role in limiting demand effects

The negative income effect from the increase in low-wage employment has been one of the factors contributing to the slow demand contribution in Germany. As will be discussed in Chapter 4, the labour income share in Germany in recent years has declined strongly, and the real wage distribution in Germany has become more unequal. OECD (2008a) has drawn attention to the fact that personal consumption in Germany has not only been slow because of weak household income growth, but also due to upward pressure on household savings as a result of tax incentives for retirement savings plans.

In sum, it seems that the unbalanced growth of the German economy relative to other countries is in part the result of the creation of a more labour intensive services industry characterized by slow growth and limited demand vis-à-vis a very productivity-competitive external sector of the economy.

Appendix to Chapter 3

A3. Concerns about measurement of productivity

Traditional productivity measures are based on the assumption that all factor inputs and outputs are measured without errors. Practically, mismeasurements of output and input factors may happen and, as a consequence, lead to understatement or overstatement of productivity measures.

Van Ark (2004) follows Griliches (1994) in distinguishing between the quality of measures of output and productivity across industries. Griliches (1994) showed a striking difference between the acceleration of labour productivity growth in "measurable" sectors of the U.S. economy (agriculture, mining, manufacturing, transport and communication, and public utilities) and the slowdown in "unmeasurable" sectors (e.g., construction, trade, the financial sector, "other" market services and government) over past decades. Apart from this rise in measurement error at the aggregate level, due to the shift towards the unmeasurable sectors of the economy, one may also observe an increase in measurement problems in the unmeasurable sector itself. This component of the rise in measurement problems may be related, at least in part, to the increased use of ICT.

Table A3.1 summarizes the measurement problems concerning output, value added and productivity, partly in relation to the increased role of ICT. The sources of measurement problems can be divided into four categories. These are measurement problems with regard to output in manufacturing (the major industry of the "measurable" sector of the economy) and output in services (which dominate the "unmeasurable" sector) vis-à-vis measurement problems concerning the inputs (production factors and intermediate inputs) in manufacturing and services. The table presents a summary of the major issues in each quadrant and the most desirable and feasible solutions.

Table A3.1: Summary of Main Measurement Problems of Output at Industry Level

	Manufacturing	Services
Output	Primarily computers and other ICT. Solution primarily through use of hedonic price indices. Feasible provided data availability.	Most services with "customised" production, and non-market services (education, health, etc.). Solutions through detailed surveys on multiple dimensions of output for each industry. Difficult in methodological terms and in terms of data availability.
Input	Primarily semiconductors and software. Solution primarily through use of hedonic price indices. Feasible given availability of data and use of input-output matrices	Primarily ICT input including software. Solution through use of real input series adjusted with hedonic price deflators. Feasible provided availability of capital-flow matrices.

Source: Van Ark (2004)

It is difficult to precisely assess the accuracy (i.e., the extent to which these measures describe reality) of the variables described above. Essentially what is required is a careful assessment of the accuracy of each of the underlying measures in the productivity equation, including output, labour input, capital inputs, etc.[37] Various national and international statistical agencies are developing statistical procedures to assess the accuracy of their numbers.[38] At the level of international comparison, however, informed "guesstimates" of accuracy are the best that can be achieved. Such guesses are based on the assessment of revisions that have been carried out in various countries, sampling errors of underlying survey statistics, and counterfactual experiments (e.g., applying hedonic deflators of the United States to countries that do not use such price indices).

Table A3.2 gives a rough indication of how a margin of uncertainty of 0.1 percent in the annual growth estimates of GDP and labour input, and of 0.3 percent in capital input growth, affect the uncertainty of labour productivity and total-factor productivity growth estimates. It also indicates how this affects comparisons of growth between countries. Hence, based on these guesstimates, differences in labour

[37] In fact the quality assessment of the estimates goes beyond the issue of accuracy, and also involves criteria such as integrity, methodological soundness, reliability, serviceability, and accessibility (Carson, 2001).
[38] See, for example Akriditis (2002).

productivity growth within a range of 0.4 percentage points (0.2 percentage points both ways) do not lead to a different ranking of country performance. Similarly average annual TFP growth estimates within a range of 0.5 percent cannot lead to conclusions on different rankings.

Table A3.2: Informed Guesstimates about Margin of Uncertainty in Annual Growth Rates of Output, Input and Productivity in OECD Countries

	country A	country B	difference A/B
GDP growth	+/- 0.1	+/- 0.1	+/- 0.2
Labour input growth	+/- 0.1	+/- 0.1	+/- 0.2
Capital input growth	+/- 0.2	+/- 0.2	+/- 0.4
Total input growth	+/-0.133	+/-0.133	+/- 0.266
LP growth	+/- 0.2	+/- 0.2	+/- 0.4
TFP growth	+/- 0.233	+/- 0.233	+/- 0.466

Note: Margin of uncertainty in total input growth is obtained by weighting margin of labour input growth by 2/3 (proxy to share of labour income in GDP) and for capital input growth by 1/3 (proxy to share of capital income in GDP).

Siegel (1995) is also concerned about errors in productivity measurement, and Table A3.3 summarizes potential sources of mismeasurement and potential resulting biases. Using a regression framework, he analyzes whether multifactor productivity growth could be due to errors in the measurement of the input factors shown in Table A3.2. His main result is in line with various other papers, arguing that it is important to consider measurement errors, but they may not explain a substantial share of productivity growth because they are relatively constant over time and may cancel out in a measure of multifactor productivity.

Table A3.3: Measurement Errors Concerns in the Estimation of Productivity

Variable	Potential Source of Mismeasurement	Potential Bias
Output	New product generated by the industry	Underestimation of real output
Capital	Industry's investment in computers	Underestimation of capital input
Labour	Changes in the quality of the labour force	Unclear
Materials	Foreign outsourcing of materials	Underestimation of materials input
Materials	Investment in computers undertaken by suppliers of materials inputs	Underestimation of materials input
Services	Outsourcing and/or increased use of purchased services	Underestimation of materials input

Source: Siegel (1995), p. 298.

Houseman (2007) warns that productivity statistics should be regarded with caution. For example, she argues that the poor measurement of international outsourcing may lead to a systematic underestimation of its amount and thus to an overestimation of productivity growth. Her major concern is that cost savings resulting from lower prices are counted as productivity gains. Houseman has no definitive information on the size and the empirical significance of these effects and admits that the potential bias of productivity measures could only be small. Garner (2004) emphasizes that recent productivity growth in the United States would be far too high and too rapid to be affected so strongly by such measurement errors. He estimates that U.S. productivity growth would only be overstated by 0.4 percent per annum if imported services were underestimated by $100 billion (developed over two years).

B3. Quality and analysis of services and public sector data

Productivity of market services is less studied than productivity of goods-producing industries. Service activities are intangible, more heterogeneous than goods and often depend on the actions of producers or consumers. Thus, finding adequate measures of service output and productivity is much more difficult and challenging than for goods production. Measuring output volumes requires accurate price management, adjusted for changes in the quality of service output.

Inklaar et al. (2008) show, on the basis of a comparison of European measurement practices, that improvements are feasible in many countries and industries without needing any fundamental conceptual research. They mostly require effort and resources from national statistical institutes. This is exemplified in retail trade, where existing data can be used to yield conceptually superior output measures. But there are other industries for which more is required. Recent progress on the conceptual challenges to actually measuring bank output suggests that new data collection efforts would be needed in most countries to improve measurement of output growth in that industry.

The measurement problems in nonmarket services, such as public administration, education, health or social work, are more substantial than in market services, and in several cases output growth is measured using input growth. One reason measurement problems in the private sector are less substantial than in the public sector is that one may assume that the price of the marketed output reflects the consumers' marginal valuation (Inklaar et al., 2008). Amongst others, Atkinson (2005) argues that there are no markets for collective services like defence or public administration, and in cases where public services are provided to individuals, the type and quality of the services provided may differ strongly. When output is not sold on markets, appropriate market prices are not available and thus the marginal benefits to consumers are lacking.

Consequently, it is difficult to measure output and productivity growth in non-market services. Unlike in the market sector, consumers do not face full prices for public goods and services, and the lack of market prices requires other approaches to measure the public sector's output. The common method of using inputs as a proxy for output in the public sector is judged to be unacceptable by Eurostat (2001). Eurostat also considers quality-adjusted output measures as more appropriate than counting pure activities in the public sectors. For example, the amount of teaching consumed per pupil for education, or the amount of care received by a patient for hospital services is seen as the preferred output measure. O'Mahony and Stevens (2006) recommend combining information on quantities (e.g., activity rates) with information on outcomes to control for quality changes, but add that this can be difficult to realise in practice. Castelli et al. (2007) favour a quality-adjusted output

measure for the health system output that uses the before and after treatment of health outcomes, together with activities growth, weighted by unit costs.

There are still many unresolved measurement issues that affect the international comparability of public sector data. Thus, the following figures have to be interpreted with caution and any conclusions can only be tentative. Due to the measurement problems of output volumes it is recommended to compare input measures rather than output and MFP in the non-market sector services. Nevertheless, the figures below deliver interesting insights into the contributions of the public sector to gross value-added growth for Germany, the United States, the United Kingdom, France, the Netherlands, and the EU-15 in the public sector countries between 1990 and 2005.

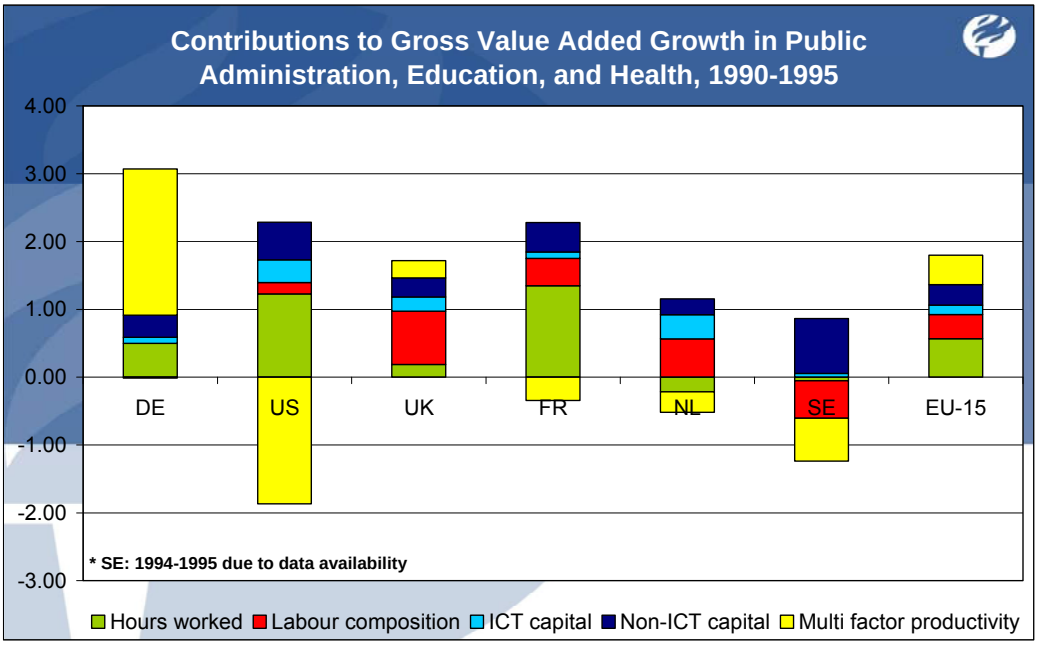
The German contribution of labour and ICT capital to gross value added in the public sector was very low compared to all other sample countries in all sub periods between 1990 and 2005. The United States showed a comparatively stable contribution to gross value-added growth of hours worked and labour composition. Compared with the EU-15 countries, labour input in the United Kingdom contributed an above average amount to the public sector performance over all periods. Nevertheless, the strong labour contribution in the United Kingdom declined slightly since the mid 1990s. Also, the Netherlands exhibited a labour composition above average in 1990-1995 (0.52), which fell to -0.01 in 2000-2005. The contribution of hours worked in the Netherlands and United Kingdom was remarkably high in 2000-2005 but was average over the whole period of consideration. The share of ICT capital in the Netherlands varied between 0.42 and 0.71 percent and was thus considerably higher than the EU-15 average of 0.14–0.24 percent in the period of consideration.

Concerning the overall performance of the public sector in the EU-15, the major gross value-added growth stemmed from hours worked, followed by labour composition in all sub periods. The growth performance of all countries in the public sector depended much more on non-ICT capital than in the private sector where, on average, ICT capital was a more important success factor. Nevertheless, ICT capital in the EU-15 countries gained in importance in public administration, education and health as the contribution to gross value-added growth rose from 0.14 between 1990 and 1995 to 0.23 percent between 2000 and2005. At the same time, the contribution of non-ICT

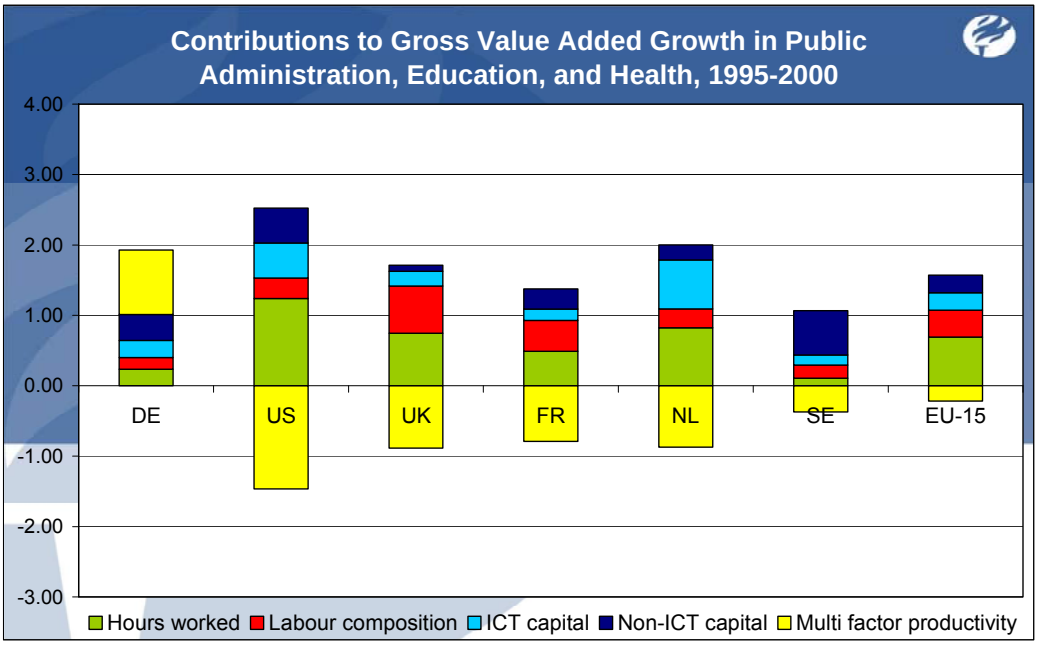
capital demonstrated a decreasing trend in the EU-15 countries (0.31 percent in 1990-1995 and 0.25 percent in 2000-2005).

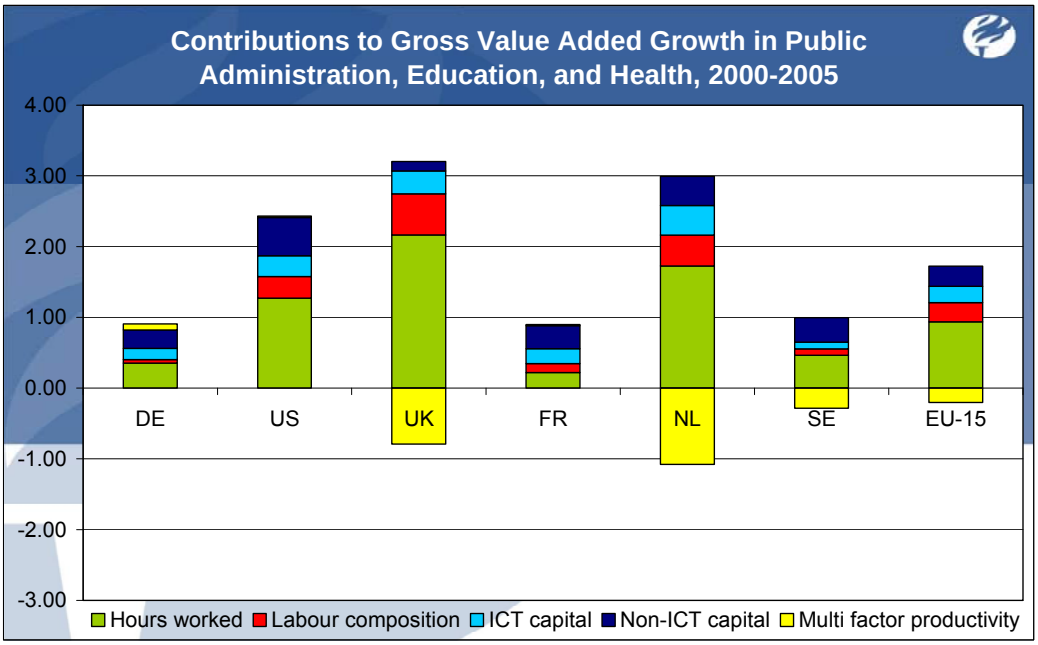
Even though the measurement of public-sector productivity faces severe problems and the existing figures have to be interpreted with caution, the German Federal Ministry of Interior has noted the comparatively low public-sector productivity in Germany during the past decade. Hence the German government has taken on a reform agenda for its federal administration to be more innovative, productive, and efficient.[39] The Ministry of Interior formulated strategies to reach these goals, including more efficiency through optimized use of resources and human resources development, efficiency-evaluating tasks and customer service from the customer's viewpoint.

Figures B3.1 to B3.4: Contributions to Gross Value-Added Growth in the Non-Market Sector: 1990-1995, 1995-2000, 2000-2005, and 1990–2005.



[39] See Bundesministerium des Innern (2006) for a detailed description of the modernisation of the federal administration.


Contributions to Gross Value Added Growth in Public Administration, Education, and Health, 1995-2000
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
DE
US
UK
FR
NL
SE
EU-15
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity


Contributions to Gross Value Added Growth in Public Administration, Education, and Health, 2000-2005
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3.00
2.00
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-2.00
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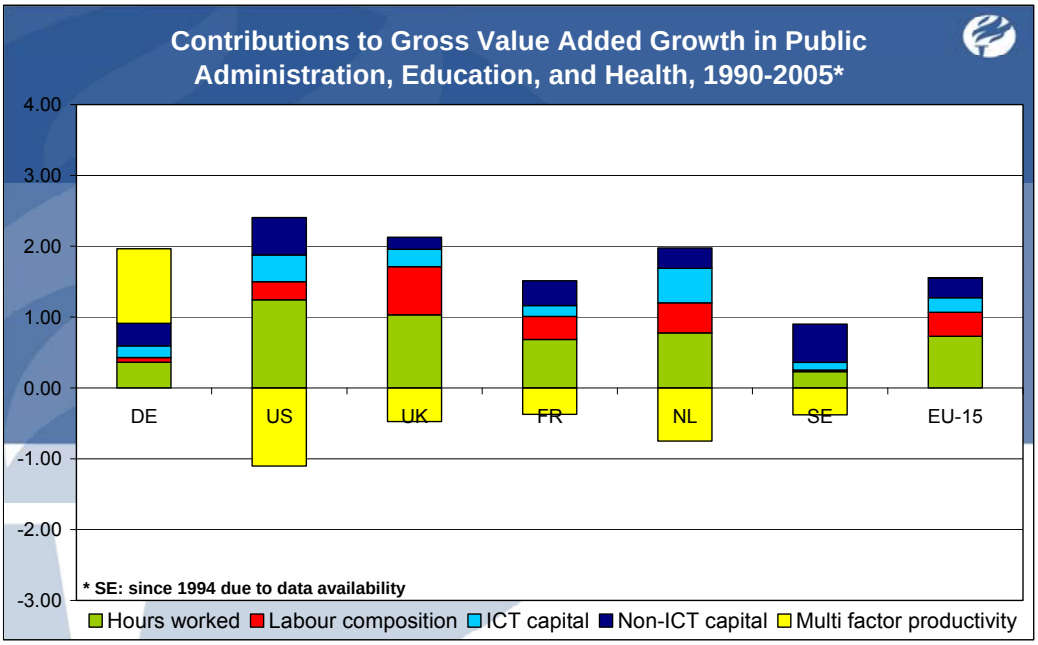
UK
FR
NL
SE
EU-15
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity

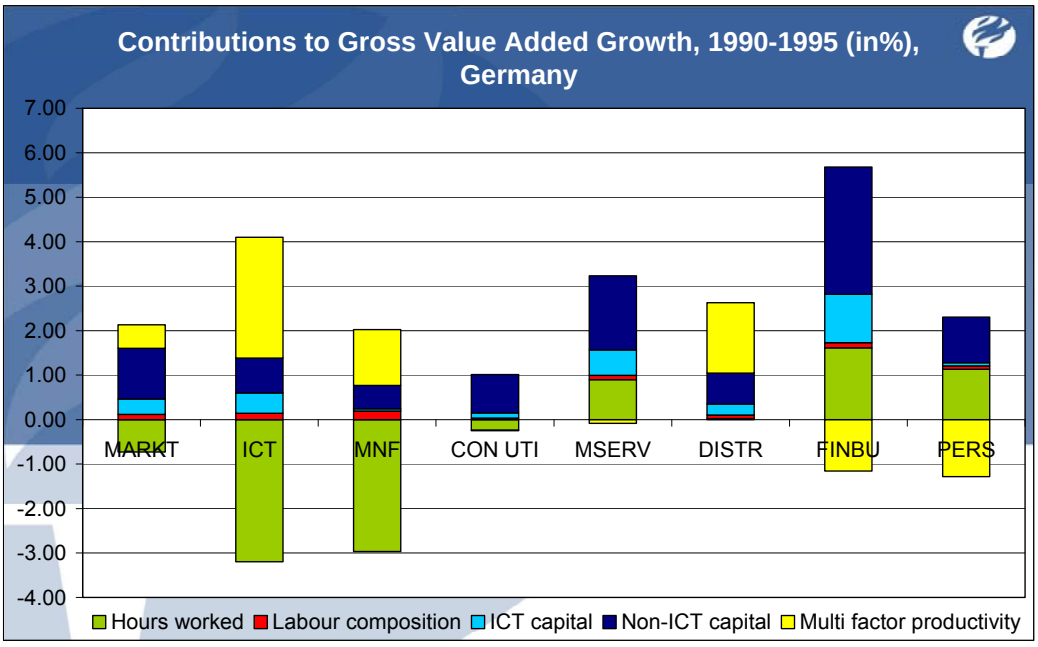


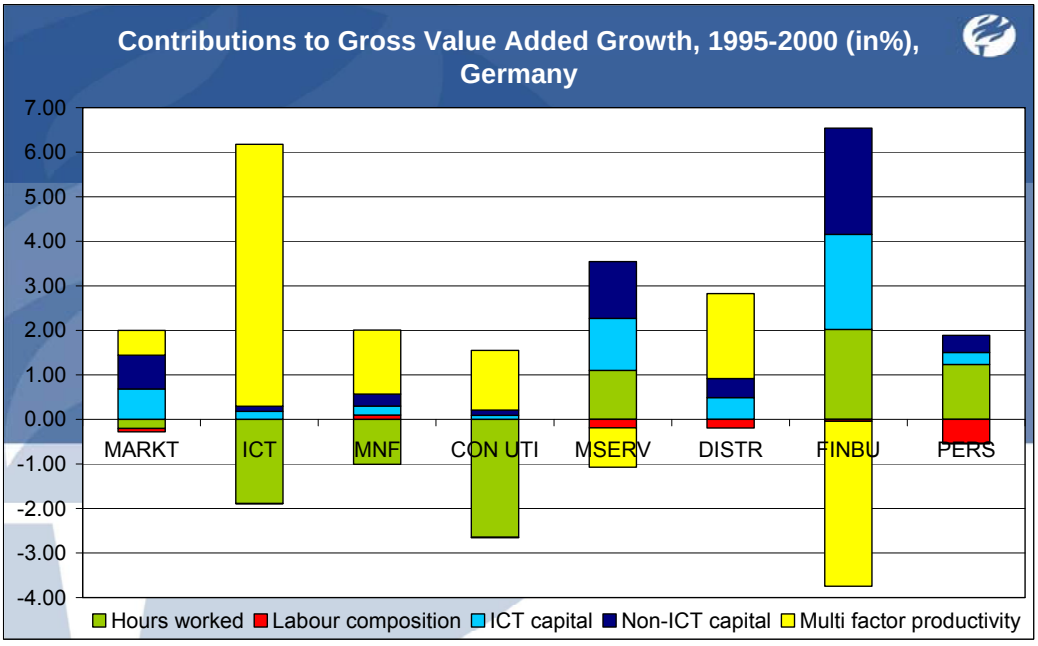
Data source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics

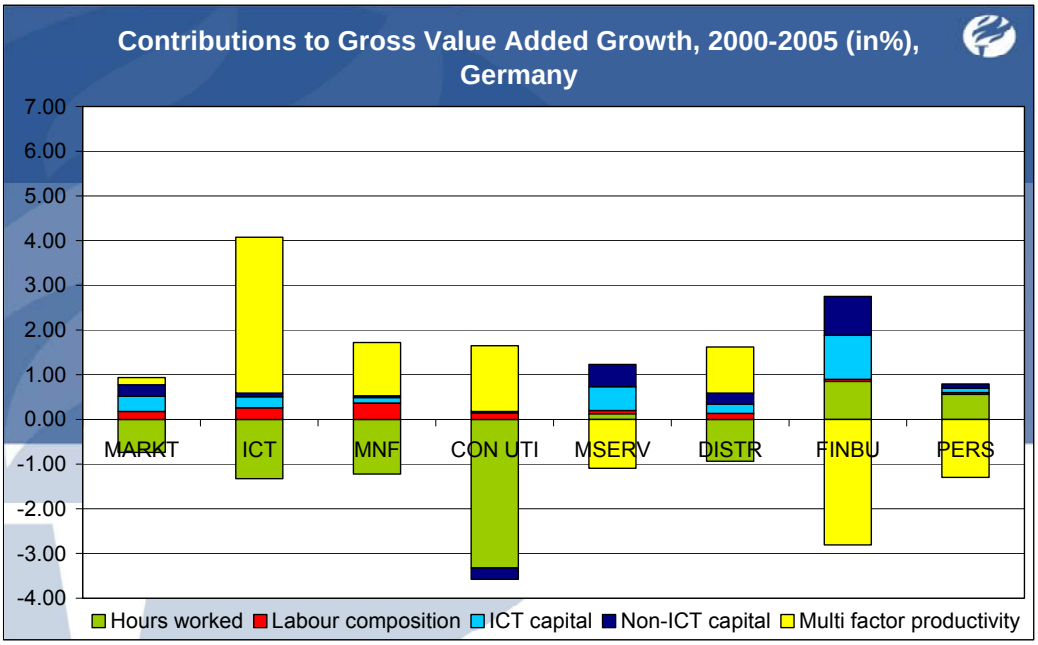
C3. Appendix figures and tables

Contributions to Gross ValueAdded Growth in Germany, France, Netherlands, Sweden, United Kingdom, United States, and EU-15: 1990–1995, 1995–2000, and 2000–2005.

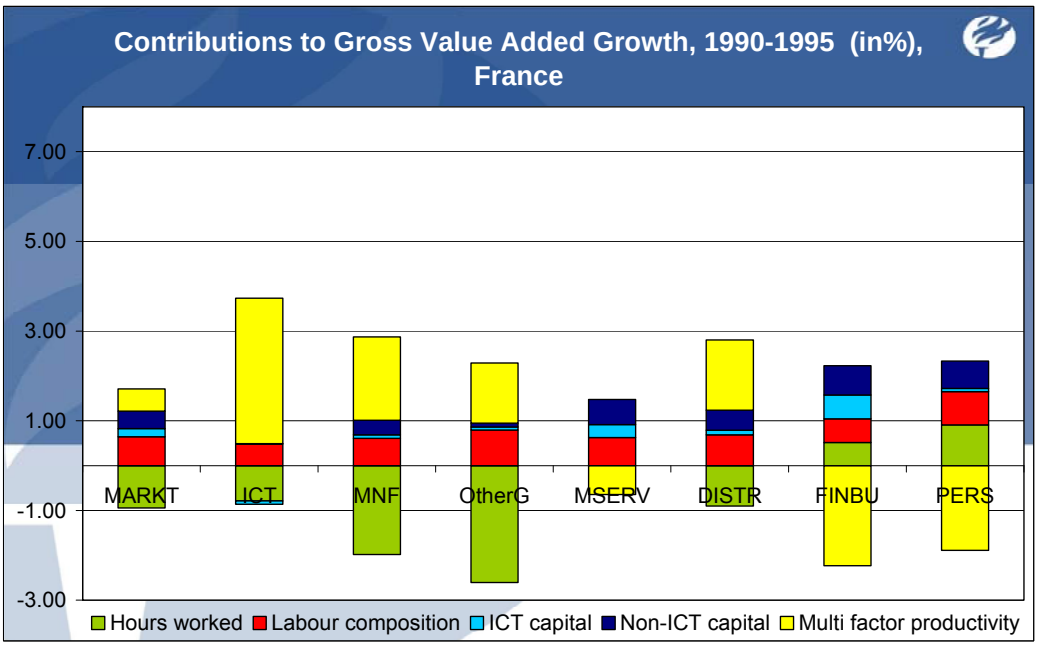
Figures C3.1a to C3.1c: Germany

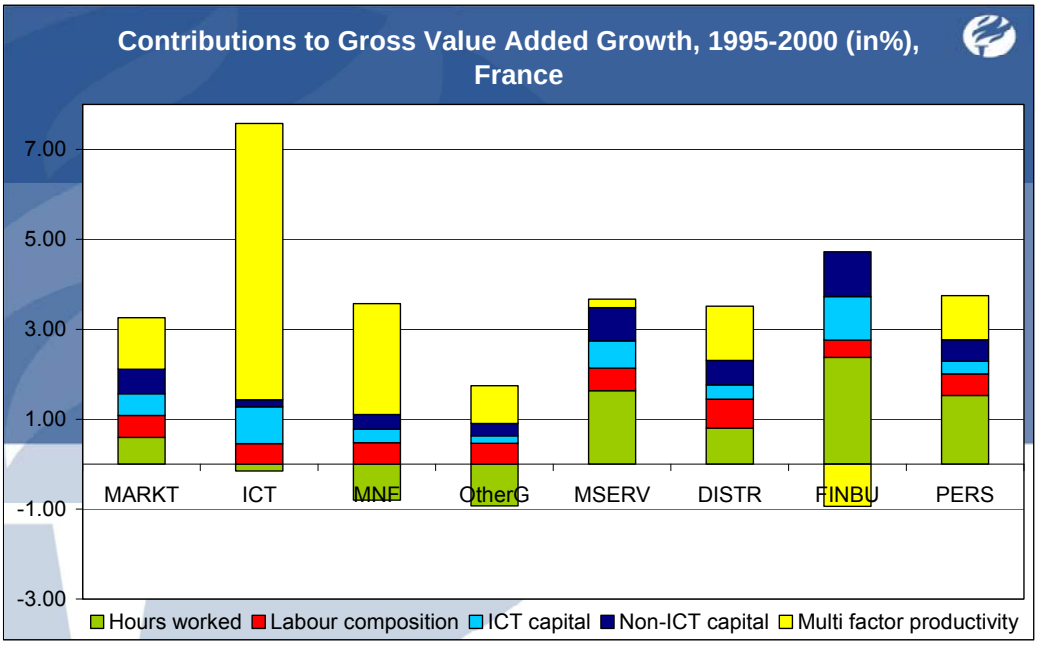


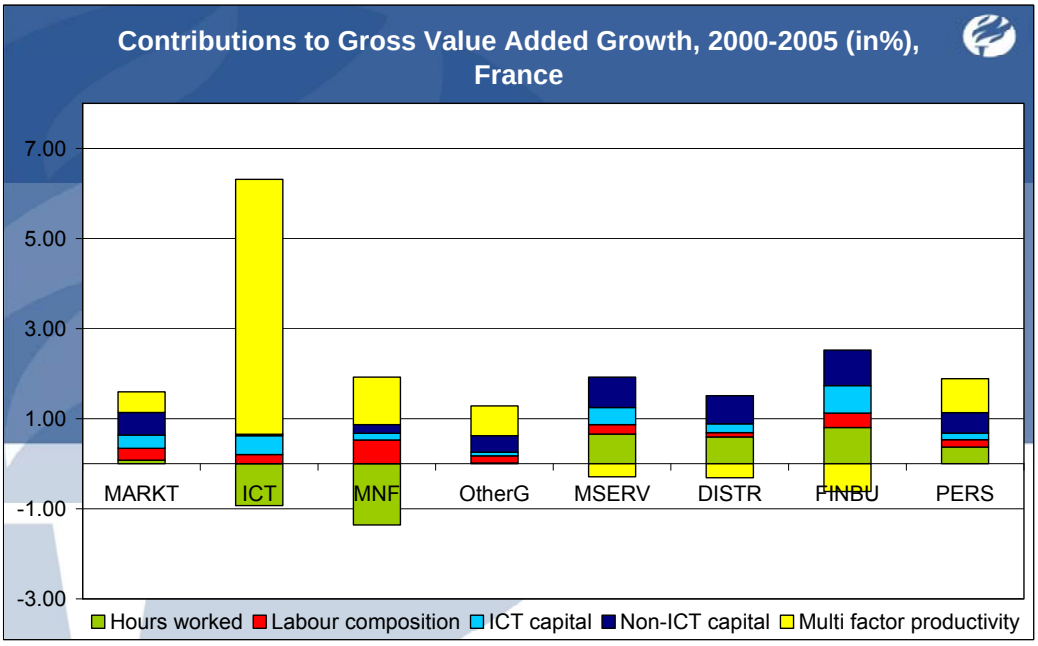




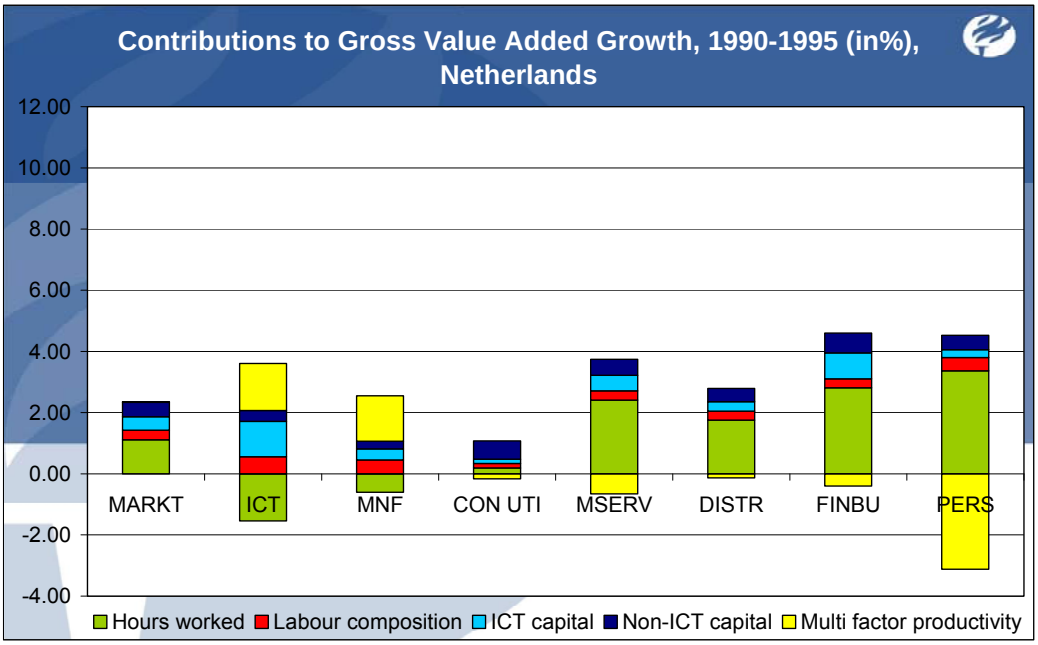
Figures C3.2a to C3.2c: France

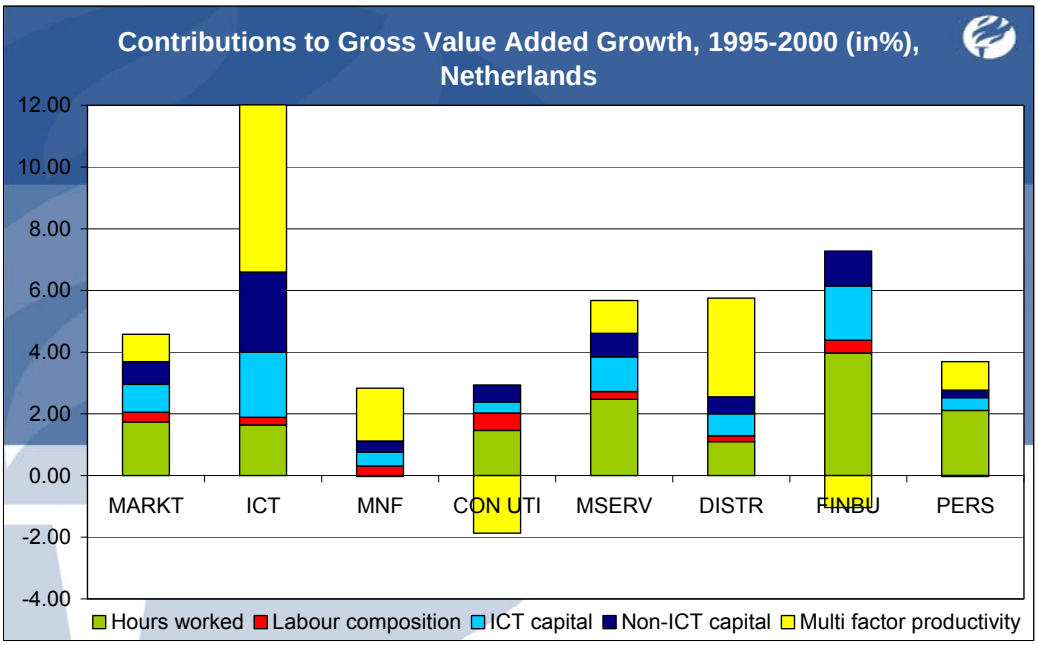


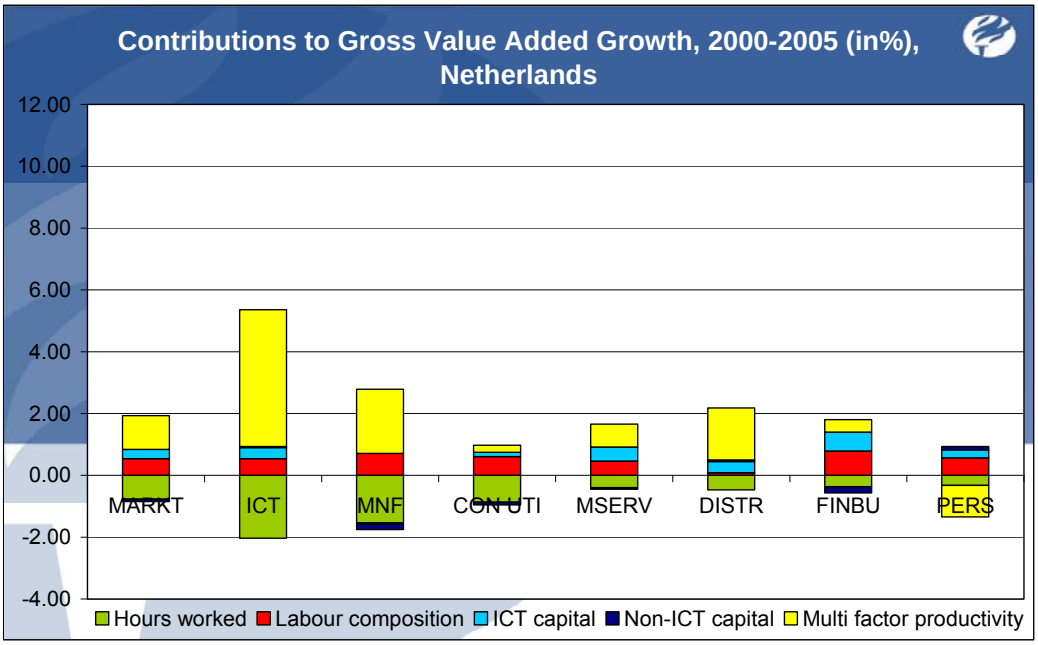

Contributions to Gross Value Added Growth, 1995-2000 (in%), France
7.00
5.00
3.00
1.00
-1.00
-3.00
MARKT
ICT
MNF
OtherG
MSERV
DISTR
FINBU
PERS
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity


Contributions to Gross Value Added Growth, 2000-2005 (in%), France
7.00
5.00
3.00
1.00
-1.00
-3.00
MARKT
ICT
MNF
OtherG
MSERV
DISTR
FINBU
PERS
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity

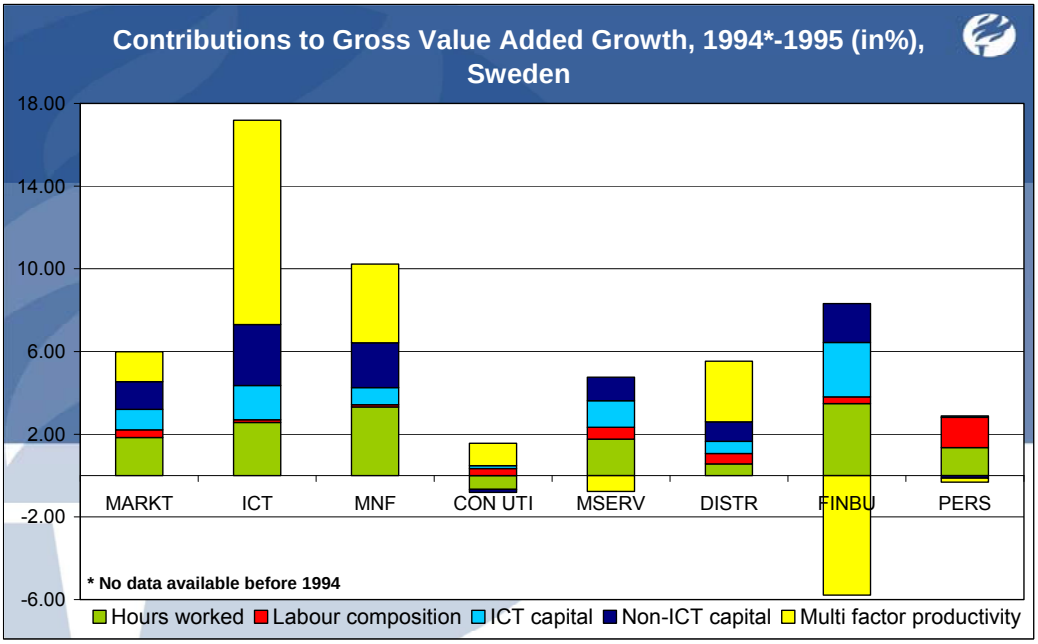
Figures C3.3a to C3.3c: Netherlands

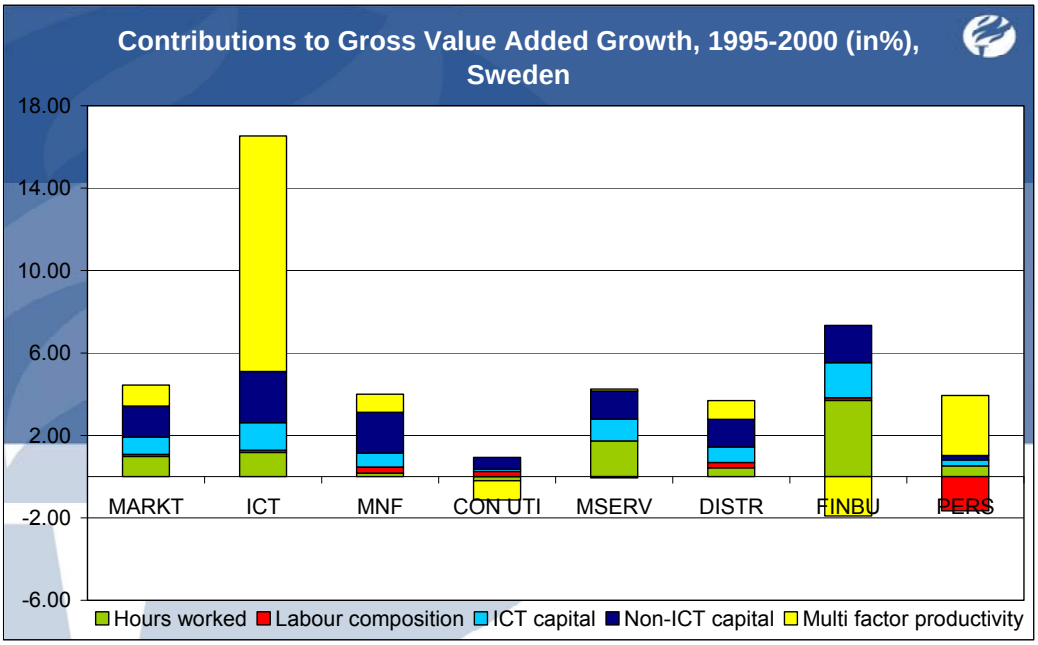


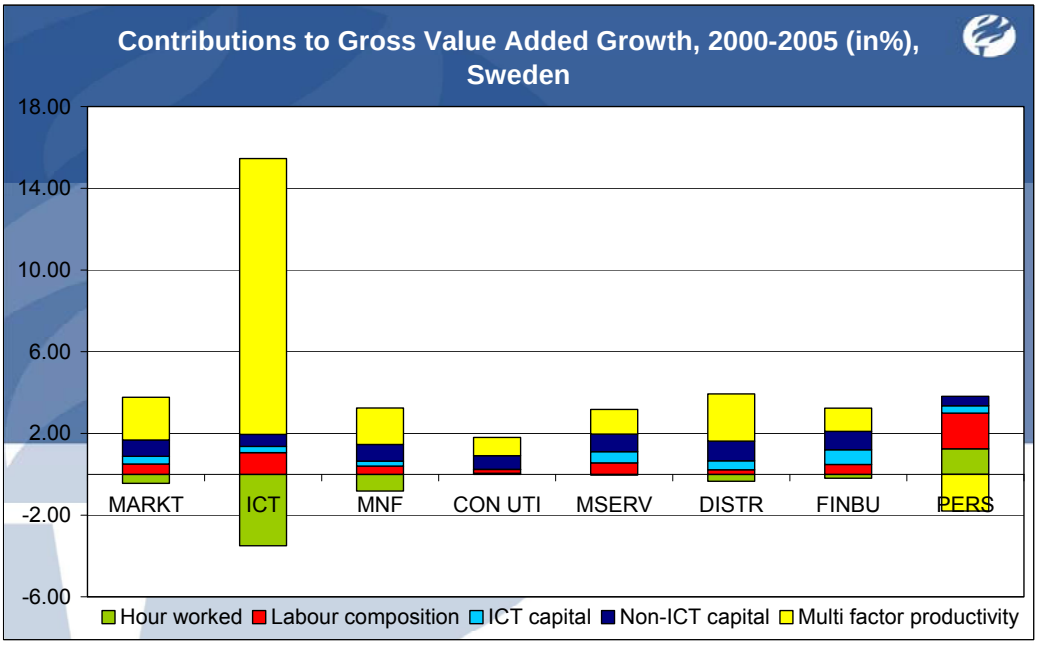




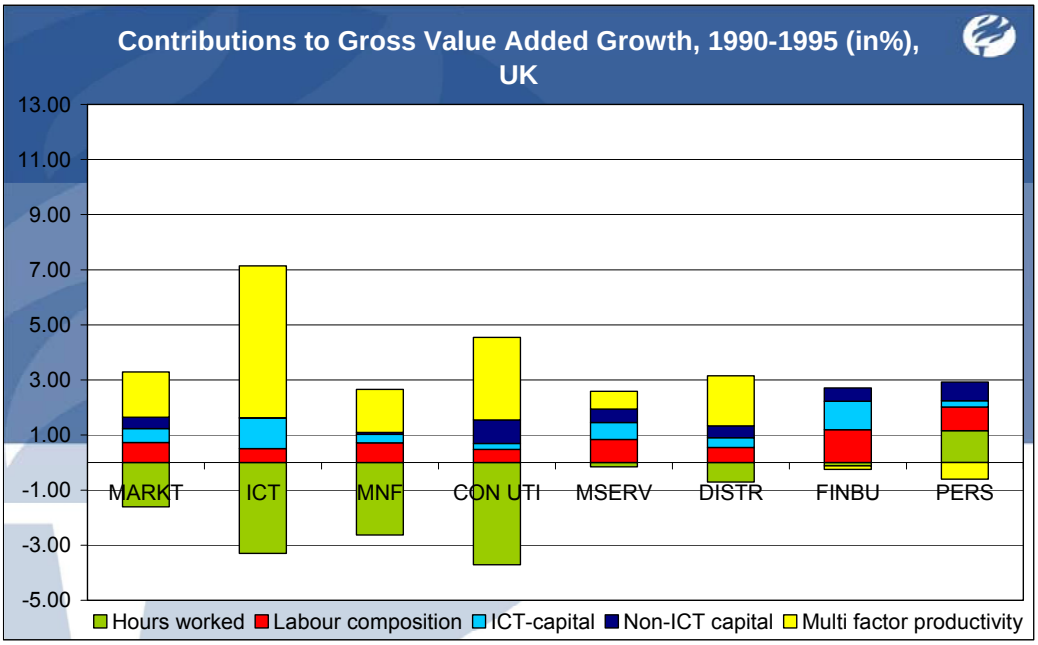
Figures C3.4a to C3.4c: Sweden

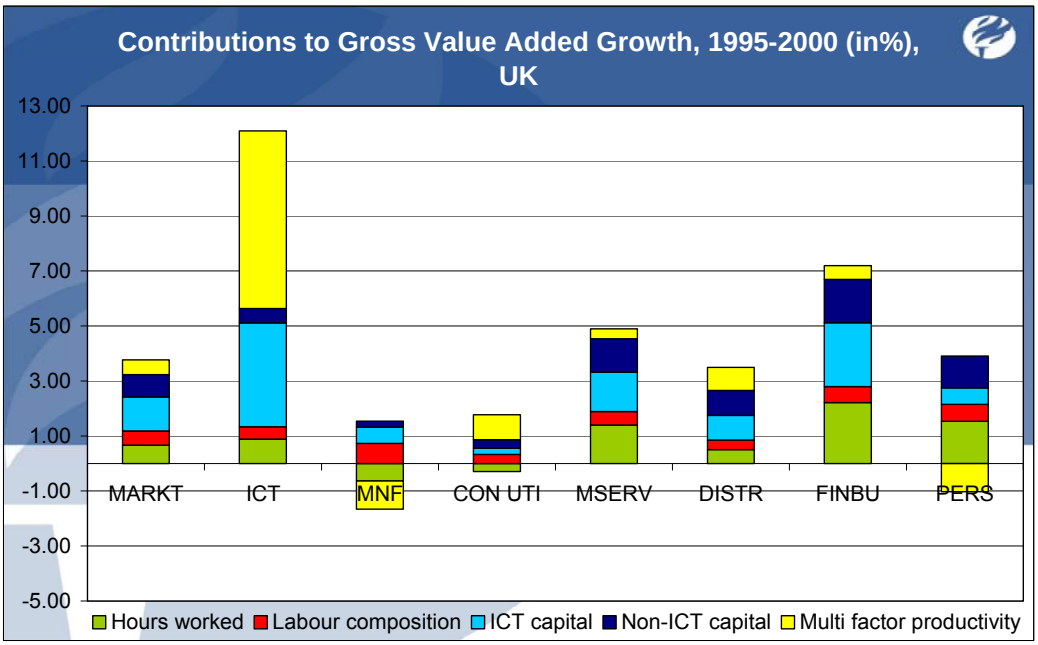


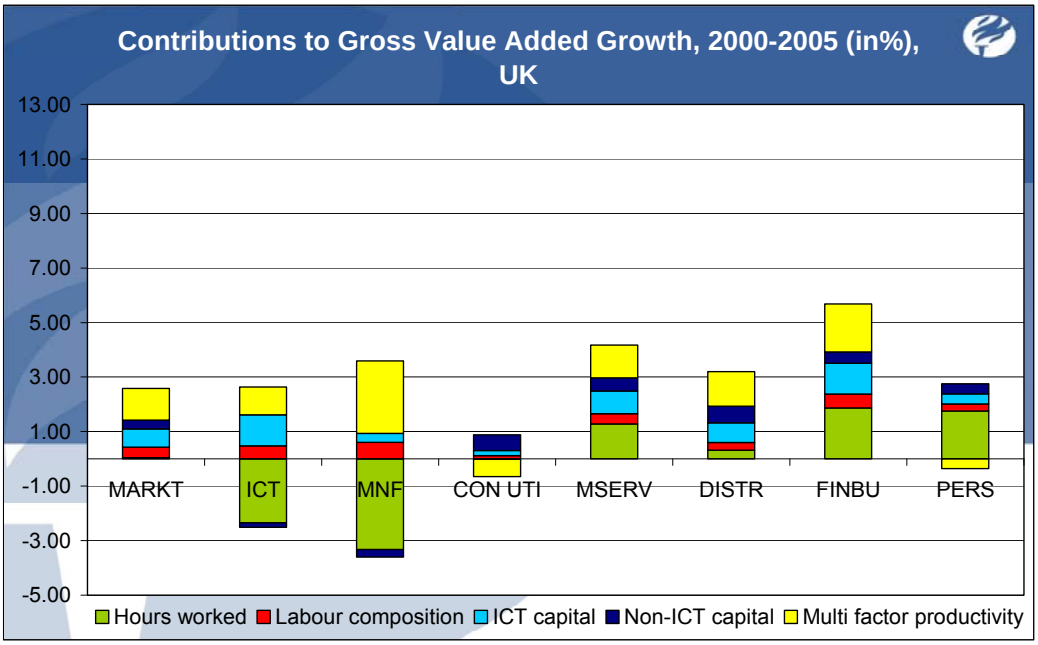

Contributions to Gross Value Added Growth, 1995-2000 (in%), Sweden
18.00
14.00
10.00
6.00
2.00
-2.00
-6.00
MARKT
ICT
MNF
CON UTI
MSERV
DISTR
FINBU
PERS
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity


Contributions to Gross Value Added Growth, 2000-2005 (in%), Sweden
18.00
14.00
10.00
6.00
2.00
-2.00
-6.00
MARKT
ICT
MNF
CON UTI
MSERV
DISTR
FINBU
PERS
Hour worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity

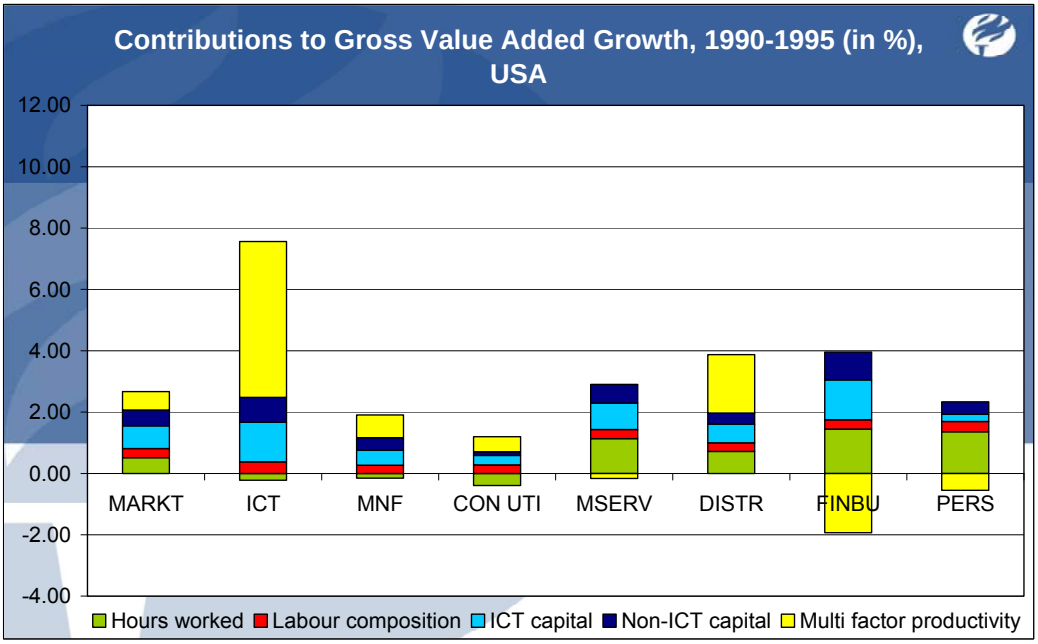
Figures C3.5a to C3.5c: United Kingdom

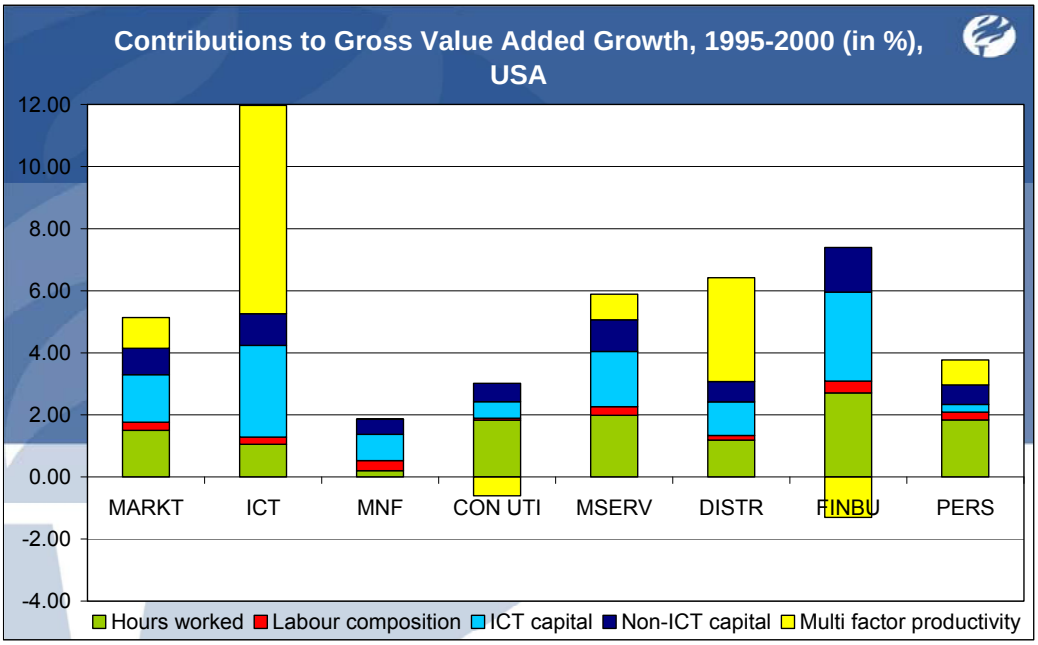


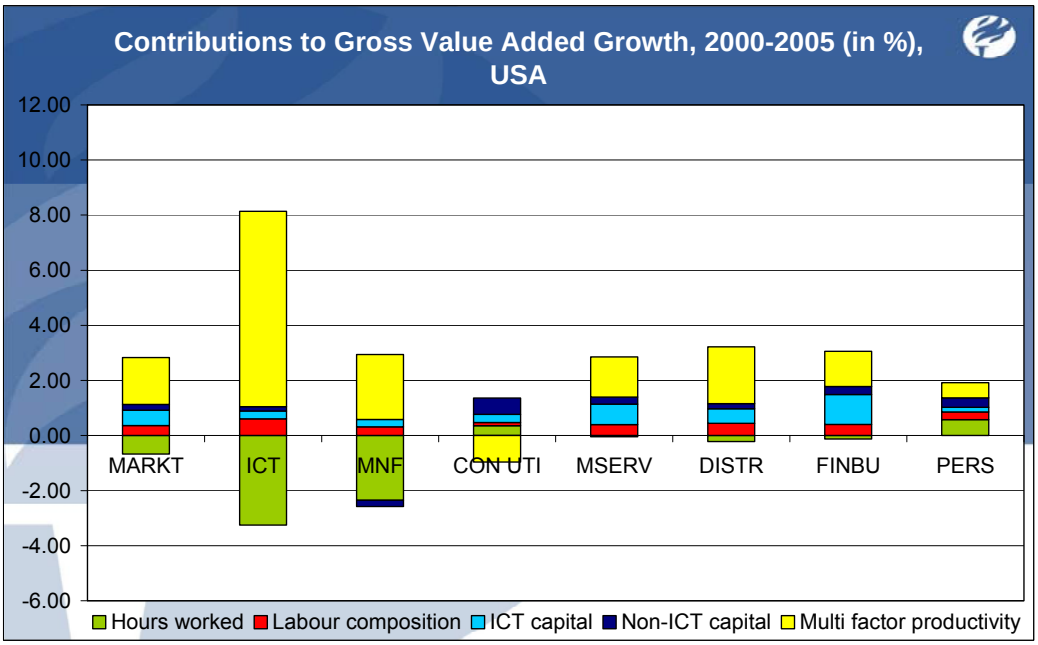




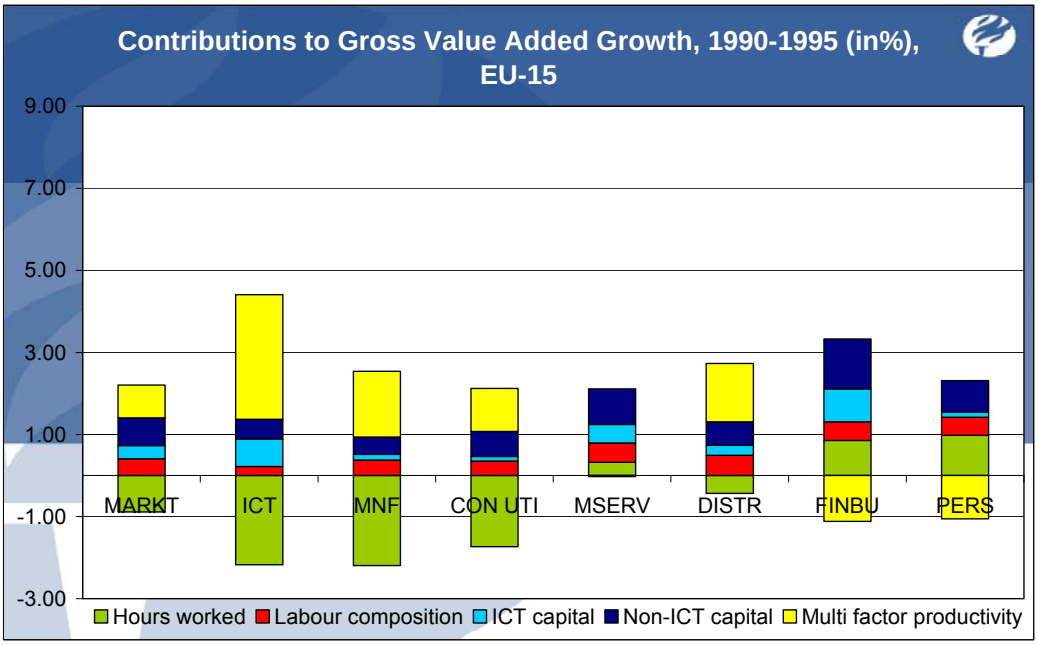
Figures C3.6a to C3.6c: United States

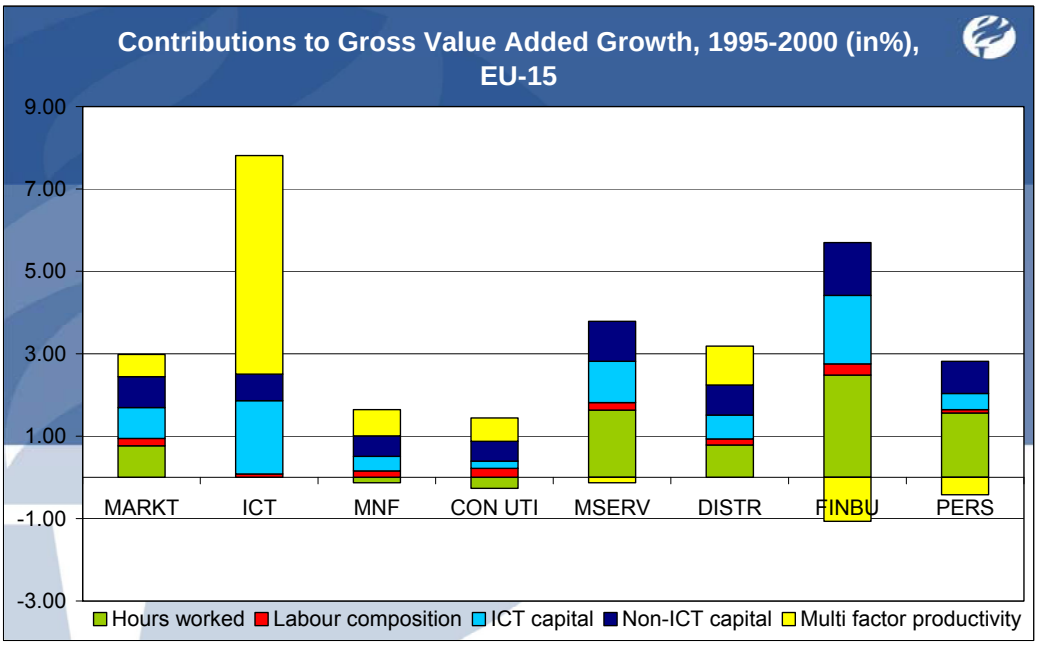


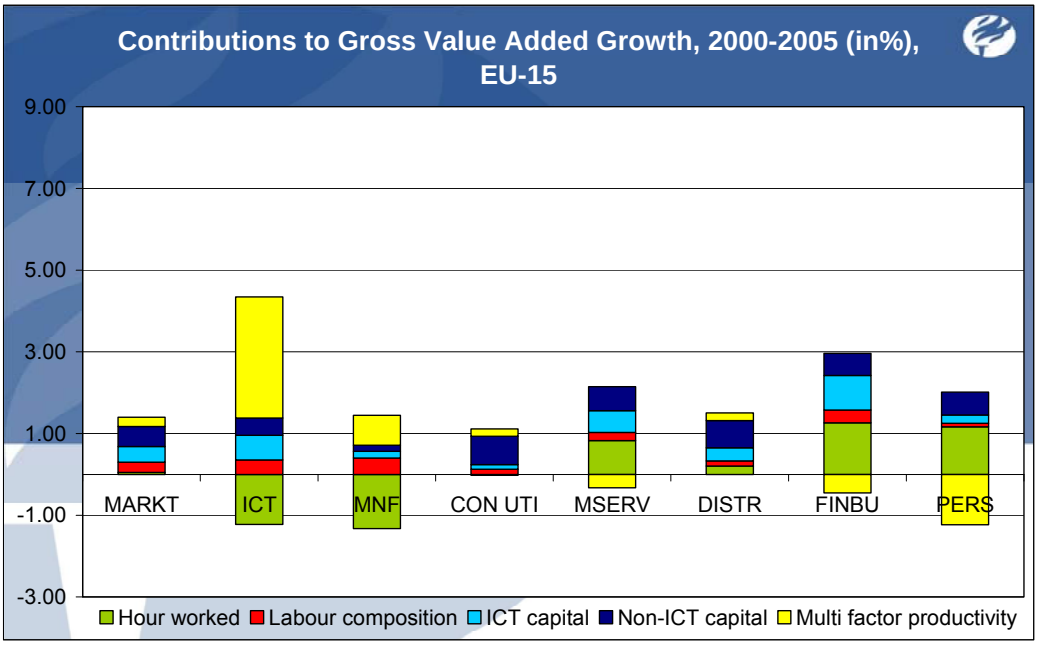

Contributions to Gross Value Added Growth, 1995-2000 (in %), USA
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
MARKT
ICT
MNF
CON UTI
MSERV
DISTR
FINBU
PERS
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity


Contributions to Gross Value Added Growth, 2000-2005 (in %), USA
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
MARKT
ICT
MNF
CON UTI
MSERV
DISTR
FINBU
PERS
Hours worked
Labour composition
ICT capital
Non-ICT capital
Multi factor productivity

Figures C3.7a to C3.7c: EU-15







Data source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics

Table C3.1: Industry Lists for Growth Accounting Variables

Description	Code
TOTAL INDUSTRIES	**TOT**
MARKET ECONOMY	**MARKT**
ELECTRICAL MACHINERY, POST AND COMMUNICATION SERVICES	**ICT**
Electrical and optical equipment	30t33
Post and telecommunications	64
GOODS PRODUCING, EXCLUDING ELECTRICAL MACHINERY	**GOODS**
TOTAL MANUFACTURING, EXCLUDING ELECTRICAL	**MNF**
Consumer manufacturing	Mcons
Food products, beverages, and tobacco	*15t16*
Textiles, textile products, leather and footwear	*17t19*
Manufacturing n.e.c.; recycling	*36t37*
Intermediate manufacturing	Minter
Wood and products of wood and cork	*20*
Pulp, paper, paper products, printing and publishing	*21t22*
Coke, refined petroleum products and nuclear fuel	*23*
Chemicals and chemical products	*24*
Rubber and plastics products	*25*
Other non-metallic mineral products	*26*
Basic metals and fabricated metal products	*27t28*
Investment goods, excluding high tech	Minves
Machinery, n.e.c.	*29*
Transport equipment	*34t35*
OTHER PRODUCTION	**CON UTI**
Mining and quarrying	C
Electricity, gas and water supply	E
Construction	F
Agriculture, hunting, forestry and fishing	AtB
MARKET SERVICES, EXCLUDING POST AND TELECOMMUNICATIONS	**MSERV**
DISTRIBUTION	**DISTR**
Trade	50t52
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel	*50*
Wholesale trade and commission trade, except of motor vehicles and motorcycles	*51*
Retail trade, except of motor vehicles and motorcycles; repair of household goods	*52*
Transport and storage	60t63
FINANCE AND BUSINESS, EXCEPT REAL ESTATE	**FINBU**
Financial intermediation	J
Renting of m&e and other business activities	71t74
PERSONAL SERVICES	**PERS**
Hotels and restaurants	H
Other community, social and personal services	O
Private households with employed persons	P
NON-MARKET SERVICES	**NONMAR**
Public admin, education and health	LtN
Public admin and defence; compulsory social security	*L*
Education	*M*
Health and social work	*N*
Real estate activities	70

Table C3.2: Industry Lists for Demand Decomposition of Output Growth

Hich tech manufacturing

Chemicals, chemical products and man-made fibres
Machinery and equipment n.e.c.
Office machinery and computers
Electrical machinery and apparatus n.e.c.
Radio, television and communication equipment and apparatus
Medical, precision and optical instruments, watches and clocks
Motor vehicles, trailers and semi-trailers
Other transport equipment

Low tech manufacturing

Food products and beverages
Tobacco products
Textiles
Wearing apparel; furs
Leather and leather products
Wood and products of wood and cork (except furniture); articles of straw and plaiting materials
Pulp, paper and paper products
Printed matter and recorded media
Coke, refined petroleum products and nuclear fuels
Rubber and plastic products
Other non-metallic mineral products
Basic metals
Fabricated metal products, except machinery and equipment
Furniture; other manufactured goods n.e.c.

Market Services

Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel
Wholesale trade and commission trade services, except of motor vehicles and motorcycles
Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods
Hotel and restaurant services
Land transport; transport via pipeline services
Water transport services
Air transport services
Supporting and auxiliary transport services; travel agency services
Post and telecommunication services
Financial intermediation services, except insurance and pension funding services
Insurance and pension funding services, except compulsory social security services
Services auxiliary to financial intermediation
Real estate services
Renting services of machinery and equipment without operator and of personal and household goods
Computer and related services
Research and development services
Other business services

Note Appendix Table C3.3 is available from The Conference Board on request.

Chapter 4—Distribution of Gains from Productivity

4.1 Introduction

Labour productivity, measured as the total amount of goods and services produced per hour worked, is the single most important determinant of a nation's standard of living. However, aggregate productivity estimates tell us little about who is actually benefiting from productivity growth. The distribution of the gains from productivity has an effect on the inequality of income and ultimately affects the demand potential of an economy.

The standard thinking on distributional issues is that one expects European economies, which are characterized by relatively rigid labour markets and a redistributive income structure, to converge towards a more egalitarian distribution of productivity gains. In contrast, the more flexible labour market in the United States—lower social transfers and a less progressive tax system, combined with a more entrepreneurial business culture—favours entrepreneurship, ownership of high-return capital and the highly skilled worker whose specific skills are in high demand. The U.S. model also promotes a significantly more lopsided income distribution than in Europe.

While the standard view is broadly confirmed by the analysis in this chapter, it is also clear that there are substantial differences among countries in the way the distribution mechanisms work. In fact, there is no straightforward positive or negative relationship between productivity growth and inequality, as different factors are affecting this relationship in different ways. While productivity growth often contributes to a decline in consumer prices, productivity gains also often overtake the rise in real wages bringing labour compensation shares in total income down.

This chapter begins with a discussion of a simple model showing various distribution mechanisms. It then focuses on how productivity gains are distributed between consumers (by way of lower prices) and producers (the owners of labour and capital)

in a competitive environment. Next, it looks at the distribution of the gains between labour and capital. The chapter ends with an examination of the effects of productivity growth on the income distribution of the population and offers evidence of a positive impact of greater equality on productivity because of high marginal returns to human capital.

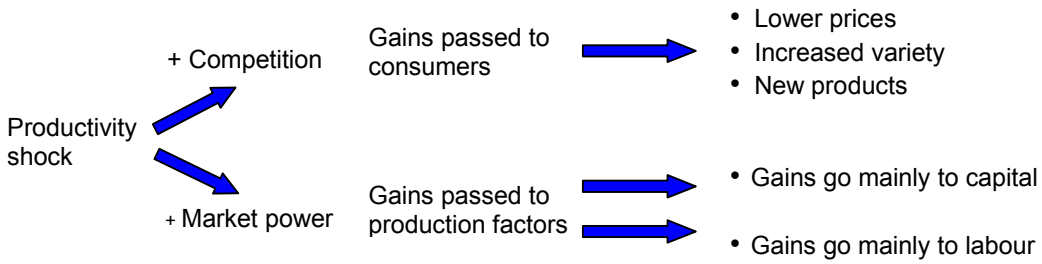
4.2 Productivity Gains and Their Distribution between Consumers and Producers

Competition determines the income distribution effect from productivity gains

Figure 4.1 illustrates how the effects of productivity growth are distributed among consumers and production factors (capital and labour) depending on the market structure. Under perfect competitiveness, any gains due to higher productivity are short-lived as competing firms will simultaneously improve their productivity and compete on price or quality, thereby transmitting the productivity gains to the consumers. The resulting decline in consumer prices usually provides a disproportional benefit to lower income individuals who spend a larger share of their income on consumption.

In an economy characterized by imperfect competition, the largest share of the productivity gains may go to the production factors, depending on the market structure of the sectors and the market power of the production factors. If capital owners have strong market power, they receive a higher share of the productivity gains. Since they are disproportionately present in the top-end decile of the income distribution, the effect would be an increase in income inequality. If, on the other hand, labour has a relatively higher bargaining power, the gains might be more evenly distributed.

Figure 4.1: The Distribution of Productivity Gains to Consumers, Labour and Capital.



Source: The Conference Board

Ample evidence that productivity leads to lower consumer prices...

There is a large body of literature that shows that productivity gains generally benefit consumers through lower prices. Dew-Becker and Gordon (2005) show that variations in productivity growth lead to at least one-on-one inverse changes in the inflation rate, until productivity growth stabilizes. For example, in the United States during 1995-2005, the increase in productivity growth decreased the inflation rate by 1.2 percent. Nordhaus (2004) analyzes the appropriability of innovations in the American economy over the last 50 years, finding that most of the productivity gains are passed on to the consumers through lower prices, and claiming that innovators capture just around 2 percent of the total social gains from their innovations.[40]

… not just in the United States, but elsewhere

In Canada almost half of the productivity gains in the manufacturing sector between 1965 and 1980 were redistributed to other sectors of the economy through lower prices.[41] The Bureau of Industry Economics in Australia reported similar results for the period 1954-55 to 1981-82, and a more recent report found that 30 percent of productivity gains were transmitted as lower prices from 1970 to 1988, the majority of the gains going to labour (over 60 percent) and just 8 percent going to capital.

[40] Nordhaus (2004) only considers innovations that lead to Schumpeterian profits, where profits exceed the risk-adjusted return to innovative investments.
[41] Fluet and Lefebvre (1987)

Deregulation of product markets usually results in productivity increases and lower prices. Productivity in the United States increased after deregulation in airlines, trucking, railroad, banking and natural gas industries, without significant changes in profitability and with lower real average prices (between 30 and 75 percent) passed to consumers.[42] In 1997 the Industry Commission of Australia also found that reforms had increased competition in the economy and shifted the distribution of productivity gains towards lower prices. Industries with the highest productivity growth increased their wages in line with the rest of the economy, but transmitted the remainder productivity gains to the consumer by decreasing their relative prices.[43]

In a competitive environment, the consumer benefits from productivity growth

In a competitive industry, the productivity gains may go to the consumer through lower prices. Firms may also choose to substitute lower prices for improvements in the quality of their products or to add new useful product features, thereby offering a higher variety of products to consumers and increasing consumers' utility. The increase in productivity for an industry producing intermediate goods may result in lower output prices for these goods, which provides cheaper inputs into the final production of a consumer product. An example would be any portable media player. The increase in productivity of flash memory and micro hard-drive production significantly decreases the price of the components and allows for the creation of an affordable product.

Under imperfect competition, the bargaining power of capital and labour is crucial

In an industry with imperfect competition, the market structure will allow firms to retain part of the productivity gains, and transmit only residual gains to the consumers. Firms with high market power may keep a larger share of productivity gains. The way the productivity gains are then divided between capital and labour depends on the bargaining power of each production factor. For example, unions will often react to a profit increase, which may be the results of productivity, to bargain for significant wage increases. The distribution of productivity gains between labour and capital is discussed in more detail below.

[42] See Winston (1998). Measuring the effects of deregulation from just looking at price is clearly incomplete. For example, deregulation in the financial sector may also increase the risk in the sector or decrease the quality of the service.
[43] Parham et al. (2000).

4.3 Productivity and Returns on Production Factors

United States shows greater productivity benefits to capital and Europe to labour

The channels of distribution of productivity gains differ between countries. One useful test measures how sectoral productivity gains translate into higher wages and lower output prices. Table 4.1 shows the correlation coefficients between the growth in labour productivity, on the one hand, and the growth of output prices and wages, on the other hand, using industry-level data for the period 1970-2005.

Table 4.1. Correlation Coefficients between Labour Productivity Growth and Growth in Wages and Prices for the Total Market

	France	Germany	Netherlands	Sweden	United Kingdom	United States
Change in industry-level prices	-0.55	-0.26	-0.18	-0.25	-0.10	-0.62
Nominal labour compensation growth	0.11	0.21	0.42	0.20	0.44	0.01

Source: EU KLEMS database, March 2008 (www.conference-board.org/economics).

The relatively high negative correlation between productivity growth and prices suggests that a good deal of productivity growth has held down the growth of output price. In the United States and France, productivity gains are most strongly transmitted into lower output prices. This strong correlation could be consistent with greater competitive pressure in the product markets impacting on lower prices. The other European countries all show weaker relationships between productivity and price declines. Particularly in the Netherlands, the productivity gains led to lower prices in fewer cases, but even there the more productive industries had, on average, larger price decreases than the less productive ones.

The relationship between productivity and nominal wage growth is positive for all five European countries in this report's sample, but virtually zero in the United

States.[44] The relationship is strongest for the United Kingdom and the Netherlands, which implies that increases in labour productivity growth are strongly related to wage increases in the respective industries. The relatively rigid labour markets and coordinated wage bargaining may explain lower correlations for France, Germany and Sweden. On the other hand, the lack of correlation between productivity growth and wage growth in the United States may also indicate that productivity gains tend to benefit the owners of capital more than labour.

A sectoral analysis later in this chapter points at the wide distribution in wage gains from productivity.

Germany has experienced the largest decline in labour income share

The distribution of productivity gains to labour and capital can be further examined by looking at labour income share (LIS), which represents the proportion of labour compensation in total national income. Between Europe and the United States, there have been roughly two major groups of economies with distinctly different patterns in changes in labour income shares. During the 1980s and 1990s, continental European countries, such as France, Germany, Italy and Spain, were often characterized by rapid declines in labour income shares as the economies turned increasingly capital intensive (see also chapter 3).[45] In contrast, Anglo-Saxon countries like the United States, Canada and the United Kingdom are assumed to have shown more stable labour income shares (Blanchard, 1997).

In general, but in particular since 2000, the assumed distinction between the continental European and Anglo-Saxon economies appears less robust. Figure 4.2 shows that labour income shares have been volatile in most countries.[46] But labour income shares have been on a continuous downward trend in Germany and the United

[44] The correlation is based on nominal instead of real wages, as the correlation between productivity and prices is addressed separately. Moreover, wage negotiations mostly focus on nominal wages, taking into account an inflation correction.

[45] In this chapter we use the compensation of employees (variable COMP from EU-KLEMS) to compute labour income share. The use of different definitions of compensation of labour (by incorporating for example, the labour share of self-employed) does not significantly change the variation of labour income share.

[46] The Netherlands shows a rather low income share which may be due to the dominance of capital intensive firms and large multinationals.

States Since 2000, labour income shares have been coming down in all countries, with the exception of France.

Table 4.2 shows the average rate of growth of labour income shares for five European countries and the United States from 1970 to 2005 for the market economy. While there is no clear distinction between the Anglo-Saxon and continental models throughout the period, all countries – except France – have experienced a decline in labour income shares since 2000. In fact, Germany experienced the largest decrease in labour income share, ahead of the United States. The Netherlands, Sweden and, especially, the United Kingdom, experienced more moderate declines in their income labour shares.

Table 4.2. Labour Income Share for the Market Economy (Average Growth Rate) for Selected Periods during 1970-2005

	France	Germany	Netherlands	Sweden	United Kingdom	United States
1970-1985	0.30	0.47	-0.56	-0.74	-0.62	-0.25
1985-1995	-0.22	-0.01	0.48	-0.69	-0.06	-0.13
1995-2005	0.44	-0.69	-0.16	0.45	0.68	-0.11
2000-2005	0.86	-1.20	-0.70	-0.44	-0.12	-0.93

Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics).

Germany also shows largest decline in real wages relative to productivity growth

Expressing the change in the labour income share as the ratio between the changes in real product wage and labour productivity allows for a further interpretation of the labour income share. Table 4.3 shows that France and Germany had higher growth rates for real wages than for labour productivity during the 1973-1995 period. But between 1995 and 2000, the growth of labour productivity in Germany was higher than the growth of real product wage (1.87 percent versus 1.69 percent), and in between 2000 and 2005, the change in real product wage had even stalled. Consequently, the labour income share in Germany was decreasing during the period 1995-2000 by a negative growth rate of -0.17 percent, followed by an even faster decrease in the period 2000-2005 of -1.20 percent.

In contrast to France and Germany, Sweden—the only Nordic economy in this report's sample group—showed a higher growth in labour productivity than in real product wages for the 1970-1995 period, leading to a decline in the labour income share of −0.78 percent per year. During the period 1995-2000, the growth of real product wages was higher than the growth of labour productivity, but this reversed again after 2000. Hence the labour income share was decreasing (at −0.44 percent per year) since 2000.

Almost all countries align after 2000 through declining labour income shares

Like Sweden, the Anglo-Saxon countries also started with slightly higher labour productivity growth than real product wage growth between 1970 and 1995, leading to a relatively constant labour income share. For both the United Kingdom and the United States, the increase in demand for labour in the period 1995-2000 led to a spike in real product wage and an increase in labour income share. But after 2000, the growth of real product wage was lower than the growth of labour productivity, in line with all other countries except France.

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BOX

Decomposition of labour income share

As the labour income share (LIS) is the ratio of labour compensation to total income, it may also be expressed as the ratio of real wage and labour productivity. To be precise, we start with the following relation:

$LIS = \frac{W \times L}{P \times Y}$, where W is the average wage, L is the labour, P is the production price index and Y is the output.

By introducing total hours worked (H), we obtain $LIS = \frac{\frac{W \times L}{P \times H}}{\frac{Y}{H}} = \frac{RPW}{LP}$, with the numerator being the real product wage (RPW) and the denominator being labour productivity (LP).

The growth of labour income share is Gr LIS = $\frac{\dot{LIS}}{LIS}$.

As $LIS = \frac{RPW}{LP}$, then $\dot{LIS} = \frac{\dot{RPW} \times LP - RPW \times \dot{LP}}{LP^2} = \frac{\dot{RPW}}{LP} - \frac{RPW}{LP} \times \frac{\dot{LP}}{LP}$

and therefore $\frac{\dot{LIS}}{LIS} = \frac{\dot{RPW}}{RPW} - \frac{\dot{LP}}{LP}$.

This is exactly the relationship looked for: growth LIS= growth RPW – growth LP.

END OF BOX

For the Netherlands, the productivity gains before 1995 mask a spike in unemployment (more than 14 percent in 1984, the largest unemployment rate among all six countries after 1970). The growth of labour productivity was relatively constant (between 2.1 and 2.25 percent). The growth of real product wage went up to almost 2.5 percent in 1995-2000, leading to a temporary increase in labour income share.

Table 4.3: Accounting for Annual Average Growth in Market Sector Labour Income Share, Real Product Wage, Labour Productivity, Hours Worked, and Employment for Various Periods.

Country		1973-1995	1995-2000	2000-2005
France	Labour Income Share	0.09	0.03	0.86
	Real Product Wage	3.15	2.57	2.43
	Labour Productivity	3.05	2.55	1.57
	Hours Worked	-1.10	0.71	0.02
	Employment	-0.37	1.54	0.59
Germany	Labour Income Share	0.04	-0.17	-1.20
	Real Product Wage	2.72	1.69	0.01
	Labour Productivity	2.68	1.87	1.21
	Hours Worked	-0.78	-0.15	-1.01
	Employment	0.11	0.68	-0.41
Netherlands	Labour Income Share	-0.27	0.37	-0.70
	Real Product Wage	1.97	2.46	1.46
	Labour Productivity	2.24	2.09	2.16
	Hours Worked	0.21	2.52	-1.06
	Employment	1.07	2.68	-0.47
Sweden	Labour Income Share	-0.78	1.33	-0.44
	Real Product Wage	1.25	4.57	3.51
	Labour Productivity	2.03	3.25	3.95
	Hours Worked	-0.11	1.20	-0.62
	Employment	-0.35	1.28	-0.13
UK	Labour Income Share	-0.28	1.48	-0.12
	Real Product Wage	1.82	4.25	2.28
	Labour Productivity	2.11	2.77	2.40
	Hours Worked	-0.47	1.00	0.17
	Employment	-0.30	1.56	0.42
US	Labour Income Share	-0.13	0.71	-0.93
	Real Product Wage	1.29	3.52	2.25
	Labour Productivity	1.43	2.82	3.18
	Hours Worked	1.33	2.25	-0.85
	Employment	1.62	2.20	-0.39

Data Source: Authors computations based on EU-KLEMS data.

Institutional factors in labour markets contributed to changes in labour income shares

The changes in real product wage, labour productivity and the corresponding labour income share reflect significant changes in capital intensity, technological developments and labour market institutions in the countries under consideration.

For continental European countries, the rise in the labour income share during the 1970s reflected the gradual slowdown in productivity growth compared with the pre-1973 period. Increased shortages of labour during the 1960s led to faster wage increases and stronger bargaining power of labour.[47] The oil shocks in the years 1973 and 1979 and a less favourable international economic climate affected European businesses, leading to a decrease in profits. New labour regulations offered relatively higher levels of protection to labour, thereby increasing the labour income share. Most continental European countries reached a peak in labour income share around the early 1980s.

During the 1980s, the labour income share declined in all countries. The decline may be seen as a delayed response of businesses to the increase in real wages by substituting capital for labour. As firms were unable to react to changes in labour regulations in the short run, they began to use increasingly capital-intensive technologies, leading to higher unemployment and lower labour income shares.[48] For the United Kingdom, changes in labour regulations aimed at decreasing the power of unions, together with privatization of important industries at the end of 1970s and into the 1980s, contributed significantly to the low labour income share.

Of course, there are many factors beyond institutional changes that affect labour income shares, including supply shocks (such as the oil crises), endowments of capital and labour, and the nature of technological change.[49] For example, before 1985 technological change was generally seen as labour augmenting, whereas it became more capital augmenting after 1985, and skill augmenting since the mid-1990s.[50]

[47] Eichengreen (2007).
[48] Caballero and Hammour (1997) and Berthold et al. (2002) discuss the different elasticities of substitution between capital and labour in the short and long run.
[49] Blanchard (1997) and Checchi and Garcia-Penalosa (2005).
[50] Guscina (2006)

Nevertheless, institutional factors, such as union density, minimum wage and unemployment benefits, have all mattered in addition to the other explanations.

The increased role of services lowered labour income shares until mid 1990s…

Differences in labour income shares across countries can also be determined in part by the sectoral distribution of production. For example, Germany and France have relatively large manufacturing sectors, while in the United Kingdom the services sector has grown more rapidly. If "correcting" the labour shares by keeping the weight of the sectors in the economy constant between 1970 and 1998, one finds a milder downward trend in the labour share for most countries, due to the relatively lower wage shares and wage growth in many services industries. For Germany there was even a reversal of the trend for the mid 1980s, if the increase share of services is not taken into account.[51]

… but manufacturing is increasingly responsible for lower labour income shares...

Over the past decade, the trend towards the lowering aggregate labour income share (LIS) has seemed more due to manufacturing than to service sector activity. Table 4.4 shows the average rate of growth of LIS and the main employment sectors of the economy from 1995 to 2005. The table shows that the highest variations in LIS were in the ICT sector (electrical machinery and post and telecommunication services), ranging from -1.75 percent for the Netherlands to 0.58 for the United Kingdom. The negative development of the LIS for all four continental European countries was due to a rapid increase in labour productivity even beyond the rapid growth in real product wages, which was faster than elsewhere in the economy. Only in the United Kingdom did real wages grow even faster than labour productivity in this sector. However, employment growth in this sector fell in all six countries. Hence, in general, high-tech is not leading to a more equal distribution of income, as it benefits high-income categories more through larger capital shares.

Manufacturing (excluding the ICT sector) has experienced negative growth rates of the labour income share, except for Sweden and the United Kingdom. The sector has experienced a relatively rapid increase in labour productivity, together with slower

[51] De Serres et al. (2002).

growth in real product wages to maintain competitiveness. The decrease in employment in all countries shows that the manufacturing industries experience strong competitive pressure, competing with imports and maintaining or expanding market share in the global markets. However, in general, labour income shares in manufacturing (excluding ICT) have not declined as rapidly as in the ICT sector, except for the United States.

… while market services experience faster wage growth than productivity

In most countries, the aggregate market services sector showed a slight increase in LIS, representing a somewhat faster increase than in productivity. But in Germany (and Sweden) the LIS even declined in market services, probably related to low real product wage increases. The finance and business services sectors accounted for the largest positive impact on labour income shares. Rapid increases in real product wages were insufficiently offset by faster productivity growth. Services may contribute significantly to future increases in the labour income shares, as employment growth has been relatively rapid in this industry, unless productivity grows beyond wage growth in the sector.

In sum, an important consequence of productivity growth is the slower growth or even decline in prices, which in a competitive environment will be passed on as a benefit to the consumer. However, in the case of any market power among owners of labour or capital, the latter will benefit as well. While there has been much variation over the years and between countries, the overall trend in labour income shares has been downward over the past decades, and especially since 2000, particularly in Germany. There is evidence that goods-producing rather than service activities are increasingly contributing to the decline in labour income share. Hence services may not only contribute to economic growth but also to a broader distribution of productivity gains.

Table 4.4: Average Rate Of Growth of Labour Income Share (LIS) and Employment for the Main Sectors of the Economy, 1995-2005.

	Average rate of growth of ...	Market Economy	ICT Sector	Manufacturing	Market Services	Finance and Business*	Non-Market Services
France	... LIS	0.44	-1.03	-0.21	0.61	0.38	-0.44
	... Employment	1.06	-0.20	-1.06	2.17	2.81	0.86
Germany	... LIS	-0.69	-1.70	-0.96	-0.11	0.96	-0.52
	... Employment	0.14	-1.58	-1.15	1.78	3.71	0.95
Netherlands	... LIS	-0.16	-1.75	-0.65	0.01	0.32	0.11
	... Employment	1.10	-0.20	-0.99	1.79	2.99	2.30
Sweden	... LIS	0.45	-0.61	0.90	-0.21	0.48	0.34
	... Employment	0.58	-1.31	-0.74	1.58	3.76	0.41
UK	... LIS	0.68	0.58	1.17	0.65	0.81	0.70
	... Employment	0.99	-0.67	-2.53	2.02	2.93	1.73
US	... LIS	-0.11	-0.71	-1.65	0.28	1.05	0.19
	... Employment	0.91	-1.15	-2.01	1.51	2.37	1.56

Note: *except real estate

Data Source. EU KLEMS database, March 2008 (www.conference-board.org/economics).

4.4 Income Distribution

Decreasing labour income shares generally have a negative impact on the personal income distribution.

The declines in labour income shares over time, discussed above, are therefore an indication of changes in income distribution against the middle spectrum of the income distribution range, which depends mainly on labour income.[52] In contrast, an increase in capital income share benefits mainly the top decile of the income distribution.[53]

[52] See, for example, Atkinson (2003) and Checchi and Garcia-Penalosa (2005).

[53] The capital income share is related to the returns to the capital factor of production. In practice it is measured as the residual by deducting labour income from the national income. However, its

Personal income distribution relatively equal in continental European countries...

Figure 4.2 presents a cross-country view of the Gini coefficients in the context of high and medium income countries in the year 2000. The countries can be grouped into Nordic countries with less unequal income distribution (Sweden has a coefficient of 0.242), closely followed by continental Europe (Germany has a Gini coefficient of 0.275 and France has a coefficient of 0.278) and Anglo-Saxon countries with more unequal income distribution (the United Kingdom has a Gini coefficient of 0.343 and the United States has a coefficient of 0.370). The Netherlands has a Gini coefficient of only 0.252, comparable to Sweden. The United States not only has the most unequal income distribution in this selection of countries, but with the exception of Mexico and Russia, the highest among all countries considered.

The inequality measures presented in Figure 4.2 are based on disposable income. It is useful to distinguish between market income and disposable income, as the difference highlights the importance of the redistributive system in reducing inequality. The market income covers wages and compensation received by individuals. As the disposable income adds the social transfers and deducts the income tax, it is expected to benefit especially those in the lower half of the income distribution, and promote a more equal income distribution.[54] The high level of redistribution and the specific structure of the tax system and, to a lesser extent, the social transfers, may significantly influence the distribution of the productivity gains in the society.

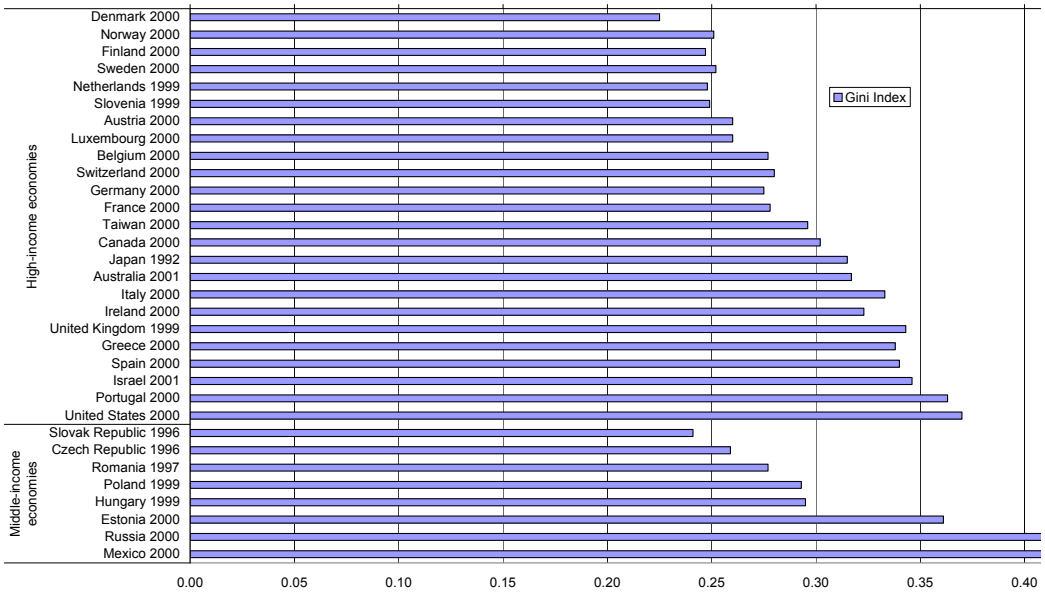
Figure 4.3 compares the distribution of market and disposable incomes, showing the effects of social transfers and income tax for 16 countries, based on the Luxembourg Income Study. While Germany and the United States show similar Gini coefficients for market income (0.48), the high social transfers and income taxes lead to a much lower Gini coefficient of only 0.28 for disposable income for Germany, as opposed to a Gini coefficient of 0.38 in the United States. While Sweden has a much more unequal market income distribution than the Netherlands (with a Gini coefficient as high as 0.46 for Sweden versus 0.38 for the Netherlands) the higher income

components – return on investment capital and profits – cannot be distinguished unless one makes significant additional assumptions.

[54] Bach, Corneo and Steiner (2007) found that a significant share of adult population in Germany does not have market income.

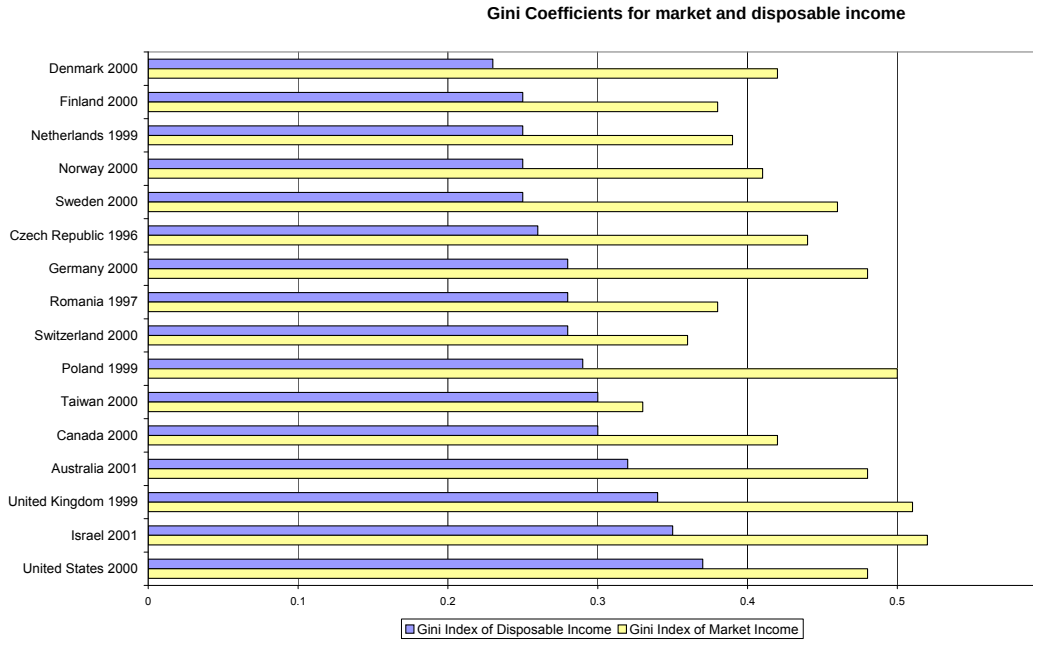
redistribution effects lead to almost identical Gini coefficients for disposable income of 0.25.

Figure 4.2: The Distribution of Disposable Income in High and Middle Income Countries.



Source: Smeeding and Bandolini (2007).

Figure 4.3: Gini Coefficients for Market and Disposable Income.



Source: Smeeding and Brandolini (2007), based on Luxembourg Income Studies data.

… and declining labour income shares does not translate in greater inequality

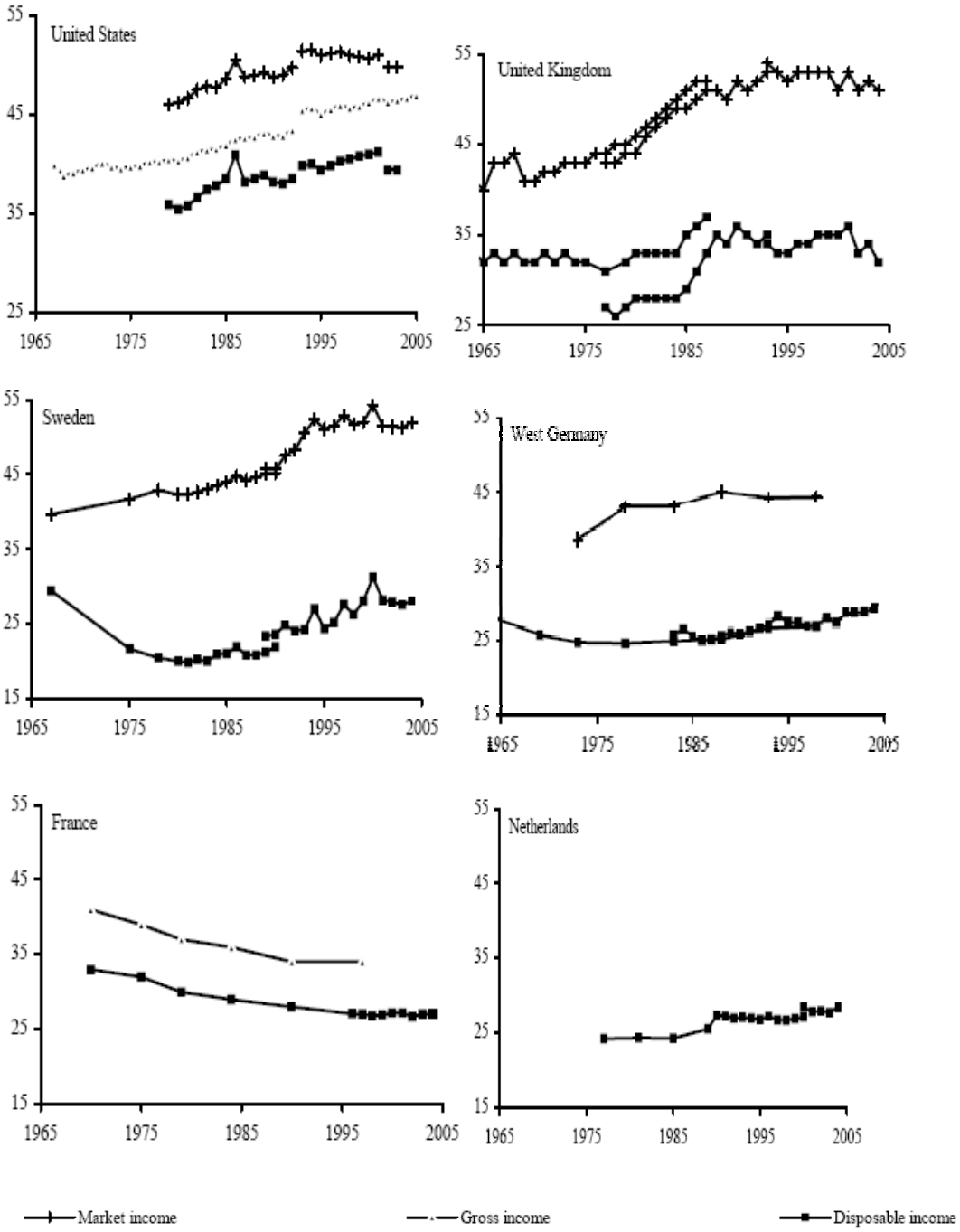
The change in the inequality of income distribution over time, as measured by Gini coefficient, for the six considered economies can be seen in Figure 4.4. Depending on data availability, the inequality measures are based on market, disposable, or gross income (the latter being the before-tax income with social transfers added to the market income).

The three continental European countries do not show large variations in inequality. Germany had a relatively constant Gini coefficient based on market income throughout the 1990s, with a slight increase in the inequality in terms of disposable income in recent years. France's Gini coefficient, based on both gross and disposable income, showed only a weak decrease in inequality, which became stable in recent years[55]. For the Netherlands, the Gini is based on the disposable income. The data exhibit a more or less stable Gini coefficient in the 1990s. Hence, in practice the declines in labour income shares described above do not seem to have affected the personal income distribution much.

The other three countries present larger changes in income inequality, partially explained by important changes in the tax and social transfer system in the 1980s and 1990s. The most dramatic changes took place in the United Kingdom from1985 to 1990, when the increase in market income inequality was further exacerbated by reforms of the income tax system, unemployment benefits, and social assistance, which led to a surge in disposable income inequality (Atkinson, 2003). The 1990s was a period of relatively stable income inequality in the United Kingdom. In Sweden, the modification of the income tax system in 1991 and changes in capital gains taxation introduced greater inequality for both market and disposable income (Eriksson and Pettersson, 2000). For the United States, the long period of stable and relatively low income inequality ended in the 1970s, and was followed by a continuous increase in inequality for market, gross and disposable income during the 1980s and 1990s.

[55] The French results are based on tax data which may mask inequality at the lower end of the distribution (Smeeding and Brandolini, 2007).

Figure 4.4: Evolution of Gini coefficients over Time, 1965-2005.

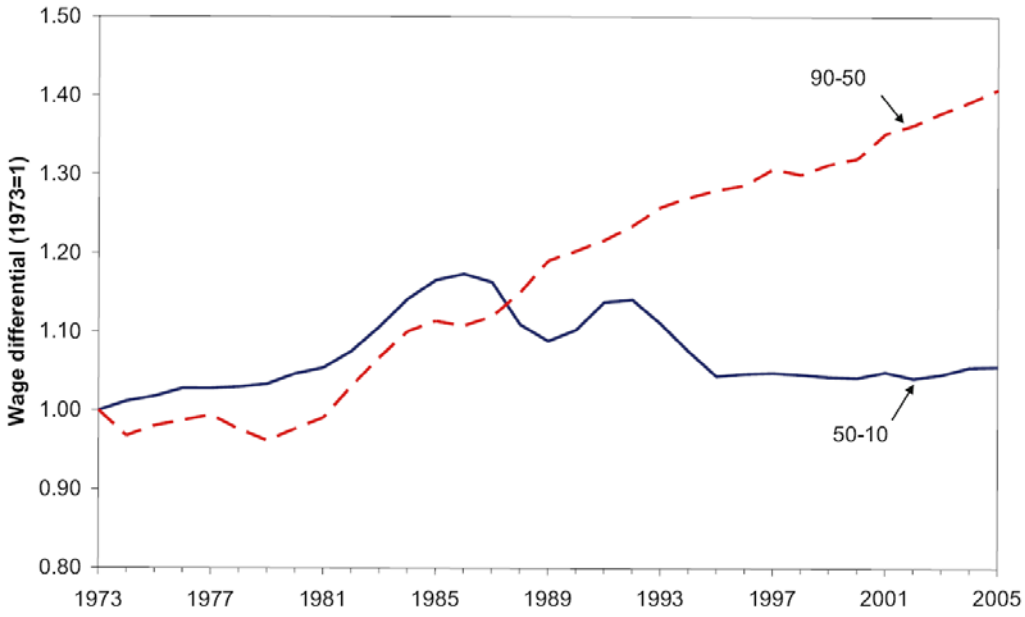


Source: Smeeding and Brandolini (2007), based on Luxembourg Income Study data.

Nature of U.S. income inequality changed from general to high-end inequality

Despite the overall increase in income inequality in the United States, the nature of the larger income disparity differed significantly between the two decades. The 1980s were characterized by greater wage inequality all over the wage distribution. But during the 1990s, inequality was increasingly concentrated at the top end of the wage distribution while inequality at the low end of the distribution even declined, at least for men. Even though within-group inequality grew substantially among college-educated workers, it changed little for most other groups. Other studies also find that high-end inequality (i.e., the difference between the 90th and 50th percentile of the distribution of residuals) increased substantially while inequality at the low end (between the 50th and the 10th percentile) actually decreased (Figure 4.5). [56]

Figure 4.5: Low-End Versus Top-End Wage Inequality in the United States (Men)



Source: Lemieux (2008).

There are several explanations for the overall increase in wage inequality. Among them, the increase in the demand for highly skilled workers due to the computer revolution and the skill-biased nature of technological change emerged as the most important. However, this does not explain the concentration of inequality at the higher

[56] Piketty and Saez (2003), Lemieux (2008).

end of the income distribution during the 1990s. One may therefore distinguish between three skill categories. While there has been an increase in demand for jobs characterized by creative skills ("abstract jobs"), there has been a fall in demand for clerical and routine analytical skills ("routine jobs") and a stable or even increasing demand for non-routine manual tasks ("manual jobs"). Computers have been seen as complements to abstract jobs, as substitutes for routine jobs and as not interfering with manual jobs.[57] Therefore, computerization has led to an increase in the demand for high-skilled workers and a reduction in the demand for medium-skilled workers.[58] As the routine jobs are also relatively easy to offshore, this will further depress the demand for the last category of workers.

Smaller role for unions and increase in capital income

The increased inequality at the higher end of the income range during the 1990s may have also been due to labour market institutions and the relative increase in the capital income share in the United States. Wage-setting institutions (such as the smaller role for trade unions) led to the removal of some barriers to higher wages in the United States and the United Kingdom, but this was less so in countries like France or Germany, where their importance remained significant[59]. Correspondingly, Piketty and Saez (2003) and Dew-Becker and Gordon (2005) argue that changes in pay-setting institutions and in social norms allowed executives in several countries to influence the pay-setting mechanism. This was further strengthened by the extraordinary increase in capital income that emerged since the late 1990s.

Greater income inequality may also negatively affect growth

While the effects of productivity growth often flow to the consumer and, depending on the institutional characteristics of the labour and the nature of technological change, to the workers, there may also be important feedback effects. Many scholars have argued that there exists a trade-off between equity and efficiency.[60] However, it may also be argued that greater inequality slows long-run economic growth. Inequality may incite socio-political instability, and the associated costs may tax economic growth. This may decrease incentives to save and invest, and lead to lower

[57] See Autor et al, (2006).
[58] The eventual increase in demand for "manual jobs" resulting from the growth of the economy.
[59] Piketty and Saez (2006).
[60] For example, Okun (1975).

capital accumulation and lower productivity. Low-income earners will not be able to invest in the right amount of education for them and their children, resulting in lower human capital and lower productivity. Even though there are major measurement and specification issues, various cross-country studies in the early nineties provided empirical evidence of the negative effect of inequality in economic growth.[61]

In addition, inequality can become particularly negative for growth when capital markets are highly imperfect and the production technology exhibits diminishing returns to capital.[62] Income inequality affects primarily investments in human capital, which are characterized by strong diminishing returns. Since borrowing for such intangible investments is usually expensive, personal wealth and income become significant determinants of the size of the investment. Redistribution from the rich to the less-endowed with human (or physical) capital may create investment opportunities and can therefore be growth-enhancing.

When human capital becomes key driver of growth, greater equality favours growth

The impact of income inequality on development may also depend on the role of physical versus human capital accumulation as a prime engine of economic growth.[63] In early stages of development, when physical capital accumulation is often the main driver of economic growth, inequality may direct resources to individuals whose marginal propensity to save is higher. In contrast, in more advanced stages of development, human capital becomes the prime engine of growth, and the return to human capital increases due to capital-skill complementarity. Provided capital markets are imperfect, investment in human capital promotes economic growth and equality.

While there may be a role for redistributive policies in these conditions, the crucial issue then becomes how to redistribute income so that it favours growth. Transfers or subsidies to borrowers are an important policy tool, especially in the case of investments in human capital. Greater access to education would then reduce

[61] Alesina and Rodrik (1994) show that an increase of one standard deviation for their Gini coefficients will decrease the average per capita rate of growth by almost one percent. See also Clarke (1995).
[62] Aghion et al. (1999).
[63] Galor and Moav (2004).

inequalities, and diminish the effect of family wealth on individuals' investment possibilities.

Income distribution also raises market size and consumption

Income distribution also has a significant effect on demand patterns and market sizes. For example, there is evidence that ownership of consumer durables such as cars, cameras, televisions, and refrigerators is strongly positively related to household income in Germany[64]. While high-income classes consume more in absolute terms than low-income classes, the rate of increase in the number of products consumed diminishes after a certain income threshold.[65] Income redistribution would therefore increase the size of the market, as additional consumers would be able to purchase a greater variety of goods. This effect can be quite sizable, as appears from recent research on pharmaceuticals showing that an increase in the potential market by 1 percent for a given drug category increases the number of drugs sold by about 5 percent.[66]

[64] Bonus (1973).
[65] Jackson (1984).
[66] Acemoglu and Linn (2004).

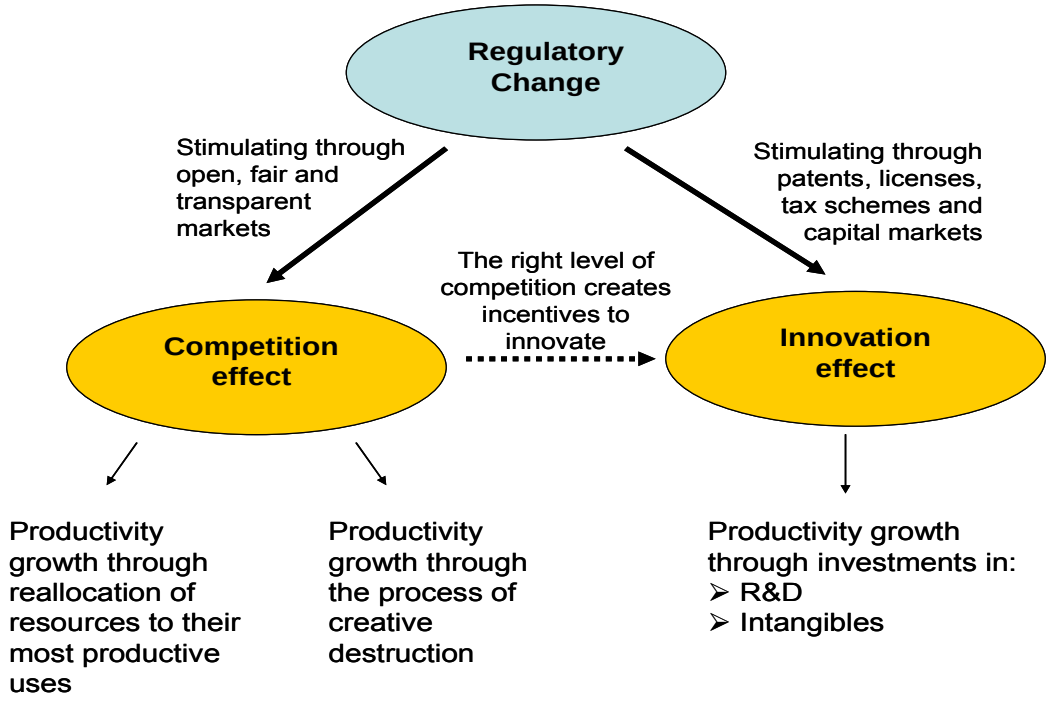
Chapter 5—The Impact of Markets and Institutions on Productivity

5.1 Introduction

In recent years the topics of regulation, markets and institutions has risen to the top of the economic policy agenda of most advanced countries. The debate has often been cast in a simplified context of deregulation as a major source of more intense competition among business, therefore supporting efficiency and lower prices for consumers. In reality the role of regulation is much more subtle and complex.

This chapter looks at regulatory change as a mechanism to support the functioning of labour, capital and product markets through greater competition—which increases the incentives to use resources more efficiently—and as an institutional framework that supports technological change and innovation as the major sources of sustainable productivity growth. Hence regulatory change is at the heart of a strategy to increase productive jobs.

Figure 5.1: The Impact of Regulatory Change on Productivity Growth



Source: The Conference Board

Figure 5.1 explains the two mechanisms through which regulatory change influences productivity growth. The first is through competition that is achieved by a regulatory environment that generates open, fair and transparent markets. Competitive markets force companies to reallocate resources to their most productive uses, which eventually leads to an increase in productivity. In addition, a high level of competition leads to the Schumpeterian effect of creative destruction, where lagging companies either adapt and catch up with leading companies or are forced out of the market, and where entrepreneurs with innovative ideas are able to enter the market. These issues are discussed in section 5.2.

The second way in which regulatory change raises productivity is through the innovation effect. Innovation depends on a variety of institutional arrangements. Innovation can be directly stimulated, for example by effective patent and licence laws that enable innovators to gain amortization and reasonable profits on their investments in research and development. The state can also introduce favourable tax schemes, which make investments in R&D more attractive. Moreover, innovation activity is directly affected by capital markets, which often provide the monetary resources for investments in R&D. These arrangements, which differ between countries, are organizations in the national innovation system and are discussed in Section 5.3.

Regulatory change fosters competition and innovation and, when combined, these two benefits have a large effect on productivity growth. However, too much competition may strangle a firm's resources and incentives to innovate. At the end of Section 5.3, this report addresses the possible trade-off between competition and innovation effects.

The effects of regulatory change on economic growth, productivity and employment vary widely across economies and industries. Section 5.4 examines the effects of regulatory change in three major industries: telecommunication services, the retail industry and business services. Section 5.5 focuses on the regulatory aspects related to labour markets and discusses how these relate to the competition and innovation effect.

Policy approaches to market regulation are still quite different across OECD countries, especially within Europe. An appendix to this chapter offers an extensive review of evidence on the progress on regulatory change programmes in the sample countries.

5.2 The Competition Effect: Barriers to Entrepreneurship

An important link between regulatory change and productivity growth is through the channel of increased, albeit balanced, competition. Competition leads to the reallocation of resources to their most productive uses and to the Schumpeterian creative destruction effect which, together, lead eventually to increased productivity.[67]

Barriers to entrepreneurship dominate competition issues over state control

More intense competition is supposed to generate both static and dynamic efficiency gains on product capital markets. Static efficiency gains occur because incumbents are forced to eliminate inefficiencies when their position as a dominant market player is challenged by competitors. In addition, there are three channels through which competition leads to dynamic efficiency improvements. First, increased competition facilitates the benchmarking of performance of managers and companies. Second, price elasticity tends to be higher in competitive markets, so that efficiency gains and cost reductions tend to generate more revenue. Third, to prevent losing market share or even bankruptcy, managers at all levels are incentivised to be more productive than in less-competitive industries.[68]

Regulation affects competition through two channels: state control through public ownership and provisions that establish barriers to entrepreneurship.[69] While state control still plays a role in some specific industries, especially utilities and some public service industries (with considerable implications for productivity), concerns

[67] In general, regulation has few direct effects on productivity growth. A recent study by Conway et al. (2006) shows, that the direct impact of regulatory burdens and weak competition is limited to ICT-intensive industries. This means that ICT-producing and ICT-using sectors are particularly sensitive to ill-designed regulation. Conway et al. (2006) did not find a direct impact on non-ICT industries.
[68] See Nicoletti and Scarpetta (2003) for further details.
[69] Nicoletti and Scarpetta (2003).

about barriers to entrepreneurship seem more widely spread.[70] Indeed, the entry of new companies with innovative ideas is one of the main elements of the Schumpeterian model of creative destruction.

Barriers to trade still arise from non-tariff barriers

In a global economy incumbents compete not only with new entrants but also with imports. Barriers to trade are therefore often seen as another way to avoid competitive pressures. Tariffs have been gradually falling in recent decades, especially among developed countries, because of accession to the WTO and through bilateral or multilateral trade agreements. Thanks to the EU-Treaty and the Single Market program, there are no tariffs affecting intra-EU trade in products. But non-tariff barriers (e.g. restrictive licensing or quotas) impede trade between EU countries and the United States and especially the trade between developed and developing countries. Within the services sector, there are still non-tariff trade barriers even between EU member states.

Economic barriers to entry of new firms abound…

Entry barriers can be either practical or regulatory hurdles that hinder prospective new companies from entering the market or expanding freely. An economic barrier to entry can be high costs to enter the market. For example, in the chip industry, the high cost of building a new factory results in few chip manufacturers. Economies of scale can also be a relevant hurdle, as in the automobile industry where firms can only be competitive at high volume. The accumulation of expertise and knowledge increasingly is becoming a constraint on start-up companies. Finally, a lack of access to productive resources can be a hurdle to entry. A limited supply of engineers hampers the ability to businesses to develop new products or to expand, and the lack of good educational institutions may result in skill shortages, making it more difficult for newcomers to compete with incumbent operators or manufacturers.

… but removal of state-created barriers to entry might be more effective in strengthening competition

[70] Nicoletti and Scarpetta (2003) find that privatization leads to direct productivity gains due to increased competitive pressures and entrepreneurial incentives. The scope of these gains may vary depending on whether the state keeps large stakes in privatized companies or not.

While policy interventions may remove some economic barriers to entry, their obvious targets are barriers imposed by state regulations. The state may set special mandatory rules or requirements for opening a business (e.g., diplomas, certificates or simply necessary procedures to start a business). These may not only affect start-up companies but also companies that are already operating and want to expand into new business areas. They may have to deal with licenses required to operate legally and patents for specific products or procedures that prevent them from being copied. Moreover, new and well-established companies that want to bring new products to the market must comply with safety and health regulations. Indirect barriers to entry may take the form of discriminatory licensing procedures or antitrust exemptions.

Large differences between countries for procedures to start up new businesses

A number of studies suggest that by easing entry of new firms, more intense competition emerges, which will help to better allocate resources to their most productive uses and eventually will promote aggregate investment, technology adoption and innovation. A decrease in entry costs will have long-run effects on growth since the entry of new firms will be correlated with lower mark-ups and higher employment and real wages.[71]

Table 5.1: Regulatory Barriers to Open a Business

Region or Economy	Procedures (number)	Duration (days)	Cost (% GNI per capita)
France	5	7	1.1
Germany	9	18	5.7
Netherlands	6	10	6.0
Sweden	3	15	0.6
United Kingdom	6	13	0.8
United States	6	6	0.7
OECD	6	14.9	5.1

Source: World Bank, Doing Business project (http://www.doingbusiness.org), 2008.

Table 5.1 examines the procedures, time, and cost involved in launching a commercial or industrial firm with up to 50 employees and start-up capital of 10 times the economy's per capita gross national income (GNI). There are substantial differences among the listed countries. In Sweden, only three procedures have to be completed to

[71] See Arnold et al. (2008) and Schiantarelli (2005).

start a new business, compared with nine procedures in Germany. Also, the time it takes to open up a new business is very different. In the United States, a business can be started six days after the first registering step, whereas in Germany the procedure takes three times longer. The costs to start a business, a crucial factor in the rate of business entry, are relatively low in the Anglo-Saxon countries, but seven to nine times higher in the Netherlands and in Germany.

There is strong evidence that reducing the number of registration steps, permits and licenses required to start a new business, as well as reducing the cost and time it takes to register one, raises productivity.[72] In addition to the number of necessary administrative procedures required to open up a business, the number of government institutions that must be contacted to register a business also plays a role. A European-wide initiative that focuses on the introduction of a one-stop-shopping policy should assist would-be entrepreneurs and enable businesses to fulfil all administrative requirements in one place—preferably electronically—and under short deadlines.[73] According to a country-by-country assessment in late 2007, the one-stop-shopping policy is not yet fully operational in Germany and the Netherlands, but is already established in France, Sweden and the United Kingdom. The costs to start a company also vary significantly across Europe, ranging from € 0 in Denmark to € 2673 in Italy (the United Kingdom, € 54; France, € 84; Sweden, € 222; Germany, € 783, and the Netherlands, € 1040).[74]

Regulations also affect investment decisions

The regulatory situation in individual countries can strongly influence the investment climate. For example, the business disclosure index from the World Bank measures the degree to which investors are protected through disclosure of ownership and financial information. The index ranges from 0 to 10, with higher values indicating more disclosure.

[72] Crafts (2006)
[73] See the 2006 Spring Council conclusions of the European Council.
[74] The full document is available on the European Commission website (ec.europa.eu/enterprise/entrepreneurship/support_measures/start-ups/onestop2006.pdf).

Table 5.2: Business Disclosure Index

	2005	2006
France	10	10
Germany	5	5
Netherlands	4	4
Sweden	2	6
United Kingdom	10	10
United States	7	7

Source: World Bank, Doing Business Database, Business disclosure index (0=less disclosure to 10=more disclosure)

As Table 5.2 shows for 2006, the United Kingdom and France had strong laws on disclosure, whereas the Netherlands, Germany and Sweden belonged to the group of countries in which investors were less protected. This example illustrates the regulatory diversity which exists across Europe and which affects investment decisions.

"Cherry picking" of best regulatory practices should not ignore institutional variation

It is not easy to compare and assess regulation policies across countries and their respective impact on competition, due to the very different and distinct institutional, social and legal environments of each country. Therefore, taking regulatory reforms that worked well in one country and applying them to another country will often fail due to different institutional settings and social parameters. "Cherry picking" is attractive for policy making, but the process must consider the transferability of single policy measures and structural reforms in terms of the economic, social and political characteristics of the respective countries.

Cutting administrative burdens has positive but non-recurring effects on productivity

Some of the competition strengthening may also come from the reduction of "unnecessary" administrative burdens, or "red tape", which has become an important item on the policy agenda. For businesses, the effect of reducing these administrative burdens on labour productivity seems obvious since productive resources can be re-employed from unproductive compliance work to activities that produce economic activity as measured by GDP. Many European states have set up high-profile groups, special task forces or other advisory groups to cut these unnecessary costs through

legislative changes.[75] The European Commission has also publicly announced measures to cut red tape.[76]

However, the reduction of unnecessary costs from administrative regulation usually has a one-time effect on productivity and efficiency. Moreover, even though many regulations may be unnecessary at face value, several laws may originally have been set up either to protect the user or worker from possible negative external effects or to maintain stability in the economy or strengthen trust in the economic and financial institutions, and therefore have positive welfare effects. But one often lacks good measures of the effect of administrative burdens on growth and productivity. A key parameter for judging the quality of better regulation therefore is higher transparency of its effects. In fact, some regulations are needed to strengthen the monitoring of the regulatory change process itself and provide mechanisms to devise or correct policy measures.

[75] For example, the Better Regulation Task Force 2005 in the United Kingdom.
[76] Spring Council of the European Union, 2007.

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BOX:

What is Restructuring and Reallocation?

In dynamic competitive economies, businesses are continuously adapting to the changing economic environment—altering their scale of operations, their location of operations, their workforce, their technology, their product mix, and their organizational structure. All such changes encompass the concept of restructuring. In addition, in dynamic competitive economies, there are always winners and losers. Winning firms are those that find the competitive advantage in their choices of product mix and ways of doing business. Such firms expand relative to their competition and increase their market share. Losing firms are those that find themselves at a competitive disadvantage and contract and exit. As part of this dynamic selection process, new firms enter to try out new products and new ways of doing business. The churning of firms and associated changing shares of market activity encompass the concept of reallocation.

Source: The Conference Board (2008): *Performance 2008, Productivity, Employment, and Growth in the World's Economies*, R-1421-08-RR.

END OF BOX

Lack of single market in services may be source of inefficiency in Europe

Europe has achieved a single market for free trade and distribution of goods through liberalization of the market and removal of trade barriers between the member states. But the completion of the single market for services has not yet been achieved, due to remaining regulatory barriers in the form of restrictive authorisation schemes and other disproportionate requirements in the member states.[77] One reason for this might be that international competition for non-tradable services has not been as strong as for tradable goods. Additionally, the market for professional services has been sheltered in many advanced countries. Inefficiencies caused by ill-designed regulations also trickle down to other industries through higher prices, since the vast majority of industries use non-manufacturing products as intermediate inputs.

[77] Copenhagen Economics (2005), p. 7; Arnold et al. (2008).

A study by Copenhagen Economics (2005) identifies four potential effects of reducing barriers in the services market. First, it points out that prices of services will fall in the covered sectors due to stronger competition. Second, output will rise in all sectors of the EU economy, leading to an estimated increase in total value added in the service sectors of approximately € 33 billion. Third, the report expects that total employment will rise. Though jobs will be lost due to the reallocation of labour, net employment is expected to increase by up to 600,000 jobs across the European Union. Finally, trade in services will intensify while the internal market becomes more integrated, which again promotes competition in this sector. While the effects of the services directives are disputed,[78] it is evident that removing barriers to service providers will lead to productivity gains, mainly through the competition effect.

To reap the full potential of economic growth and job creation in the European services sector, the European Commission has tabled a widely debated directive on services in the internal market. After controversial discussions in the European Parliament and the Member States (especially in France and Germany) a watered-down version of the Services Directive was passed on December 12, 2006, not including the country-of-origin principle.[79] It is too early, however, to assess the effects of the current measures of regulatory change in services across European Union member states.

[78] Economics of the Services Directive, a TUC assessment (2005). The study of the British Trade Union Congress argues that Europe doesn't have a general economic problem with excessive product market regulation and that the proposed measures are therefore disproportionate and not justified.

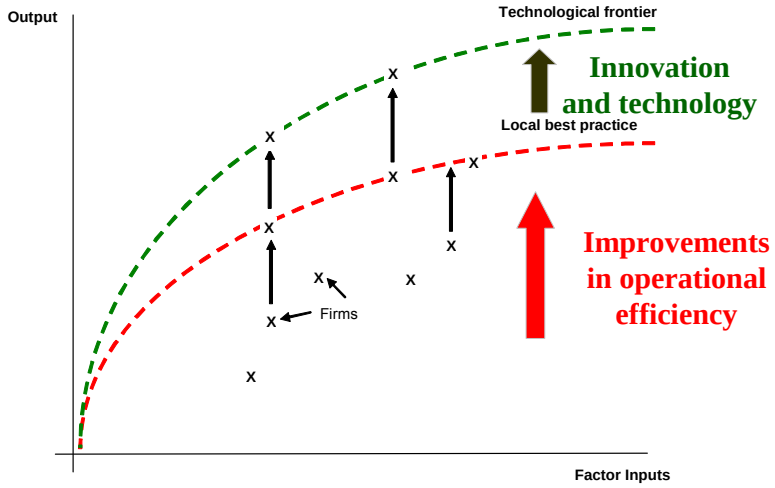
[79] According to the country of origin principle, which a service provider is subject only to the law of the country in which he is established and Member States may not restrict services from a provider established in another Member State. See the Proposal for a Directive of the European Parliament and of the Council on services in the internal market (presented by the Commission) [SEC (2004) 21].

5.3 The Innovation Effect

Innovation-supporting institutions are critical to productivity growth

The effects of regulation on competition, discussed above, largely affect productivity through improvements in operational efficiency (see Figure 5.2). Adequate regulation provides the breeding ground for companies to move up to the technological frontier, but the improvements in the operational effectiveness and innovation need to come from the companies themselves. Firms that are substantially below the local best practice will eventually drop out and, according to Schumpeter's theory of creative destruction, new and innovative companies will enter the market.

Figure 5.2: Regulation Strengthens Productivity Growth through Improvements in Operational Efficiency and Innovation



Source: The Conference Board

But regulatory changes that facilitate the bare imitation of technologies are not well suited for growth close to the technology frontier. The regulatory and institutional framework should rather focus on innovation in a competitive market environment, which makes use of a country's own resources, such as skilled labour and research and development.[80] Hence, the other important effect from regulation on productivity

[80] Inklaar et al. (2008), p. 140.

is through changes in incentives to invest in innovation and innovation-enhancing resources.[81]

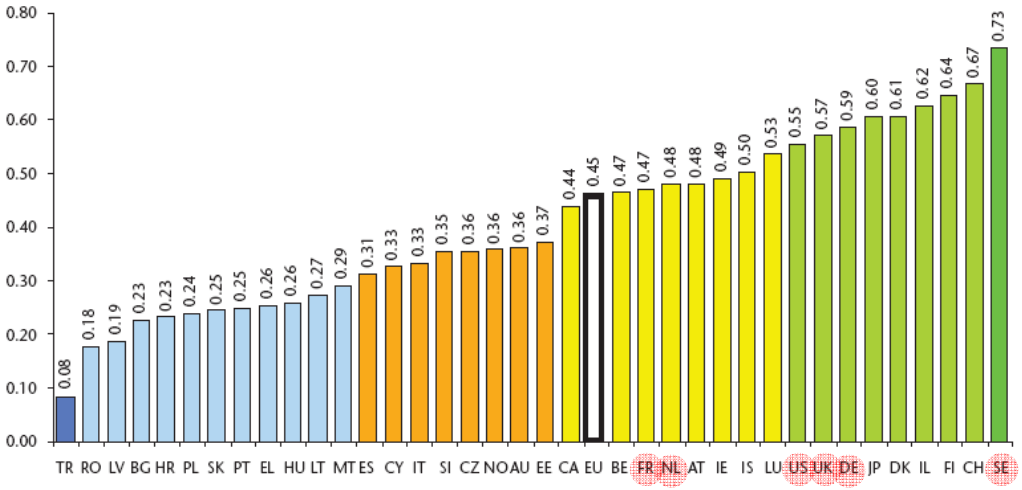
Crafts (2006) likens an increase in regulation to a rise in the tax rate because it reduces present value of an investment project. More regulation therefore leads to a lower level of capital intensity and thus to a lower level of labour productivity. It also reduces or distorts the rate of technological progress and the long-run labour productivity growth rate because regulations create disincentives to innovate, or they diminish or offset the expected gains from technological progress and process improvements through higher costs. In contrast, a growth-oriented regulatory environment will provide strong incentives to invest in resources to innovate. Innovations are expected to raise the output per worker through improved processes, products, machines and services and thus the expected profits for the investors or entrepreneurs. At the same time investments in technology and research and development raise capital intensity. The array of institutional changes that strengthens incentives to invest in innovation and innovation-enhancing resources is often referred to as the "national innovation system".[82]

Germany has a strong innovation performance but weak innovation drivers

There are several ways to measure differences in innovation performance between industries and countries. For European countries, the Community Innovation Survey (CIS) provides some indicators as to where the respective countries stand in terms of innovation performance. A summary measure of innovation shows that Germany is well positioned among developed countries. It is classified as an "innovation leader" (green colour), together with Sweden, the United Kingdom, the United States, Denmark, Finland, Israel, Japan and Switzerland (Figure 5.3).[83] The other two countries analyzed in this study, France and the Netherlands, are classified as "innovation followers" (yellow colour).

[81] See Crafts (2006).
[82] See Crafts (2006).
[83] "*Innovation followers"* include Austria, Belgium, Canada, France, Iceland, Ireland, Luxembourg and the Netherlands. "*Moderate innovators'* include Australia, Cyprus, Czech Republic, Estonia, Italy, Norway, Slovenia and Spain. "*Catching-up countries"* include Bulgaria, Croatia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania and Slovakia. Turkey currently performs below the other countries.

Figure 5.3: The 2007 Summary Innovation Index (SII).



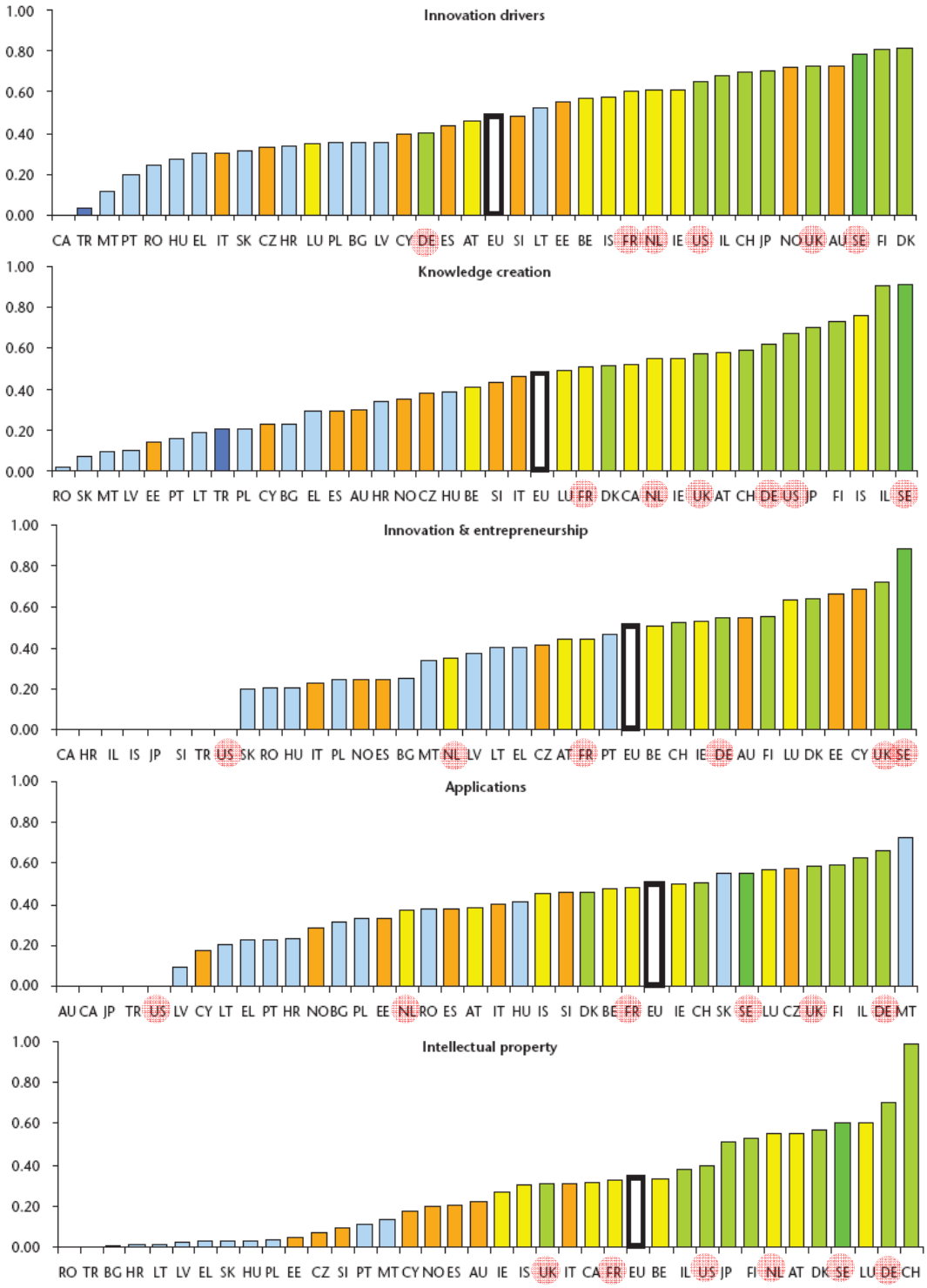
Source: European Innovation Scoreboard (2007)

The European Innovation Scoreboard (EIS) classifies 25 innovation indicators into five dimensions: (1) "innovation drivers" measure the structural conditions required for innovation potential; (2) "knowledge creation" measures the investments in R&D activities; (3) "innovation and entrepreneurship" measures the efforts towards innovation at the firm level; (4) "applications" measures the performance expressed in terms of labour and business activities and their value added in innovative sectors, and (5) "intellectual property" measures the achieved results in terms of successful know-how.

Mostly innovation leaders rank high across all five categories. Germany, however, has a below-average performance (i.e., below the EU average) in the category "innovation drivers" (i.e., the structural conditions required for innovation potential), which is possibly an area where regulatory reforms should be considered. Germany shows excellent performance with regard to innovation efficiency. Innovation efficiency, which is analogous to productivity, is defined as the amount of innovation inputs over the generated innovation outputs. Three dimensions are measured for inputs and two for outputs (intellectual property rights and applications). Germany performs best in the efficiency of applications and is in the top group in intellectual property efficiency. Interestingly, Sweden, the overall leader in innovation, shows a relatively low ranking in transforming inputs into innovation outputs. Sweden, the overall leader

of the ranking, also shows an excellent performance in the three dimensions capturing innovation inputs, although the performance in the two dimensions capturing innovation outputs is relatively weak. The United Kingdom has a solid rank in terms of applications, but has a below-average performance in terms of intellectual property efficiency, which might indicate that inputs are channelled to generating applications, but it might also indicate a low efficiency in general.

Figure 5.4: Innovation Performance per Innovation Dimension



Source: European Innovation Scoreboard (2007)

Venture capital helps to finance innovation

Capital markets influence productivity mainly through the investment channel because they provide the financial resources for purchases of machinery, equipment and structures. They directly raise productivity through capital deepening or through spending on research and development, which will contribute to productivity growth through innovation.

While capital markets are generally an important source of capital for incumbent firms to raise money for expansions and investments, innovative ideas are often not supported by the regular credit market because banks and other institutions shy away from the risk of lending money for untested business concepts. The consequence is that innovations often are not brought to the market due to the lack of capital or knowledge of how to enter the market. Private equity and venture capital play a specific role for innovation and ultimately productivity growth.

Private equity investment refers to the financing of unquoted or unlisted companies with growth potential, comprising all stages of financing: seed, start-up, expansion, replacement capital and buyouts. Venture capital is limited to the growth stages of a company (i.e., seed, start-up and expansion capital). Venture capital is a major (and often the only) source for innovative entrepreneurs to start new businesses with new ideas, new products, or new services. A mature venture capital market also contributes to the competition effect because it enhances competition, "crowds out" less competitive firms and speeds up the process of creative destruction.

While venture capital took off in more easily in the United States…

The concept of venture capital was developed in the United States. Two essential successful elements of the American innovation system are directly linked to venture capital: (1) strong links between the research sector and industry and (2) innovation strategies of larger firms that outsource innovative activity to a large degree. These elements are less common in Europe. The European system has tended to favour incumbents and has been less successful in encouraging collaboration between universities and companies or spin-offs as an innovation strategy. The gap between

basic research and commercial application (the so-called "innovation gap") is much bigger in Europe than in the United States.[84]

… Europe has somewhat caught up

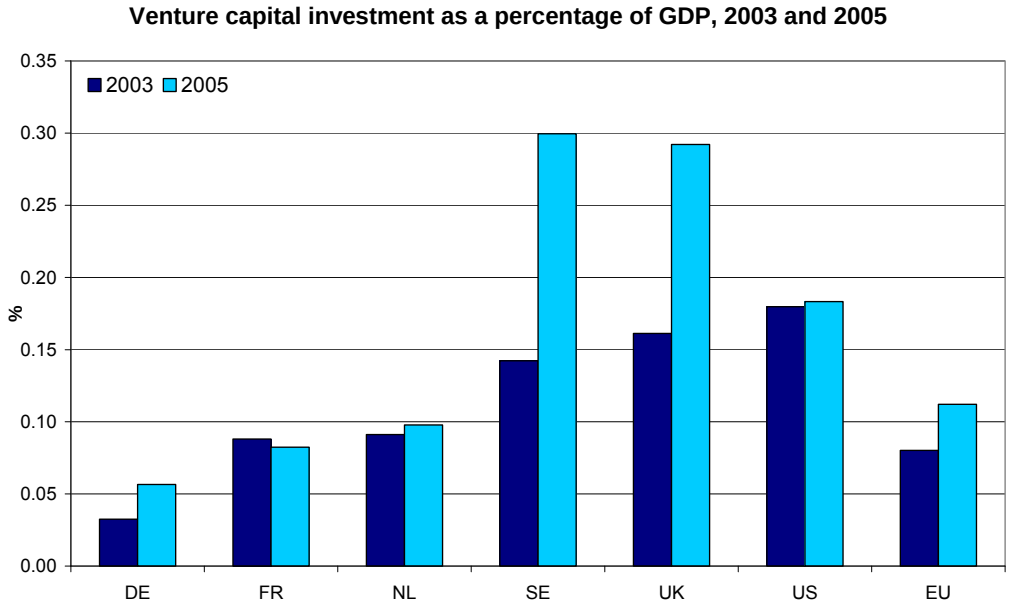
Europe adopted the venture capital model slowly.[85] Until recently, investors from the United States and other parts of the world have been reluctant to invest in Europe. But this is changing. Between 2001 and 2006 venture capital investments in Europe doubled. Growth rates of private equity investments were even higher due to the strong increase in investments in buyouts: in 2006, € 84.3 bln. of funds raised in Europe were allocated to buyouts and € 17.5 bln. to venture.[86] In 2007, as the credit crunch emerged, investments in venture capital fell to € 10.4 bln. (and € 60.0 bln. for buyouts).

As a percentage of GDP, venture capital investment increased significantly in Sweden and the United Kingdom between 2003 and 2005 (Figure 5.5). While the United States was the country with the highest venture capital investment in 2003 (0.180 percent), it fell to third place (0.183 percent) amongst the countries of interest in this study. Investment in venture capital also declined in France, and Germany lagged significantly behind the other five countries in both years.

The portfolio of investments within the three main high-technology sectors--communication, information, and health and biotechnology--differed considerably across the six sample countries (Figure 5.6). While these three key sectors made up 90 percent of all venture capital investments in the United States, venture capital was much more widely spread in the United States. European countries showed a broader distribution of venture capital investment beyond the three key technology sectors.

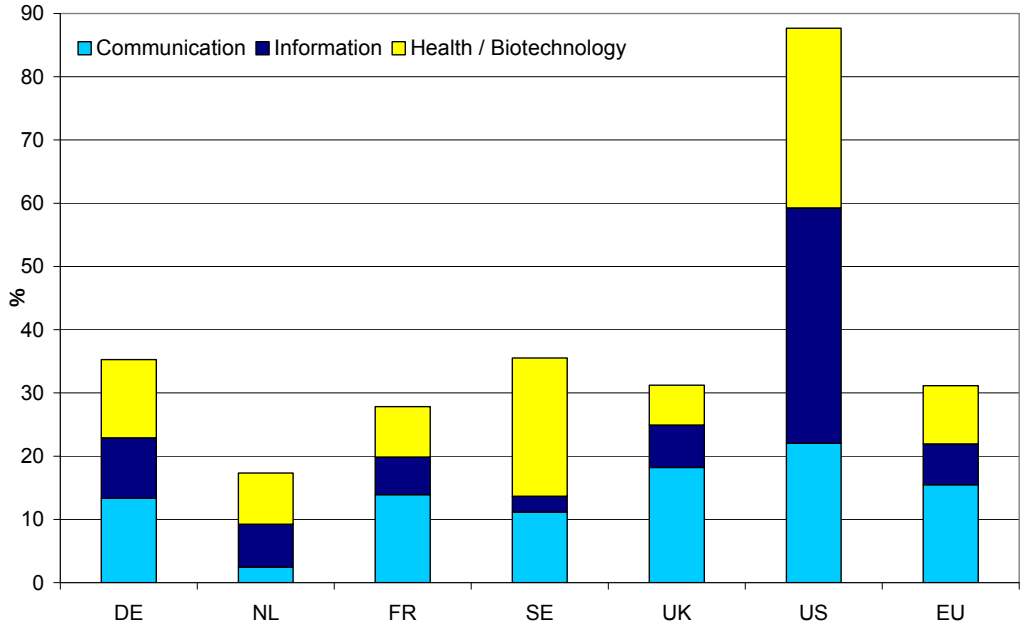
[84] See Dubocage and Rivaud-Danset (2004), page 4 and further for an overview regarding the emergence of venture capital in Europe.
[85] Germany traditionally let banks finance its corporations (which led to the phenomenon that German banks acted as direct investors with huge direct influence on corporate decisions, "Deutschland AG"), while the United Kingdom was mainly active in leverage buyouts, which were executed in a market-based system. See also www.europeanvc.com.
[86] Statistics obtained from the European Venture Capital Association (EVCA) (www.evca.eu/publicandregulatoryaffairs/default.aspx?id=86).

Figure 5.5; Venture Capital Investment as a Percentage of GDP, 2003 and 2005



Data source: OECD Science, Technology and Industry: Scoreboard 2007.

Figure 5.6: Share of High-Technology Sectors in Total Venture Capital, as a Percentage of Total Venture Capital Investment, 2005



Data source: OECD Science, Technology and Industry: Scoreboard 2007.

A variety of new experiences with financing innovation has emerged

Despite the recent declines in investment rates, there are various success stories that highlight Europe's strengthened financing of its innovation system and the emergence of European venture capital markets. For example, in 2004 the Luxembourg-based Mangrove Capital invested in a then-obscure voice-over-Internet phone company called Skype.[87] Some months later, after Skype had become a huge success across the world, Mangrove Capital sold the start-up company to eBay for $2.6 billion.

An important distinction has to be made between pre-seed ("proof of concept") finance and seed capital finance. The former is generally provided from public sources, the latter by private companies.[88] It is therefore critical to establish a cooperation or partnership between the two capital providers to make the transition from publicly funded to privately funded start-ups a success. Germany has positive experience with government-sponsored guarantee and co-investment strategies, balancing out some of the structural disadvantages of its bank-based system.[89]

Foreign direct investment as a key driver to raise competition and innovation

The effects of foreign direct investments (FDI) on productivity in receiving countries have already been analyzed in Chapter 3 of this study. In addition to the multiple effects on productivity, including an increase of the production base, employment creation, multiplier effects, increase in competition, increase in management expertise and marketing skills, FDI is also an important source for financing innovations.

However, the influence of FDI on innovation in target firms is ambiguous and the empirical literature has yielded mixed results[90]. Besides the innovation-enhancing effects of FDI in foreign affiliates, technology transfer from parent companies might reduce the incentive to invest in R&D in the affiliates abroad. In addition, MNEs tend to locate their R&D activities close to their headquarters rather than in the affiliates

[87] See Business Week, May 26, 2006, Special Report: Europe's Best Entrepreneurs Under 25

[88] European Commission, DG for Enterprise and Industry, "Financing SMEs, entrepreneurs and innovators – Seed Finance. Summary report of the workshop, Brussels 21 November 2006.

[89] The "Kreditanstalt für Wiederaufbau (KfW)" provides government support for venture capital in Germany, see Dubocage and Rivaud-Danset (2004), page 14.

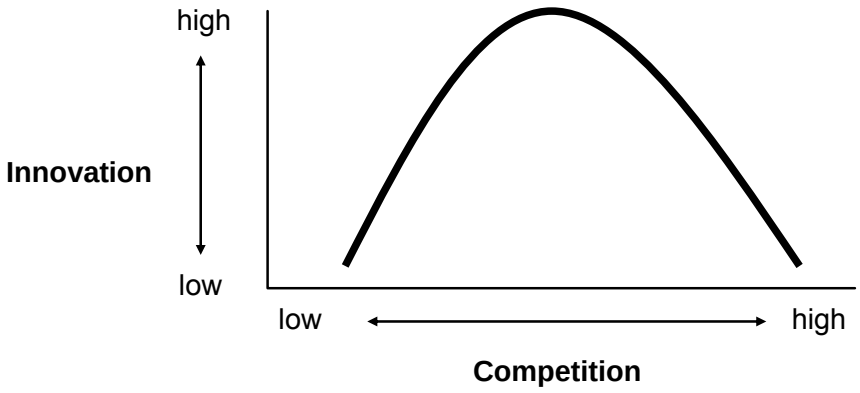
[90] For example, Griffith et al. (2004), Love et al. (1996), Kogut and Chang (1991), and Wagner (2006), have proven a positive relationship between innovation intensity and foreign ownership, whereas Stiebale and Reize (2008), amongst others, found a negative impact of foreign takeover on the average R&D expenditures and the performance on innovative activities in innovative firms.

abroad. However, a recent survey by The Conference Board suggests that, in particular, development-related R&D is more often tied to individual business units and is more likely to be positioned in proximity to production locations.[91]

The balance between competition and innovation is a subtle one

Despite the positive impacts of deregulation on innovation and productivity, there is also evidence that overshooting deregulation may lead to such fierce competition that innovation is hampered. Aghion *et al.* (2005) find a hump-shape relationship where both too little and too much competition destroy incentives to innovate and therefore eventually slows down productivity growth (Figure 5.7).

Figure 5.7: The Inverted U-Relationship between Competition and Innovation



Source: Aghion et al. (2005).

Inverted U-shapes are usually observed when two conflicting effects are at play. On the one hand, competition may increase the incremental profit from innovating (called "escape competition effect"); on the other hand, increased competition may also reduce innovation incentives because the innovation rents will shrink too much as they will in part be captured by a rival ("appropriability effect").[92]

[91] See van Ark, Dougherty, Inklaar and McGuckin (2007).
[92] See Aghion et al. (2005). See also Arnold, Nicoletti and Scarpetta (2008).

The described inverted-U relationship can be explained with these two effects, but its precise shape will largely depend upon the structure of a given industry sector.[93] If one divides industries into "leader-follower" industries (in which companies use different technologies) and "neck-and-neck" industries (in which companies use mainly the same technologies), it may be argued that the latter have low incentives to innovate as they earn moderate profits. However, with increased competition "neck-and-neck" firms will strengthen their innovation efforts as the potential rewards to innovation grow with the prospect of becoming a market leader ("escape competition effect"). In contrast, "leader-follower" industries face low incentives to innovate under strong competition. Their prospect is to reach the "neck-and-neck" status, which would mean they would face lower margins.

The described hump-shaped relationship between competition and innovation suggests that an ideal institutional framework that strives to foster productivity through competition and innovation must balance competitive pressures with maintenance of sufficient profit margins to allow companies room to invest in innovation. Because markets are not static and differ between industries and sectors as a result of the ever-changing landscape of neck-and-neck and leader-follower industries, external effects and such variables as raw material costs, this balance must be constantly monitored and carefully adapted to the changing needs of the respective markets. The discussion in Section 5.4 focuses explicitly on some of these effects by industry.

[93] In his work during the early 20th century, Schumpeter stressed the negative linear relationship between competition and innovation, since more competition reduces the expected innovation rents of a monopoly, thus negatively influencing innovation incentives. But other authors have emphasized the positive effect of competition on innovation (e.g., Nicoletti and Scarpetta, 2003). Schmutzler (2007) argues that there is no general robust relation between competition and investment due to the ambiguous effect of competition on markups, the sensitivity of equilibrium demand to marginal costs, the level of equilibrium demand, and the extent to which efficiency gains are passed on to consumers.

5.4 The Impact of Regulation on Industry Sectors

Given the different market structures and innovation dynamics among industries described above, an empirical strategy should be used to analyse the impact of regulatory change on productivity on an industry-by-industry basis. This section compares OECD regulation data with industry-specific data on TFP, labour productivity, value added and employment growth.

Unfortunately, the OECD's regulation data are only available for a limited number of sectors and only until the year 2003.[94] This section compares the telecommunication sector, which was massively deregulated during the 1990s, and the retail sector, which is an example of a sector in which regulation and innovation played a major role in creating growth, especially in the United States. This section also briefly analyzes the business services sector and the overall market economy. It compares the OECD regulation indicator for the year 2003 (country scores 0-6, ranging from least- to most- regulated) with the respective growth rates of TFP, labour productivity, value added and employment for the time span 2000-2005.

Telecommunication services have shown an overall trend towards deregulation

The telecommunication sector is an important example of successful deregulation creating opportunities for new companies in a market that had been dominated by state monopolies. The liberalization of the telecom sector in Europe started in the late 1980s. The EU Green Paper on Telecom Liberalization (1987) contained a 10-year programme envisaging full liberalization of the sector by 1998. To abolish state monopolies in the telecommunication sector, European countries opened up telecommunication services for other operators and state monopolies were largely privatized. Efficient regulation proved critical for a successful liberalization. New regulatory bodies were introduced to create fair markets and a level playing field for all competitors. These regulatory bodies have the power to determine maximum prices for the rent of networks that are still mostly owned by the state.

As one can see from Table 5.3, the OECD regulation index for 2003 is relatively low across the board, reflecting a liberalized telecommunication market. The index

[94] The OECD intends to publish new regulation data at the end of 2008.

analyzes the regulation with regard to market entry, public ownership and the market structure in the telecommunication sector of the respective countries. In general the regulatory change in the telecom services industry has been a success in most countries. Consumer prices have fallen continuously and the five European countries listed above all showed a value-added growth rate of between 3.3 percent and 8.2 percent from 2000 to 2005, which is much higher than the overall value-added growth rate of the market economy of the respective countries for that period. Also, labour productivity improved significantly in all countries. Germany's performance was at the lower end of the growth and productivity range, although higher than in the United Kingdom. The latter, however, was able to generate at least some employment growth in the telecom services industry. France was the only country that could achieve high labour productivity and value-added growth with a positive employment effect at the same time. While France's telecom regulation index was the highest of the countries being compared, at 2.1 on a scale from 0-6, it is still relatively low and shows that the EU's attempt to liberalize the market has been successful.

Table 5.3: Comparison between OECD Regulation Indicators (Country Scores 0-6) and Labour Productivity, Value Added and Employment Growth in the Post and Telecommunication Sector.

Country	OECD Overall Regulation Indicator 2003	Labour Productivity Growth 2000-2005	GDP Growth 2000-2005	Employment Growth 2000-2005
France	2.1	7.4	7.7	0.3
Germany	1.6	5.3	3.5	-1.9
Netherlands	1.1	11.6	8.2	-3.4
Sweden	1.8	7.6	4.9	-2.7
United Kingdom	0.5	2.7	3.3	0.6
United States	0.2	11.9	7.8	-4.2

Note: data include postal services, which is a relatively small share of output and employment.
Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics) and OECD.

During the restructuring and deregulation phase, European countries were able to realize large output and productivity gains. The United States was slower than most European countries in switching to mobile telephone services. Moreover, technological progress and new high-tech products, such as mobile phones and other innovations in the ICT area also contributed to a high valueadded and labour-productivity growth and worked as an enabler of efficiency gains.

The United States has realized the fastest productivity gains since 2000, in part because of a large restructuring (reflected in the large decline in employment) of the sector switching towards more intense use of mobile phones, a development that boomed earlier in Europe during the late 1990s

The impact on output and productivity growth comes only in the longer term

Compared with the regulatory environment of the 2000s, the telecommunication sector was much more regulated during the 1990s (see Table 5.4).

Table 5.4: OECD Regulation Indicators (country scores 0-6) for the Telecommunication Sector.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
France	6	5.9	5.9	5.9	5.8	5.6	5.4	4.4	2.8	2.4	2.5	2.1	2	2.1
Germany	6	5.9	5.9	5.9	5.8	5.7	4.8	4.4	4.1	2.1	1.8	1.8	1.7	1.6
NL	6	6	6	6	5.2	4.8	4.4	2.7	2.4	2.2	2	1.8	1.5	1.1
Sweden	5.9	4	4	3.9	3.8	3.7	3.5	3.4	3.3	3	2.5	2.4	2.3	1.8
UK	3.7	2.2	2.2	1.5	1.4	1.3	1.2	1.1	0.9	0.7	0.6	0.5	0.5	0.5
US	1	1	0.9	0.9	0.8	0.7	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.2

Data source: Conway and Nicoletti (2006).

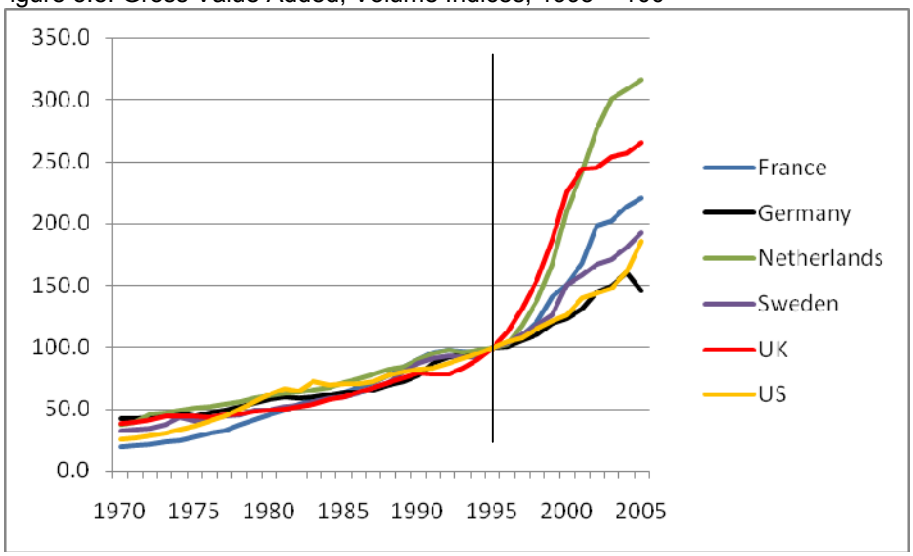
Indeed, the unleashing effect of deregulation in the telecommunication sector on output and productivity growth is best seen by looking at the long-term series of the industry-specific data. Figures 5.8 and 5.9 below show a significant output productivity shock since 1998, when full EU-wide deregulation of the sector kicked in. The chart also shows that the United Kingdom, where the national telecom provider British Telecom had already been privatized in the 1980s, took the lead in terms of value-added growth and labour-productivity growth until 2001. Subsequently it was overtaken by the Netherlands. The data therefore provide stronger evidence of a positive relationship between deregulation and productivity growth in the telecom sector when viewed across a longer period.[95]

A recent study, based on the EU KLEMS database, revealed that the telecommunication services industry is one of the few for which a statistically significant effect of deregulation on multifactor productivity also can be shown. After controlling for differences in relative levels of productivity in post and telecommunications, a significant negative effect on productivity comes from higher

[95] This finding is confirmed by the results of Inklaar et al. (2008).

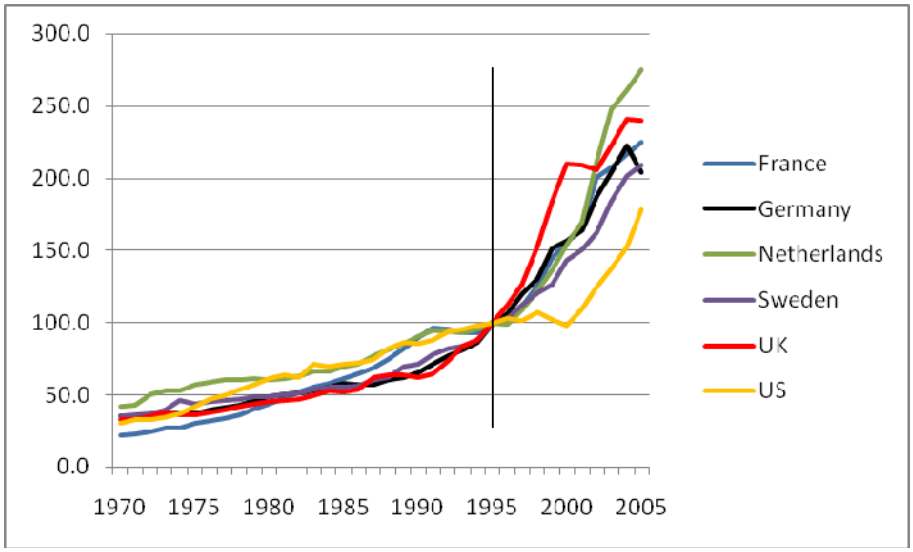
barriers to entry, supporting the notion that lower barriers to entry promote productivity growth by increasing competition.[96]

Figure 5.8: Gross Value Added, Volume Indices, 1995 = 100



Note: The data shown above comprises the post and telecommunication sector
Data Source: EU KLEMS database, March 2008, at http://www.conference-board.org/economics and OECD.

Figure 5.9: Gross value added per hour worked, volume indices, 1995=100



Note: The data shown above comprises the post and telecommunication sector
Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics) and OECD.

In addition to the deregulation effect, the harmonization of European technology standards in the telecom sector has been of vital importance for the productivity and

[96] Inklaar, Timmer and van Ark (2008), Table 11.

eventually the success of this sector. EU-wide harmonization of technical standards, especially in the mobile sector, created a larger market and increased incentives for companies to invest in innovation and scale advantages across European countries. As a result, the current European mobile telephone technology is a good example of successful European creation of a conducive regulatory environment. Today, the telecommunication sector faces another fundamental change, namely the transformation of networks to broadband, which will increase the speed of information and communication exchange and is expected to lead to further efficiency gains beyond this industry.

The telecommunication sector serves as an example of other network industries (such as utilities) showing that the liberalization of a sector can bring lower prices for customers and a substantial increase in value-added and labour productivity in the longer run. At the same time all network industries struggle with issues of optimal regulation. Indeed, these issues are strongly related to market structure, such as the number of players, price setting and the role of new versus old technologies. There is considerable debate on which access regulations to networks maximize productivity and efficiency in the provision of downstream services; which degree of vertical separation of utilities fosters competition best, and which price regulation scheme needs to be applied to maximize efficiency gains, which should be passed on to the consumers.[97]

The telecommunication sector example also shows that conducive regulation is necessary to create competitive markets, and to create a fair and level playing field where newcomers have a reasonable chance to start new businesses. Also, the harmonization of technical standards has been a huge advantage for Europe to invest in research and innovation and to reap scale effects.

[97] See Nicoletti and Scarpetta (2003).

Retail

In contrast to the telecommunication sector, the degree of deregulation and the effect on growth and productivity is much less straightforward in other service industries. This is in part due to the wider variation in technology and innovation applications in this industry, larger differences in industry structure between countries, and the different pace of reforms. In addition, different demand conditions, such as weak private consumption growth in Germany in recent years, may have caused overcapacity and are another reason for Germany's disappointing growth in this sector.[98]

Table 5.5: Comparison between OECD Regulation Indicators (Country Scores 0-6) and TFP, Labour Productivity, Value Added and Employment Growth in the Retail Sector

	OECD Regulation Indicator 2003	TFP (value added based) Growth 2000-2005	Labour Productivity Growth 2000-2005	Value Added Growth 2000-2005	Employ-ment Growth 2000-2005
France	3.1	-0.2	0.31	0.92	0.60
Germany	3.1	0.4	0.72	-0.37	-1.08
Netherlands	1.6	0.2	0.65	0.69	0.04
Sweden	0.5	3.8	4.99	5.07	0.08
U.K.	2.0	1.4	3.30	4.08	0.79
U.S.	2.6	5.0	6.28	5.96	-0.31

Data Source: EU KLEMS database, March 2008 (www.conference-board.org/economics) and OECD.

No obvious relationship between regulation and productivity in retailing

The main regulatory areas that are analyzed by the OECD regulation indicator in the retail sector are licences or permits needed to engage in commercial activity, specific regulations for large outlets, protection of existing firms, regulation of shop opening hours and price controls.[99]

The first striking finding in Table 5.5 is that the retail sector is least regulated in Sweden (0.5). Sweden also has the second highest labour-productivity and value-added growth rate of the compared countries. Even the employment growth is positive, albeit quite low. Germany and France, the two countries that are most regulated (with a regulation indicator of 3.1 in both countries), show a poor

[98] Fuentes et al. (2006).
[99] The obvious omission in this list of relevant regulations for the retail industry are zoning laws, related to land use (see Baily and Kirkegaard, 2004).

performance regarding labour-productivity and value-added growth. Output and employment growth in Germany was even negative during the given time span. Despite being a comparatively low-regulated economy, the Netherlands also achieved slow growth in the retail sector.

The United States, with an unexpectedly high overall regulation rating of 2.6, nevertheless shows a very positive performance of the sector. While the United States, for example, has completely deregulated shop opening hours (OECD rating 0), it gets the worst possible rating of 6.0 when it comes to permits that are required to open new businesses. Also, specific ratings for large outlet stores are restrictive (3.8). Nevertheless, the United States stands out with the highest labour-productivity growth of 6.3 percent and the highest value-added growth rate (6.0 percent) of the compared countries.

Technology and innovation is the main factor determining retail productivity …

It turns out that the regulation effect in retailing is probably of less importance for output and productivity growth than other effects, notably major investments in information and technology and the application of these technologies to generate a much more productive business model in the retail sector.

According to a study by The Conference Board in 2005, the marriage of technology and organisational change is at the core of the U.S. trade sectors' productivity acceleration away from post-1995 Europe.[100] Barcodes, scanners, and electronic replenishment capabilities, along with complementary organisational adjustments, have led a structural transformation of the sector, increased competitiveness, and created strong productivity growth.

A series of important improvements stems from the use of ICT equipment. First, modern IT equipment enables retailers, wholesalers, and manufacturers to use detailed real-time information about customer purchases to make business decisions. Second, information gathering and reporting is highly automated and flows almost instantaneously between business units and companies. Also, at all stages of the value

[100] See McGuckin et al. (2005), page 6.

chain, participants boost efficiency by keeping lower and more accurate inventories on hand.

These new technologies and innovations in retail reward scale and scope, and enable large centralised chains and "big box" stores to expand rapidly. As the result of these investments in innovation and ICT, operating margins and real consumer prices decline as productivity gains are passed on to the consumers.

… but regulatory reform may still have played a role in adoption of ICT

Despite the major impact of technological change, there are three major categories of regulations that may not be unrelated to the slower retail productivity growth in Europe: store opening hours, land usage restrictions and zoning laws (especially on large stores), and labour laws. American regulatory changes in these areas have typically favoured size and scope much more than the European regulatory framework. Due to the diverse regulatory environment in Europe, it is difficult for retailers to operate smoothly across European borders and to reap large-scale benefits. Delayed regulatory reforms in the retail sector have made it difficult for firms to fully capture the benefits of ICT, especially in terms of reaping efficiency gains from advanced use of technology in production, supply and management techniques.[101]

Despite the lack of a visible relationship between regulation and productivity in retailing, recent studies have shown that ICT adoption has been stronger in countries with more liberal regulations fostering competition. Panel regressions that focused on the link between product market regulation and ICT investment showed that regulations had a negative impact on investments in ICT (Conway *et al.*, 2006).[102]

The productivity effect of regulatory change depends on social and cultural factors

The German retail market is characterized by a high level of competition, with many retailers competing on price. With strong incumbents like Aldi, Lidl, Plus, and Real in the low-to-middle price segment, competition is fierce and margins are comparatively low. As a result, entry into the market is very difficult. The withdrawal of Wal-Mart,

[101] Arnold et al. (2008).

[102] The study accounts for workers' skills, industry composition and other characteristics which have an impact on ICT adoption. The share of ICT investments of total investment in the U.S. was for example 4 percent higher than the OECD average during the 1985-2003 period.

which is considered to be a best-practice retailer in terms of technology and lean retailing, from the German retail market in 2006 might be due to various factors. The first possibility is that the German market is very efficient and leaves no room for new competitors. Second, it might be that the American business model did not work in the German regulatory environment, which might have been adverse to the "big box" retailing concept. Third, management failures to adequately respond to the particularities of the host market may have played a role.

Recent studies suggest that while all factors played a role, the regulatory and social environment was a decisive factor. The success of Wal-Mart's business concept is based on two pillars. First is the flexibility and independence to invest and disinvest rapidly. Second is strong control over supplier firms and employees. This business concept cannot be abstracted from the regulatory environment. In Germany, by contrast, land usage restrictions play a limiting role for big box retailers. Zoning regulations in Germany are mostly set on the level of individual states (Länder) and municipalities are required to follow those regulations in their planning decisions. German authorities have traditionally sought to consider other public interests besides the land requirements for large retailers, such as the development of city centres, incumbent retail shops in smaller towns and villages, the protection of the environment and the prevention of a disproportionate increase in traffic.

Equally important, social norms and labour market regulations in Germany emphasize consultation and collaboration with employees when it comes to management decisions. This may have conflicted with Wal-Mart's business model of autonomy and independence. Moreover, the German regulatory system discourages flexible investment and disinvestment strategies – the second pillar of Wal-Mart's business strategy – through legal hurdles and high firing costs.

5.5 The Effect of Labour Market Institutions on Productivity Growth

Labour market institutions affect the rate of participation in the labour force, as does the level of education and training of the labour force. Both, therefore, have a direct impact on productivity. Well-designed institutions should lead to an efficient and dynamic labour market that matches the supply and skills of workers with the needs of companies, keeps the unemployment rate at a minimum and connects the educational and training system with the ever-changing demands of a modern economy. An efficient labour market may also help attract foreign direct investment with more effective technology and consequent spillover effects for the host economy.

However, highly rigid labour markets may force companies to increase the quantity and quality of capital, substituting capital for labour and therefore increasing labour productivity while decreasing the demand for labour. Labour market institutions that are rigid and promote the status quo may have a significant effect on the implementation of innovations and technological change, through increased costs for adopting new technologies. That, in turn, may reduce companies' incentives to conduct R&D to increase productivity. National labour market institutions have a direct effect on the international flow of highly skilled workers and capital. Very restrictive labour markets will find it difficult to attract highly skilled foreign workers, a scarce resource, and may even contribute to the loss of the nation's own highly skilled nationals, with a direct negative effect on productivity.

The main labour market institutions that may affect productivity are the system of industrial relations, competence formation and training and the cost of hiring and firing (Employment Protection Legislation – EPL). Industry-specific characteristics may also influence the effects of these institutions on productivity.[103]

[103] Scarpetta and Tressel (2004); Bassanini and Ernst (2002).

The impact of industrial relations on productivity depends on incentives it creates to reduce or support innovation

The system of industrial relations, which concerns the relations between employers and workers—including trade unions in a sector or economy—determines the wage bargaining process. This can be more or less coordinated in the following manner: i) the wage-bargain occurs in a centralized way or co-ordination among employers and/or trade unions sets a uniform band of wages at industry or sector level; ii) employers and trade unions co-operate in decision-making inside the firm, and iii) business associations have an active role in solving free-riding problems across firms (Carlin and Soskice, 1990).

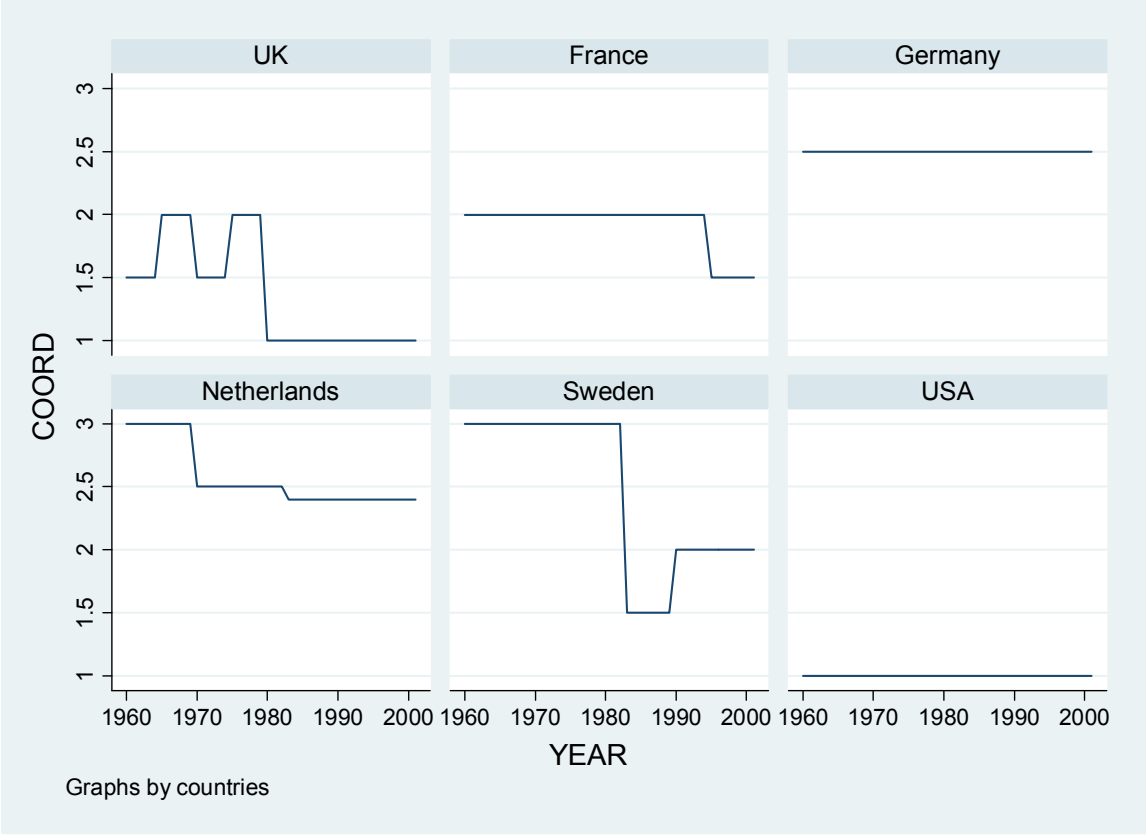
The relationship between industrial relations and productivity in the short run is related to the speed with which firms can reallocate resources within the firm and between firms to achieve higher productivity levels. In the longer run, the productivity impact is bigger, as the system of industrial relations determines the incentives of firms to invest in research and development and innovation. For example, a decentralized labour system, combined with a flexible labour market, may allow quick changes in the labour structure, with relatively low adjustment costs to promote innovation. But when wage bargaining at the company level is combined with high hiring costs, the resulting environment promotes opportunistic behaviour for the insiders, as the return on the innovations may be largely appropriated when the labour contracts are renegotiated, lowering the return on research. A coordinated wage bargaining system, with the wage bargained at industry or sector level, may eliminate this hold-up problem and promote innovation[104].

Figure 5.10 tracks the variation in time in wage coordination on the basis of an index for the six countries from 1960 to 2000. The index, based on national and comparative industrial relations research literature, ranges from 1 to 3, with 1 corresponding to uncoordinated wage bargaining (company/plant level) and 3 to economy/sector coordinated bargaining. Starting in 1980, the United States had an uncoordinated structure all the time and the United Kingdom rapidly converged to a low level of wage coordination during the 1980s; Germany had high and constant level of

104 Teulings and Hartog, 1998.

coordination at 2.5, followed by the Netherlands at 2.4 from 1980. France switched to a lower level of wage coordination of 1.5 in 1990. Finally, Sweden had the highest level of coordination in wage bargaining until the 1980s, and, in 1990, it stabilized at an average level of coordination of 2.

Figure 5.10: The Variation in Time of Wage Coordination Selected for France, Germany, the Netherlands, Sweden, the United Kingdom, and the United States, 1960-2000



Data Source: Ochel (2000).

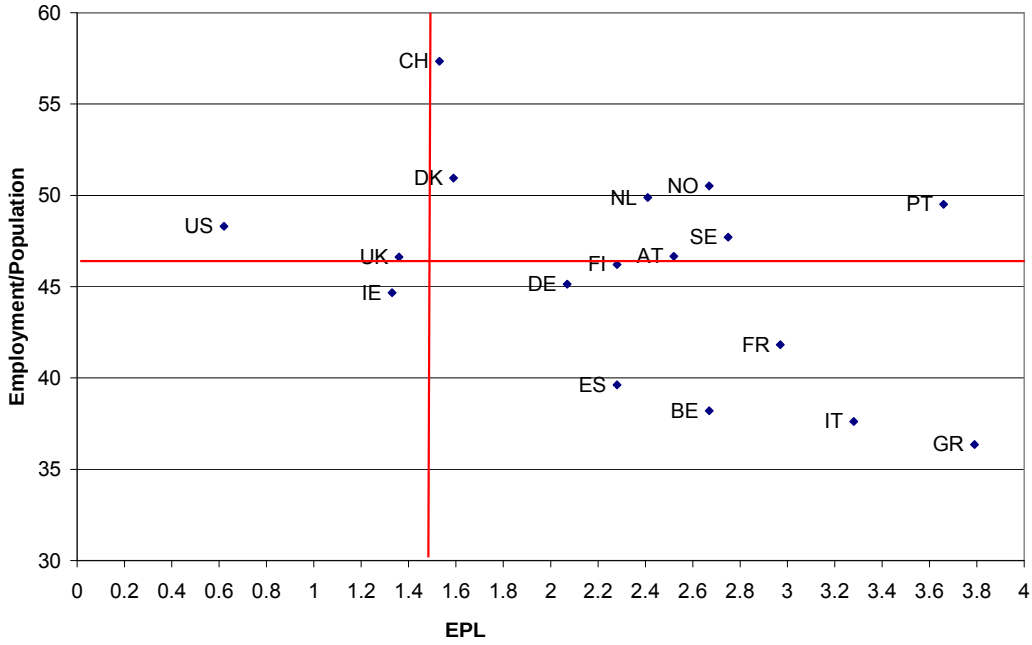
The impact of employment protection legislation on the employment rate shows no single European model

Labour market institutions have a double objective: to support not only economic efficiency and provide social protection. The trade-off between these two objectives depends on how higher levels of social insurance create economic distortions and hence affect the efficiency of the labour market.[105] Figure 5.11 presents the trade-off

[105] See Blanchard (2004).

between the efficiency of the labour market, represented here by the employment rate, and the level of social protection, represented by an index of employment protection legislation ranging between 0 and 4 (with 4 the highest level of protection) for European countries and the United States. The lines that divide the graph in four quadrants stand for the GDP-weighted averages—employment rate (94 percent) and EPL (1.49)—for these countries. The United States and the United Kingdom are in the northwest quadrant, with higher-than-average efficiency and lower social protection. Ireland is in the southwest quadrant with slightly lower social protection and efficiency than the average. The continental European countries are almost all in the southeast quadrant (except for Switzerland, Austria and Portugal), where the social protection levels are higher than the average and efficiency is lower. France and Germany have the most efficient labour market within this quadrant, and South European countries are less efficient, with higher social protection. The Nordic countries, Switzerland, Austria and Portugal are in the northeast quadrant, with efficient labour markets and high social protection, managing to reach both objectives: higher efficiency in the labour market and social protection.

Figure 5.11: Employment Rate and Employment Protection Legislation Index for the United States and Several European Countries (2001).

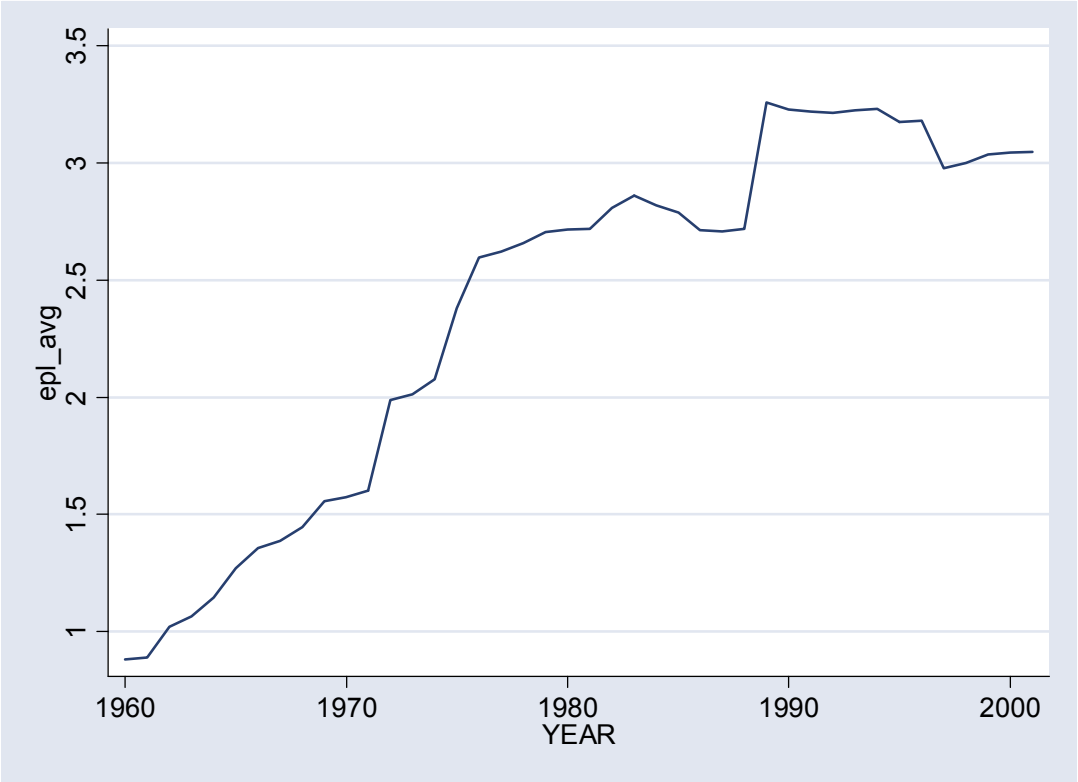


Note: The data is for the United States, the EU–15 countries (less Luxembourg), Norway and Switzerland.

Data Source: Allard and Lindert (2006)

Figure 5.12 shows the variation in time for the GDP-weighted average of EPL for European countries.[106] The EPL index started from a very low level of protection in 1960, and stabilized at a high level of social protection at the end of the 1990s. The regional level of social protection in Western Europe is at least three times higher than the level of social protection in the United States.

Figure 5.12: The Variation in Time of the Weighted Average of the EPL for Norway, Switzerland and EU–15 less Luxembourg.



Data Source: Allard and Lindert (2006)

The EPL impact on productivity also works through innovation

Employment protection legislation may affect productivity through different channels. On the one hand, strict EPL increases the adjustment costs for any change in technology for a company, thereby decreasing the incentive to invest in research or innovation, or to adopt more advanced technologies that require changes in the

[106] Norway, Switzerland and EU-15 less Luxembourg.

structure of the labour force. On the other hand, a rigid labour market may decrease the opportunities for workers to be hired by another company, motivate workers to contribute to the performance of their firms and diminish opportunistic behaviour.[107] Hence companies will have an incentive to train their workers and to use internal labour markets to deal with adjustment costs arising from technical changes, mitigating the effects of a rigid labour market.[108]

Stricter EPL may also affect productivity through a strengthening of human capital. In the short run, higher protection for workers may allow them to obtain more experience and training, increasing their human capital and, therefore, increasing productivity. But in the long run the positive impact on workers may be offset by the decrease of human capital of outsiders, discriminating particularly against women and young workers. Allard and Lindert (2006) find empirical evidence of a negative effect of strict EPL on productivity in the long run, after controlling for other possible effects.

The variations in time of employment protection legislation are presented in Figure 5.13. The EPL index ranges from 4, the strictest protection, to 0, the lowest amount of protection.[109] France, Germany and the Netherlands increased employment protection at the beginning of the 1970s as a result of full employment and strong unions. France has increased protection almost continuously, having the highest level of protection among the six countries in 2000. Germany kept a high level of protection in the '70s and '80s, transitioning to a more flexible regime in the 1990s. The Netherlands oscillated around a medium level of protection for the past 40 years. For Sweden and the United Kingdom, the first oil shock provided the impetus for worker protection. Sweden had the highest level of worker protection until the beginning of the 1990s, after which reforms led to a decrease in level of protection. For the United Kingdom, the level of worker protection eroded since the Thatcher years, with the lowest level of the EPL for the European countries in this report's sample. The United States had

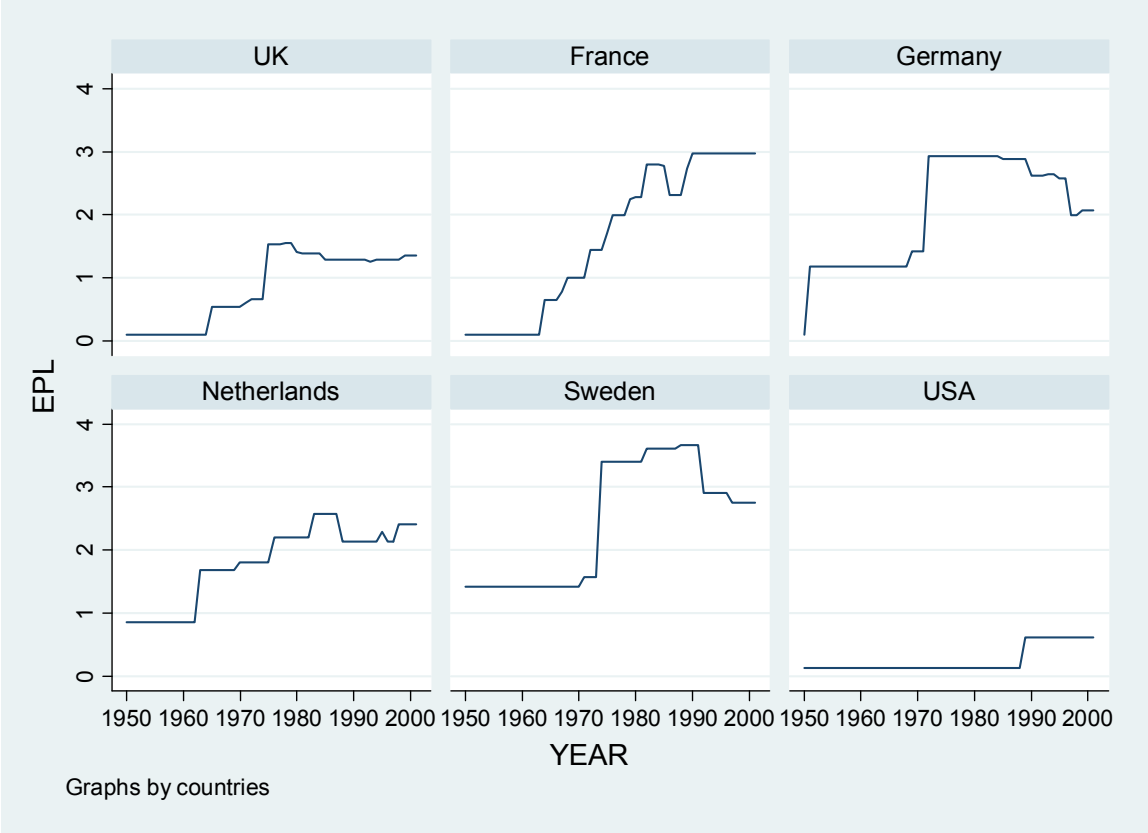
[107] Acemoglu, 1997a, 1997b

108 Blinder and Krueger (1996) and Acemoglu and Pischke (1999)

109 The Employment Protection Law indicator is a weighted average of three subcomponents: strictness of regulation for regular contracts, temporary contracts and collective dismissals (the last one with just 40% of the weight assigned to regular and temporary contracts). (OECD Employment Outlook, 2007a).

the lowest level of workers protection until 1988-1989 when the implementation of measures against collective dismissal increased the EPL index somewhat.

Figure 5.13: The Variation in Time of Employment Protection Laws for France, Germany, the Netherlands, Sweden, the United Kingdom and the United States.



Data Source: Allard and Lindert (2006).

Impact of labour market regulations also depends on nature of innovation process

Various studies have shown that the effects of industrial relations and employment protection legislation also depend on the industry considered. Scarpetta and Tressel (2004) show that for industries in which technological progress is cumulative, the internal labour market may alleviate high firing costs, as opposed to industries in which technical change leads to large shocks in labour and capital. Bassanini and Ernst (2002) show that a country like Germany, with coordinated wage bargaining and strict labour markets, has a comparative advantage in industries with cumulative technological progress. Saint-Paul (2002) applies a model that shows that economies with flexible labour markets tend to specialize in "primary" innovations (new

products) relative to economies with rigid labour markets that specialize in "secondary" innovations (improving an existing product). The results concur with the observation that the digital revolution that proposed many new products came to fruition in an economy with flexible labour markets, such as the United States.[110]

Note The appendix to Chapter 5 is available from The Conference Board on request.

[110] On the other hand, the Community Innovation Survey from Eurostat, 2004 found that Germany, with a relatively more rigid labour market, has the highest share of companies for both product and process innovation in the EU (42 percent and 34 percent, respectively), exactly double the share of the United Kingdom, which has a flexible labour market but one of the lowest share of companies innovating product or process in Europe. The results may be influenced by the different structure of the two economies, with Germany having a much larger share of manufacturing than the United Kingdom, with a large number of small and medium companies.

Chapter 6—Intangible Assets Promote the Growth of Labour Productivity

6.1 Introduction

Innovation is at the root of productivity growth. While growth in human and physical capital is subject to diminishing returns, they are the forces of innovation that allow for a continuous renewal of the sources of growth that drive productivity. Innovations arrive through the introduction of new goods and services, the improvement in the quality of existing products (and lowering their cost) and the increase in the amount of information on available products. They revolutionize the organization of production, not just the "technology" of production, as well as the management and global reach of corporations around the world. Innovation has become such an important source of growth that one may speak of the rise of the "knowledge economy", which postulates that the production, distribution, and use of knowledge is in fact today's *main* driver of growth, wealth creation, and employment.

The creation of the knowledge economy depends on investment decisions by individuals, governments and businesses

In Chapter 5, this report focused on the role of regulatory change, related to markets and institutions, as an important condition for innovation and knowledge creation. However, the knowledge economy ultimately builds upon intricate relations between individual decisions concerning resources (time and money) spent on education, public decisions on the organization and the quality of the educational sector, and business decisions on spending on information and communication technology (ICT) hardware and software, research and development, brand equity, training and organizational change.

Intangible investments are the key to knowledge economy

While the impact of innovation is evident "on the ground" and widely supported in the academic literature, it has proven surprisingly difficult to develop an overall

measure of the magnitude of its macroeconomic impact. How much of the recent growth in GDP is due to this revolution? What is the impact on living standards and worker productivity? How much of the difference in growth between countries can be explained by variations in innovation efforts?

This final chapter applies a recently developed practice to include computerized information, innovative property and economic competencies as intangible assets in growth accounting to measure their impact on output and productivity growth. It reports measures on intangibles and examines their impact on growth for the United States (Corrado, Hulten and Sichel, 2005, 2006), the United Kingdom (Marrano, Haskel and Wallis, 2007), the Netherlands (Van Rooijen-Horsten, van den Bergen and Tanriseven, 2008) and complements those with the report's own estimates for the market sector of France and Germany.[111] This is the main topic of sections 6.3 and 6.4.

Continental European countries have fallen behind the United States in intangible contribution to growth

This report finds substantial differences between countries in terms of the absolute size and the GDP share of intangibles, relative to tangible assets. The United States and the United Kingdom appear to have invested more in intangibles than the continental European countries. Germany invested the least, particularly as a share of GDP, even though the share of innovative property was among the largest of the countries in the sample, while economic competency is the largest component in the United States, the United Kingdom, the Netherlands and France.[112] This analysis shows that the rise in intangible assets per worker contributed to about 0.45 percentage points of annual growth of labour productivity in Germany from 1995 to 2003, slightly less than in France and the United Kingdom and substantially less than in the United States. The contribution of intangible assets, however, increased during the period of productivity slowdown between 2000 and 2004, while the contribution of other assets, and notably multifactor productivity, dropped significantly.

[111] Unfortunately we were not able to provide intangible estimates for Sweden.
[112] We define conventional tangible assets as non-ICT equipment and non-residential buildings.

Before going into the full set of intangibles, Section 6.2 looks at the evidence on investments in human capital, which crucially contribute to the creation of the knowledge economy by facilitating the adoption of new technologies and the innovation of new technologies. Section 6.5, the final section, looks at the policy requirements to generate positive feedback effects between investments in intangible (and tangible) capital and the creation of productive jobs.

6.2 Human Capital Accumulation Is the Key for Creation of Productive Jobs

Human capital is the productive wealth of the labour force embodied in their skills and knowledge. Education is the main determinant of human capital. There are significant social and private returns to education for individuals and evidence of positive effects on economic growth.[113] It has also been shown that skilled labour has a stronger effect on growth in economies that are relatively close to the technological frontier, and that differences in the availability of skilled labour is an important source of divergence in the growth performance among OECD countries.[114]

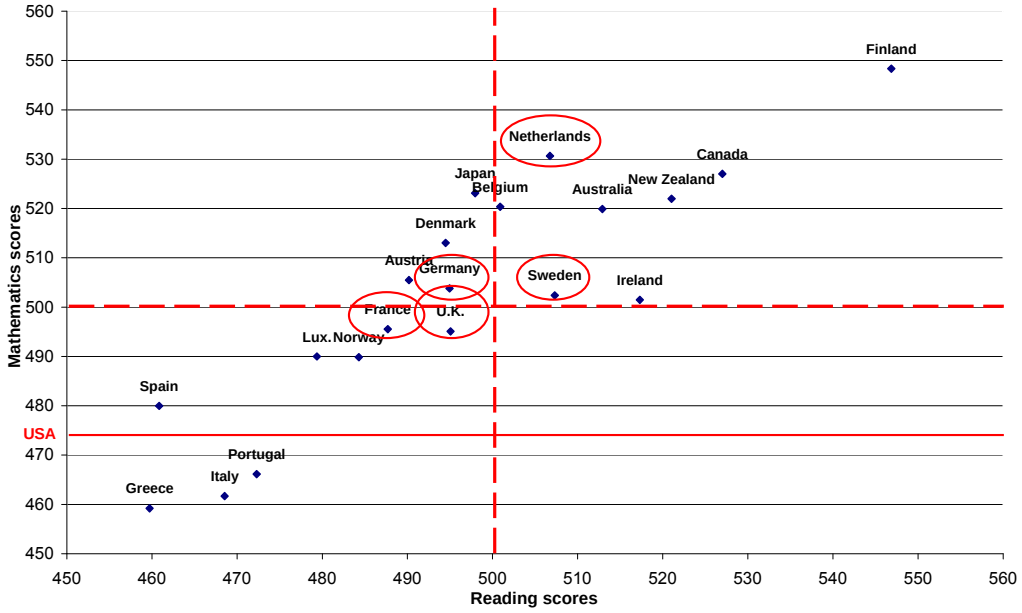
Germany performs on average in terms of quality of education

The quality of education is an important factor in promoting economic growth for advanced countries that already have almost complete enrolment at primary and secondary school levels.[115] The quality of education has been analysed through surveys like the Programme for International Student Assessment (PISA), which comprises a comprehensive and rigorous assessment of student performance on the basis of student, family and institutional factors that can help explain differences in performance.[116]

[113] See Card (1999), Harmon et al. (2003) and Hanushek and Wößmann (2007).
[114] Vandenbussche et al. (2006) differentiate between adopting versus innovating technologies as they require different combinations of skills, with unskilled labour contributing less to technological improvement.
[115] See, for example, Hanushek and Wößmann (2007) and Jamison et al. (2007).
[116] Started in 1997 as an OECD initiative, the programme executed three surveys (in 2000, 2003 and 2006) that measured the reading literacy, mathematics and science competencies of 15 year-olds in 30 OECD member countries. An additional 27 partner countries and economies participated in the last survey. The surveys will be repeated in 2009, 2012 and 2015. Another international survey is the International Adult Literacy Survey (IALS), which tested a sample of adults and then related measures to labour market experiences. Twenty-three countries and regions participated in one of three different waves of surveys conducted in 1994, 1996 and 1998 (Hanushek and Wößmann 2007).

The results of the PISA surveys in Mathematics and Reading are presented in Figure 6.1. The scores are calibrated to an OECD average score of 500. The country with the overall highest scores in all three tests is Finland. Australia, Canada and New Zealand also have significantly higher scores than the rest of the countries and Greece, Portugal, Spain and Italy have significant lower scores than the average. Germany performs very much on average, with slightly better maths skills and slightly weaker reading skills than the average results for OECD countries. The Netherlands shows clearly better maths skills, and the Netherlands and Sweden both have slightly better reading skills than Germany. The United States, for which no reading skills score is available, is by far the weakest of all six sample countries on the basis of scores in Mathematics (at 474).

Figure 6.1: Reading and Mathematics Scores for the EU-15 Countries, Australia, Canada, Japan, Norway and New Zealand.



Source: PISA 2006: Science Competencies for Tomorrow's World, Vol. 2, OECD 2007d.
Note: For the United States, the mathematics score was 474.

Skills become increasingly focused on non-routine activities

The increased level of globalization and computerization is continuously changing the labour market and, implicitly, the structure of education. Jobs that are characterized by easy-to-understand routines are the ones that can be most easily substituted by ICT and/or can be easily off-shored. For example, the largest increase in jobs in the United States was in non-routine interactive tasks and in non-routine analytical tasks, while routine tasks saw steep declines from 1960 to 2000 (Figure 6.2).[117] Therefore, students preparing for the jobs of tomorrow are likely to be required to solve problems for which there are no clear rule-based solutions and to communicate complex ideas clearly (OECD, 2007d).

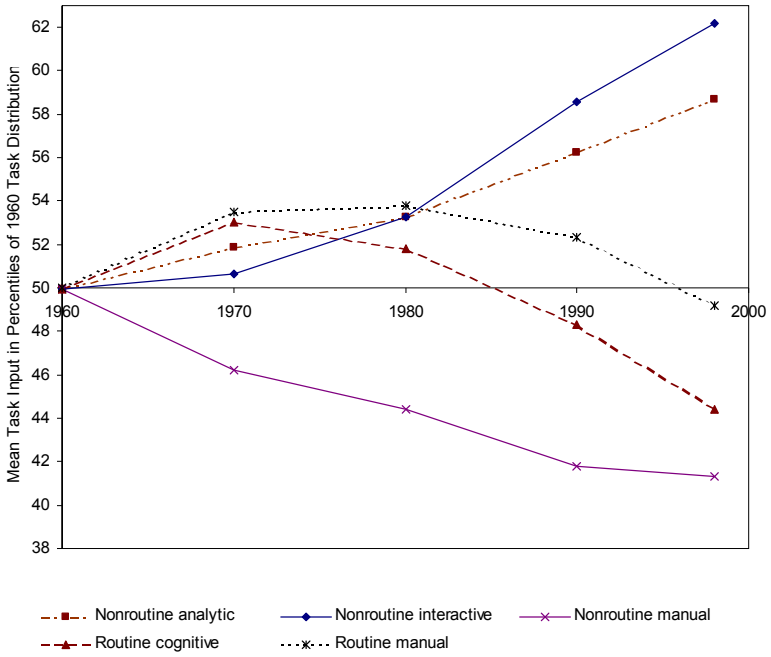
Quality of university system in continental European countries below average

The quality of the university system in an economy determines the ability to adopt complex technologies and create new technologies. The research productivity of universities is a good indicator of the quality of the tertiary education system in a country. One of the most widely used global indicators of the quality of universities is Shanghai Jao Tong University's academic ranking of world universities.[118] According to the 2007 general ranking, there is strong domination by the American universities among the first 50 universities, of which 37 are U.S. universities, five British, one French and one Dutch. The first German and Swedish universities are jointly at the 53rd position. The ranking in the broad field of Engineering / Technology and Computer Sciences (latest ranking – 2008), which may be the most relevant now for technological change, shows only four British universities and five institutions from other European countries among the first 50 universities in the engineering field, none of which are from Germany or France. These rankings may indicate a lack of competitiveness of the top universities from continental European countries and may highlight the need for more resources and/or institutional changes to improve the performance of these universities.

[117] Autor et al. (2003)

[118] The rankings are based on the quality of education and of faculty, research output and size of institution. The most prestigious scientific prizes and the number of citations in scientific journals are used to classify the universities.

Figure 6.2: Trends in Routine and Nonroutine Task Input in the United States (1960-2000).



Source: Autor *et al*. 2003.

While tertiary education provides high-skilled specialists, it is equally important for the educational system of a country to provide intermediate-skilled workers. The traditional apprenticeship system has greatly contributed to providing skilled workers for European countries like Germany, Switzerland, Austria, Denmark, the Netherlands, France and the United Kingdom.[119] Apprenticeship systems are based on some form of public/private cooperation to provide training to young people, with the state, the enterprises, the trade unions and the apprentices as the main participants. The distinctive characteristic is the emphasis on education in the workplace, complemented by vocational courses taken in classrooms.[120]

Apprenticeship system has traditionally been a strong point of German model

In Germany and Switzerland, employers traditionally have a high level of commitment to the system, volunteering to offer apprenticeship places and paying the associated

[119] The apprenticeship system is used by other European countries like Ireland, Italy or Portugal but plays a less significant part in the training of the labour force (Steedman, 2005).
[120] While there are major differences, around 70 percent of time is spent in the workplace (Steedman, 2005).

costs. Concurrently, the participation in apprenticeships has reached more than 50 percent of graduates of secondary schools in Germany and Switzerland. On the other hand, in France and the United Kingdom, employers have a low level of commitment, with the state compensating the firms for the training costs. Only around 15 percent of businesses in France and the United Kingdom have an apprenticeship system. France and the Netherlands integrate the apprenticeship system into the full-time education system, allowing for paths to higher education. Alternatively, in Switzerland and especially in Germany, the apprentices are able to pursue further specialization after graduation to attain technician and *Meister* (master craftsman) status, but do not have a direct path to tertiary education. In Germany the apprentice certification is fully portable, especially compared with the training received in France and the United Kingdom, which is much more firm specific.[121]

Traditionally, the apprenticeship system has been considered one of the main contributors to Germany's economic success. The apprenticeship system has produced a large number of intermediate-skilled workers because of a highly specific model in which the firms voluntarily pay workers to acquire portable skills, leading to higher productivity and wages for workers and international competitiveness for firms – a "high-skill, high-wage" equilibrium. The success of the model is based in part on the German financial system, which allows a long-term view for companies, the German system of industrial relations with its strong trade unions, workers' councils and employers' associations, and the organization of production in the manufacturing sector to promote incremental innovations. The idiosyncratic institutions on which the model is based have made it difficult to copy in other economies. Therefore, the German apprenticeship system has long been seen as a competitive advantage for the German economy.[122]

The apprenticeship system has been more difficult to implement recently

In recent years the apprenticeship system has been the target of criticism, first because the financing became problematic as demand for apprenticeships exceeded supply and created the risk that subsidized apprenticeships would crowd out overall measures for

[121] Thelen, 2007; Steedman, 2001; Culpepper, 1999; and Charraud et al., 1997. For a detailed presentation of the apprenticeship system in presented countries, see Steedman, 2001.
[122] Finegold and Soskice (1988), Culpepper (1999), Ryan (2001), Steedman (2005) and Thelen (2007).

job creation, and second because, in an increasingly flexible labour market, skill requirements of apprentices are continuously changing and are difficult to capture in formal qualifications.[123]

The future of the apprenticeship system may depend on the resourcefulness of its main actors as they continuously react to challenges and develop new strengths. The corresponding increases in the training costs have forced enterprises and the state to find new ways to keep the same high level of training while keeping costs under control.[124] The increasing share of the service sector in the economy is another challenge because the apprenticeship system traditionally was associated with the manufacturing system. The successful introduction of new apprenticeships in the field of information and communication technology in Germany is proof that the apprenticeship system is innovative enough to accommodate a highly dynamic sector.[125]

6.3 Intangible Investment Goes beyond Human Capital[126]

Expenditures on intangibles are, in traditional national accounting, expensed instead of capitalized...

In practice, national accounts statistics do not capitalize intangibles, such as research and development, copyright and licenses, new product development in the financial industry, new architectural and engineering designs, brand equity, human capital and organizational structure. Instead these outlays are expensed, so that they are seen as a cost rather than as an investment. Not measuring intangible assets shows that traditional book-keeping adjusts too slowly to the new knowledge economy.

[123] See OECD (2004).
[124] The new Vocational Training Act, adopted by the German government in 2005, increases the flexibility of the system in several ways, streamlining the procedures for modernizing training and adopting new occupational profiles and promoting the modularizations of the training, which allows cooperation between firms and other institutions (Thelen, 2007).
[125] The shortage of ICT skills in Germany led to the introduction in 1997 of new ICT apprenticeships, with 60,000 apprentices in training by 2001 (Steedman, Wagner and Foreman, 2003).
[126] This section summarizes how much Germany invested in intangible assets in 2004, and compares the results with those for the United Kingdom, the United Kingdom, the Netherlands and France. The estimates for Germany and France are derived from Hao, Manole and van Ark (2008).

Intangible investment is relatively low in Germany …

Recently, Corrado, Hulten and Sichel (CHS) (2005) developed a pathbreaking methodology to measure intangible assets at the national level. They drew up a comprehensive list of intangible assets, estimating that the U.S. private sector invested, on average, 11.7 percent of GDP or $1,220 billion (2000 constant prices) in intangible assets from 1998 to 2000, which was 20 percent more than investment in tangible assets. From 2000 to 2003, the average size of intangible investment was about the same as from 1998 to 2000 (CHS, 2006). Other studies have replicated the results of CHS (2005, 2006) for the United Kingdom, Germany, France and the Netherlands (see Figure 6.3). The market sector of the United Kingdom invested 10.1 percent of GDP in intangibles and that of France invested 8.3 percent of GDP in 2004– all in 2000 prices. Compared with those countries, the market sector of Germany invested less in intangibles at 7.1 percent of GDP in 2004. Intangible investment was larger than tangible investment in the United States (2000-2003), the United Kingdom (2004) and the Netherlands (2004), and was almost as large as tangible investment in Germany (2004) and France (2004) (Figure 6.3).[127]

… and concentrated in innovative property

Intangible assets consist of three major categories (Figure 6.4): economic competency, innovative property, and computerized information. Economic competency includes firm-specific human capital and organizational structure. It is the largest component of intangible investment in the United States, the United Kingdom, France and the Netherlands, and is the second largest component in Germany. Innovative property includes R&D, mineral exploration and evaluation, copyright and licenses, development of new products in financial industry and new architectural and engineering designs. It is the second largest component in the United States, the United Kingdom, France and the Netherlands, and is the largest component in Germany. Computerized information includes software and databases. It is the smallest component of intangible investment in all five countries.

[127] The value here is slightly different from that in Hao, Manole and van Ark (2008), because we use 2000 constant prices for Germany, to be consistent with measures in the following sections. Using current prices reaches different values from using constant prices, because software has different price deflators from GDP.

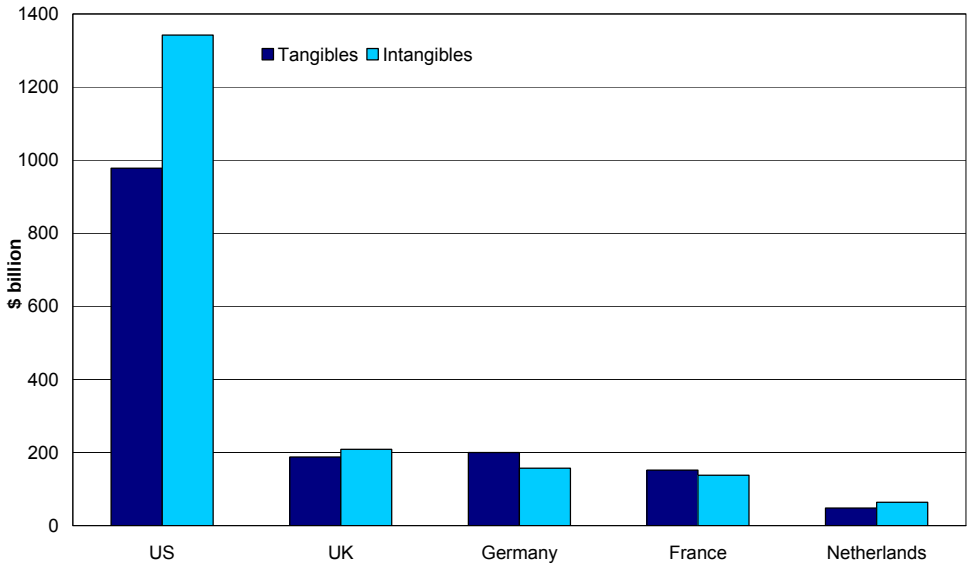
Even though the intangibles share of German GDP increases, the focus remains on manufacturing

A further breakdown of intangible investment shows that in 2004 R&D accounts for the largest shares in GDP among the intangibles (1.69 percent of GDP), followed by firm-specific human capital (1.34 percent of GDP) and organizational structures (0.97 percent of GDP) (Table 6.1).

When focusing on the trends in intangibles in Germany since 1991, it is striking to observe that investment in some intangible assets increased from 1991 to 2004, while investment in other intangible assets decreased during the same period (Figure 6.5). While most intangibles showed a strong acceleration between 1995 and 2000, market research fell considerably as a percentage of GDP. However, since 2000 the trends have been much more diverse. Software and R&D flattened as a percentage of GDP growth, while product development in the financial industry increased. This may, in part, reflect the shift of the economy from manufacturing to services.

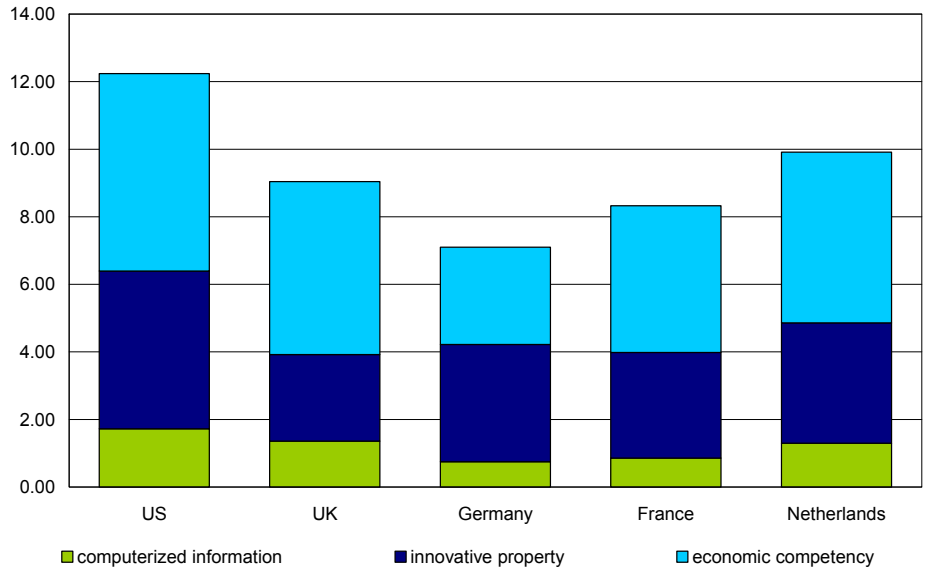
Total (tangible and intangible) investment in the market sector of Germany decreased as a percentage of GDP, from 21.3 percent of GDP in 1991 to 16.1 percent of GDP in 2004. Nevertheless, the role of software and R&D remain relatively large, supporting the notion that manufacturing has continued to retain a strong position in the German economy. Tangible investment in the market sector decreased from 14.3 percent of GDP to 9.0 percent of GDP. In contrast, intangible investment in the market sector increased from 6.9 percent of GDP to 7.1 percent of GDP (Figure 6.6).

Figure 6.3: Tangible and Intangible Investment in the Market Sector in 2004, in bln. US$ (Converted at Exchange Rate)



Sources: Corrado, Hulten and Sichel (2005), Marrano and Haskel (2006), Hao, Manole and van Ark (2008), van Rooijen-Horsten, and van den Bergen and Tanriseven (2008).
Note: The value for the United States is the annual average from 2000 to 2003.

Figure 6.4: Intangible Investment in the Market Sector in 2004 (% GDP)



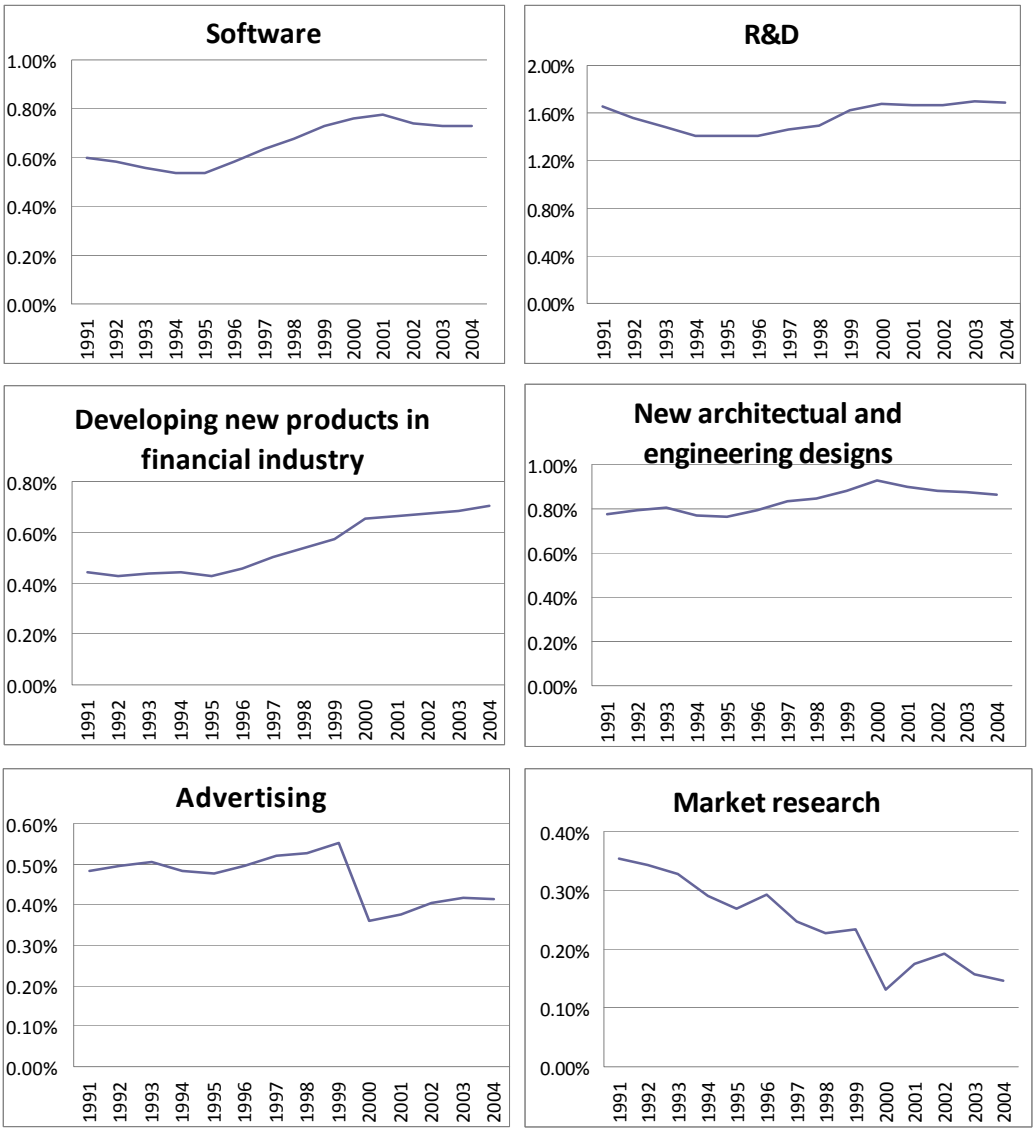
Sources: Corrado, Hulten and Sichel (2005), Marrano and Haskel (2006), Hao, Manole and van Ark (2008), and van Rooijen-Horsten, van den Bergen and Tanriseven (2008).
Note: The value for the United States is the annual average from 2000 to 2003.

Table 6.1: Intangible Investment in the Market Sector of Germany, in 2000 bln. Euros and % of GDP, 2004

Type of Assets	Billion Euros (2000 prices)	% GDP
1. Computerized information	**15.7**	**0.75**
1) software	15.4	0.73
2) databases	0.4	0.02
2. Innovative property	**73.1**	**3.47**
1) R&D, including social sciences and humanities	35.7	1.69
2) Mineral exploration and evaluation	0.1	0.00
3) Copyright and license costs	4.2	0.20
4) Development costs in financial industry	14.8	0.70
5) New architectural and engineering designs	18.3	0.87
3. Economic competencies	**60.7**	**2.88**
1) Brand equity	11.8	0.56
Advertising expenditure	8.7	0.41
Market research	3.1	0.15
2) Firm-specific human capital	28.3	1.34
Continuing vocational training	14.2	0.67
Apprentice training	14.1	0.67
3) Organizational structure	20.5	0.97
Purchased	10.6	0.50
Own account	10.0	0.47
Total	**149.5**	**7.09**

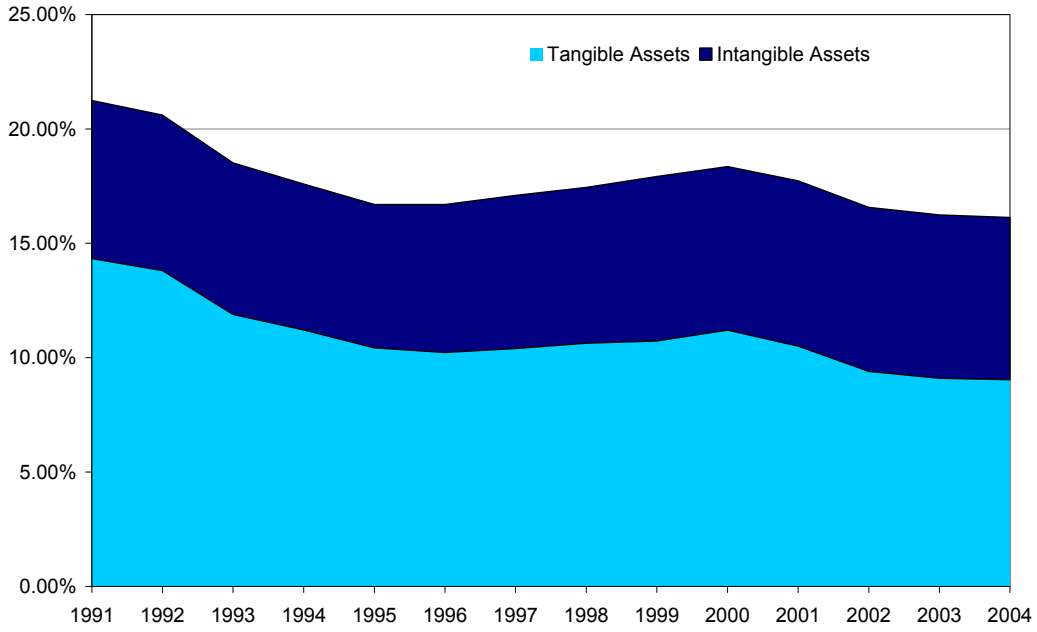
Sources: Hao, Manole and van Ark (2008). Numbers differ from those in Hao, Manole and van Ark (2008), because we convert values in current prices into values in 2000 constant prices, and use EU KLEMS instead of Ifo for software investment.

Figure 6.5: Trends of Investment in Selected Intangible Assets in the Market Sector of Germany as % of GDP, 1991-2004



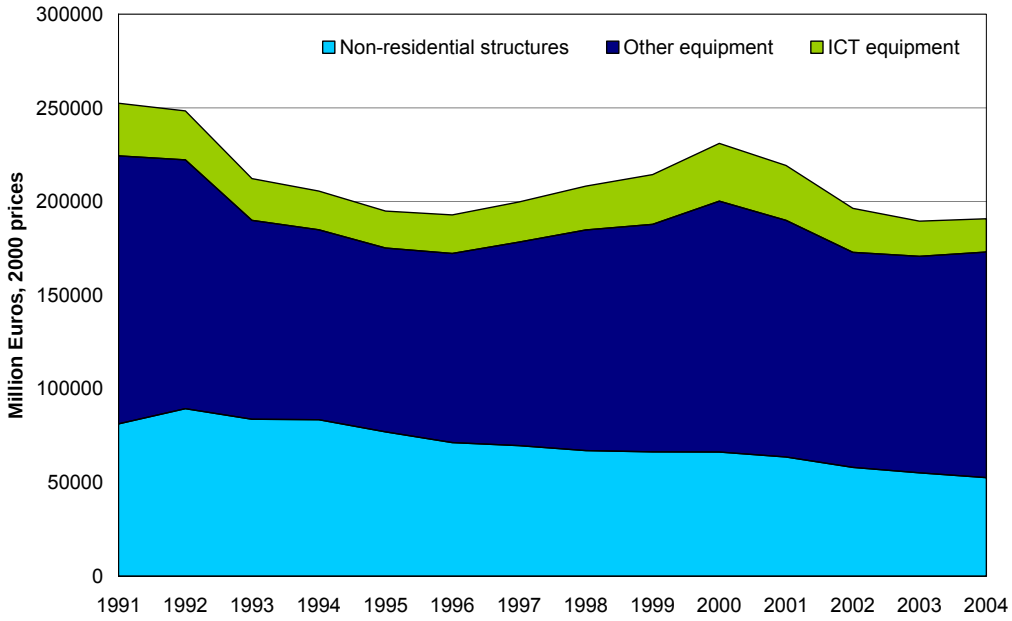
Source: Hao, Manole and van Ark (2008).

Figure 6.6: Total Investment in Tangible and Intangible Assets in the Market Sector of Germany (% GDP)



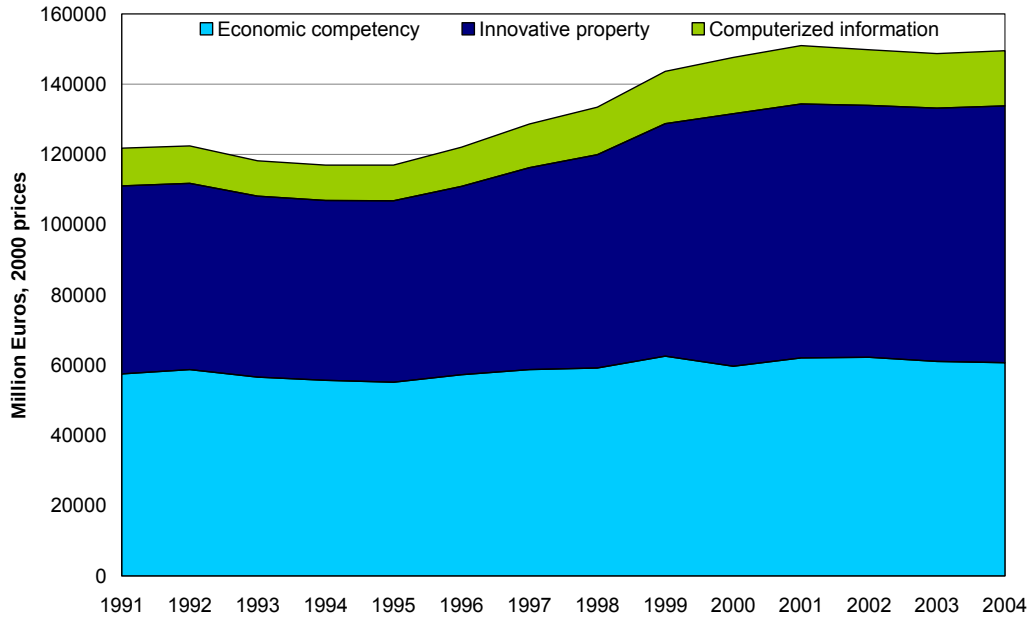
Source: Our estimate of intangible assets, The Conference Board and EU KLEMS.

Figure 6.7: Investment in Tangible Assets in the Market Sector of Germany, 2000 mln. Euros



Source: The Conference Board and EU KLEMS.

Figure 6.8: Investment in Intangible Assets in the Market Sector of Germany, 2000 mln. Euros



Source: Hao, Manole and van Ark (2008).

6.4 Contributions of the Knowledge Economy to Labour Productivity

To determine the contributions of the knowledge economy to productivity growth in the market sector, this report measures the summed contribution of human capital deepening (section 6.2), intangible assets (section 6.3) and ICT tangible assets (see below). We use growth accounting to measure how much each of those assets contributed to the growth of labour productivity in the market sector from 1995 to 2003, comparing Germany with the United States, the United Kingdom and France. Labour input is hours worked. We construct the stock of tangible and intangible assets using the perpetual inventory method, accumulating investments and adopting depreciation rates based on EU KLEMS (for tangibles) and Corrado, Hulten and Sichel (2006).

Table 6.2 and Figure 6.9 present the contribution of tangible ICT assets, intangible assets and human capital deepening to the annual growth of labour productivity in the market sector from 1995 to 2003. We estimate that knowledge contributed 0.76 percentage points of the annual growth of labour productivity from 1995 to 2003 in

Germany, 1.01 percentage points in France, 1.92 percentage points in the United Kingdom, and 1.77 percentage points in the United States.

Contributions of tangible assets shows advantage of United Kingdom over France and Germany

Labour productivity increased by 3.09 percent annually on average in the United States, 2.93 percent in the United Kingdom, 2.34 percent in France, and 2.07 percent in Germany from 1995 to 2003. ICT assets are particular important in the United Kingdom, contributing 1.02 percentage points of the annual growth of labour productivity, while in the United States, Germany and France, ICT tangible assets contributed to 0.6, 0.27, and 0.17 percentage points, respectively. Intangible assets are more important in the United States and the United Kingdom than in Germany and France. Intangible assets contributed to 0.84 and 0.59 percentage points in the United States and the United Kingdom, compared with 0.45 and 0.55 percentage points in Germany and France.

The contribution of human capital in Germany fell behind all countries

Among intangible assets, human capital deepening contributed 0.04 percentage points in Germany, 0.29 percentage points in France, 0.31 percentage points in the United Kingdom and 0.33 percentage points in the United States, clearly showing the slowest contribution in Germany. The slow growth in Germany is particularly related to the rapid increase in low-skilled labour, relative to the growth of high and medium-skilled personnel.

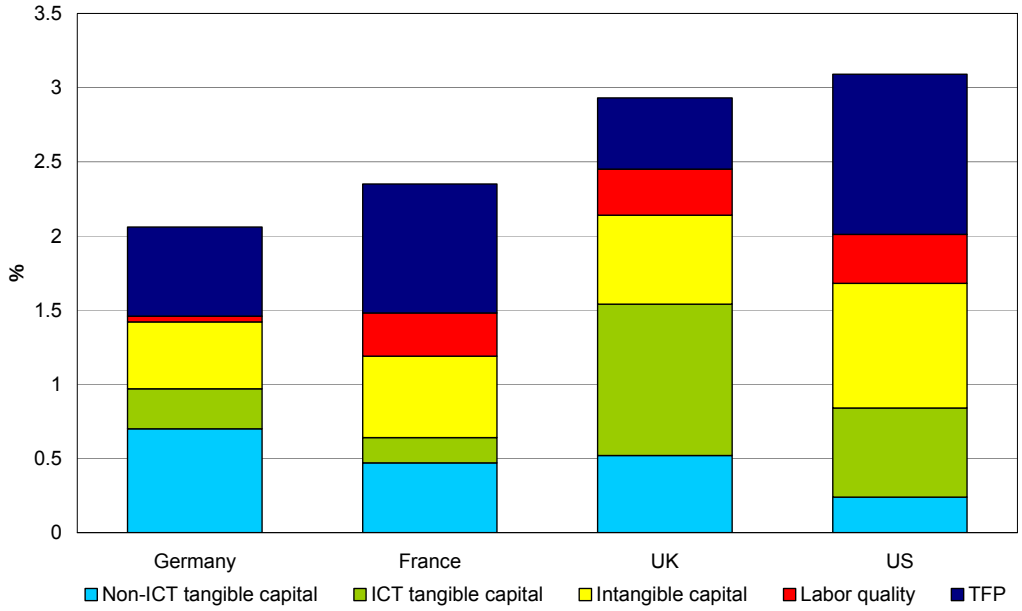
Table 6.2: Annual Growth of Labour Productivity in the Market Sector (%), 1995-2003

	Germany	**France**	**U.K.**	**U.S.**
Labour Productivity	2.07	2.34	2.93	3.09
Capital deepening	1.42	1.19	2.14	1.68
Tangibles	0.97	0.64	1.54	0.85
ICT equipment	0.27	0.17	1.02	0.6
Other	0.70	0.47	0.52	0.24
Intangibles	0.45	0.55	0.60	0.84
Software	0.09	0.12	0.18	0.27
Other	0.36	0.43	0.41	0.57

Human capital deepening	0.04	0.29	0.31	0.33
MFP growth	0.60	0.87	0.48	1.08

Sources: Corrado, Hulten and Sichel (2005), Marrano and Haskel (2006), Hao, Manole and van Ark (2008), and EU KLEMS.

Figure 6.9: Contribution to Labour Productivity in the Market Sector (annual average, 1995-2003)



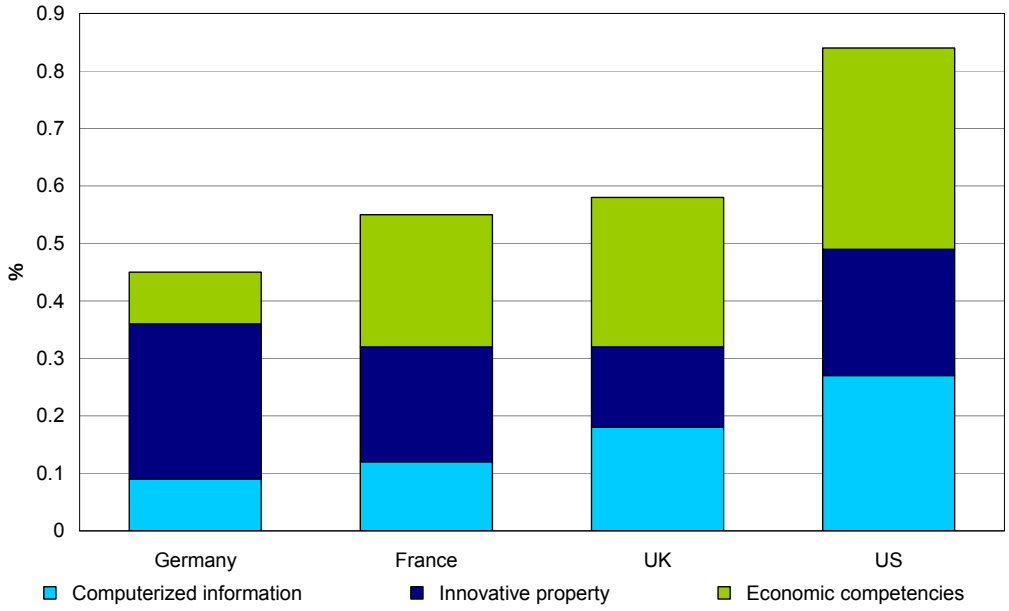
Sources: See Table 6.2.

Table 6.3: Intangible Assets Contribute to Labour Productivity in the Market Sector (%), 1995-2003, Comparing with United States, United Kingdom and France

Intangible Assets	Germany	France	U.K.	U.S.
All Intangible Assets	0.45	0.55	0.59	0.84
Computerized information	0.09	0.12	0.18	0.27
Innovative property	0.27	0.20	0.14	0.22
Economic competency	0.09	0.23	0.26	0.35
Brand equity	-0.02	0.07	0.04	0.08
Firm-specific resources	0.11	0.16	0.23	0.27

Sources: Corrado, Hulten and Sichel (2005), Marrano and Haskel (2006), Hao, Manole and van Ark (2008).

Figure 6.10: Contribution of Intangible Assets to the Growth of Labour Productivity in the Market Sector, 1995-2003



Sources: Corrado, Hulten and Sichel (2005), Marrano and Haskel (2006), Hao, Manole and van Ark (2008), and EU KLEMS.

Intangibles contribution to productivity growth in Germany and France fell behind. CHS (2005) estimated that intangible assets contributed to 0.84 percentage points to the annual growth of U.S. labour productivity of 3.09 percent on average from 1995 to 2003. CHS (2006) was replicated by Marrano, Haskel and Wallis (2007) for the United Kingdom. They estimated that intangible assets contributed to 0.59 percentage points of U.K. labour productivity growth of 2.93 percent annually, on average, from 1995 to 2003. In contrast, the contribution in France and Germany was only 0.45 and 0.55 percentage points, respectively, much less than the contribution of intangibles in the United States.

Innovative property is the most important intangible asset in Germany, contributing 0.27 percentage points to the annual growth of labour productivity, more than in any of the other countries (Table 6.3 and Figure 6.10). This probably underlines the dominant manufacturing-based characteristics of the innovation process in Germany, even though services innovation has recently improved as well.

Growth of labour productivity slowed after 2000 …

As we have seen before, productivity growth in most European countries, including Germany, has slowed since 2000. From 1995 to 2000 labour productivity in the market sector of Germany grew by 2.20 percent each year on average. From 2000 to 2004, labour productivity in the market sector grew by 1.63 percent each year on average (Figure 6.12).

… because of tangible assets and multifactor productivity

This report's analysis shows that intangible assets became more important over time in the productivity growth of the market sector, while tangible assets became less important over time. Non-ICT tangible assets became less important as a contributor to growth since 2000. From 1995 to 2000, non-ICT tangible assets contributed 0.65 percentage points of annual growth of labour productivity, but from 2000 to 2004 they contributed only 0.62 percentage points of annual growth. ICT tangible assets contributed 0.33 percentage points of annual growth from 1995 to 2000 and only 0.19 percentage points from 2000 to 2004.

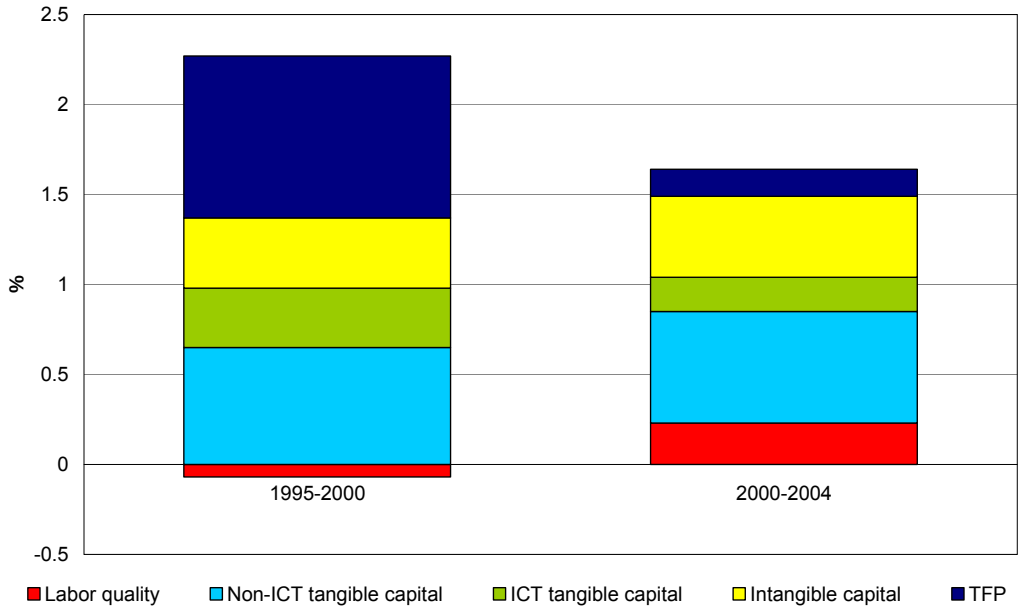
Multifactor productivity (MFP) accounted for most of the decrease in the labour-productivity growth from the first period to the second period. MFP contributed to 0.90 percentage points of the annual growth of labour productivity from 1995 to 2000, but contributed to only 0.15 percentage points from 2000 to 2004. While MFP represents a wide range of factors that may drive or limit the efficiency of the production process, the uncompleted reform agenda, the nature of the dual economy and slow transformation to productive services may have been the important causes, as discussed in this study.

Intangible assets and labour quality keep growing

Intangible assets stabilized the growth of labour productivity from the first period to the second period. Intangible assets contributed 0.39 percentage points of annual growth from 1995 to 2000 and 0.45 percentage points from 2000 to 2004. Labour quality contributed -0.07 percentage points of the annual growth of labour productivity from 1995 to 2004 but contributed 0.23 percentage points from 1995 to 2004.

Other research, which typically examined only one intangible asset or a small set of intangible assets, has also indicated that intangible assets promote economic growth. Software investment, for example, drove the growth of labour productivity from 1991 to 2004 in Germany. In particular the software-intensive industry contributed 35 percent of labour productivity growth in the whole economy from 2000 to 2004.[128] Studies for European countries, often based on the EU's Community Innovation Survey, showed that product innovation, process innovation and efficient organizational structure has driven the growth of labour productivity.[129]

Figure 6.11: Contribution to Labour Productivity in Germany in the Market Sector, 1995-2000 and 2000-2004 (annual average growth, %)



Sources: Our estimate of intangible assets, and EU KLEMS.

[128] Eicher and Strobel (2008)
[129] Pianta and Vaona (2007)

6.5 The Sustainability of Productivity through Social and Economic Progress

Productivity leads to growth of income and living standards...

Productivity is not only important for economic growth; it also creates productive jobs, a process that has been the focus of this study. Productivity is also important for social progress for at least two reasons. The first and most obvious is that, together with a greater use of labour, productivity positively contributes to per capita income, which is a reasonable proxy for living standards. As shown in Chapter 2, the traditional trade-off between productivity and job creation is not automatic and subject to a well-functioning labour market, particularly when societies create more services activities as they grow richer.

… and to accumulation of new tangible and intangible capital

The second reason, less obvious but perhaps more important, is that labour-productivity growth often goes hand-in-hand with the accumulation of intangible capital. Intangible capital contributes to social progress as workers become equipped with more human capital, more knowledge and access to networks, which may ultimately lead to a feedback effect in which the creation of more social capital strengthens the knowledge base of the economy.

Positive feedback between social and economic progress depends on incentives...

The positive spiral between social progress and investment can generate sustainable productivity growth, which ultimately depends on an optimal allocation of tangible and intangible sources of growth. Productivity and job creation, without long-term trade-offs, are feasible under such a model, provided that new sectors and industries can develop and flourish and are not constrained by lack of growth or innovation potential because of product market regulations or restricting practices initiated by interest groups. Policies that create incentives to invest in and accumulate tangible and intangible assets are of major importance in generating productivity growth.

… and non-distortionary distributions of the gains from productivity growth

There is also a need to distribute the social and economic returns from such investments to sustain the positive feedback mechanisms. This requires policies to reduce distortionary effects from redistribution that cause misallocations of resources. In a competitive environment, the gains are most likely to go to the end user, but in a less competitive environment the owners of capital and labour may benefit unduly. The policy framework therefore needs to create checks and balances to generate incentives for investment and effectuate distribution of the returns.

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