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LABOUR SUPPLY AND EMPLOYMENT IN THE EURO AREA COUNTRIES

DEVELOPMENTS AND CHALLENGES

Task force of the Monetary Policy Committee
of the European System of Central Banks

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CONTENTS

TASK FORCE OF THE MONETARY POLICY COMMITTEE OF THE EUROPEAN SYSTEM OF CENTRAL BANKS

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RATIONALE AND MAIN OBJECTIVE OF THE REPORT

The functioning of labour and product markets affects the economic environment in which monetary policy is conducted. For example, structural policy measures which enhance labour supply and employment growth increase the pace at which an economy can grow without higher inflation. A greater flexibility of euro area labour markets and wages would reduce adjustment costs and inflation pressures in the case of adverse supply shocks and augment resilience of the economy, facilitating the conduct of the stability-oriented monetary policy of the ECB. In addition, an enhanced flexibility of wages and labour mobility is needed to limit employment losses in the case of adverse country specific shocks, thereby facilitating the functioning of EMU.

Labour markets in the euro area, as in other developed economies, face the triple challenge of demographic change, technological progress and globalisation. *Demographic change* (a decrease in the size of the working age population and an increase in the average age of the labour force) reinforces the need to increase labour market participation and employment in the euro area. Increasing the share of people working will help to support the euro area's potential output and per capita income, and reduce the old-age dependency ratio. All this would help to finance pension and health care systems and to reduce the per capita financing burden for those who have to pay for these systems via taxes and social security contributions. *Technological progress* results in firms searching for people with new types of skill and knowledge. In order to support both high wages and low unemployment, it is important that the population of the euro area is well educated and trained in the types of skills that firms seek and that workers invest in enhancing and developing their skills over the course of their working lives. Efficient schooling and education systems, including vocational training, will play an important role in enhancing investment in education and equipping individuals (including

older persons) with both the skills demanded in the labour market at any point in time and the general competences that will allow them to adapt flexibly to new developments in labour demand. In this context, training in skills sought by traditional industries also remains important. Finally, *globalisation* increases the ease with which firms can either hire labour from abroad (through immigration) and/or relocate their production and services. It also increases the competition faced by firms in the production of goods and services. For workers in Europe, this means that they have to remain competitive in terms of the interplay between type and level of skills, adaptability, productivity and compensation packages.

Against this background and to successfully face this triple challenge, conditions must be in place that enhance the quantity and quality of labour supply and efficiently match the workforce with firms' demand for labour. This is necessary to maximise individuals' income and welfare and – at the aggregate level – an economy's potential output, allowing an increase in the economy's rate of sustainable growth. Well-designed and flexible labour and product market institutions are essential to this process. Moreover, structural policy changes that enhance incentives for schools, universities and firms to identify and develop the "right" skills are needed. In addition, the euro area should make the best use of global labour supply through immigration, ensuring that immigrants are effectively integrated into its labour market and society.

The aim of this report, which has been prepared by a Task Force of the Monetary Policy Committee of the Eurosystem, is to describe and analyse the main developments in labour supply and its determinants in the euro area, review the links between labour supply and labour market institutions, assess how well labour supply reflects the demand for labour in the euro area and identify the future challenges for policy-makers. The data available for this report generally cover the period from 1983 to spring 2007. The cut-off date for the euro area statistics included was 14 December 2007.

**MAIN FINDINGS ON DEVELOPMENTS IN
LABOUR SUPPLY:**

Following a conceptual introduction to labour
supply from a macroeconomic perspective in
Chapters 1 and 2, Chapter 3 documents the key
developments in labour market participation,
employment and hours worked in the euro area
and EU Member States. Particular emphasis is
given to issues relating to the quality of labour
and human capital and immigration. Chapter 3
finds that:

i) over the period 1996-2007, overall labour
market developments appear to have been
quite favourable for the euro area as a whole.
Employment growth accelerated significantly,
with the equivalent of 21.6 million new jobs
created. This contributed to a substantial
3.9 percentage point reduction in the
unemployment rate, which stood at 7.5% in
spring 2007. As a result, the positive gaps in
labour market participation and employment
rates between the United States and the euro area
became narrower and are now closer to those
prevailing in the early 1970s. In the euro area,
the total labour market participation rate rose by
5.6 percentage points over the period 1996-2007,
to nearly 71%, and the employment rate rose by
7.7 percentage points to over 65%. The highest
levels of participation in 2007 were registered
for men at 78% (employment at 73%), for prime-
aged individuals at 85% (79%), for citizens of the
new EU Member States (countries joining the
EU since 2004) at 77% (69%) and for the highly
educated at 88% (85%). Increases in participation
have compensated for a slight decline in the
working age population in recent years. However,
whilst much has been achieved, there is no room
for complacency. For example, labour supply
projections show that even if these positive
participation trends continue, they will soon no
longer be sufficient to counteract the fall in the size
of the working age population. Furthermore, by
international standards, many euro area countries
continue to exhibit high unemployment rates and
low labour market participation;

ii) labour supply composition has changed over
time. Particularly *women* and the so-called

non-EU15 immigrants (immigrants from the
new EU Member States and non-EU countries)
have entered the labour market in increasing
numbers, and *older workers* have tended to
remain in the labour market for longer. The
participation of these groups increased by
9.0 percentage points, 7.4 percentage points
and 10.5 percentage points respectively
over the period 1996-2007. Changes in
educational levels, preferences and social
norms have, over time, played a role in
increasing female labour market participation
(through so-called cohort effects). Experiences
with *immigration* vary considerably by
country, but on the whole, immigrants have
contributed positively to labour supply and
employment, enhancing competition in labour
markets and helping to fill skills shortages.
Cross-border commuting within the euro
area has increased threefold in the last ten
years. Potential for further increases in labour
market participation exists, particularly among
younger workers (following completion of
their education), women and older workers, and
through enhancing immigrants' integration;

iii) these developments have been accompanied
by an increase in *labour quality* and the
share of workers with higher education,
particularly those with tertiary level education
(by 6 percentage points between 1996 and 2007,
to a level of 20.7%). This implies an increase
of 16.7 million in the number of people with
tertiary level qualifications. The proportion of
low-skilled workers decreased in the euro area
over the period considered (by 9 percentage
points to a level of 37.7%). However, the level
of human capital in some euro area countries
lagged behind that in other advanced countries,
and labour quality growth seems to have slowed
towards the end of the 1990s, highlighting
the need for further increases in educational
attainment and on-the-job training; and

iv) as the number of workers has increased,
the *average hours worked per week* has
declined in the euro area (by a total of
1.2 hours over the period 1996-2007). This
reflects changes in working time regulations

and especially an increase in part-time jobs, which has helped women, in particular, to join the labour market in greater numbers. The ratio of part-time to total employment increased by around 5 percentage points over the same period.

MAIN FINDINGS ON THE STRUCTURAL POLICIES DETERMINING PARTICIPATION AND EMPLOYMENT AND POLICY CONCLUSIONS:

Chapter 4 reviews how structural policies affect labour supply and may have contributed to the developments observed. Chapter 5 presents evidence on how well the characteristics of labour supply have reflected those of the demand for labour over the last two decades and discusses how to respond to the main challenges. The welcome developments in participation and employment rates over the last decade partly reflect increased labour market flexibility and reform progress. However, this progress has been quite uneven across countries. Looking forward, a priority for economic policies is to ensure high potential output, greater flexibility and resilience of the euro area countries to shocks. While there is often no single solution for all, it is important that countries learn from each other and from best practices to develop new and better labour market institutions and policies which will help to achieve desired results. Identifying which economies have performed best with regard to which specific policy areas should help with this. Furthermore, it is important to consider reform packages as a whole when embarking on reform processes, in order to predict trade-offs in a timely manner and ensure that policies are complementary within the framework of a comprehensive reform strategy. The key findings and policy conclusions of the report are as follows:

i) The analysis undertaken in Chapter 4 shows that structural policies affect, inter alia, individuals' labour market decisions and household income. There is a *need to further optimise policies in the euro area and to increase the labour market participation and employment of all groups, especially females and non-prime-aged*

workers. Reducing high marginal tax rates and tax wedges, high unemployment benefit levels and long durations, weak work availability requirements and early retirement schemes would stimulate labour supply and income. Tax and benefit systems should not discourage older workers from voluntarily staying longer in the labour market (for example, financial disincentives for extending participation beyond standard retirement ages should be removed). Reducing taxes and social security contributions on labour, especially if funded by expenditure constraint and enhanced efficiency of public finances, would enhance employment and net wages, as well as provide additional incentives for individuals to move from unemployment to work or to invest in human capital. Restrictions on working arrangements and labour contracts should be reduced to allow for more flexible working hours (both higher and lower than standard contracts) and more flexible employment protection. Furthermore, so called "work/family reconciliation" policies that facilitate the combination of work and a family (such as the provision of affordable childcare, parental leave and part-time work opportunities) should be well-designed to support and encourage labour market participation and ensure equal opportunities. Evidence suggests that the success of reform measures hinges on the use of comprehensive reform strategies that take into account the factors that may influence individuals' decisions to work and the ease with which they find a job.

ii) Chapter 5 shows that *labour market regulations and institutions need to be more flexible to facilitate the matching of labour supply with labour demand* (across skills, worker groups, sectors and regions). Labour market institutions should be geared towards lowering adjustment costs (e.g. by reducing employment protection) and barriers to cross-occupation and geographical labour mobility (e.g. through common educational standards and easier pension transfers) and should offer appropriate incentive-compatible financial support for those temporarily unemployed and job search assistance. Flexible wage bargaining

is important for allowing wages to reflect local labour market conditions (such as regional and skill-specific unemployment rates, regional and sectoral productivity growth and workers' skills). Wages that are not sufficiently differentiated – for example, by skill or region – exacerbate the mismatch between labour supply and labour demand (also by not providing the incentives for capital to shift to areas with high unemployment), thus increasing the unemployment rates of certain skill groups and regions. Institutions have an important role to play in matching labour supply with labour demand. Public employment services need to be more efficient. Institutional arrangements that hinder the employment of low-skilled workers (such as excessive minimum wages) should be avoided. Contractual arrangements should give individual workers greater freedom to agree on contract details (e.g. working hours and options to invest in additional training). Moreover tight product market regulation, and more generally measures that hinder or restrict competition, are an impediment to job creation. Policies that increase competition in goods and service markets, such as those that reduce the administrative burden on firms start-ups and remove statutory barriers to entry in certain sectors, would help support employment creation.

iii) Chapters 3, 4 and 5 highlight *the need to increase skills and knowledge (and thus the quality of labour supply) and the transferability of skills*. Employment normally enhances skills because workers learn by doing. Therefore, bringing unemployed or inactive people into jobs will, over time, enhance individuals' labour productivity and thus real wages. An efficient framework for training and counselling the (long-term) unemployed should help them to remain employable. The large differences in tertiary education funding between the United States and the euro area should be addressed also by enhancing conditions for private funding. In addition, the labour market (including firms) should play a stronger role in

signalling to education systems and workers which skills are expected to be in short supply. Good quality education should be ensured, in particular, by enhancing the relevant incentives and recognition for young people, workers and firms to invest in education and training. The efficiency and service orientation of education institutions should be improved, e.g. by enhancing some elements of competition and external quality controls.

iv) Evidence presented in Chapters 3, 4 and 5 also shows that *the euro area should make better use of skills from outside the euro area*. However, immigration is not a substitute for economic reform geared towards removing barriers to high labour market participation. Rather, it provides a means through which the euro area can tap into the global supply of labour resources and fill domestic skill shortages. From an economic perspective, the benefits derived from immigration depend on the characteristics of migrants entering the euro area and the ease with which they integrate into work and society. Immigration policy should be closely aligned with the skills needed by the labour market, ensuring appropriate migration flows that have the potential to fill gaps in labour supply and ease adjustments over time (particularly in view of population ageing). Selective migration policies which limit labour mobility within the EU should be avoided and replaced by measures that support labour market mobility (such as the increased portability of pension rights). Policies that ensure the successful integration of immigrants into the active workforce and society as a whole (e.g. through incentives to broaden language skills) are crucial. Successful integration is also important because some migratory flows are not steered in line with immediate skill needs (such as family reunification and asylum seekers). In some countries, reforms may be necessary before larger numbers of immigrants can be expected to be integrated successfully into labour markets.

I INTRODUCTION [1]

This report aims to analyse the main developments in labour supply and its determinants in the euro area, describe the level and structure of employment,[2] review some of the links between labour supply, labour market institutions and economic performance, assess how well labour supply reflects the demand for labour in the euro area, and identify challenges relating to these topics for policy-makers.

These issues are very important for economic development and welfare more generally, both at an individual and aggregate level. They are also important from a central bank perspective, since labour supply affects the environment in which monetary policy is conducted. The precise impact of changes in labour supply on potential and actual output, as well as on the natural and actual unemployment rate, is affected by the design and flexibility of labour and product market institutions and by the adjustment of labour costs to these developments. In this report labour supply is understood in a broad sense to cover the size and composition of the labour force (including the self-employed) by age, gender, educational attainment level and nationality (as an indicator of immigrant status) and is thus analysed in terms of both quality and quantity.

The main developments in euro area labour markets, from a long-term perspective, are a significant decline in employment rates and an increase in unemployment rates, which started in the 1970s. Over the most recent decade developments reversed, leading to rising labour force participation and employment rates, as well as declining unemployment rates. Policy initiatives, such as the European Employment Strategy and the Lisbon Agenda for Growth and Jobs, and a favourable macroeconomic environment, have supported these recent improvements. Many euro area countries have made some progress with labour market reforms, such as improving work incentives, and by reducing product market regulations, which also affect labour market performance. However, this progress has been quite uneven across countries and further reform of labour and product markets is needed. By international standards, most euro area countries still have high unemployment rates and low labour market participation. Such levels cannot be explained by factors like cyclical development, suggesting that there are still structural and institutional barriers to labour supply and employment within the euro area. In this respect, it is possible to identify a number of specific labour supply characteristics in the euro area (and, more widely, Europe) that warrant further consideration. These include low (but increasing) female labour supply rates, a relatively low youth labour force participation rate but an increasingly educated workforce, relatively high early retirement rates, recent increases in immigration, high youth unemployment rates and the existence of labour market mismatches across certain groups of the labour force, regions and skills.

This report is organised as follows: Chapter 2 briefly discusses labour supply in the macroeconomy from a conceptual point of view. It details how developments in labour supply are relevant to economic developments, welfare and monetary policy, outlining the possible impact of changes in both the quantity and quality of labour supply on wages and output over the short to medium term. Institutions' conceptual role in shaping this impact is also discussed. Chapter 3 presents empirical evidence on the main trends in the quantity and quality of labour supply and employment in the euro area and euro area countries over the last two decades. It considers how the age, gender, educational attainment and nationality profile of labour supply in the euro area has changed over time by assessing the participation and employment of these sub-groups. Particular emphasis is given to developments in immigration and the supply of human capital. Chapter 4 reviews how structural policies affecting labour supply – namely tax and benefit systems, work-family

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1 Prepared by J. Turunen and M. Ward-Warmedinger.
2 Providing a comprehensive analysis of the determinants of employment would require a deeper analysis also of labour demand issues and falls outside the scope of this report.

balance policies (including the provision of childcare and part-time work opportunities), immigration and educational policy – may have helped shape the labour supply developments of the sub-groups considered in the previous chapter. It presents qualitative assessments of key reforms and structures and their impact on the quantity and quality of labour supply. Looking forward, policies affecting labour supply will need to accommodate a number of challenges. Chapter 5 presents evidence on how well labour supply has reflected the demand for labour over the last two decades by analysing the returns to education and the level and change in unemployment rates by skill, region, age, gender and nationality. It presents a brief overview of how labour and product market institutions affect the matching of labour supply with labour demand. Finally, it discusses the implications of globalisation, demographic and technological change for the future composition of labour supply.

2 CONCEPTUAL ISSUES RELATING TO LABOUR SUPPLY AND THE MACROECONOMY [3]

Labour supply developments, in terms of size, quality and composition, are a major determinant of an economy's potential output, affecting an economy's rate of sustainable growth. Increasing the share of people and skills in work will also help support per capita income and reduce the old age dependency ratio, which would help reduce the fiscal burden related to population ageing. Furthermore, the cyclical sensitivity of labour supply can affect labour market tightness and thereby influence the outlook for wages and prices and inflation dynamics over the business cycle frequency. The labour supply's precise impact on potential and actual output, and on the natural and actual unemployment rate, is affected by the design and flexibility of labour and product market institutions and the response of labour cost developments. Sub-optimal structural and fiscal policy measures may undermine productivity and increase structural unemployment, with consequences for monetary policy. Such factors also affect individuals' decisions to supply labour and the types of labour supplied (discussed further in Chapter 4). Changes in the composition of labour supply [4] relative to demand can have important consequences for the unemployment rates of particular groups of workers (and thus total unemployment rates), especially if labour markets or wages are not sufficiently flexible (discussed further in Chapter 5). These factors influence labour supply developments' impact on actual and expected wage and price pressures, with possible implications for the conduct of monetary policy. This chapter briefly reviews how developments in labour supply affect the macroeconomy and their relevance for monetary policy.

Labour supply is a key contributor to economic growth. Both an increase in labour input as measured by total hours worked (employment times hours worked per worker, sometimes referred to as labour utilisation) and improvements in human capital have the potential to contribute positively to real GDP,

income growth and welfare. Labour utilisation is largely determined by developments in population growth (itself a function of fertility and mortality rates and immigration, discussed further in Box 1) and the likelihood that those in the working age population participate in the labour market (dependent on job opportunities and incentives/disincentives to enter the labour market, discussed further in Chapters 4 and 5). Furthermore, hours worked from a long-run perspective – that is total hours of work over an individual's lifetime – affect the level of output. The potential for the supply of human capital (encompassing factors such as the quantity and quality of formal education, labour market experience and on-the-job training, as well as a broader set of competencies, e.g. cognitive abilities) to contribute to growth appears substantial as reflected in the prominent role of human capital in modern growth theory. In particular, endogenous growth models suggest that improvements in human capital can generate technological progress and thus productivity growth in the long term.[5] Human capital contributes to measured total factor productivity growth through changes in the skill composition of the workforce and possible interactions between human capital and technology adoption.[6]

Changes in labour supply at the business cycle frequency can affect labour market tightness. Besides the magnitude and the persistence of a positive or negative labour supply shock, the extent and propagation of its impact on macroeconomic variables depends on its interaction with the economy's institutional framework. Three main categories of rigidities influence the transmission of a labour supply shock (and on the short-run unemployment-inflation trade-off), namely real wage rigidity, the rigidity of contracts (e.g. contract duration

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3   Prepared by K. Stovicek, J. Turunen and M. Ward-Warmedinger.
4   See Section 3.2.3 and section 3.2.4 for a discussion of composition effects in labour market participation and their effect on aggregate levels and trends in labour supply.
5   Barro and Sala-i-Martin (2004).
6   See Gomez-Salvador et al. (2006) for a more detailed description and further references.

and contract design flexibility) and rigidities in the legislative and economic framework (e.g. employment protection).[7] The interaction of a positive labour supply shock with rigid labour market institutions may shift adjustment over the business cycle from prices (wages) to quantities, thus increasing unemployment in particular in the short to medium run. Furthermore, lower incentives to take up a job (e.g. stemming from disincentives created by the unemployment insurance system), as well as regulations restricting labour demand, such as high minimum wages, may contribute further to a larger accommodation of increased labour supply via unemployment. From this perspective, labour and product market reforms (that, for example, reduce red tape, enhance real wage flexibility, lower employment protection, increase incentives from unemployment insurance systems etc. – see Chapter 4) may contribute to an economy's shock absorption capacity, by either dampening the unemployment effect of the labour supply shock, or speeding the economy's return to a high employment equilibrium by lowering the persistence of employment and output fluctuations.[8] Some of these structural reforms may also help lower the natural rate of unemployment.

The measured participation rate tends to be procyclical, since persons on the edge of labour market attachment (who have acquired little work experience or career-specific education[9]) and who are more likely to move in and out of the labour market react to changes in labour market conditions and job availability (discussed further in Chapter 4). The degree to which labour supply adjusts through participation is also affected by market rigidities, job availability and matching frictions. Movements in and out of the labour force may complicate the task of measuring labour market participation and unemployment with precision, since changes in the measured participation rate may not reflect a change in individuals' preferences (since, for example, labour market rigidities may mean that those wishing to work are discouraged from participating in the labour market). Issues related to the difficulty of measuring

labour market participation and unemployment (arising from, inter alia, actual moves in and out of the labour market or from work in the informal economy) are discussed further in Annex 1 and Box 11. Average hours worked (per person employed) are also procyclical since they provide an adjustment mechanism for employment. This form of adjustment may be particularly relevant for firms expecting a change in product demand to be short-lived and operating in the labour market with substantial adjustment costs to employment (in terms of persons employed). The shift from full-time to part-time employment, and vice versa, is another driver of changes in hours worked.

Changes in the composition of labour supply relative to demand also have important consequences for the wage structure and unemployment rates of sub-groups of workers. Assuming unchanged demand for each labour type and flexible wages, an increase (decrease) in the relative supply of a specific type of workers results in a lower (higher) wage for that type, relative to other types. If, however, relative wages are not completely flexible, the change in relative supply results in changes in relative unemployment.

Finally, changes in labour supply naturally have implications for monetary policy, since they may affect the actual and natural rates of unemployment and inflation dynamics. The institutional framework is also important in this context, since it can affect both the transmission of a labour supply shock to inflation dynamics (in particular through its affect on wage developments and their pass-through to prices) and the transmission of monetary policy to inflation itself (through its effect on adjustment in the labour market). Recently, the development

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7   See Layard et al (2005).
8   As stated in Duval, Elmeskov and Vogel (2007), there is no simple link between rigidities in labour and product markets and resilience, since institutions that dampen the initial impact of a shock may also increase its persistence and vice versa. Therefore the net effect of structural policies remains an empirical issue.
9   See e.g. Aaronson, Fallick, Figura et al. (2006), Bradbury (2005), Elmeskov and Pichelman (1993), Clark et al (1979).

of micro-founded structural models to incorporate various labour market features shows that labour market rigidities, notably wage rigidity, increase inflation persistence, thereby changing the short-run trade-off between inflation and unemployment.[10] In this framework, labour market rigidities may affect an optimal monetary policy aiming to reduce the welfare costs of macroeconomic fluctuations.[11] In a more flexible labour market, wages could be expected to more closely reflect workers' marginal productivity, reducing the impact of a labour supply shock on short-term inflation.

10 Within the literature to date, labour supply shock transmission is strongly dependent on a model's characteristics.
11 Blanchard and Gali (2007) explore the transmission of a productivity shock in the framework of real wage rigidity. They find that to the extent this transmission has implications in the medium term, optimal monetary policy may take into account both inflation and the output variability. Christoffel, Kuester and Linzert (2006) find that in the presence of labour market frictions and wage rigidity, an optimal monetary policy might consider both wage and price inflation in their monetary policy reaction function.

This chapter presents empirical evidence on the main trends in the quantity and quality of labour supply in the euro area from the early 1980s onwards using data from Eurostat's Labour Force Survey (EU-LFS).[13] Labour supply developments are discussed in terms of changes in population, labour market participation and hours worked by four main individual characteristics: age, gender, education and nationality. The chapter also briefly covers measurement issues relating to the main indicators of labour supply, with emphasis on the measurement of human capital and the quality of labour supply. Finally, this chapter describes recent developments in immigration with a focus on the euro area countries where migration has been particularly important for labour supply.

When using data on employment, unemployment and the labour force, it is important to take note of some measurement issues that can potentially lead to some mis-measurement of the true levels of these variables. For instance, a number of individuals working in the shadow economy and in household production are not registered as employed. Moreover there are individuals who do not work but are available to work, and may not be captured by the definition of unemployment used to collect labour market statistics in the EU-LFS, resulting in an underestimation of the actual labour supply (see Annex 1 for a more detailed discussion). For example, since non-participation and the number of hours worked are not just the result of individual preferences, but also of market rigidities which undermine labour demand, "true" unemployment in the euro area may be higher than measured.[14] Taking these issues into account in a systematic way is beyond the scope of this study. However, given these potential measurement problems regarding the distinction between non-market activities, inactivity and unemployment, and the overall importance of employment, this report also presents information on employment rates.

Main findings of this chapter include an increase in labour market participation of 5.6 percentage points in the euro area over the

period 1996 to 2007, with the highest levels of participation in 2007 registered for men (78%), prime-aged individuals (85%), non-nationals from the 12 new Member States (77%) and the highly educated (88%). In particular, women and non-EU15 immigrants have entered the labour market in increasing numbers, and older workers have tended to stay in the labour market longer. The labour market participation of these groups increased by 9.0 percentage points, 7.4 percentage points and 10.5 percentage points respectively (0.9 percentage point, 0.6 percentage point and 0.9 percentage point on average per year). Cohort effects linked to changes in educational levels, preferences and social norms over time played a role in increasing female labour market participation. Over this period, developments in total hours worked in the economy, as an alternative measure of labour input, show an upward trend similar to that observed for employment. At the same time, average weekly hours of work per employed person in the euro area have declined by 1.2 hours per week over the period 1996 to 2007, largely due to the increase in part-time jobs, which increased by around 5 percentage points as a share of total employment. These developments have been accompanied by an increase in the share of the population with higher education, in particular those with tertiary level education (by 6 percentage points since 1996, to 20.7% in 2007). The proportion of the population with a low level of education has fallen (by 9 percentage points over the same period, to 37.7% in 2007). These positive developments have led to an increase in participation rates and have compensated for the negative impact on labour supply of the

12 Prepared by R. Gomez-Salvador.
13 See Annex 2 for a description of this dataset. The need to achieve international comparability means that the LFS dataset uses standardised and widely accepted definitions of e.g. employment and unemployment, as adopted by ILO. These constitute the basis of the Eurostat LFS. It should be noted that these definitions differ from those adopted by countries in their national definitions of labour market status, where international comparability is not necessary.
14 Suggesting, for example, underemployment-that is, the lower hours worked per year-in the euro area may not be voluntary (or may not be a matter of choice). See Leiner-Killinger, Madaschi and Ward-Warmedinger (2005) for a discussion of institutional arrangements reducing hours of work.

slowdown in population growth rates. However, projections of future labour supply show that under current policies, the labour force will start declining soon due to a fall in the size of the working age population.

3.1 POPULATION AND THE LABOUR FORCE [15]

In 2007, the euro area labour force (the employed plus unemployed) included over 148 million people, out of a total population of 318 million and a working age population (ages 15 to 64) of around 209 million. This implies a participation rate (labour force divided by working age population) of close to 71%. Of the labour force, the number of employed persons reached around 137 million in 2007, leading to an employment rate (employment divided by working age population) of 65.5%, and the number of unemployed persons

was around 11 million, translating into an unemployment rate (unemployment divided by labour force) of 7.5%. Both euro area participation and employment rates were below those recorded in the United States (75.3% and 71.8% respectively in the United States in 2007), while the euro area unemployment rate was higher (4.7% in the United States) – see last column of Table 1.

Table 1 also summarises recent and past developments in population and labour market indicators. Developments are presented in two ways: trend developments, to control (to the extent possible) for cyclical effects; and recent developments, which divide the past decade into two five-year periods (of relatively higher and lower economic growth – see average real

15 Prepared by R. Gomez-Salvador.

Table 1 Population, working age population, participation, labour force, employment and unemployment in the euro area and the United States

(average year-on-year growth rates (%), unless otherwise indicated)

| | Trend developments | | Recent developments | | Level[1] | |
	1984-1995	1996-2007	1996-2001	2002-2007	1983	2007
Euro area						
Population	0.3	0.4	0.3	0.6	291.9	318.8
Working age population	0.5	0.4	0.3	0.5	188.5	209.3
Participation rate[2]	0.2	0.5	0.4	0.6	63.3%	70.8%
Labour force	0.8	1.1	0.9	1.3	119.3	148.3
Population effect[3]	0.5	0.4	0.3	0.5		
Participation rate effect[3]	0.3	0.7	0.6	0.8		
Employment	0.6	1.6	1.6	1.4	107.2	137.1
Total hours	n.a.	1.3	1.1	1.3	n.a.	222,400
Unemployment	1.9	-2.1	-4.2	0.1	12.1	11.1
Employment rate[2]	0.1	0.6	0.7	0.6	56.9%	65.5%
Unemployment rate[2]	0.1	-0.3	-0.6	-0.1	10.1%	7.5%
Real GDP	2.8	2.5	2.8	1.9		
US						
Population	1.1	1.1	1.2	1.0	234.3	302.6
Working age population	1.1	1.4	1.4	1.3	148.3	195.6
Participation rate[2]	0.3	-0.1	0.0	-0.3	73.2%	75.3%
Labour force	1.5	1.2	1.4	1.0	108.5	147.3
Population effect[3]	1.1	1.4	1.4	1.3		
Participation rate effect[3]	0.4	-0.2	0.0	-0.3		
Employment	2.0	1.3	1.6	1.0	97.9	140.4
Total hours	n.a.	1.2	1.3	1.0	n.a.	267,427
Unemployment	-2.6	-0.4	-1.3	0.5	10.6	6.9
Employment rate[2]	0.5	-0.1	0.1	-0.2	66.0%	71.8%
Unemployment rate[2]	-0.3	-0.1	-0.1	0.0	9.8%	4.7%
Real GDP	4.0	3.7	3.9	2.8		

Sources: Eurostat, BLS and ECB calculations.
Note: Euro area data refer to the second quarter of each year, while US data are annual averages.
1) In millions, unless otherwise indicated.
2) Average year-on-year changes (percentage point).
3) Contributions to average year-on-year growth rates (percentage points).

Chart I Overall participation and employment rates for the euro area and the United States

(percentages)

— Euro area
····· United States
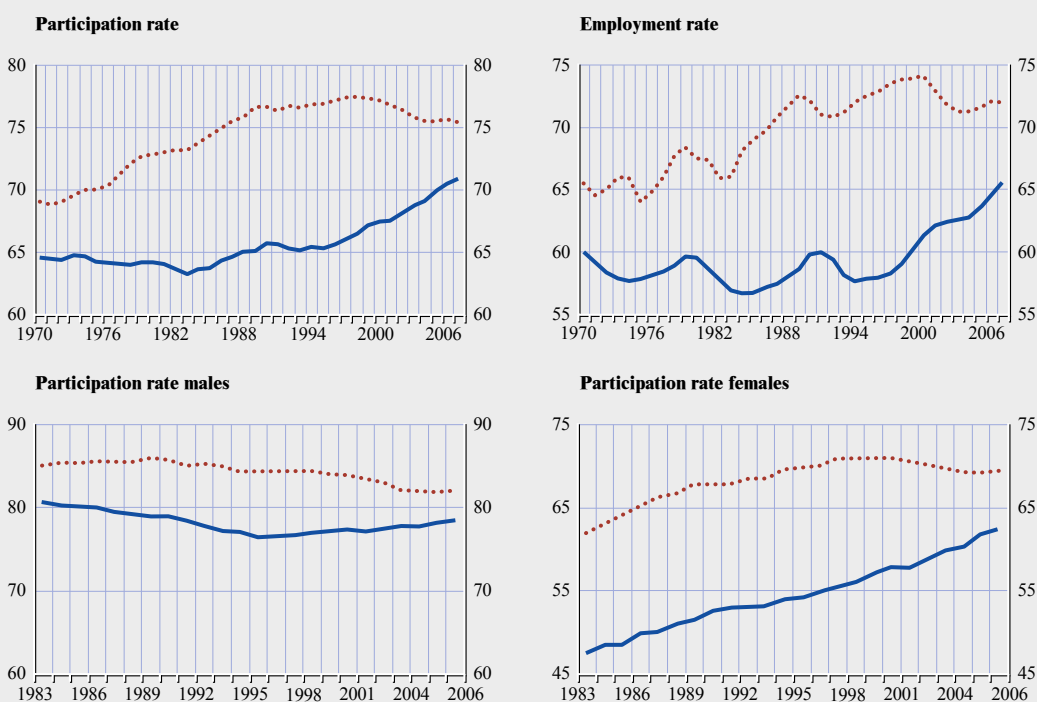
Sources: European Commission, Eurostat, BLS and ECB calculations.
Notes: 15 to 64 year olds. See Chart 11 in Appendix 3 for employment rates of males and females.

GDP in Table 1). In the past decade, overall labour market developments have been quite favourable for the euro area as a whole. As a result, the positive gap in participation and employment rates between the United States and the euro area has narrowed and is now closer to those prevailing in the early 1970s (see Chart 1). Positive developments reflect a particularly strong increase in female participation, while male participation rates actually fell below levels prevailing in 1983. These developments took place in a context of broadly stable growth of the euro area's working age population.

Labour force developments can be decomposed into two effects. First, the population effect, i.e. changes in the working age population for given participation rates and, second, the participation rate effect,

i.e. changes in the participation rate for a given working age population. Comparing average annual growth rates in the period 1996 to 2007 with those in the period 1984 to 1995, the increase in the participation rate effect (0.4 percentage point – from 0.3 percentage point to 0.7 percentage point) more than compensated for the slight trend decline in the growth rate of the working age population (the population effect -0.1 percentage point – from 0.5 percentage point to 0.4 percentage point), allowing the growth rate of the labour force to increase (from 0.8% to 1.1%).

Looking at the same developments *within* the past decade shows two interesting results. First, the participation rate contribution has increased over time, something that contrasts with the expected pro-cyclicality of participation rates,

as periods of relatively low economic growth normally tend to discourage workers from participating in the labour force (as discussed in Chapter 2).[16] This suggests that labour market developments have recently been related to factors independent of the cycle, such as changes in the composition of the labour force and cohort effects. Second, the contribution from population growth also increased, in contrast with the trend decline in population growth rates observed since the early 1980s.

3.2 PARTICIPATION RATES [17]

3.2.1 PARTICIPATION RATES BY INDIVIDUAL CHARACTERISTICS IN THE EURO AREA

The participation rate, and its evolution over time, is not the same for all groups inside the working age population. Characteristics such as gender, age, qualification level and origin have a strong impact on the observed rate of labour market participation. The EU-LFS provides detailed information on the socioeconomic characteristics of the working, unemployed and inactive populations in the euro area. Data on gender and age are available, and the survey provides information on level of education, by distinguishing between low (completion of lower secondary education or less), medium (completion of up to a diploma of upper secondary education) and high (holding a diploma of tertiary education) qualification level.[18] Information on work experience, training or on-the-job qualifications is not available. Furthermore, information on country of origin is limited to the nationality of the survey respondent [19] and distinguishes

16 The cyclical behaviour of participation in the euro area is documented in Genre and Gomez-Salvador (2002).
17 Prepared by J. De Mulder.
18 The precise definition of the educational levels is provided in Annex 2.
19 Nationality and origin do not necessarily provide the same information, as immigrants or their descendants can have obtained the nationality of the considered country.

Table 2 Euro area participation rates according to different subdivisions

(employment rates in brackets)

	Average annual change (percentage points)				Level (%)
	Trend developments		Recent developments		
	1984-1995	1996-2007	1996-2001	2002-2007	2007
Total	0.2 (0.1)	0.5 (0.6)	0.4 (0.7)	0.6 (0.6)	70.8 (65.5)
Excluding the effect of changes in the					
population composition[1]	*n.a. (n.a.)*	*0.3 (n.a.)*	*0.1 (n.a.)*	*0.4 (n.a.)*	
According to gender					
Males	-0.3 (-0.4)	0.2 (0.3)	0.1 (0.4)	0.2 (0.2)	78.4 (73.2)
Females	0.6 (0.5)	0.7 (0.9)	0.6 (0.9)	0.9 (0.9)	63.2 (57.8)
According to age					
15-24 years old	-0.7 (-0.5)	0.0 (0.3)	0.0 (0.6)	0.0 (0.0)	44.0 (37.3)
25-54 years old	0.5 (0.2)	0.4 (0.6)	0.3 (0.7)	0.5 (0.5)	84.6 (79.1)
55-64 years old	-0.3 (-0.4)	0.9 (0.9)	0.2 (0.3)	1.5 (1.5)	46.4 (43.4)
According to education level[2]					
Low	n.a. (n.a.)	0.4 (0.6)	0.3 (0.7)	0.5 (0.5)	63.5 (57.6)
Medium	n.a. (n.a.)	0.2 (0.4)	0.1 (0.3)	0.4 (0.4)	80.4 (75.3)
High	n.a. (n.a.)	0.0 (0.2)	-0.1 (0.3)	0.2 (0.2)	88.3 (84.7)
According to nationality[3]					
Nationals	n.a. (n.a.)	0.3 (0.5)	0.4 (0.8)	0.2 (0.3)	70.9 (65.9)
Other EU15-citizens	n.a. (n.a.)	0.2 (0.3)	0.0 (0.5)	0.4 (0.2)	73.7 (67.6)
Non EU15-citizens	n.a. (n.a.)	0.6 (0.8)	0.2 (0.5)	1.1 (1.1)	69.6 (59.3)
of 12 new EU member states	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	77.1 (68.7)
of non EU27-countries	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	68.3 (57.7)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Note: 15 to 64 years old, except for the subdivision according to education level (25-64 years old). EU15 refers to those countries that were EU Members prior to 2004. The 12 new EU Member States include the countries joining the EU since 2004.
1) Calculated by weighting the participation rates of 18 subgroups of the population of working age (subdivided according to gender, age and education level) with the structure of the population of working age in 1995.
2) EU-LFS data concerning education level only available from 1992 onwards.
3) EU-LFS data concerning nationality only available from 1995 onwards.

between nationals (persons having the nationality of the considered country), other EU citizens and citizens of other (non-EU) countries. Although level of education and nationality are not perfect measures of qualification and country of origin, they provide the best available proxies for constructing a long time series to investigate developments in labour supply according to these characteristics.

Consideration of the participation rates of these different groups shows that, on average, female, low-skilled, young and older persons and non-EU citizens participate less in the labour market than other groups (see Table 2). However, with the exception of the young, the increase in the participation rate of these groups has accelerated over the last decade, with the result that they have at least partially caught-up to the participation level of other groups. Over the period 1996 to 2007, the average increase in participation has been largest for females (0.7 percentage point), older workers (0.9 percentage point) and non-EU citizens (0.6 percentage point). In contrast, the participation rate of 15-24 year olds stabilised during this period.

Participation and employment rates are still highest for males, prime-aged workers (25-54 year olds), the highly educated and EU citizens. Participation is substantially higher for males than for females in all age groups (see Table 27, Annex 3). Participation for both genders is highest between the ages 25 to 49, but while some 90% or more of males in this age group participated in the labour market in 2007, this was only the case for about 77% of females. Female participation is strongly affected by family status. Until the age of 49, female participation rates are clearly lower when a woman has a partner and when there are dependent children. Similar differences between genders are also found for employment rates.

The lower participation rate for younger persons is often linked to their pursuit of education. If this results in individuals obtaining a diploma of upper secondary or, in particular, tertiary education, the immediate downward effect on participation rates of studying longer is compensated afterwards by higher labour market participation (and employment) as the education level rises. Rates of labour market participation, and in particular employment, remain highest for the highly educated, but the participation rate gap related to education is gradually getting smaller. This catch-up is attributable to females. Their participation increased for all three education levels, but the increase was stronger for those with the lowest level of education.

Nevertheless, the positive impact of higher education on labour market participation is still much stronger for females. In 2007, moving from a low to medium education level increased the female participation rate by 24 percentage points, and from medium to highly skilled by another 9 percentage points. For males, the increases were 9 and 5 percentage points respectively. The remaining gap between female and male participation is therefore mainly due to the low skilled. In 2007, 78% of 25-64 year old low-skilled males participated in the labour market,[20] while only 50% of their female counterparts did the same.

Turning to the breakdown by nationality, in 2007, differences in labour market participation across nationality groups within countries were relatively small; the highest participation (and employment) rate is found for citizens of the 12 new member states of the EU. The apparently almost equal participation of nationals and non-nationals nevertheless hides two important facts. First, compared with the corresponding figures for EU citizens, the labour market participation of non-EU nationals is especially low for women and middle-aged persons. Perhaps surprisingly, this is also the case for highly skilled non-EU citizens, whose participation rate is comparable to that of

20 The participation behaviour of older people is treated in Box 6.

medium-skilled EU-citizens, and particularly for highly skilled females.[21] In relative terms, this group seems to experience substantially more problems entering the labour market than do less skilled immigrants.[22] Second, although non-EU-citizens do not appear to participate in the labour market much less than nationals on average, they are less likely to be employed (in 2007 by 8.2 percentage points), and are thus significantly more often unemployed (discussed further in Chapter 5).

3.2.2 PARTICIPATION RATES IN THE EURO AREA COUNTRIES

Labour market participation rates also vary across euro area countries, ranging in 2007 from 78.5% in the Netherlands to 62.5% in Italy (see Table 3). At about 76% to 77%, participation rates were also relatively high in Germany and Finland, while Greece, Luxembourg and Belgium were among countries with the lowest participation rates at 67% or less. In comparison, employment rates ranged from 76% of the working age population in the Netherlands to 59% in Italy. By

means of comparison, in Denmark, Sweden and the UK, levels of participation and employment rates are still much higher than in the euro area and only comparable with the levels in the Netherlands and Finland.

Looking at trend developments, participation rates have increased in all euro area countries over the last decade, and to a greater extent than in the preceding decade (for almost all countries for which data are available for the 1980s [23]). The

21 In the absence of more detailed data on immigration, it is not possible to provide details on the explanation of this finding. However, one might speculate that family reunification and integration issues and/or regulations governing access to the labour market of non-EU workers may play a role.

22 A similar observation can be made for ethnic Germans immigrating into Germany from former socialist countries. On average, the unemployment rate of highly skilled ethnic German immigrants (with the exception of engineers) is higher than that of their medium-skilled counterparts. This can be explained, at least partly, by a lack of applicability of existing skills. For example, the human capital of lawyers depreciated immediately and almost completely upon arrival.

23 No trend for the years 1984 to 1995 could be calculated for Austria and Finland (where the EU-LFS started only in 1995) or for Slovenia (first EU-LFS collected in 1996).

Table 3 Overall participation rates in euro area countries

(employment rates in brackets)

| | Average annual change (percentage points) | | | | Level (%) |
| | Trend developments | | Recent developments | | |
	1984-1995 [1]	1996-2007 [2]	1996-2001 [3]	2002-2007 [4]	2007 [5]
Belgium	0.2 (0.3)	0.4 (0.4)	0.3 (0.6)	0.5 (0.3)	66.7 (61.6)
Germany	0.3 (0.3)	0.4 (0.4)	0.1 (0.2)	0.7 (0.6)	75.6 (69.1)
Ireland	0.0 (0.1)	0.9 (1.2)	1.0 (1.8)	0.8 (0.6)	72.2 (68.9)
Greece	0.0 (0.0)	0.6 (0.6)	0.5 (0.3)	0.6 (0.8)	67.0 (61.5)
Spain	0.5 (0.3)	0.9 (1.6)	0.6 (1.8)	1.2 (1.4)	71.5 (65.8)
France	-0.1 (-0.3)	0.2 (0.3)	0.2 (0.5)	0.2 (0.1)	69.6 (63.6)
Italy	-0.1 (-0.3)	0.4 (0.7)	0.4 (0.6)	0.4 (0.7)	62.5 (58.9)
Luxembourg	0.0 (0.0)	0.4 (0.4)	0.6 (0.7)	0.2 (0.0)	65.6 (63.0)
Netherlands	0.9 (1.1)	0.8 (1.0)	1.1 (1.6)	0.5 (0.3)	78.5 (76.0)
Austria	n.a. (n.a.)	0.2 (0.2)	-0.1 (-0.1)	0.5 (0.4)	73.7 (70.3)
Portugal	0.0 (0.1)	0.5 (0.4)	0.7 (1.1)	0.3 (-0.2)	73.7 (67.6)
Slovenia	n.a. (n.a.)	0.5 (0.6)	0.2 (0.4)	0.7 (0.8)	71.7 (68.3)
Finland	n.a. (n.a.)	0.4 (1.0)	0.8 (1.6)	0.0 (0.4)	77.3 (71.3)
Euro area	0.2 (0.1)	0.5 (0.6)	0.4 (0.7)	0.6 (0.6)	70.8 (65.5)
Denmark	0.1 (0.3)	0.1 (0.3)	-0.1 (0.3)	0.2 (0.2)	80.3 (77.3)
Sweden	n.a. (n.a.)	0.2 (0.3)	0.1 (0.6)	0.3 (0.0)	79.9 (74.3)
United Kingdom	0.3 (0.4)	0.0 (0.2)	0.0 (0.5)	0.0 (0.0)	75.0 (71.1)
United States	0.3 (0.5)	-0.1 (0.0)	0.0 (0.1)	-0.3 (-0.2)	75.5 (72.0)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Note: 15 to 64 years old
1) 1987-1995 for Spain and Portugal.
2) 1997-2007 for Slovenia and 1996-2006 for the United States.
3) 1997-2001 for Slovenia.
4) 2002-2006 for the United States.
5) 2006 for the United States.

Netherlands outperformed all other euro area countries, moving from the lowest participation rate in 1983 to the highest rate in 2007. During the past decade, the increase in participation was strongest in Spain and Ireland. In other countries, like Luxembourg, Italy and Belgium, which also had low participation levels in 1996, the advance was more limited.

However, over the last decade, the apparent acceleration of participation rates for the euro area as a whole is not widespread across individual countries. In six countries (Belgium, Germany, Greece, Spain, Austria and Slovenia) the increase in participation was clearly higher in 2002-07 than between 1996 and 2001. However, participation growth rates more or less stabilised in France and Italy and decelerated in the remaining five countries.

Although remaining lower than for males, female participation is especially high in Finland and the Netherlands, but low in Italy, Greece and Luxembourg (see Annex 3, Table 28). Low-skilled persons participate substantially more often in Portugal, and only to a relatively limited degree in Belgium and Italy. Together with Spain, Portugal also registers the highest participation rates of non-EU-citizens. The latter group participates only to a rather limited degree in Belgium and the Netherlands.

3.2.3 COMPOSITIONAL EFFECTS IN PARTICIPATION

Although over time, there has been a broad-based increase in participation across the various sub-groups considered, the observed evolution of the euro area aggregate participation rate can in part be explained by the effects of changes in the composition of the working age population.[24] Ceteris paribus, this factor appears to explain almost half of the observed increase in participation over the last decade[25] (see Table 2), mainly as a result of the gradual rise in average education level and the shift in the age structure of the population (the share of young people in the working age population decreased in favour of the 25-54 year olds). But during the most recent five-year period, when the participation rate increased on average by

0.6 percentage point per year, the impact of changes in composition fell to one-fourth. Thus the larger contribution (0.4 percentage point) to the increase in labour market participation over the last five years is attributable to a real underlying increase in participation behaviour.

For individual countries, over the last decade the contribution of the population structure effect to participation[26] was especially important in Italy and Greece. For these countries, the population effect explained more than three quarters of the observed participation rate increase. In Belgium and Ireland it accounted for about half of the increase, and in Austria, Finland and France its impact was limited to one-fifth or less. In these latter three countries, the positive impact of the rise in education level was partly offset by a negative impact from the ageing of the population towards the 55-64 age group. During the 2002-07 period, the latter phenomenon became more widespread, implying that the population effect was in general more limited across euro area countries.

In addition to influencing the development of the overall participation rates, differences in the population structure also have an impact on the observed participation rate level across euro area countries.[27] As can be seen in Chart 2 for the year 2007, the impact of the population

24 As participation structurally depends on factors like gender, age and education level, a shift in the relative shares of these groups in the population affects the development of the observed overall participation rate.

25 For this aim, detailed EU-LFS data on the participation rates of 18 subgroups of the population of working age – subdivided according to gender (men, women), age (15-24, 25-54, 55-64) and education level (low, medium, high) – were weighted by using the population composition of 1995. As (the evolution of) participation also differs substantially according to nationality, ideally this factor should also be taken into account. Unfortunately, for the 1990s, EU-LFS data for several euro area countries do not provide this subdivision. This makes such a decomposition exercise unreliable.

26 Due to a lack of data, no reliable results are available for Germany, Spain, Luxembourg, the Netherlands and Slovenia, or for Denmark, Sweden and the United Kingdom.

27 Indeed, for two countries differing only in population structure, the country with, for instance, proportionally more national highly skilled men aged 25 to 54 will have a higher observed overall participation rate than the country where the population proportionally consists of more young or more older, low-skilled non-EU women.
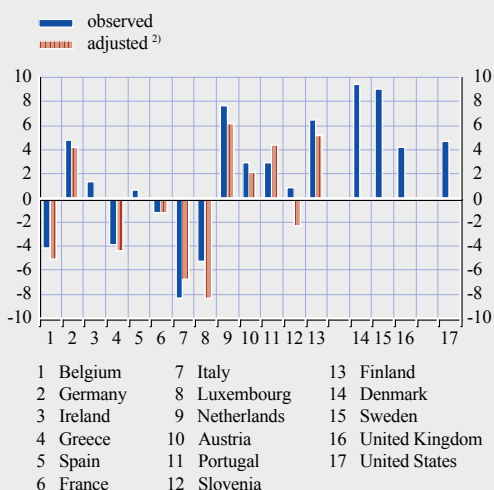
Sources: EU-LFS (spring data) and NBB calculations.
Note: 15 to 64 year olds.
1) For Spain, Ireland, Denmark, Sweden and the UK the adjusted participation rate is not displayed, as the mathematical impact originating from the fact that the population used excludes the EU-LFS respondents for which not all characteristics concerning gender, age, education level and nationality are available, was too large. For the United States, no detailed data available to calculate an adjusted participation rate.
2) Remaining difference, after correction for data non-availability and population structure (composition of the population by gender, age, education level and nationality).

structure is particularly important for some countries.[28] The effect is most pronounced for Slovenia, where the observed participation rate is close to the euro area average, but, having a population with almost no foreigners and relatively few low-skilled persons, its rate would be clearly below this average if it were to have the same population composition as the euro area as a whole. Also in countries such as Luxembourg, the Netherlands and Finland, the positive effect of population composition is important, mainly due to a relatively high-skilled population.[29] Conversely, the participation rates in Italy and Portugal are considerably higher if one corrects for the population structure effect, as, according to the EU-LFS, the population of both countries is on average less skilled than in the euro area as a whole. Excluding this population structure effect, the range of participation rates among euro area countries is reduced, but still remains large. The Netherlands still has the highest

participation rate among euro area countries, while the lowest adjusted rates are found in Italy and Luxembourg.

3.2.4 COHORT EFFECTS IN PARTICIPATION [30]
This section considers to what extent trend developments in the euro area participation rate can also be attributed to so-called cohort effects. These effects are due to differences in labour market participation across birth cohorts emerging as a result of different individual participation choices made early in life (e.g. regarding fertility, maternity leave and/or education) and persisting throughout the life-cycle. Beyond potential crowding-out effects stemming from the size of the cohort entering the labour market and differences in human capital investment over time, these cohort effects are likely to reflect evolving preferences, social norms and/or institutions.[31]

Chart 3 shows participation rates by age group of different cohorts in the euro area population. A cohort refers to persons in the same age group, thus persons born within a particular

28 Due to detailed data availability concerning nationality in the EU-LFS for 2007, it was possible to do this decomposition exercise using 54 population groups, obtained using the combination of the following factors: gender (men, women), age (15-24, 25-54, 55-64), education level (low, medium, high) and nationality (nationals, other EU-citizens, non-EU-citizens). To exclude the population structure effect, the country specific participation rates of these groups were weighted by using the population structure of the euro area as a whole. For Spain, Ireland, Denmark, Sweden and the United Kingdom, the results suffer from reliability problems, as too large a proportion of the population was not subdivided according to the four factors used.
29 For Luxembourg, this exercise is less conclusive, as currently 38% of persons working in the country are commuters. They reside in one of the neighbouring countries, and are therefore part of the population of those countries. As the EU-LFS data for Luxembourg consider only the Luxembourg population, they do not reflect the situation of the whole labour force.
30 Prepared by A. Balleer and J. Turunen.
31 So-called cohort effects generally encompass any factor associated with a particular birth year, e.g. general economic conditions or crowding-out effects. Empirical evidence suggests that the size of the cohort entering the labour market greatly affects participation. There are many explanations for this, e.g. depressed earnings (see Welch (1979), Berger (1985) and Korenman and Neumark (1997)), also formulated as the "relative income" hypothesis, i.e. large cohorts experience lower incomes relative to their expectations (Easterlin 1980). Finally, large events like WWII may result in cohort effects as Acemoglu et al. (2002) find evidence that, owing to men going to war, more women worked and also stayed in the labour market in the US.

Chart 3 Age-cohort profiles in the euro area

(1983-2007)

x-axis: age groups
y-axis: participation rate

— born 1943-1947   ····· born 1963-1967
····· born 1948-1952   – – – born 1968-1972
– – – born 1953-1957   ···· born 1973-1977
— born 1958-1962   –·–· born 1978-1982

Females

Males

1 15-19	4 30-34	7 45-49
2 20-24	5 35-39	8 50-54
3 25-29	6 40-44	9 55-59
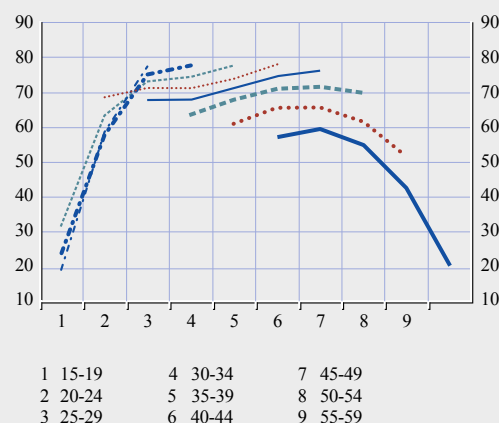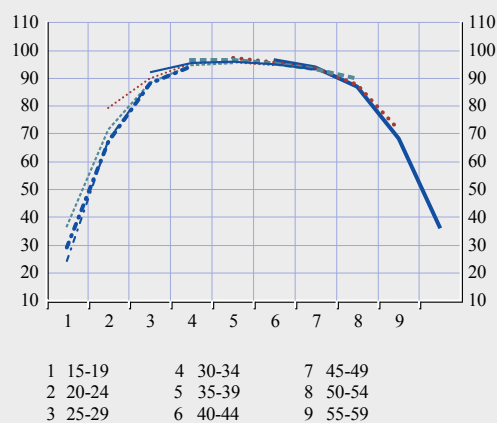
Sources: LFS and ECB calculations.

time period, and is represented by a separate line in the graph.[32] The cohort effect is measured as the vertical distance in participation rates between the different cohorts for a given age. The Charts suggest a substantial cohort effect for females, but no visible cohort effects for males. Female participation has risen by close to 20 percentage points when comparing the participation rate of the 1943-1947-born cohort with the 1963-1967-born cohort at the age of 40-44 years old.[33] In addition to the substantial level effect, the shape of the profile between ages 20 and 35 changes for the younger cohorts as the kink that is visible in the profile of those born 1963-1967 at the ages 30-34 disappears. The timing of this effect suggests that the differences across cohorts may reflect a number of factors relating to, e.g., improved possibilities for reconciling family and employment, and shifts towards postponed motherhood or longer education. Potentially due to the latter effect, participation of persons

aged 15-24 has declined between the cohort born in 1968-1972 and the two youngest cohorts for both males and females.

Table 4 presents the vertical distance (i.e. the difference in participation levels) between the youngest and the oldest cohort for females between the ages of 25 and 44 in individual countries over the recent decade. The increases in levels of female participation between the youngest and older cohort are particularly large in Ireland, Greece, Spain, Luxembourg and the Netherlands, but relatively small in Austria and France. (For comparison, the changes are even smaller in the UK and

32 It is generated by starting in the year 2005 for a particular age group, and tracking the participation rate of each cohort backwards in time over five-year intervals. It has to be noted that this procedure does not identify a pure cohort effect, but rather its interaction with age (a so-called age-cohort). Owing to the relatively short time series dimension, cohort profiles only partially overlap.

33 This is the vertical distance between the participation rate of the group born between 1943 and 1947 and the group born between 1963 and 1967 in Chart 3.

(percentage points and levels in 2007)

Country	Age group							
	25-29		30-34		35-39		40-44	
	1997-2007	2007	1997-2007	2007	1997-2007	2007	1997-2007	2007
Belgium	7.4	84.7	8.2	80.7	17.7	81.1	24.5	80.2
Germany	7.2	78.2	13.0	80.8	14.4	81.5	16.7	83.8
Ireland	19.6	82.4	29.2	75.1	34.7	70.3	34.6	67.9
Greece	24.4	77.8	19.2	73.4	21.7	74.4	23.4	71.6
Spain	21.7	80.6	29.9	78.1	36.3	73.8	26.3	72.8
France	5.6	81.2	8.1	80.2	10.8	82.8	12.2	84.2
Italy	2.8	62.7	11.4	68.9	11.7	67.1	16.9	64.7
Luxembourg	9.9	75.1	25.6	80.4	23.1	72.3	25.6	68.0
Netherlands	20.5	86.1	30.5	84.7	25.1	81.6	29.6	81.9
Austria	-3.3	76.7	1.8	78.0	6.9	83.4	7.4	85.9
Portugal	12.5	84.9	13.9	87.9	19.8	87.6	14.5	84.7
Slovenia	3.3	79.0	-1.2	81.1	-1.8	85.2	1.1	89.7
Finland	9.6	77.4	14.2	77.9	16.6	77.7	20.8	78.1
Denmark	-5.1	82.4	-5.2	84.3	-1.4	86.8	-3.5	85.4
Sweden	2.6	83.5	4.9	87.8	1.5	88.4	-0.1	88.8
United Kingdom	10.8	76.5	10.1	74.9	5.8	76.5	4.1	79.3
United States [1]	0.2	74.9	-0.7	74.1	-2.2	74.0	-1.0	77.0

Sources: LFS and ECB calculations.
1) Developments for the United States are 1995-2007, information is taken from Aaronson et al. (2006) for 1995 and from the Bureau of Labour Statistics for 2007.

Sweden and even negative in Denmark.) It has to be noted that for the ages discussed above, but also for the very young workers, the shape of the participation profiles, as well as the levels reached in 2007, are very heterogeneous across countries. This may be linked, among many other reasons, to differences in investment in education or educational systems across countries.

The cohort profiles shown in Chart 3 are potentially influenced by both business cycle factors and evolving institutions (which may also help to explain the country differences).[34] [35] Overall, a continued increase in the proportion of women in the labour force and demographic changes which shift the relative share of the labour force between birth cohorts imply that cohort effects will continue to affect euro area labour supply in the future. Box 1 considers future developments in labour supply further.

34 See e.g. Genre et al. (2007) for a study on the role of institutions for participation rates by age and gender. In this study, lagged participation tries to capture cohort effects for older women (those between 55-64). This term is statistically significant.

35 Estimating a cohort-based model of participation for the euro area and most euro area countries using the model presented in Aaronson et al. (2006) and Fallick and Pingle (2007) which controls for business cycle and age effects, confirms that cohort effects are statistically significant for females and are robust to period effects as measured by an indicator of the business cycle, while cohort effects for males are not statistically significant for the euro area. The estimation suggests a negative effect on participation for the female cohorts born between 1922 and 1940 (entering the labour market around the early 1940s and early 1960s) and a positive effect for those born between 1966 and 1973 (entering in the late 1980s and early 1990s). The higher participation-propensity of females born in the late 1960s and early 1970s has therefore contributed to the increase in female participation in the euro area. The overall pattern of increasing cohort effects for women appears similar to that observed in the United States, see Figure 8 in Fallick and Pingle (2007). In addition, the results suggest that the cycle has strongly influenced the participation rates of the youngest cohorts.

Box 1

PROJECTIONS OF LABOUR SUPPLY IN THE EURO AREA AND EURO AREA COUNTRIES [1]

Demographic developments

A key determinant of labour force developments is the underlying demographic trend. In particular, the evolution of birth rates gives an early indication of future population structure. Chart A shows that birth rates in the euro area tended to follow a downward trend from the mid 1960s until the mid 1990s, remaining broadly stable thereafter. This general trend holds for most euro area countries, with considerable heterogeneity in fertility rate levels across countries (as indicated by the distance between the maximum and minimum birth rates). Ireland and France emerge as the countries with the highest birth rates in recent years, and Germany, Italy and the Netherlands are among those with the lowest. The observed thirty-year decline in birth rates should lead to

Chart A Crude birth rates in the euro area [1], [2]
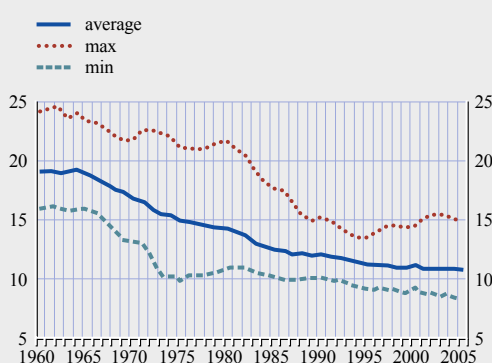
Sources: Eurostat and ECB calculations.
1) Ratio of the number of births during the year, per 1,000 inhabitants.
2) Average, maximum and minimum birth rates across euro area countries.

a prolonged decline in the share of prime-aged workers in the total population in the near future. Since this group exhibits the highest participation rate in the labour market (see Section 3.2.1), this should also translate into a slowdown in the growth of the labour force.

Future participation rates and labour force developments

On the basis of population projections and assumptions about group-specific participation rates, it is possible to make projections of labour force developments in the euro area.[2]

According to the latest Eurostat population projections, the working age population is expected to grow slightly up to 2011 and then decline (although at varying intensity) across the rest of the forecast horizon (see Table). Under the assumption that participation rates by gender and age groups remain constant at the 2007 level, the euro area labour force would shrink by an average of 0.5% per year over the period 2007-2050. This reflects the continued ageing of the working age population and, therefore, the previously mentioned decline in the share of prime-aged workers. Indeed, the overall participation rate would fall by 1.5 percentage points to 69.4% in 2050 (see Table). As a result of population ageing, the old-age dependency ratio

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1 Prepared by R. Gomez-Salvador and A. Novo.
2 Population projections are based on Eurostat's "baseline variant" for the working age population on January 1st of each year, based on assumptions on fertility, life expectancy and net migration. In particular, the projections are based on the assumption that the share of the net migration over the total population remains stable at 0.4% over the forecast horizon. The labour force developments are then obtained following the methodology described in Shimer (1998).

Working age population, participation rate and labour force developments [1]

	Working age population [2]				Participation rate [3]				Labour force [2]			
	2007-10	2011-30	2031-50	2007-50	2007	2010	2030	2050	2007-10	2011-30	2031-50	2007-50
Belgium	0.3	-0.3	-0.2	-0.2	66.7	66.1	65.2	65.3	0.0	-0.4	-0.2	-0.3
Germany	-0.1	-0.6	-0.7	-0.6	75.6	75.9	74.4	74.5	-0.1	-0.7	-0.7	-0.6
Ireland	0.8	0.6	-0.2	0.3	72.2	72.0	70.3	70.8	0.9	0.5	-0.2	0.2
Greece	0.2	-0.3	-1.0	-0.6	67.0	67.0	63.6	64.8	0.2	-0.6	-0.9	-0.6
Spain	0.2	-0.2	-1.2	-0.6	71.5	71.3	67.0	68.7	0.2	-0.6	-1.1	-0.7
France	0.3	-0.2	-0.2	-0.1	69.8	69.2	68.3	68.7	0.1	-0.2	-0.1	-0.2
Italy	-0.1	-0.5	-1.0	-0.7	62.5	62.3	58.6	60.3	-0.2	-0.8	-0.9	-0.8
Luxembourg	1.0	0.5	0.5	0.5	65.6	64.6	63.2	63.2	0.6	0.4	0.5	0.4
Netherlands	0.3	-0.2	-0.1	-0.1	78.5	78.2	77.4	78.0	0.1	-0.2	-0.1	-0.1
Austria	0.3	-0.3	-0.5	-0.4	74.9	74.6	72.0	72.2	0.2	-0.5	-0.5	-0.4
Portugal	0.0	-0.4	-0.9	-0.6	73.7	73.8	71.1	72.0	0.0	-0.5	-0.9	-0.6
Slovenia	0.0	-0.6	-0.8	-0.6	71.7	71.8	69.0	69.4	-0.1	-0.8	-0.7	-0.7
Finland	0.2	-0.5	-0.2	-0.3	77.3	76.8	77.5	77.2	0.0	-0.5	-0.3	-0.3
Euro area	0.1	-0.4	-0.7	-0.5	70.8	70.8	68.5	69.4	0.0	-0.5	-0.6	-0.5

Sources: Eurostat and ECB calculations.
1) Working age population derived from Eurostat projections (baseline scenario). Overall participation rate derived by keeping participation rates by gender and age group constant at the 2007 level.
2) Annual growth rates.
3) Levels expressed as percentages.

(i.e. the elderly population divided by the working age population) is expected to increase from around 25% in 2007 to around 55% in 2050.[3,4]

For euro area countries, the impact of population structure on the future overall participation rate is negative in almost all cases, but to varying degrees. Together with the general decline in the working age population, this will lead to a decline in the future labour force in most countries.[5]

An alterative scenario

Based on a European Commission ageing report,[6] a second scenario for the euro area can be considered. Relative to the baseline scenario, which assumes that group-specific participation rates remain stable at their 2007 level, the alternative scenario projects higher participation rates after 2007, particularly among women, whose participation rates have been increasing over recent decades, and older workers, due to recently enacted public pension system reforms (see also Section 4.1.3 and Box 6). Under this scenario, the euro area labour force would contract by 0.3% per year on average over the period 2007-2050, that is, by less than in the previous scenario. Indeed, the overall participation rate in this alternative scenario would increase by 4.2 percentage points to 75.1% in 2050, to around 5 percentage points higher than in the scenario presented above. However, the positive contribution from increased labour market participation would only result in positive developments in the labour force until 2015 (the labour force growing by 0.4% per year on average). From that year onwards, the negative contribution coming

3 It is worth mentioning that two periods can be distinguished with regard to the impact of ageing on the participation rate. From 2007 to 2030 the participation rate is projected to fall by around 2.5 p.p to 68.5%, and then, as the share of prime-aged workers starts to increase again, to recover by around 1 p.p in 2050 (see Table). However, the positive contribution coming from this increased participation in the last part of the projection horizon is not expected to have any significant impact on labour force developments, being outweighed by the continued decline in the working age population (see Chart B).
4 For detailed country-specific and euro area charts on the projected developments in dependency ratios, see Maddaloni, et al (2006).
5 The only two exceptions are Ireland and Luxembourg, where positive developments in the working age population may more than offset the decline in participation, and therefore translate into an increase in the labour force (see Table).
6 European Commission (2006, 2007). This second scenario does not assume a general rise in education levels, but analyses the effects of expected demographic and labour market developments given the present enrolment and cost situation.

**Chart B Euro area labour force projections –
constant participation rates [1]**

— labour force (left-hand scale)
····· participation rate (right-hand scale)
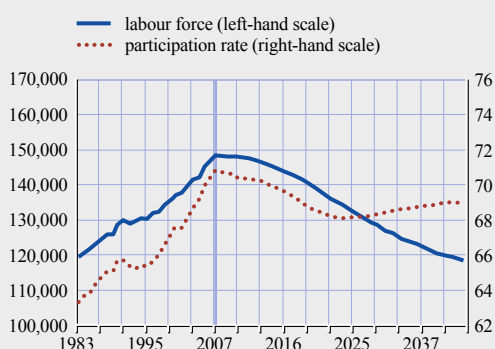
**Chart C Euro area labour force projections –
varying participation rates [2]**

— labour force (left-hand scale)
····· participation rate (right-hand scale)
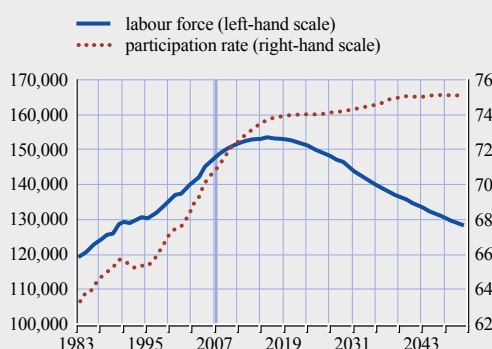
Sources: Eurostat and ECB calculations.
1) Constant participation rates across gender and age groups (15-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60-64) at the 2007 level.
2) Varying overall participation rates at the country level.

from demographic developments would dominate, and labour force growth would start declining by 0.5% per year on average until 2050 (see Chart C).

In sum, even if the most dominant recent trends in labour market participation, such as the increase in female participation continue, the labour force can be expected to decline in the near future, due to the projected fall in the working age population.

3.3 HOURS WORKED [36]

To evaluate labour utilisation, it is important to look at not only the (relative) number of people participating in the labour market (the extensive margin), but also the number of hours worked per employed person (intensive margin). Indeed, in the context of population ageing and shrinkage of the total labour force, both channels can be used to increase the effective labour supply. To obtain a fuller picture of labour supply, this section considers average yearly hours of work at an aggregate level from 1991 onwards using data from the OECD.[37] Unfortunately these data are not available for different sub-groups of the labour force, so this analysis uses EU-LFS data on usually-worked weekly hours.[38] The data on both concepts are comparable, since the OECD uses the EU-LFS data as input for calculating annual hours.[39] In addition, data on annual and weekly working hours are closely linked (see Chart 12 in Annex 3).

3.3.1 HOURS WORKED IN THE EURO AREA AND IN THE UNITED STATES

The main difference between hours of work in the United States and Europe is the number of hours worked in annual terms. According to the most recent OECD data, an average euro area worker worked 1,672 hours in 2005,[40]

36 Prepared by J. De Mulder and R. Gomez-Salvador.
37 See Annex 2 for a short description of this dataset.
38 The EU-LFS also provides information on actual weekly working hours, but this concept is – more than the usual working hours – influenced by one-off factors (for instance exceptional absences or overtime work) during the reference week of the survey.
39 The OECD figures on hours worked per year are obtained by combining EU-LFS information on weekly hours (usual hours, overtime work and hours on additional jobs) with the number of weeks worked per year.
40 As Slovenia is not an OECD member, there are no OECD data available for the euro area as a whole. Therefore a euro area average of the other twelve countries was calculated, weighted by employment (number of persons at work). Before 1995, no data are available for Austria and Finland, so the euro area figures for the period 1991-1994 correspond to the weighted average of ten countries.

Chart 4 Hours worked per worker in the euro area and the United States

(euro area (EA) vs. United States (US))

— annual hours EA (left-hand scale)
···· annual hours US (left-hand scale)
---- weekly hours EA (right-hand scale)
— weekly hours US (right-hand scale)
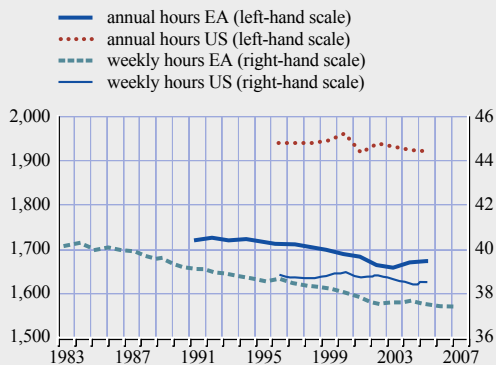
Sources: Eurostat, OECD and ECB calculations.

Chart 5 Developments in employment, total hours worked, and productivity per person and per hour in the euro area

— total hours - 1991=100 (left-hand scale)
···· employment - 1991=100 (left-hand scale)
---- productivity per hour (right-hand scale)
— productivity per person (right-hand scale)

Sources: OECD, EU-LFS and own calculations. Employment in thousands and Total hours in millions.

considerably less than the 1,922 hours worked in the United States. This suggests that regulations on hours of work and annual holidays may play an important role in explaining the differences between annual and weekly hours in the United States and euro area. Over the past decade, average annual hours of work also fell faster in the euro area than in the United States (by respectively 0.3% and 0.1% per worker per year). However, since 2003, a minor increase in annual hours has been observed in the euro area (see Chart 4).[41] With regard to weekly hours, EU-LFS data show that the decline in average working time per worker had already started in the early 1980s, and the reduction in hours of work in Europe in recent years has come mainly from a relative decline in hours per week. The average working week was 40.1 hours in the euro area in 1983, decreasing to 37.4 hours per week in 2007. Comparable data for the United States are only available for the period 1996-2005. The data show that the average working week in the United States was around 39 hours in 1996, comparable to hours worked in the euro area. However, since then the length of the average working week has roughly stabilised in the United States.[42] In 2005, the latest available year, it was 38.5 hours.

The information on annual hours worked per worker can be combined and compared with data on the number of people employed to allow

a qualification of the developments in total hours worked in the euro area (see Chart 5). This shows that following a slight decline, both the number of people employed and total hours worked show a similar upward trend since the mid 1990s, although employment increased faster than total hours worked (while total hours appears to have been more pro-cyclical).[43] Moreover, the picture of employment developments in the last decade changes somewhat when labour input is measured in hours (rather than in the number of people). It appears that instead of the decline in average growth rates between 1996-2001 and 2002-07 recorded by the employment rate (as shown in Table 1), the growth in total hours has remained broadly stable (at 1.1%), similar to the growth rate of total hours in the Unites States. Finally, it is worth mentioning that this different pattern has an impact on measured productivity growth in the euro area, which shows a less marked slowdown in the second half of the

41 This is driven by the smaller number of annual weeks worked in Europe, fewer overtime hours worked on the main job in Europe, and fewer hours worked on additional jobs in Europe.
42 According to the Groningen Growth and Development Centre (GGDC), hours worked were also stable in the US over the whole of the 1980s and 1990s.
43 Indeed, looking at the period 2001-2004, it appears that hours worked per worker have acted more as a buffer to economic conditions, given that total hours declined slightly and then recovered, in line with the economic slowdown, while employment growth remained slightly positive.

1990s when measured in hours worked instead of number of employed persons.

3.3.2 HOURS WORKED IN THE EURO AREA BY DIFFERENT WORKER GROUPS [44]

This section examines whether the number of hours worked per worker in the euro area varies by worker group. In addition to the characteristics of gender, age, education level and nationality, professional status (employee or self-employed) and work regime (part-time or full-time work) may also affect average hours across countries.[45]

An important explanation for the downward trend in euro area hours worked per worker per week is the substantial increase in part-time work.[46] As can be seen in panel B of Table 5, the average part-time worker worked 20 hours per week in 2007, compared with 41.5 hours for a full-time worker. In 1983, only 9% of the working age population was working part-time; however, by 2007, this figure had risen to 19%. This development is linked to the rise in female participation described in the previous section (see also Section 4.2). In 2007, 35% of all working women had a part-time job, compared with only 7% of men; thus, the greater importance of part-time work for women also explains their lower average number of hours worked.

At an average of 34 hours per week in 2007, young persons worked the fewest hours. This figure mainly reflects the fact that many young people work part-time as they combine their studies with a job.[47] There is little difference

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44 Prepared by J. De Mulder.
45 The latter two factors were not treated in the section on participation rates, as they only concern the working population, whereas the labour force is composed of both the working and the unemployed.
46 In the EU-LFS, the full-time versus part-time distinction is based on the declaration by the respondent, except in the Netherlands, where this subdivision is made according to whether the respondent usually works at least 35 hours (full-time) or less (part-time).
47 In 2006 (last year for which this information is available), an average working student aged 15 to 24 worked for roughly 13 hours, which has a considerable downward influence on the average number of hours worked by young persons.

Table 5 Hours worked per worker in the euro area

	Average annual change (%)				Level (hours)
	Trend developments		**Recent developments**		
Panel A: Total	**1984-1995**	**1996-2005**	**1996-2001**	**2002-2005**	**2005**
Annual hours	n.a.	-0.3	-0.3	-0.1	1,672
	1984-1995	**1996-2007**	**1996-2001**	**2002-2007**	**2007**
Weekly hours	-0.3	-0.3	-0.3	-0.2	37.4
Excluding the effect of changes in the population composition[1]	*n.a.*	*-0.2*	*-0.3*	*-0.2*	
Panel B: Weekly hours in 2007 according to different subdivisions (hours)					
According to work regime		*According to gender*			
Full-time work	41.5	Males			40.9
Part-time work	20.0	Females			32.9
According to age		*According to education level*			
15-24 years old	33.7	Low			38.2
25-54 years old	37.8	Medium			37.1
55-64 years old	37.3	High			38.4
According to nationality		*According to professional status*			
Nationals	37.4	Employees			35.9
Other EU15-citizens	36.9	Other workers			45.5
Non EU15-citizens	36.1				
of 12 new EU member states	37.3				
of non EU27-countries	35.3				

Sources: EU-LFS (spring data), ECB and NBB calculations.
Note: 15 to 64 years old, except for the subdivision according to education level (25-64 years old).
1) Calculated by weighting the hours worked by 36 subgroups of the population of working age (subdivided according to gender, age, education level and professional status) with the structure of the population of working age in 1995.

in hours worked per week between prime-aged and older workers, according to education level and nationality. In contrast, there is significant variation in the average hours worked by professional status. In 2007, employees worked on average 36 hours per week, while the average week was 45.5 hours long for other workers (mainly self-employed).

The decline of weekly working time since 1983 was broadly based and comparable for most worker groups. Nevertheless, the decrease was somewhat stronger for females, due to the faster up-take of part-time work, and for the younger and older generations. The latter developments most likely reflect the larger proportion of young people pursuing tertiary education and the higher participation rate of older workers, who remain at work longer in life but reduce their average weekly working time.

3.3.3 HOURS WORKED PER WEEK IN THE EURO AREA COUNTRIES

As with labour market participation rates, significant variation in the average yearly hours of work is apparent across euro area countries (see Table 6).[48] In 2005, average working time ranged from almost 2,000 hours per worker per year in Greece, to some 1,400 hours in the Netherlands.[49] In most other countries, the average person worked between 1,600 and 1,800 hours (compared with 1,600 hours in Denmark, Sweden and the United Kingdom). During the past decade (until 2005), developments

48 As mentioned before, no data for yearly hours worked are available for Slovenia.
49 These observed differences are largely attributable to differences in the composition of employment, mainly as regards the occurrence of part-time work and self-employment. Indeed, if only full-time employees are considered, average working hours in Greece only exceed those in the Netherlands by some 100 hours.

Table 6 Hours worked in euro area countries

	Annual hours [1]				Weekly hours				
	Average annual change (%)			Level (hours)	Average annual change (%)				Level (hours)
	Trend	Recent developments			Trend developments		Recent developments		
	1996-2005	1996-2001	2002-2005	2005	1984-1995	1996-2007	1996-2001	2002-2007	2007
Belgium	0.0	0.0	0.1	1,681	-0.5	-0.1	-0.1	-0.2	37.1
Germany	-0.4	-0.4	-0.6	1,622	-0.5	-0.5	-0.4	-0.6	35.6
Ireland	-0.9	-1.3	-0.2	1,729	-0.5	-0.9	-1.3	-0.6	36.3
Greece	-0.1	-0.1	0.0	1,995	-0.4	-0.2	-0.1	-0.3	42.5
Spain	0.0	-0.1	0.0	1,791	-0.3	-0.2	-0.2	-0.3	39.3
France	-0.6	-0.6	-0.6	1,592	-0.4	-0.1	-0.7	0.5	38.0
Italy	0.1	-0.2	0.5	1,730	-0.1	-0.2	-0.2	-0.2	38.5
Luxembourg	-0.7	-0.6	-0.9	1,637	-0.2	-0.6	-0.5	-0.7	36.7
Netherlands	-0.2	-0.3	0.0	1,417	-1.1	-0.5	-0.7	-0.4	30.9
Austria	0.2	0.1	0.3	1,729	n.a.	0.0	-0.2	0.3	39.0
Portugal	-0.8	-1.3	-0.1	1,775	-0.5	-0.6	-0.9	-0.2	39.6
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	-0.4	-0.1	-0.6	40.3
Finland	-0.1	0.0	-0.4	1,682	n.a.	-0.1	0.1	-0.2	37.9
Euro area	-0.3	-0.3	-0.1	1,672	-0.3	-0.3	-0.3	-0.2	37.4
Denmark	0.3	0.8	-0.3	1,586	-0.3	0.0	0.3	-0.3	35.7
Sweden	0.5	0.9	-0.2	1,558	n.a.	0.1	0.2	-0.1	36.7
United Kingdom	-0.4	-0.2	-0.7	1,662	0.0	-0.3	-0.3	-0.3	37.2
United States [2]	-0.1	-0.2	0.0	1,922	n.a.	-0.1	-0.1	-0.1	38.5

Sources: EU-LFS (spring data) and OECD calculations.
Note: 15 to 64 years old.
1) OECD annual hours data not available for the 1980s, so the trend development for 1984-1995 could not be calculated.
2) For annual and weekly hours in the United States, the considered trend period and the first recent development period start in 1997 instead of 1996. For weekly hours, the second recent development period concerns 2002-05, and the level in the last column concerns 2005.

have diverged substantially across countries. While average working hours rose in Austria, considerable decreases were recorded in Ireland, Portugal, Luxembourg and France recorded considerable decreases. Since 2002, the downward trend has continued in the latter two countries. In other countries, especially Italy, average annual working hours actually increased.

The order of the euro area countries according to the average number of weekly hours worked is roughly comparable to the one based on average annual hours. In 2007 average weekly working time was highest in Greece (42.5 hours), and by far lowest in the Netherlands (30.9 hours). In Denmark, Sweden and the United Kingdom, the situation was comparable to the euro area average, with 36 to 37 hours.

Average weekly hours worked fell in almost all European countries over all considered periods; only in Austria and France was an increase observed during the last five-year period. The decrease was strongest in the Netherlands (especially in the 1984-1995 period) and in Ireland (during the last decade). An important factor in both the level and downward trend in average weekly hours worked is the rate of part-time work, which may be linked to both institutional features and individual preferences. For example, Greece, which has the highest average working week, also experiences one of the lowest rates of part-time work among the euro area countries. Similarly, the Netherlands, with the shortest working week, has the highest rate of part-time work. Furthermore, the decrease in the average hours worked per week in the Netherlands coincided with a strong increase in part-time work following changes to part-time work legislation in 1982.[50]

3.3.4 COMPOSITIONAL EFFECTS IN HOURS WORKED

The overall impact of the evolution of the composition of employment on observed working hours[51] is rather limited for the euro area as a whole (see panel A of Table 5). Overall, the downward influence of the higher proportion of females and employees in employment was partly compensated by a decreasing share of young workers.

Contrary to the euro area average, changes in the composition of the employed population seem to have had a considerable impact in some countries.[52] In Belgium, Spain, Finland, Greece and Italy, they accounted for almost the entire development of average working hours over the last decade, implying that the underlying working hours of the various subgroups have hardly changed. In France, a downward development took place, which was partly counteracted by changes in the population structure. In most other countries, the effects of changes in the population structure have been limited over the last five years.

Part of the observed differences in average hours worked between countries in 2007 can also be attributed to the different country-composition of employment.[53] For example, the short working week in the Netherlands can partly be explained by a relatively larger share of young workers in employment than on average in the euro area, while part of the longer working week in Greece can be attributed to a relatively high proportion of male workers and self-employed.

50 For a discussion of the explanations for the differences in hours of work across countries, see also Leiner-Killinger, Madaschi and Ward-Warmedinger (2005).

51 For this ceteris paribus exercise, detailed EU-LFS data concerning the hours worked of 36 subgroups of the working age population – subdivided according to gender (men, women), age (15-24, 25-54, 55-64), education level (low, medium, high) and professional status (employee or self-employed) – were weighted using the employment composition of 1995. In the previous section, these four factors were identified as the most important distinguishing characteristics concerning hours worked in the euro area. The work regime was not taken into account, since definitions of part-time and full-time work depend on the national legal system (for instance, a person working 38 hours per week is working (more than) full-time in France and Belgium, but is working part-time in other countries). In addition, this variable is closely linked to gender.

52 The size of the population effect depends on the relative size of the different evolutions inside the employed population. In most countries, the share of females and employees is growing, having a downward effect on average hours worked. On the other hand, the proportion of young persons in employment is decreasing, pushing upwards the average working time.

53 Again, detailed EU-LFS data, subdivided according to gender, age, education level and professional status, were used. To exclude the population structure effect, the country-specific working hours of these groups were weighted using the employment structure of the euro area as a whole.

After adjusting for the structure of employment, the spread of weekly hours worked inside the euro area decreases by one fourth, to 9 hours per week. Nevertheless, working weeks still appear to be longest in Greece and – by far – shortest in the Netherlands (see Chart 6).[54]

3.4 IMMIGRATION [55]

Both the quantity and the quality of labour supply in the euro area are important in order to maximise welfare and future potential growth. Immigration provides one channel for the euro area to increase its labour supply along both dimensions. Furthermore, it may help alleviate shortages of particular skills in the labour market, improving the allocation of labour resources. It may offset some of the negative effects of demographic change and, since immigrants tend to be more mobile than native workers, it may also help the labour supply adjust to economic shocks. Immigration to the euro area has increased significantly over recent decades. Chart 7 presents the net flow of

migrants into the euro area and into the United States since 1980. It shows that net migration to the euro area has been higher than to the United States since 1997.[56] Furthermore, migration to the euro area prior to the late 1990s was mainly the result of guest-worker programmes (1950s and 1960s), family-reunification (1970s) and asylum-seeking (late 1980s and early 1990s, when political events and ethnic conflicts increased). More recently, euro area immigration appears to have entered a new phase, possibly as a result of EU enlargement, globalisation, and changing immigration policies in some countries, with an increase in the number of immigrants (also of different origin) looking for employment.

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54 In the case of Greece, the relatively long hours even after this adjustment may reflect in part the relatively high share of retail and tourist businesses with long operating hours.

55 Prepared by M. Ward-Warmedinger.

56 This measure therefore estimates the immigration of individuals from outside each area, it does not consider cross-state or cross-euro area migration.

Table 7 The composition of the working age population by nationality

	Average annual change (p.p)				Level (%)	
	1996-2001[2]		2002-2007[3]		2007	
Total working age population [1]						
Nationals	-0.1		-0.2		91.9	
Other EU15 citizens	0.0		-0.1		1.8	
Non EU15 citizens	0.1		0.3		6.3	
of 12 new						
member states	n.a.		n.a.[5]		0.9	
of Non EU27	n.a.		n.a.[6]		5.3	
Non-national working age population [4]						
According to gender						
Males	-0.4	*0.1*	-0.3	*0.0*	50.0	*50.1*
Females	0.4	*-0.1*	0.3	*0.0*	50.0	*49.9*
According to age						
15-24 years old	-0.7	*-0.1*	-0.2	*-0.2*	15.9	*17.5*
25-54 years old	0.3	*0.2*	0.5	*0.0*	73.5	*64.3*
55-64 years old	0.3	*-0.1*	-0.3	*0.2*	10.6	*18.2*
According to education level						
Low	-0.3	*-0.2*	-0.6	*-0.1*	48.6	*36.6*
Medium	-0.1	*-0.2*	0.9	*0.2*	34.4	*42.1*
High	0.5	*0.5*	0.4	*0.2*	16.7	*21.0*
Participation rates						
Nationals	0.4		0.2		70.9	
Other EU15 citizens	0.0		0.4		73.7	
Non EU15 citizens	0.2		1.1		69.6	
of 12 new						
member states	n.a.		n.a.[5]		77.1	
of Non EU27	n.a.		n.a.[6]		68.3	
Employment rates						
Nationals	0.8		0.3		65.9	
Other EU15 citizens	0.5		0.2		67.6	
Non EU15 citizens	0.5		1.1		59.3	
of 12 new						
member states	n.a.		n.a.[5]		68.7	
of Non EU27	n.a.		n.a.[6]		57.7	

Source: EU-LFS and ECB calculations.
Note: 15 to 64 years old. To the extent that this data does not capture illegal immigration, it may underestimate the stocks and flows of immigrants.
1) The non-national population is separated into non-national EU15 citizens and non-national non-EU15 citizens. For the period 2005-07, this last group is further split into the 12 new member states (which together with the EU15 form the EU27) and non-national non-EU27 citizens.
2) It is important to note that data for Ireland start in 1998, data for Portugal and the Netherlands in 1999, and data for Slovenia in 2002.
3) Irish data only available until 2004, Italian data only available for 2005-07.
4) The numbers in italics show the respective values for the national working age population.
5) The average annual change 2006-07 for total working age population is 0.1, for participation rates 0.6 and for employment rates 1.4.
6) Average annual change 2006-07 for total working age population is 0.2, for participation rates 0.6 and for employment rates 1.3.

Whilst the potential for significant economic gains from immigration exists, realising these gains depends on the characteristics of immigrants relative to nationals and immigrants' successful integration into the labour market. The future challenges facing the euro area suggest the need for a great variety of skills. For example, immigration may help meet the future demand (see Chapter 5) for services such as nursing, household care, childcare, health care and eldercare arising from population ageing, and for high skilled workers. Furthermore, it is important that immigrants' skills and qualifications are effectively utilised.[57]

Table 7 shows that the increase in immigration to the euro area since the mid-1990s was composed largely of females, non-EU15 nationals and prime age individuals (25-54 age group).[58] Whilst nearly half of the existing population of immigrants in 2007 were low-skilled persons, the flow of new immigrants since 1996 has mainly been made up of medium and highly skilled labour. This may partly reflect selective immigration policies in place in many EU Member States, which try to attract highly skilled immigrants (discussed further in Section 4.3). The increase in immigration from 1996 to 2007 was largest in Spain, Greece, Portugal and Luxembourg (see Table 29 in Annex 3). The extent to which migration flows have contributed to labour supply also varies strongly across euro area countries (see Table 8, Table 29 in Annex 3 and also Box 2). One particular form of worker immigration – namely daily cross-border commuting – has increased three-fold over the past 10 years (see the Box in

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57 Work by the OECD (2006) "Gaining from migration: towards a new mobility scheme" suggests that the over-qualification rate is two to three times higher for foreign born relative to native born in some euro area countries.

58 In the absence of more detailed data on immigration, it is not possible to provide details on the explanation of this trend. However, one can speculate that family reunification, an increase in female labour market participation and the regularisation of illegal work in some countries may have played a role in these developments.

Table 8 Immigration in euro area countries

Country	% of working age population 2007					Participation rates 2007					Employment rates 2007				
	Nationals	Other EU15	Non-EU15	of which 12 NM	of which Non-EU27	Nationals	Other EU15	Non-EU15	of which 12 NM	of which Non-EU27	Nationals	Other EU15	Non-EU15	of which 12 NM	of which Non-EU27
Belgium	90.9	5.3	3.8	0.5	3.2	67.0	69.1	55.7	71.1	53.2	62.4	62.4	40.6	62.1	37.1
Germany	89.6	2.8	7.6	1.0	6.6	76.7	76.7	63.8	73.3	62.4	70.6	69.6	51.5	63.7	49.7
Ireland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spain	87.1	1.5	11.4	2.3	9.1	70.5	70.2	79.7	82.4	79.0	65.3	62.7	70.0	72.9	69.2
Greece	93.8	0.3	6.0	1.0	5.0	66.6	53.6	73.8	71.7	74.2	61.1	48.8	67.9	65.6	68.4
France	94.1	2.1	3.8	0.2	3.6	70.0	72.8	59.3	68.0	58.9	64.2	67.8	44.9	53.6	44.5
Italy	94.2	0.3	5.5	1.0	4.5	61.9	60.0	73.0	76.7	72.2	58.4	57.9	67.4	71.1	66.6
Luxembourg	57.9	37.7	4.4	1.1	3.3	61.7	71.6	64.9	*63.4*	65.4	59.4	69.3	57.7	*61.4*	56.4
Netherlands	95.7	1.6	2.7	0.2	2.5	79.1	78.0	57.6	72.3	56.3	76.7	75.8	51.8	67.7	50.4
Austria	88.7	2.2	9.1	1.6	7.6	74.2	77.2	67.8	75.1	66.3	71.3	73.1	59.5	69.6	57.3
Portugal	96.3	0.4	3.3	0.2	3.1	73.4	74.6	82.8	72.9	83.5	67.5	69.3	70.6	67.8	70.8
Slovenia	99.3	n.a.	0.7	n.a.	*0.7*	71.7	n.a.	65.7	n.a.	*65.1*	68.4	n.a.	59.7	n.a.	*59.0*
Finland	98.0	0.4	1.6	0.4	1.2	77.4	85.1	67.8	80.0	63.9	71.6	77.8	53.6	74.4	47.0
Euro area	91.9	1.8	6.3	0.9	5.3	70.9	73.7	69.6	77.1	68.3	65.9	67.6	59.3	68.7	57.7
Denmark	94.6	1.1	4.4	0.2	4.2	81.2	76.6	61.1	*76.3*	60.3	78.5	73.8	53.9	*71.8*	52.9
Sweden	95.0	2.1	2.9	0.3	2.6	80.4	75.4	65.1	74.1	63.9	75.1	70.8	52.3	56.0	51.9
United Kingdom	92.2	1.8	6.0	1.4	4.6	75.2	76.9	71.0	84.7	66.7	71.4	71.5	65.2	79.6	60.7

Sources: Eurostat, LFS and ECB calculations.
Notes: 15 to 64 years old. For Ireland: data available for 1998-2004 only; for Italy: for 2005-07 only; for the Netherlands and Portugal: data start in 1999; for Slovenia: data start in 2002; for Sweden: data start in 1997. For Greece, figures from the LFS differ significantly from those of the 2001 Population Census. According to the 2001 Population Census non-EU and other EU15 citizens accounted for 7.7% and 0.5% of the working age population in Greece in that year. Numbers in italics are based on figures smaller than the Eurostat's reliability limits.

Annex 4). Nevertheless, while the employment level of migrants from other EU countries is similar to or even higher than that of nationals for most euro area countries, overall participation and employment rates for non-EU nationals lagged behind those of nationals in 2007, especially in Belgium, Germany, France, the Netherlands and Finland. There is some evidence in some countries of decreasing employment rates for non-nationals from 2002 to 2007. On the other hand, in Spain, Greece, Italy and Portugal, the employment rate for non-EU nationals was even higher than for nationals in 2007 (see Table 8).[59]

59 These differences in participation rates may reflect a country's history of immigration. For example, countries where immigration is a new phenomenon may experience a high proportion of immigrants who are driven by the economic motivation to enter the labour market and find a job. Countries with a longer history of immigration may receive immigrants driven by more varied and potentially less labour-market-driven motivations, including, for example, family reunification.

Box 2

RECENT EXPERIENCES WITH IMMIGRATION IN EURO AREA COUNTRIES [1]

Although most European countries have experienced an increase in immigration during the last 20 years, country experiences with immigration have differed (in terms of the magnitude of inflows, the characteristics of immigrants and the impact of immigration on the native population). While some countries have a long history of immigration (e.g. Germany, France and Austria), there are several countries for which large-scale immigration is a relatively new phenomenon (e.g. Ireland, Spain or Italy). Numerous factors account for these cross-country differences, including historical ties with a host country, a common language, geographical proximity and the extent of labour market opportunities, which can affect both the magnitude and duration of immigration to a particular country. This box focuses on the immigration experiences of Spain, Italy, Ireland and Austria, which have attracted the majority of permanent immigrants in recent years.

Immigration in Spain and Italy

The immigration experiences of Spain and Italy have been fairly similar in recent years. In both countries immigrants have become an important and a fast growing share of the population. Spain has faced the highest net migration rates in Europe, with an average of 700,000 new immigrants per annum during the last two years. This consistently high inflow pushed up the percentage of non-nationals in the Spanish population from 2% in 2000 to 13% seven years later (see Table). Italy also experienced consistently high inflows of foreign workers, although at a relatively lower rate, increasing the share of non-nationals from 2.7% at the end of 2002 to 6% of the total population in 2007.

1 Prepared by A. Rosolia, A. Lacuesta, Y. McCarthy and A. Stiglbauer.

Characteristics of immigrants for selected countries (2007)

	Ireland		Spain		Italy		Austria	
	Immigrants	**Natives**	**Immigrants**	**Natives**	**Immigrants**	**Natives**	**Immigrants**	**Natives**
Quantity								
% Total Population	6.6		12.9		5.8		11.3	
Gender								
% Male	50.6	50.2	49.9	50.7	49.0	50.1	49.5	49.8
Age								
15-24	20.2	23.5	18.1	16.3	14.7	15.6	17.0	18.0
25-54	73.5	62.1	76.9	66.6	81.1	65.4	72.0	64.7
55-64	6.3	14.4	5.1	17.0	4.2	19.0	11.0	17.3
Education								
Low	20.8	39.1	46.3	50.3	51.8	48.9	38.4	23.9
Medium	28.5	36.7	33.8	21.2	37.4	39.0	45.7	61.9
High	38.3	23.3	19.1	27.0	10.9	12.1	15.8	14.2
Participation Rate	66.6	68.8	78.5	70.5	72.4	61.9	69.6	74.2
Unemployment Rate	6.3	4.4	12.0	7.3	7.6	5.7	10.8	3.9

Source: EU-LFS.
Note: 15-64 year old.
* Data for Ireland refer to 2004.

Geographical proximity and historical ties are the main factors underlying migration to Spain and Italy. Immigrants from South America account for over one third of the immigrant population in Spain, and immigrants from Africa, especially from Morocco, accounted for 20% of the total stock in 2006. Albania, Morocco and Romania are the main source countries of migration to Italy, accounting for one-third of all immigrants in 2006. Despite the retention of some restrictions on the free movement of workers from the 2004 EU new Member States, the flow and the share of immigrants coming from these countries have significantly increased. For example, in Spain, those origin countries represented 2% of all immigrants in 2000, compared with more than 15% just seven years later.

Regarding individuals' characteristics, in both countries, non-nationals are much younger than nationals. While about 65% of natives are concentrated in the 25-54 age group, this number increases to above 76% for the non-national population. There are no important educational attainment disparities between non-nationals and nationals in either country.

Despite the magnitude of immigrant flows and the similarity of educational attainment of immigrants and natives, there is no evidence that migration has reduced the job opportunities for residents in either country. Indeed, the simple correlation across regions between the participation and employment rates of Italian citizens aged 25-54 and the share of foreigners in the same population age-group is not statistically significant.[2] Research conducted at the Bank of Italy relates natives' labour market outcomes to the presence of foreign citizens in a province over the decade 1993-2003, taking into account a host of individual characteristics as well as the characteristics of local labour markets that could affect simultaneously Italian citizens' labour market outcomes and the overall presence of foreigners. The results show that male and female employment and participation display a positive correlation with the presence of foreigners of the same sex. Carrasco et al (2008) undertake an analysis in this regard for the Spanish case, finding that foreigners have no significant negative impact on natives' occupational opportunities. Rather, the increase in foreign workers has occurred at the same time as the increase in female participation, and some research has linked the two phenomena. This evidence is confirmed by independent work of The Economic Bureau of the President in Spain, which provides evidence that immigration facilitates female participation in the labour market by increasing the supply of domestic help, thus easing the combination of work and family life for women.

One possible explanation for the lack of a negative relationship between immigrants' and natives' labour market outcomes is the fact that highly skilled immigrants have been willing to take jobs requiring less skill than their educational attainment. Fernández and Ortega (2006) show that this matching problem is more important for immigrants than for natives (see also Chapter 5). Moreover, immigrants' contractual conditions have been more flexible than those of natives with the same characteristics. In Spain, for instance, the share of immigrants on a temporary contract is around 60%, compared with 30% for natives. Unemployment has also been much higher for non-nationals than for nationals (respectively 12%/8% for non-nationals and 7%/6% for nationals in Spain/Italy). However, at least part of this difference can be attributed to immigrants' lack of experience in their destination country, and over time the gap with the native population is expected to close (Amuedo-Dorantes and de la Rica, 2007; Fernández and Ortega, 2006).

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2 Because immigrants tend to locate where job opportunities are richer, such simple correlations might hide some crowding-out of comparable native workers.

Immigration in Austria

At 11% in 2007, Austria has a large non-national population. At the end of the 1960s, the immigrant population share was only 2%. Thereafter, it increased gradually to 4% at the end of the 1980s, then, in the wake of the fall of the "iron curtain" and the Yugoslav wars, a large number of immigrants entered Austria within just a couple of years. By 1995, the immigrant share had risen to more than 8%. Since then, it has risen continuously, although at a slower pace. Most immigrants stay permanently, but seasonal work is also significant. The share of immigrants in the workforce is more than 12%, with the largest groups of non-national workers coming from the former Yugoslavia, Germany, Turkey, Hungary, the Czech Republic and Slovakia, Poland and Romania.

Non-nationals in Austria are on average younger than nationals: 11% of the non-national population is between ages 55 and 64, compared with 17% of natives. Non-nationals tend to be less educated than nationals, with 38% of the foreign population holding only a primary education, compared with 24% of nationals. This partly underlies the fact that immigrants work disproportionally in industry, in the construction sector, in tourism and agriculture. Seasonal work and commuting are very common in the latter sectors. Illegal inflows of immigrant workers are most likely substantial, particularly in the household and personal service sector, which includes cleaning and nursing services.

The available empirical evidence suggests that the aggregate effects of immigration on native workers' unemployment and wage growth are small or insignificant. Econometric studies are mostly from the mid-1990s and exploit the then-sudden increase of foreign workers. They find that increased immigration had no negative employment or wage effects for native women. For almost all groups of men, these studies find only a slight deterioration of employment prospects. Low-income men also faced lower wage growth, whereas high-income males appeared to experience a wage gain associated with the increase in immigration.

Austria faces several challenges with regard to the integration of immigrants. For example, the unemployment rate for non-nationals in 2007 stood at about 11% (whereas that of nationals was merely 4% – see also Chapter 5). The difference between the performance of immigrant children and nationals in the PISA studies was also one of the largest observed over all participating countries (OECD, 2007b). Without appropriate countermeasures, Austria risks perpetuating the lower labour market chances of immigrants and their descendants.

Immigration in Ireland

Ireland's experiences with migration changed dramatically during the 1990s as Ireland rapidly moved from being a country of net emigration to one of significant positive net inflows. Since 1996, net migration to Ireland has been positive, and the most recent numbers show a net migration of 71,800 individuals for the twelve months to April 2006 (1.7% of the population). As a result, there has been a rise in the non-national proportion of the population, from about 6% in 2002 to about 10% in 2006. The change in Ireland's migration experience has also had an important impact on labour supply growth. In the period 2000 to 2005, labour supply grew by almost 3%, with migration accounting for just under half of this growth. By comparison, in the early 1990s migration subtracted from labour supply growth. This change in the quantity of immigrants in Ireland was accompanied by an important change in the origin country of

immigrant inflows. In the late 1980s, over half of immigrants entering Ireland came from the United Kingdom. However, over time this proportion fell significantly, reaching about 17% in 2006. In recent years, immigrants from the new EU Member States have been the most important contributors to immigrant inflows in Ireland.

Focussing on characteristics, Labour Force Survey data available to 2004 (see Table) show that immigrants in Ireland are young relative to the native population. Data for 2004 indicate that 73.5% of the non-national population is in the prime working age category, 25 to 54 years old, compared with 62.1% of natives. Immigrants in Ireland also tend to be more highly educated than natives, as over 38% of non-nationals hold tertiary education compared to 23.3% of nationals.

Despite this higher educational attainment, non-nationals face higher unemployment rates relative to nationals, at 6.3% and 4.4% respectively in 2004. [3] A study conducted by Barrett et al (2006) using data from a national household survey for 2003 found that immigrants in Ireland tended to hold occupations of a lower level compared with those held by natives, once characteristics such as age and education had been taken into account. Barrett and McCarthy (2007) examined the earnings of immigrants relative to natives in 2004, finding that immigrants earned 18% less than natives on average, controlling for education and years of work experience. This gap was more pronounced for immigrants from non-English speaking countries and for those immigrants with a third-level qualification.

3   However, this finding of a higher rate of unemployment for immigrants is not unusual, as immigrants could possess lower levels of location-specific human capital when they arrive in a host country. Over time it would be hoped that immigrants would assimilate into the labour market and that this rate of unemployment would fall.

3.5 THE SUPPLY OF KNOWLEDGE AND SKILLS [60]

Labour quality can be improved through investment in human capital. Human capital consists of the ability, skills and knowledge embodied in the general population that are accumulated through schooling, training and experience.[61] This section begins with an examination of a traditional measure of human capital − that is, educational attainment − as captured by the highest level of education attained by individuals in the euro area. It then examines alternative measures to account for the quality of educational attainment. Box 4 assesses the growth in labour quality in the euro area over time.

3.5.1 EDUCATIONAL ATTAINMENT

Improving the stock of human capital has been formally identified through the Lisbon strategy as a key area of potential growth within the euro area. The level of educational attainment within a country serves as one potential indicator of the stock of such capital.

Table 9 shows educational attainment of euro area countries as captured by the proportion of the adult population that has received various levels of education over time.

The average proportion of the 30-54 year old population with a high level of education (tertiary education) in the euro area was 16.1% in 1992. By 1999 this had increased to 20.1%, and the figure stood at 24.6% in 2007. On the other hand, there has been a fall in the proportion of the population with only a low level of education, and a subsequent rise in those with a medium level. However, the rate of increase in this measure of the stock of human capital differs across euro area countries. For example, Ireland registers the largest increase in persons with a high level of education between 1999

60   Prepared by P. Cipollone, Y. McCarthy and K. McQuinn. This contribution has benefited from the comments of P. Montanaro, Bank of Italy.

61   In much of the initial empirical work addressing this issue, human capital has been measured by educational attainment. Educational attainment, in this regard, is taken to be the number of years of schooling received by an individual.

Table 9 Educational Attainment of 30-54-Year-Old Population

(% of population by highest level of education attained)

Country	1992			1999			2007		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Belgium	47.1	30.4	22.5	40.4	31.8	27.7	29.4	37.3	33.3
Germany	17.4	58.8	23.8	17.5	57.4	25.1	14.1	60.1	25.8
Ireland	56.9	25.8	17.3	44.1	36.0	19.9	30.6	36.7	32.8
Greece	60.5	26.0	13.5	46.2	35.0	18.8	36.4	40.1	23.5
Spain	76.1	10.9	12.9	62.2	16.4	21.4	46.6	23.0	30.5
France	n.a.	n.a.	n.a.	37.1	42.1	20.8	29.4	43.4	27.2
Italy	64.8	27.2	8.1	53.9	35.4	10.7	45.3	40.8	13.9
Luxembourg	64.1	22.8	13.1	35.0	45.5	19.5	32.7	38.9	28.4
Netherlands	n.a.	n.a.	n.a.	33.8	42.6	23.6	24.5	44.1	31.4
Austria	n.a.	n.a.	n.a.	22.6	62.3	15.1	18.5	63.1	18.5
Portugal	79.3	9.0	11.7	80.9	9.9	9.1	72.2	13.9	13.9
Slovenia	n.a.	n.a.	n.a.	24.3	60.0	15.7	17.1	59.6	23.3
Finland	n.a.	n.a.	n.a.	23.7	42.8	33.5	15.4	44.2	40.4
Euro area	47.4	36.5	16.1	39.3	40.6	20.1	31.9	43.5	24.6
Denmark	23.3	53.7	23.0	19.5	51.8	28.7	23.1	43.2	33.7
Sweden	n.a.	n.a.	n.a.	20.5	49.2	30.3	12.1	55.8	32.0
United Kingdom	49.4	31.0	19.6	36.2	36.0	27.8	26.6	40.7	32.6

Sources: Eurostat, LFS and ECB calculations.
Notes: 30 to 54 years old. Data include vocational training to the extent that a qualification has been gained. See Annex 2 for details on this and definitions of low, medium and high. See Table 30 in Annex 3 for this information for prime age individuals only. See Table 31 for information on education attainment by cohort.

and 2007 at 12.8 percentage points, followed by Spain with a 9 percentage point increase. Furthermore, in 2007, the proportion of the population with a high level of education was highest in Finland, Belgium and Ireland, while it was lowest in Italy, Portugal and Austria.

An examination of educational attainment by gender shows that both males and females in the euro area registered an increase in educational attainment between 1992 and 2007, and by 2007 there was very little difference between male and female educational levels in the euro area.

Table 10 Educational Attainment: Subject specialisation

(2006)

Subject	General Programmes	Teacher Training and Education	Humanities Languages and Art	Social Science Business and Law	Science Math Computing	Engineering and Manufacturing	Agriculture	Health and Welfare	Services
Belgium	6.6	9.1	6.2	22.2	6.8	28.4	1.6	12.7	6.4
Germany	6.0	5.2	3.8	28.3	2.3	34.2	3.0	8.7	8.4
Ireland	50.8	3.9	4.0	11.1	8.8	8.1	1.7	6.4	5.2
Greece	47.6	3.0	5.9	13.1	4.1	13.7	1.4	6.0	5.2
Spain	30.2	6.1	5.8	22.8	6.1	15.6	1.3	8.6	3.5
France	1.6	0.9	10.2	32.2	9.3	29.3	3.7	8.0	4.8
Italy	0.1	10.2	13.0	31.5	11.8	22.4	2.2	4.8	3.9
Luxembourg	8.3	5.7	9.3	29.7	7.0	15.0	1.8	7.2	16.1
Netherlands	8.3	9.4	4.9	27.2	3.5	19.2	2.9	15.6	8.9
Austria	8.3	4.1	3.8	26.6	1.3	34.6	4.5	5.5	11.2
Portugal	3.3	8.8	20.9	25.7	19.0	12.7	0.9	6.0	2.7
Slovenia	8.5	4.7	2.1	26.3	1.2	37.9	3.2	5.5	10.6
Finland	13.4	3.2	4.4	17.6	2.3	29.3	4.9	12.8	11.9
Euro area	15.0	5.9	7.5	24.7	6.8	22.6	2.4	7.9	7.3
Denmark	1.8	4.8	7.2	30.3	5.0	26.7	3.1	15.1	6.0
Sweden	11.3	8.3	4.9	20.7	2.9	26.6	2.3	15.6	7.5
United Kingdom	0.7	6.6	11.7	25.5	11.0	21.5	1.7	14.0	7.4

Sources: LFS and ECB calculations. Ireland refers to 2005 data.

For example, in 1992, respectively 19.4/12.8% of males/females aged 30-54 years had a high level of education in the euro area. These figures increased to 21.8/18.4% in 1999 and 24.7/24.5% in 2007.

Table 10 provides information on the type of skills acquired through education in euro area countries. More specifically, the table shows educational attainment across euro area countries in 2006 (the latest year available) according to the main subject studied. The results show that "engineering" (manufacturing and construction) and "social science, business and law" are generally among the top two most studied disciplines in the majority of euro area countries. In Ireland, Greece and Spain, however, "general programmes" is the most popular area of study.[62] In general, there has been little change in the respective rankings of subject take-up across euro area countries since 2003, the earliest year for which data are available.

3.5.2 THE QUALITY OF EDUCATIONAL ATTAINMENT

While cross-country comparisons of the quantity of education received are important and informative, attention has increasingly focussed more on differences in the quality of education received across countries. In attempting to measure the quality of educational attainment, a growing line of research uses indexes based on scores obtained by students on cognitive tests. Cross-country information on such measures is provided under a number of different international auspices. The IEA-TIMSS (Trends in International Mathematics and Science Study)

collects educational achievement data at the fourth and eighth grades in mathematics and science. Comparable data are available for 1995, 1999 and 2003.[63,64] The IEA-PIRLS (Progress in International Reading Literacy Study) examines literacy progress at the fourth grade (9-and 10-year-olds). The first survey was conducted in 2001 on about 150,000 students across 35 countries (including five euro area countries). A second survey was conducted in 2006. The OECD has launched the Programme for International Student Assessment (PISA), an internationally standardised assessment of the competences of 15-year-old students. The assessment covers the domains of reading, mathematical and scientific literacy, and includes all euro area countries with the exception of Slovenia. The first survey, conducted in 2000, focused mostly on reading literacy; the second was conducted in 2003 with a major focus on math; science literacy is the main focus of the third survey, conducted in 2006. The development of these databases is of considerable interest, particularly in the context of studies examining cross-country income differentials.

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62 "General programmes" refers to all other categories of education. It is important to note that these categories may be somewhat sensitive to a country's educational system. For example, many students at the degree level in Ireland would take a general ARTs degree, included under the "General Programmes" definition. However, in another country degree programmes may be more specialised, allowing them to be categorised under "Social Science, Business and Law" or "Humanities, Languages and Art".

63 The IEA (International Association for the Evaluation of Educational Achievement) is an independent, non-profit, international cooperative of national research institutions and governmental research agencies, established in 1959.

64 For more on this, along with a summary of results from both PIRLS and TIMSS, see Montanaro (2007).

HUMAN CAPITAL AND GROWTH [1]

Initial growth studies incorporating the role of human capital such as Barro (1991), Benhabib and Spiegel (1994), Barro and Sala-i-Martin (1995) and Sala-i-Martin (1997) had focussed solely on the role played by educational attainment in terms of the number of years of schooling

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1 Prepared by P. Cipollone, Y. McCarthy and K. McQuinn. This contribution has benefited from the comments of P. Montanaro, Bank of Italy.

in a country. These studies generally found that educational attainment was positively correlated with the growth rate of GDP per capita across countries. The provision of databases such as Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS), however, enables studies of income differentials to focus on the role played by enhanced educational quality. For example, TIMSS formed the basis for the measurement of labour-force quality in studies by Hanushek and Kimko (2000) and in Barro (2001). Both of these studies used the TIMSS database as an enhanced indicator of educational attainment in growth regressions. The Hanushek and Kimko (2000) results are particularly interesting as they emphasize how the explanation of cross-country growth is affected by the inclusion of quality measures. Their estimates suggest that a one-standard-deviation improvement in a test performance (equivalent to 47 score points in PISA 2000 mathematics) could increase the annual average growth rate of a country by 1 percentage point.[2] Recently, Hanushek and Wößmann (2007) have extended the Hanushek and Kimko results to 50 countries (from 31), exploiting all the available information gathered by IEA's and OCSE PISA survey on test score in math and science. The study supports the Hanushek and Kimko finding of a positive link between educational quality and GDP growth. Additional work by Bosworth and Collins (2003), Ciccone and Papaioannou (2005), Coulombe et al. (2004) and Coulombe and Tremblay (2006) all find that improvements in educational quality strongly outweigh increases in educational quantity in influencing economic growth.

2   See Montanaro (2007) for a more detailed discussion of this issue.

Table 11 compares educational attainment of euro area countries as captured by the traditional quantity measure, highest level of education attained, with the PISA results for 2006 – the latest year for which data are available. While the quality and quantity of education are two different concepts, the results in the table nonetheless demonstrate a positive correlation between the rankings of countries in terms of the proportion of the population with a high level of education and the rankings based on the PISA proficiency scores. For example, Finland registers the highest proportion of its population with a high level of educational attainment in 2006, at 38.7%, followed by Belgium, at 32.6%. Finland also ranks the highest across the three PISA categories, while Belgium and the Netherlands are typically among the top four countries when ranked by both the PISA average scores and the proportion of the population with a high level of educational attainment. In this context, Greece would appear to be an outlier. It registers among the lowest of the euro area countries in terms of the average scores across the three PISA categories, while it enjoys an average level of high educational attainment relative to the other euro area countries.

A key message emerging from this section is that euro area countries have generally been successful in increasing their stock of human capital over time. However, there is scope for further improvement, particularly since some euro area countries still lag far behind the average human capital level in the euro area, as well as the level of human capital in other advanced economies. Moving beyond the human capital level of the euro area population, Box 4 examines developments in the quality of the euro area workforce between 1992 and 2005. This analysis suggests that labour quality growth is likely to decline over the next decade. This slowing of labour quality growth could have important ramifications for labour productivity growth and potential output. In an attempt to ensure continued labour quality growth commensurate with past rates, policy should be directed towards promoting further increases in educational attainment and on-the-job training (see also Section 4.4 and Box 8).

Table 11 Educational Attainment of Population and PISA scores, 2006

(% of total population by highest level of education attained; Pisa score)

Country	2006			PISA 2006			PISA 2006
	Low Education	Medium Education	High Education	Proficiency in Reading	Proficiency in Maths	Proficiency in Science	
	Percentage 30-54 year old population			Average Score			Total
Belgium	30.9	36.4	32.6	501	520	510	1531
Germany	15.0	59.3	25.7	495	504	516	1515
Ireland	31.7	37.1	31.2	517	501	508	1526
Greece	37.2	39.3	23.5	460	459	473	1392
Spain	48.3	22.3	29.4	461	480	488	1429
France	31.1	42.9	26.0	488	496	495	1479
Italy	46.1	40.5	13.4	469	462	475	1406
Luxembourg	34.0	41.6	24.4	479	490	486	1455
Netherlands	25.3	43.7	31.0	507	531	525	1563
Austria	18.4	63.0	18.7	490	505	511	1506
Portugal	72.1	14.2	13.7	472	466	474	1412
Slovenia	17.7	60.4	22.0	494	504	519	1517
Finland	15.6	45.8	38.7	547	548	563	1658
Euro area	32.8	43.1	24.1	491	497	503	1491
Denmark	17.1	46.3	36.6	494	513	496	1503
Sweden	12.6	56.3	31.1	507	502	503	1512
United Kingdom	27.2	41.7	31.1	495	495	515	1505

Sources: Educational attainment data are from Eurostat, LFS and ECB calculations. PISA data are from the OECD.

Box 4

LABOUR QUALITY GROWTH IN THE EURO AREA AND EURO AREA COUNTRIES [1]

Increases in the supply of highly educated and more experienced workers have the potential to contribute positively to economic growth. Standard measures of labour input, such as total hours worked, ignore these changes in the composition of the workforce, typically leading to an underestimation of the contribution of labour to growth (see OECD, 2001). This box presents estimates of the trend in labour quality growth for the euro area and euro area countries. The estimates of labour quality are constructed in two steps. In a first step, microdata are used to derive weights for a number of worker groups with different characteristics. These weights reflect differences in productivity (measured by estimated relative wages [2]) across workers groups, e.g. those with university level education or more are on average more productive than those with primary education and are thus given a larger weight. In a second step, these weights are used to adjust data on total hours worked by worker-country groups to arrive at an index of labour-quality-adjusted labour input. Labour quality growth is estimated as the difference between

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1 Prepared by J. Turunen.
2 More specifically, time-varying weights are derived from predicted wages from cross-section regressions of individuals' wages on their human capital characteristics such as education and labour market experience (as proxied by age).

Chart A Labour quality growth and the contribution of education

(average annual growth rate in 1992-2005; percent)

x-axis: growth in labour quality
y-axis: 1st order contribution of education
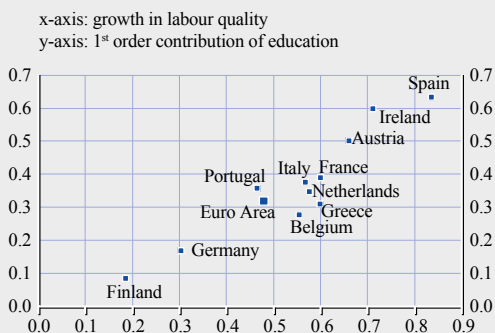
Source: ECB calculations based on estimates in Schwerdt and Turunen (2007).

Chart B Labour quality growth over time in the euro area

(annual growth rate; percent; 1992 to 2005)

Source: ECB calculations based on estimates in Schwerdt and Turunen (2007).

quality-adjusted and raw total hours worked. Estimates of labour quality growth are based on a number of assumptions and data sources and should thus be interpreted with great caution.[3]

Focussing on the period 1992-2005, estimates in Schwerdt and Turunen (2007) suggest that euro area labour quality has grown on average by 0.48% year-on-year. Relatively strong labour quality growth in most of the 1990s, driven by an increase in the share of those with tertiary education and workers in prime age (35-54 years of age), was followed by lower labour quality growth towards the end of the 1990s, possibly reflecting the impact of robust employment growth resulting in the entry of workers with lower skills. The euro area estimate of labour quality growth reflects substantial diversity across individual countries for which reliable estimates are available, with estimates ranging from the lowest in Finland (0.18%) to the highest in Spain (0.84%) (see Chart A). In line with other studies (see, e.g. Jorgenson, 2005, for the G7 countries), the rise in the average level of educational attainment is the main driver of the increase in labour quality over time, with a consistent relative contribution to labour quality growth also across euro area countries. Chart A shows that overall labour quality growth has significantly benefited from increasing shares of highly educated employees in countries like Spain, Ireland and Austria. Other countries, such as Finland and Germany, do not show such significant increases in the share of highly educated employees and, consequently, have lower

3 In particular, estimates of labour quality growth are based on the key assumption that relative marginal products of worker types are reflected in their relative wage rates. Various characteristics of labour markets, such as discrimination, union bargaining, signalling and mismatch, may result in violations of this assumption. However, due to a lack of more direct measures, wages remain the best available proxy of worker productivity. Furthermore, individual labour market experience is not directly observable in available household data. Therefore, as is standard in the literature, age is used to proxy labour market experience. The weights are derived separately for men and women, allowing e.g. for the age-earnings profiles to differ across gender. Levenson and Zoghi (2007) construct labour quality growth estimates for the US based on birth-imputed experience measures and age and find that using age results in a slightly lower estimates of labour quality growth. Schwerdt and Turunen (2007) use detailed information from the European Community Household Panel (ECHP) and the LFS on total hours worked and wages by worker groups along four dimensions − age (6 groups), education (3), gender (2) and (for the euro area estimates) country (12) − to construct estimates of labour quality growth. For a more detailed description of the data and methodology, see Schwerdt and Turunen (2007). Because of the reclassification of education categories in the LFS that occurred in the late 1990s and other breaks, estimates for country-years in which at least a 5% jump in an underlying share of total hours worked within a single education category is observed (1998 in Ireland, 1998 in Finland, 1999 in Austria and 2004 in Greece) are excluded from the calculation of time period averages shown in this box.

first-order contributions from education to labour quality growth over this time period. Overall, these country results are broadly consistent with estimates from other studies.[4]

Chart B shows the growth in labour quality in the euro area since 1992. Looking forward, owing to the ageing of the euro area population, the relative share of (the most productive) workers of prime-age is likely to decline, putting downward pressure on growth in euro area labour quality in the coming 10-15 years. This effect poses an additional challenge for sustaining labour productivity growth in the euro area.

4 See Jorgenson (2005) for estimates for Germany, France and Italy; Card and Freeman, (2004) for Germany; Melka and Nayman (2004) for France; Brandolini and Cipollone (2001) for Italy; Inklaar et al. (2005) for the EU4 (Germany, France, the Netherlands and the United Kingdom) and EU-KLEMS for a number of European countries (see www.euklems.net).

4 STRUCTURAL POLICIES AND THEIR EFFECT ON LABOUR SUPPLY [65]

An individual's labour supply is characterised by two key decisions: first, whether to participate in the labour market; and second, once in the labour market, how many hours to work. Such decisions are determined by preferences and budget constraints over the life-cycle and are greatly affected by institutions and structural conditions.[66] Empirically, a large literature has documented the significant impact of labour and product market institutions on labour supply across countries.[67] This literature has emphasized that the impact of institutions differs across labour types.[68] Institutional changes are found to have the strongest impact on the labour supply of individuals with a weaker attachment to the labour market, such as younger and older workers, females and (although less evidence is available) immigrants.[69] Against the background of population ageing, globalization and technological change, policies which succeed in attracting, integrating and retaining a high number of people in productive jobs and increasing human capital cannot be understated in their importance for increasing income levels and for the sustainability of public finances in the Member States.

This chapter thus takes a closer look at the contributions of structural policies or institutions to increasing euro area labour supply. While these institutions will mainly be considered separately below, the interaction of different institutions (e.g. active labour market policies and unemployment benefits) and the dependency of their effect on macroeconomic conditions is an important issue.[70] Particular consideration is given to institutions affecting the subgroups in Chapter 3, namely: (i) Tax and benefit systems, and the design of pension and early retirement systems, (ii) "Work/family reconciliation" policies, including parental leave, part-time work opportunities and child care provision, (iii) Policies and institutions affecting immigration and the integration of immigrants into the labour market and society, (iv) Educational and training policies.

This chapter's main findings include the fact that reducing disincentives to work, such as high marginal tax rates, high unemployment benefits, early retirement schemes and weak work availability requirements, can stimulate the labour supply and employment of all workers, but particularly those with a generally more tenuous attachment to the labour market, such as women and older workers. Female labour supply in particular is supported by so called "work/family reconciliation" policies. These policies help to reconcile fertility and labour market participation developments, with positive implications for long-term labour supply and potential output. From an economic perspective, the benefits derived from immigration depend on both the quantity and the characteristics of migrants entering the euro area. The design of national policies and institutions is important to set proper incentives and to facilitate the integration of immigrants into the labour market and society.

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65 Prepared by A. Balleer, J. Turunen and M. Ward-Warmedinger.
66 For example, the participation decision is affected by factors influencing the attractiveness of entering the labour market, relative to remaining outside it, such as the tax system and the generosity and duration of unemployment benefits, institutions that affect the incentives of workers (and firms) to invest in education and skills, contractual arrangements and regulations affecting the flexibility of hours of work including childcare, parental leave and/or part-time work opportunities. The second decision is largely determined by the extent to which working more hours results in higher current or expected net income. In the case of tight regulation, the key decision may degenerate to a decision about whether to participate full-time or part-time with the precise number of hours in these categories fixed by law or social partners. This inflexibility may also lead to individuals deciding not to enter the labour market at all. Additional aspects of individual labour supply include joint household decisions and decisions relating to the life-cycle (e.g. how many years to participate and decisions relating to investment in human capital).
67 While there exists a large number of studies that focus on unemployment, employment and participation decisions have not attracted as much attention in the literature. See for example, Genre et al. (2005b) on participation rates in the European Union, and Bassanini and Duval (2006) and Bertola et al. (2002), who investigate employment and relative employment of the sub-groups in OECD countries in 1982-2003 and 1960-1996 respectively.
68 See for example Antunes and Cavalcanti (2007), Genre et al. (2007), Bassanini and Duval (2006), Bertola et al. (2002) and Nickell and Layard (1999) for more details.
69 See for example Bertola et al, (2002), Amable et al. (2007), Nickell and Layard (1999).
70 See Bassanini and Duval (2006), Carone and Salomäki (2001), Bertola et al. (2002), Blanchard and Wolfers (2000), Killingsworth and Heckman (1986).

Finally, educational systems and the amount and efficiency of national resources devoted to education play a key role in determining the labour supply of the young and innovation capacity, overall labour quality within the euro area and long-term wage levels. It is important that national education systems are well funded and efficient, providing positive incentives for young people, workers and firms to invest in education and training, and for the efficiency and service orientation of educational institutions to be improved. Furthermore, educational systems have an important role to play in ensuring a smooth transition from education to working life and in providing the labour force with relevant skills for the future. However, a general caveat is needed: namely that policies involving higher government spending must also be considered from the perspective of the government budget. The distorting effects of tax increases to finance such policies also need to be taken into account.

4.1 TAX AND BENEFIT SYSTEMS [71]

Tax and benefit systems are a major explanatory factor of the labour supply developments observed in the euro area over the last decade. Depending on their design, tax and benefit systems affect individuals' incentives to engage in paid employment in several ways. First, they may affect the decision to enter paid employment. High income support for persons not in employment (e.g. unemployment benefits, social assistance, benefits from disability schemes, housing benefits) and high taxes on labour, such as income taxes and social security contributions, reduce the incentives for moving from inactivity to activity, from informal (or activities in the shadow economy) to formal work and from unemployment to employment. Second, tax and benefit systems affect work effort or human capital formation. In this respect, high labour taxes reduce incentives to work longer hours, to move from part-time to full-time work, to increase efforts and learning to enhance future income prospects, and to move to jobs with higher productivity. Third, pension systems affect incentives to stay in the labour force longer. Against this background, this subsection describes through what channels the

features of euro area countries' tax and benefit systems, as well as changes therein, may have supported the rise in labour supply that was identified in the previous chapter.

4.1.1 UNEMPLOYMENT BENEFIT SYSTEMS

Unemployment benefits are intended to provide financial security in case of unemployment and to increase matching in the labour market by giving jobseekers sufficient time to find suitable jobs that match their abilities. However, by raising workers' reservation wages (i.e. the wage level below which jobs are rejected), high unemployment benefit levels and long benefit durations tend to reduce the unemployed person's job search intensity and willingness to accept job offers, and are thus likely to result in an increased incidence and duration of unemployment (for a survey of the empirical literature, see OECD, 2006b, Chapter 3).[72]

As indicated in Table 12, unemployment benefit levels differ widely across euro area countries. Over the last two decades, unemployment benefits, as measured by the OECD summary measure of unemployment benefit entitlements, have tended to increase in the euro area. In more recent years, however, according to this indicator, several countries have reduced income support during unemployment, in particular Germany, France and the Netherlands. At the same time, in the majority of euro area countries, the net replacement rate [73] of unemployed persons with below-average incomes was raised between 2001 and 2005, while for persons with average incomes,

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71 Prepared by N. Leiner-Killinger.

72 Furthermore, Genre et al. (2007) find that female labour market participation declines with the size of unemployment benefit. Bertola et al. (2002) show that unemployment benefits increase prime-age employment relative to employment of young workers. Centeno and Novo (2007) distinguish between a substitution and an income effect generated by unemployment benefits. They find that an extension of the entitlement period in Portugal highlights the importance of the income effect on labour supply, which mitigates the distortionary nature of unemployment benefits. The results indicate, however, that the most constrained individuals benefit the least from the extension of the entitlement period.

73 The ratio of an individual's (or a given populations' (average)) net-income when unemployed in a given time period and the (average) net pre-unemployment income when employed in a given time period.

Table 12 Reforms of unemployment benefit systems in euro area countries

| | OECD summary measure of benefit entitlements[1] | | | Net replacement rates[2] | | | | Reform policies 1994-2006[3] | | |
| | | | | 67% of APW | | 100% of APW | | Shorter benefit duration | Tighter work availability conditions[4] | Tighter eligibility conditions[5] |
	level 2005	change (p.p) 1985-2005	change (p.p) 2001-2005	level 2005	change (p.p) 2001-2005	level 2005	change (p.p) 2001-2005			
Belgium	40.9	-2.2	2.4	71.0	2.0	56.0	1.0	+	+	+
Germany	24.2	-4.1	-5.2	78.0	-3.0	73.0	-2.0	+	+	
Ireland	33.7	5.4	4.0	70.0	3.0	59.0	5.0		+	
Greece	13.3	6.1	0.2	65.0	2.0	47.0	3.0			
Spain	36.0	1.6	-0.5	77.0	0.0	75.0	-1.0	-	+	
France	39.0	4.6	-4.5	83.0	0.0	67.0	-4.0	+	+	
Italy	32.5	32.1	-1.6	64.0	7.0	70.0	8.0	+	+	
Luxembourg	26.7	n.a.	0.0	90.0	1.0	89.0	0.0		+	
Netherlands	35.3	-19.3	-17.5	86.0	1.0	70.0	0.0	+	+	+
Austria	31.9	2.5	0.3	72.0	-1.0	68.0	-1.0		+	+
Portugal	39.5	17.9	-1.7	85.0	9.0	77.0	0.0	+	+	-
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.			
Finland	35.3	0.9	0.4	85.0	-2.0	76.0	-4.0		+	+
Euro area	32.3	4.1	-2.0	77.2	1.6	68.9	0.4			
Denmark	48.9	-4.2	-2.0	91.0	0.0	75.0	-1.0	+	+	+
Sweden	23.8	-4.1	0.2	89.0	-1.0	69.0	-3.0		+	+
United Kingdom	15.6	-5.1	-1.0	70.0	18.0	60.0	16.0	+		
United States	13.5	-1.2	0.0	49.0	-2.0	56.0	-3.0			

Sources: OECD (2006b) Employment Outlook, Chapter 3, OECD (2007b) Benefits and wages.
Notes: Unweighted averages for the euro area. n.a. not available.
1) The OECD summary measure of benefit entitlements is supposed to measure the overall generosity of unemployment benefit systems. It is defined as the average of the gross unemployment benefit replacement rates for two earnings levels, three family situations and three durations of unemployment.
2) Net replacement rates are defined after tax in the initial phase of unemployment but following any waiting period for a one-earner couple with two children aged 4 and 6. The pre-unemployment income situation relates to 67% (100%) of the average production worker wage (for further details, see www.oecd.org/els/social/workincentives).
3) Evaluations are based on OECD (2006b) and NCB assessments. + (-) indicates an increase (decrease) in the respective indicator. Assessments for Denmark, Sweden, the United Kingdom and the United States up to 2004 only.
4) Including tighter requirements for being available for work when offered a job. 2005 for Austria.
5) Including tighter eligibility requirements for certain groups of persons, most often increases in the minimum period of insured employment required to receive unemployment benefits.

reductions and increases in the replacement rate nearly balanced at the euro area level. Over the past decade, the vast majority of euro area countries tackled unemployment benefit administration by, for example, tightening work availability conditions, shortening the duration of benefit payments or tightening the eligibility conditions for unemployment benefit receipt (see Table 12). In addition, several countries introduced in-work benefits for workers working at low wages (see OECD, 2006b, Chapter 3). On average, these measures are found to have supported employment creation by, inter alia, raising the participation rate of persons with low levels of education in particular (see Chapter 3.1), and perhaps also by supporting moderate wage increases, thereby enhancing labour demand (see Box 5 for reform experiences in Ireland and Germany).

4.1.2 LABOUR TAXES

Labour taxes, including income taxes and social security contributions, affect labour supply, equilibrium employment and hours worked, as they drive a wedge between the marginal productivity of labour and net income received. In the presence of relatively high unemployment insurance (i.e. net replacement rates), they may have a particularly detrimental effect on employment of workers with low incomes.[74, 75]

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74 The effect of higher labour taxes (all else equal) on individual labour supply is a priori ambiguous. On the one hand, higher labour taxes may decrease disposable income, therefore decreasing leisure and increasing the supply of labour (income effect). On the other hand, labour supply may decrease, increasing leisure, which is now cheaper (substitution effect). However, if in general equilibrium, taxes are used to fund benefits such as unemployment insurance. Negative income effects following from higher labour taxes would tend to be cancelled out by the positive income effect for benefit recipients, while the substitution effect goes in the same direction – reducing labour supply.
75 See e.g. Carone and Salomäki (2001).

	Tax wedges [1]						Unemployment trap [2]		Low wage trap [2]	
	Single earner (67% of average worker wage)		One earner married couple (100%)		Two earner married couple (100%, 33%)					
	level 2006	change (p.p.) 2001-2006	level 2006	change (p.p.) 2001-2006	level 2006	change (p.p.) 2001-2006	level 2005	change (p.p.) 2001-2005	level 2006	change (p.p.) 2001-2006
Belgium	49.1	-1.6	40.1	-2.5	41.0	-3.0	83.0	-3.0	58.0	2.0
Germany	47.4	-0.3	36.2	-0.6	41.5	-0.5	75.0	0.0	51.0	-2.0
Ireland	16.3	-1.1	2.3	-10.5	8.9	-7.9	76.0	3.0	53.0	7.0
Greece	35.4	0.3	41.5	1.8	40.0	1.5	59.0	3.0	19.0	1.0
Spain	35.9	0.6	33.6	0.9	35.4	0.2	80.0	0.0	26.0	2.0
France	44.5	-3.1	42.0	1.5	40.0	-0.6	81.0	0.0	35.0	-6.0
Italy	41.5	-1.2	35.1	-2.0	37.9	-2.5	71.0	12.0	33.0	4.0
Luxembourg	30.6	-0.6	13.0	-1.0	17.6	-0.7	88.0	0.0	51.0	8.0
Netherlands	40.6	1.7	37.0	8.8	36.8	5.6	86.0	7.0	70.0	5.0
Austria	43.5	0.6	36.9	2.0	37.7	1.9	67.0	0.0	37.0	2.0
Portugal	31.7	-0.5	26.6	-0.5	27.9	-0.3	81.0	0.0	20.0	-1.0
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	94.0	13.5	67.0	32.1
Finland	38.9	-2.5	38.0	-1.5	36.5	-1.8	76.0	-4.0	61.0	5.0
Euro area	38.0	-0.6	31.9	-0.3	33.4	-0.7	78.4	3.0	43.3	4.5
							excl. SI	2.4	excl. SI	4.5
Denmark	39.3	-1.2	29.5	-1.1	34.4	-1.2	91.0	-1.0	82.0	-2.0
Sweden	46.0	-1.8	41.8	-1.1	41.7	-1.7	87.0	0.0	55.0	5.0
United Kingdom	30.4	2.3	27.8	2.7	25.8	2.8	68.0	0.0	58.0	0.0
United States	26.4	-0.5	11.7	-3.1	19.3	-2.2	70.0	0.0	32.0	-2.0

Table 13 Changes in labour taxes in the euro area countries

Sources: OECD (2006d), "Taxing wages 2005-2006" and Eurostat Structural indicators database.
Notes: Unweighted averages for the euro area. n.a. not available.
1) The tax wedge captures income tax plus employee and employer social security contributions less cash benefits as a percentage of labour costs. It is displayed here for a single person without children with 67% of the average worker wage, for a one-earner married couple with two children aged 4 and 6 at 100% of the average worker wage and a two-earner married couple with two children, where one earner has 100% of the average worker wage and the other 33%. Ireland is based on the old OECD definition of earnings.
2) The "unemployment trap" is defined as the percentage of gross earnings taxed away through higher taxes and social security contributions as well as benefit withdrawal when an unemployed person takes up a job. It is measured here for a single person without children with 67% of the average earnings of a full-time production worker in the manufacturing industry.
3) The "low wage trap" is defined as the percentage of gross earnings taxed away by higher taxes and reduced benefits when taking up a higher paid job. It is measured here for a single person without children, moving from 33% to 67% of the average earnings of a production worker.

Moreover, the negative impact of social security contributions on labour supply may be stronger, the smaller the perceived link between workers' social security contributions and benefit entitlements ('perception effect').[76] Bassanini and Duval (2006) and Silva (2005) document that high tax wedges reduce employment. This is supported by Nickell and Layard (1999). Evidence also suggests that the impact of taxation on labour supply may depend on the way in which the public sector uses tax revenues (see, e.g. Rogerson, 2007).

Table 13 surveys selected tax wedge (the difference between employers' cost of employing workers and employees' take-home pay after tax) indicators for various family situations. It shows that tax wedge levels vary widely across euro area countries,

with differences amounting to more than 30 percentage points. In the majority of euro area countries, tax wedges were reduced between 2001 and 2006, with the strongest reductions taking place in Ireland (see also Box 5), which has the lowest tax wedge levels across euro area countries. The modest euro area-wide tax wedge reductions between 2001 and 2006 tend to underestimate long-term reform efforts, as many countries undertook reforms lowering labour taxes somewhat earlier.[77] Overall, there seems to be a tendency across euro area

76 See OECD (2007e), Chapter 4, pp. 170 for a discussion of the literature.
77 For example, taking into account the year 2000 reduces the euro area average tax wedges significantly, i.e. by – 1.4 p.p for single earners at 67% of the average worker wage, by – 1.2 p.p for a one-earner married couple at 100% of the average worker wage and by – 1.8 p.p for a two-earner married couple at 100% and 33% of the average worker wage.

countries to focus reductions in tax wedges on persons with low earnings and on two-earner married couples, which may have supported the increase in employment of workers with low earnings and of women observed in the recent past (see Section 3.2.1).

However, as indicated by the high levels and sometimes even unfavourable developments in the unemployment and low-wage-trap indicators across euro area countries displayed in Table 13, the financial rewards for moving from unemployment to employment and from lower to higher earnings remained rather low between 2001 and 2005.

High levels of labour taxation may also provide incentives to engage in non-employment activities such as home production. Bertola et al. (2002), for example, document that the employment differential between females and males is positively affected by labour taxes, as higher taxes lead women to engage more in home production.[78] In addition, high levels of taxes on income and value added (see Table 14), and high social security contributions may lead to more labour being supplied in the shadow economy and thus often in activities with low productivity. In a differentiated Value Added Tax (VAT) rate system, a lower VAT may prove particularly supportive of labour supply in sectors whose services are easily substituted for do-it-yourself or work in the underground economy.[79] In addition, according to the literature, such incentives for involvement in the countries' shadow economies further arise from the desire to circumvent high legal labour standards, such as, inter alia, certain safety standards or high minimum wages, as well as product market regulations such as, e.g. time-consuming administrative procedures.[80]

Tax and benefit systems also affect incentives to build up human capital, e.g. through subsidies paid for participation in education, as discussed in Section 4.4.

Table 14 Changes in Value Added Tax rates in the euro area countries

	Standard VAT rates		
	level 2007	change (p.p.) 1984-2007	change (p.p.) 2000-2007
Belgium	21.0	2.0	2.0
Germany	19.0	5.0	3.0
Ireland	21.0	-2.0	0.0
Greece	19.0	n.a.	1.0
Spain	16.0	n.a.	0.0
France	19.6	1.0	-1.0
Italy	20.0	2.0	0.0
Luxembourg	15.0	3.0	0.0
Netherlands	19.0	0.0	1.5
Austria	20.0	0.0	0.0
Portugal	21.0	4.0	4.0
Finland	22.0	n.a.	0.0
Slovenia	20.0	1.0	n.a
Euro area	19.4	1.6	0.9
Denmark	25.0	3.0	0.0
Sweden	25.0	1.5	0.0
United Kingdom	17.5	2.5	0.0

Sources: OECD.
Notes: Unweighted averages for the euro area. n.a. not applicable.

78 See also Burda et al. (2006) and Freeman and Schettkat (2005). In turn, Genre et al. (2005) do not find a significant effect of labour taxes on participation.
79 For a discussion, see Copenhagen Economics (2007). Some euro area countries have, over the past two decades, raised their standard Value Added Tax (VAT) rate, although standard rates and the levels of reduced rates differ significantly across countries (see Table 14).
80 See Schneider (2006) for a survey. In a narrow sense, the shadow economy may be defined as including market-based production of goods and services that are deliberately concealed from public authorities.

RECENT REFORMS OF TAX AND BENEFIT SYSTEMS. CASE STUDY: IRELAND AND GERMANY [1]

Recent tax reforms implemented in Ireland have attempted to reduce the negative effects of high marginal tax rates on labour supply. Reforms instigated in Germany between 2003 and 2005 instead sought to reduce unemployment benefits, tighten work availability requirements and increase the attractiveness of employment. As these two examples show, reducing disincentives to work, such as high marginal tax rates, high unemployment benefits and weak work availability requirements can stimulate labour supply and employment.

The effect of taxation in Ireland

The tax wedge on labour was highest in Ireland in the late 1980s, fell back during the 1990s, and is now among the lowest in the OECD countries (Nickell, 2003) and the euro area (see Section 4.1.2 above). Chief amongst these changes was the reduction in the marginal personal taxation rate from 65% in 1983 to 41% in 2006. A narrower measure of the tax wedge that excludes consumption taxes declined by 18.3% between 1986 and 2003 – the largest reduction recorded in the OECD.

Higher taxes on labour contribute to higher unemployment and lower employment by reducing labour demand (moving employers back up their demand curve) and labour supply (by moving individuals back up their supply curves). The marked fall in these wedges during the 1990s can be taken to have contributed to Ireland's exceptional rate of employment creation. Research by Callan, Van Soest and Walsh (2003) has explored the responsiveness of Irish labour supply to various changes in the income tax code. In general, the results across different forms of tax cuts were quite similar in many respects. However, the response of married women to a top rate tax cut or to band-widening was more than twice as strong as that of men, and more than twice as large as women's response to a standard rate tax cut or allowance increase.

More recently, Callan, Van Soest and Walsh (2007) have examined the effects of increased independence in the taxation of married couples. In 2000, the Irish tax system moved towards greater independence in the tax treatment of couples in what has been termed an "individualisation" of the standard rate tax band. This involved restricting the extent to which tax bands are transferable between spouses. Callan et al. (2007) show that the impact of the change in the tax treatment of couples on married women's participation in the labour market is substantially greater than cutting tax rates or increasing tax-free allowances. They estimate that increased individualisation of tax increased married women's participation rates by 2-3 percentage points. This increase is somewhat larger than that found by Steiner and Wrohlich (2006) for Germany for a similar change in the tax treatment of couples.

Recent labour market reforms in Germany

Germany implemented major labour market reforms in 2003, 2004 and 2005, especially with the so-called Hartz Acts I to IV (for an overview of these acts, see Deutsche Bundesbank, 2006, pp. 79-83). The reform strategy included: improving employment services and redesigning active labour market policy measures (Deutsche Bundesbank, 2006, p. 66); activating the unemployed

1 Prepared by K. Mc-Quinn and H. Stahl.

and reducing unemployment benefit duration; tightening work availability requirements; and stimulating labour demand by deregulating segments of the labour market (Eichhorst and Zimmermann, 2007; and Jacobi and Kluve, 2007).

Prior to the reform, active labour market policy measures combined with a generous benefit system (unemployment benefits amounted to 67% of the last net labour income) created strong disincentives towards work in Germany. After entitlement to unemployment benefit expired (after between 6 and 32 months, depending on previous employment duration and age), unemployment assistance was paid for an unlimited amount of time and still amounted to 57% of previous net labour income. For a single blue-collar worker with average income in western Germany this would have been €833 per month in 2006 in current prices.

Hartz I and II redesigned the measures for recipients of unemployment benefits and unemployment assistance and many of the existing active measures, promoted low-paid part-time employment by waiving social security contributions and deregulated temporary employment. The inefficient public employment service was completely reorganised under Hartz III. Hartz IV replaced income-related unemployment assistance with the means-tested unemployment benefit II in 2005.[2] For a single person, unemployment benefit II amounted to about €695 per month in 2006, net of social contributions and taxes. The unemployment benefit I duration entitlement was shortened to 12 months for most of the unemployed and 18 months for the elderly (> 55 years) at the beginning of 2006. Additionally, incentives for older persons to participate in the labour force have been strengthened.

A thorough programme evaluation is mandatory under the Hartz Acts. Micro-evaluations of Hartz I-III indicate that the reforms of the Federal Employment Agency had some positive effects on employment, including the self-employed.[3,4] Training programmes in combination with training vouchers for firms improved employment opportunities (Schneider et al., 2007). However, publicly-sponsored job creation schemes and public-financed work agencies for the unemployed were found to have negative effects on employment. It is too early for a conclusive assessment of the 2003 labour market reform act and Hartz IV. However, in a recent survey, firms report an increased search intensity by the unemployed, along with reduced reservation wages (Kettner and Rebien, 2007). Moreover, unemployment fell substantially in Germany after Hartz IV was introduced (from 2005 onwards). The effect of even small reductions in replacement rates on employment can be sizeable.

In terms of spending, in 2006, two-thirds of the measures have yet to be evaluated. One clear outcome of the evaluations is that the number of measures of labour market policy, which amounted to between 60 and 80, has to be drastically reduced. Marginal tax rates for unemployed persons moving into employment are still very high. However, since every household whose income falls below a certain threshold qualifies for basic allowances, reducing the benefit-qualification level would be difficult. Other measures, such as "workfare", seem more promising.

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2 Income-related unemployment assistance prior to the Hartz reforms was also means-tested, but conditions were weak and referred only to partner income.

3 The promotion of self-employment through the provision of a benefit to unemployed workers wishing to set up their own business (paid for 6 months and equal to the unemployment benefit that the recipient would otherwise have received - for further details see Jacobi and Kluve, 2007) seems to have had long-lasting positive effects on employment. Caliendo et al. (2007) report that the probability of not being unemployed after 28 months for men in Eastern Germany is 24% higher than for comparable men that have not received this type of benefit. For women in western Germany, this probability is 18% higher.

4 However the current German Government is in the process of reversing some of the reforms undertaken, inter alia by increasing the duration of the higher unemployment benefits for older unemployed people

4.1.3 PENSION SYSTEMS

Pension benefit entitlements and their impacts on labour supply differ widely across euro area countries (e.g. OECD, 2007g; Blöndal and Scarpetta, 1999; Martins, Novo and Portugal, 2007). Overall, studies point to significant negative relationships between pension benefit entitlement and early retirement access on the labour supply of older workers (see, e.g. Duval, 2003 and 2006). As Table 15 indicates, the portion of pre-retirement incomes that is replaced by public pensions tends to be higher for low-income workers.[81] In 2004, in Greece and Luxembourg, net pension entitlements for low-income workers with 50% of average earnings were even higher than previous income from work, with net replacement rates exceeding 100%. Several reforms have been implemented to reduce the financial incentives for retiring early. For example, for the euro area as a whole, the implicit tax rate on continued work embedded in early retirement schemes, which becomes effective when a person decides to extend employment from 60 to 65, declined by 18.2 percentage points between 1993 and 2003 but remains high.[82] The reform strategies enacted to increase working incentives for older workers differ across euro area countries, with most euro area countries increasing the statutory retirement age, reducing the level of unemployment benefits for older workers or lowering the financial incentives for retiring earlier, e.g. pension levels and increases (see Table 15 and also Box 6). Together, these measures have been decisive in increasing the labour supply of workers aged 55-64, as indicated by the rise in this group's labour force participation rate over the last decade, as identified in Chapter 3 (see Table 2).

Further efforts to orientate tax and benefit systems towards increasing working incentives and labour supply are needed. As regards unemployment benefit systems, these could include improvements in benefit administration as well as adjustments in income support paid to the unemployed where it reduces incentives to search for work. Labour taxes need to be further reduced. This can be achieved by restraining government expenditures (e.g. through increased efficiency) and possibly by a partial shift from social contributions and taxes on income to taxes on consumption and other taxes, taking into account redistributive effects. However, given the impact of indirect taxes on shadow economy workers, an overall tax reduction would most likely be more effective for employment than a simple shift in the tax burden for taxes on labour to indirect taxes. As regards pension systems, where necessary, early retirement incentives need to be further reduced and the link between social security contributions and benefits needs to be strengthened.

Generally, a comprehensive approach to increasing labour supply with mutually reinforcing measures is decisive for increasing labour supply and employment.[83] By increasing GDP, and thereby tax revenues and social security contributions, such an approach allows countries with sound structural fiscal positions to further lower taxes on labour, thereby creating a virtuous circle of raising labour supply.

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81 Net replacement rates are estimated on the assumption that individuals enter the labour market at age 20 and work until the standard retirement age. See OECD (2007g), p.36.

82 Basically, the implicit tax rate on continued work measures the amount of pension foregone (net of any additional contributions paid) when an older worker decides to postpone retirement. Since by retiring later, workers receive a pension for a shorter period, to be incentive neutral this would need to be compensated by a higher yearly pension in the future. If the pension increase for retiring later falls short of compensating for one lost year of pension, the system is said to favour early retirement. The implicit tax rate is the amount of pension "lost" due to later retirement (in present value terms), relative to labour income.

83 The implementation of tax and benefit policies across euro area countries often takes the form of policy packages, combining either various reforms of tax and benefit systems or linking such reforms to reforms of other labour market institutions. The latter is the case, for example, within the currently discussed flexicurity approach. Broadly speaking, this approach is supposed to combine elements of labour market flexibility with elements of income security. A 'sufficient' flexibility in employees' contractual arrangements is meant to allow firms and employees to cope with (structural) change, while employees shall be eligible to receive an 'adequate' income in periods of joblessness that may arise from the increased labour market flexibility. Overall, the concept of flexicurity is intended to take account of trade-offs between social transfers, employment protection legislation, active labour market policies, as well as life-long learning strategies within an integrated approach. It is decisive that such reform packages exert a positive impact on labour supply by increasing overall labour market flexibility without giving rise to budgetary distortions through higher taxes.

Table 15 Reforms of pension systems in euro area countries

	Net replacement rates[1]		Implicit tax rates[2]		Policy reforms 1994-2006[3]		
	50% of av. income level 2004	100% of av. income level 2004	level 2003	change (p.p) 1993-2003	Reduced early retirement[4]	Lower unemployment benefits[5]	Financial incentives for later retirement[6]
Belgium	77.3	63.0	76.5	5.9	+	+	+
Germany	53.4	58.0	39.0	-14.2	+	+	+
Ireland	65.8	38.5	37.3	-0.6			
Greece	113.6	110.1	n.a.	n.a.	-		
Spain	82.0	84.5	33.6	22.1		+	[+;-]
France	78.4	63.1	50.6	-32.0	+ -'	+	+
Italy	81.8	77.9	20.6	-79.8	+	+	+
Luxembourg	107.6	96.2	75.3	-3.5		+	+
Netherlands	97.0	96.8	29.5	-59.8	+	+	+
Austria	90.4	90.9	65.6	n.a.	+		+
Portugal	81.6	69.2	76.5	0.9	+	+	+
Slovenia	n.a.	n.a.	n.a.	n.a.			
Finland	77.4	68.8	59.4	-21.4	+	+	+
Euro area	83.9	76.4	49.8	-18.2			
Denmark	132.7	86.7	n.a.	n.a.	+	+	+
Sweden	81.4	64.0	35.7	14.3	+		[+;-]
United Kingdom	66.1	41.1	26.4	6.2			
United States	67.4	52.4	12.8	6.5			[+;-]

Sources: OECD (2006b) Employment Outlook, Chapter 3 and OECD (2007g) "Pensions at a glance"; N. Brandt, J.-M. Bruniaux and R. Duval (2005), "Assessing the OECD Jobs Strategy: Past Development and Reforms" OECD Economics Department Working Paper No 429.
Notes: Unweighted averages for the euro area. n.a. not available. Changes in the replacement rate over time are not available.
1) The net replacement rate is defined as the individual net pension entitlement divided by net pre-retirement earnings, taking account of personal income taxes and social security contributions paid by workers and pensioners. It is displayed at 50% and 100% of average earnings, respectively. Displayed for retirement in 2004.
2) The implicit tax on continued work is defined as the average annual change in pension/social wealth (i.e. the present value of the future stream of pensions/social benefits), net of additional contributions paid, resulting from a decision to postpone retirement from age 60 to age 65. The calculations are made for a single worker with average earnings. For 2003, they reflect the steady-state of currently legislated systems thus taking account of recent reforms and their impact on future pension streams, which in some cases will take several decades. The figure for Belgium refers to the period 1995-2003.
3) Evaluations are based on OECD (2006b, 2007g) and NCB assessments. + (-) indicates an increase (decrease) in the respective indicator or simultaneous measures acting in both directions. Assessments for Denmark, Sweden, the United Kingdom and the United States up to 2004 only.
4) Includes tightened eligibility to early retirement (e.g. through increase in retirement age for early retirement).
5) Includes unemployment benefits for older persons seeking a job with an extended duration of unemployment benefit receipt.
6) Includes actuarial adjustments to early or late receipt of pensions or financial incentives to retire later (e.g. bonuses)

Box 6

ENHANCING THE PARTICIPATION RATE OF OLDER WORKERS: THE NEED FOR A COMPREHENSIVE STRATEGY [1]

Despite the fact that in most euro area countries the statutory retirement age is currently 65 for both men and women (see Table and Social Security Administration, 2006),[2] in 2006, the participation rate of individuals aged 55 to 64 stood, as for younger individuals, at around 44%. This low rate of participation for older workers reflects cohort effects (for women), but is also due to economic and institutional factors. In fact, the participation rate of men between 55 and

1 Prepared by D. Nicolitsas.
2 See Table for details on the statutory pensionable age in 2005. The only euro area countries in which the statutory pensionable age for men was not 65 in 2005 were France (60) and Slovenia (63). The euro area countries in which the statutory pensionable age for women was less than 65 in 2005 were Belgium (64), Greece (60 but only for those women who joined the labour force prior to 1993), France (60), Italy (60), Austria (60) and Slovenia (61).

64 years of age in the euro area is lower today than two and a half decades ago, while the average effective retirement age for both men and women is lower today than in the 1980s.[3]

The significant discrepancies between countries in the effective retirement age (see Table) reflect, inter alia, cross-country differences in the level and composition of economic activity,[4] and in the extent of self-employment. The main factors, however, behind these discrepancies are differences in: the statutory retirement age, early retirement schemes, restrictions on employment during retirement, and replacement rates.[5]

The decline in the average effective retirement age is mainly due to the fact that in the 1980s a number of countries tried to tackle unemployment, especially that of the young, by introducing early retirement schemes (e.g. Belgium, Germany, Austria) and made disability benefits more generous (e.g. Netherlands). At the same time, the increase in the unemployment rate amongst older people led them to withdraw from the labour market (known as the discouraged worker effect).

The main reason for which individuals take advantage of early retirement schemes are the high implicit tax rates on continued work. As can be seen from Table 13, implicit tax rates are positive in all countries and very high in some. In other words, Blöndal and Scarpetta (1999) estimate that in the 1990s in a number of OECD countries a 55 year-old man could expect no increase in his pension if he continued working for another 10 years – a situation in sharp contrast with what prevailed in the 1960s.

More recently, given other developments (e.g. population ageing and the need for fiscal consolidation), it became clear that while measures such as early retirement schemes and more generous unemployment and disability benefits were not effective in lowering unemployment,[6] they could, ceteris paribus, lead to a reduction in output and mount pressure on public finances by reducing the size of the aggregate labour force. For this reason, a number of countries reversed such measures and started to give employers incentives to increase the number of older workers, and workers incentives to stay at work longer.[7]

Limiting the use of early retirement schemes will have wider benefits than just helping public finances. More specifically, such measures could contribute to increased training activities by lengthening the pay-back period for investment in human capital or by encouraging older workers to weather a temporary demand shock without withdrawing permanently from the labour market (see, inter alia, Duval, 2003). Moreover, staying in work can help older people remain integrated in society. Despite the beneficial effects expected as a result of the measures that have already been planned, and the fact that the participation rate of older workers is expected to increase due

3 See Blöndal and Scarpetta (1999) for evidence until the mid-1990s and Romans (2007) for evidence on the more recent period.
4 Individuals from certain sectors in which work is more arduous (e.g. construction, manufacturing, mining and quarrying and transportation) generally have earlier retirement dates.
5 Differences in the decision to retire early also differ across individuals depending on, inter alia, their education level; in general, there is a negative correlation between early retirement and education level.
6 See OECD (2006d) for an illustration of the point that in 2004, countries in which participation rates of older workers were low also had high unemployment rates (Chart 9, p.132).
7 For example, in Germany the statutory retirement age will, between 2012 and 2029, progressively increase from 65 to 67 starting with the age cohort born in 1947; in Austria early retirement schemes are to be abolished with effect from 2017; in France a pension supplement is given to people over the age of 60 who, despite the fact that they could earn a full pension, decide to stay on at work; social security contributions for older employees have decreased in Belgium; in Portugal, the pension scheme reform enacted in 2007 included a bigger financial penalty for early retirement – an increase from 4.5% to 6% for every year prior to the legal retirement age – and introduced a "sustainability factor" that will make the calculation of new pensions conditional on life expectancy at 65.

Statutory pensionable age and average exit age from work by gender (2005)

	Statutory pensionable age (1)	Early pensionable age (2)	Average exit age (3)	Statutory pensionable age (4)	Early pensionable age (5)	Average exit age (6)
	Men			Women		
Belgium	65	60	61.6	64 (65)[1]	60	59.6
Germany	65 (67)[2]	63	61.4[3]	65 (67)[2]	63	61.13[3]
Ireland	65	-	63.6	65	-	64.6
Greece[4]	65	60	62.5	60 4	55	61
Spain	65	-	62	65	-	62.8
France	60	-	58.5	60	-	59.1
Italy	65	-	60.7	60	-	58.8
Luxembourg	65	57	59.4	65	57	59.4
Netherlands	65	-	61.6	65	-	61.4
Austria	65	62.5[5]	60.3	60[5]	58.5[5]	59.4
Portugal	65	55	62.4	65	55	63.8
Slovenia	63	-	n.a.	61	-	n.a.
Finland	65	62	61.8	65	62	61.7
Euro area[6]	64.2	60.3	61.5	62.6	58.9	61.2
Denmark	65	60	61.2	65	60	60.7
Sweden	67	61	64.3	67	61	63
United Kingdom	65 (68)[7]	50 (55)[7]	63.4	60 (68)[7]	50 (55)[7]	61.9
United States	65	62	n.a.	65	62	n.a.

Sources: DG Employment, Active ageing country fact sheets (for columns: 1, 3, 4 and 6) and Social Security Administration, 2006 for columns 2 and 5.
1) The statutory retirement age will, from 2009, increase to 65.0 for women.
2) The statutory retirement age will gradually (between 2012 and 2029) increase to 67, starting with the age cohort born in 1947.
3) Data refers to 2004.
4) In Greece, data refer to the modal case of the main pension provider for private sector employees. Statutory retirement ages are considerably lower for public sector employees, while they are less generous for farmers and the self-employed. The statutory pensionable age is 65 years for women who joined the labour force since 1993. The median exit age for women was 58.4 in 2006.
5) Early retirement is being increased gradually (by one month every four months) until it equals the statutory age – i.e. until 2017.
6) Average for the countries for which data are presented in the Table.
7) The statutory pensionable age will increase from 65 to 68 by one year in each of the years 2024, 2034 and 2044; statutory pensionable age will be equalized for men and women in the period 2010-2020; and early retirement age for a non-state pension will increase from 50 to 55 by 2010.

to the improvement in the educational level of the population as a whole and due to the increased importance of the service sector, there is still need for further action. This is prompted by the rapid expected deterioration in the old-age dependency ratio[8] (from around 25% in the euro area in 2006 to around 35% in 2025 and 55% in 2050).[9] In addition, there is still a discrepancy of around 8 percentage points between the euro area employment rate of individuals aged 50-64 and the target of 50% for 2010 set by the 2001 Stockholm European Council. The significant cross-country differences and past experience with policy measures suggest that for the adopted measures to succeed, it will take a comprehensive strategy that incorporates many of the special features needed to promote the activation of older workers, not least of which is the need for life-long learning (see, inter alia, Employment Committee, 2007). Such comprehensive reform should also take into account other measures which may currently dampen incentives for further training and render older employees less employable, for example those arising from the rigidity of age-earnings profiles.

8 The old-age dependency ratio is defined as the population over 64 years old as a percentage of the working age population.
9 Figures from Maddaloni et al. (2006).

4.2 PARENTHOOD AND PARTICIPATION [84]

As discussed in Chapter 3, the labour market participation and employment rates of females are still low compared with those of males. According to recent calculations, euro area GDP would be substantially increased if female employment rates could be raised to those of men (see Daly, 2007). Female labour supply, that of parents in general, and fertility developments (and thus long-term labour supply and potential output) are substantially influenced by so called "work/family reconciliation" policies, namely childcare opportunities, parental leave and part-time work opportunities. These policies differ across euro area countries and may consequently help to explain differences in female labour supply and fertility across countries. In general, it is important to create incentive-compatible policy frameworks that support both female labour market participation and high fertility.

This section briefly describes how these policies affect female and parents' labour supply and suggests optimal policy designs for childcare, parental leave and part-time work opportunities for reconciling fertility and female labour market participation.

4.2.1 FERTILITY AND FEMALE PARTICIPATION: WHAT IS THE RELATIONSHIP?

Box 1 in Chapter 3 highlighted the importance of fertility rates for future labour supply. Most countries with high participation rates also have relatively high fertility rates (such as Finland, France and the Netherlands – see Chart 8). At the same time, a number of countries are plagued with both mediocre or low participation and low fertility (Italy, Spain and Greece), while others such as Germany and Austria have relatively high participation rates, but low fertility rates.[85] When comparing the situation in 1992 with that of 2006, most countries retain a similar relative position, despite the general increase in female participation rates described in section 3.2.1. One exception is the Netherlands (and to some extent Ireland), which managed to move from mediocre to become a top performer in both categories.

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84 Prepared by M. Ravanel and H. Schauman.
85 See also Genre et al. (2005) and OECD (2001).

Chart 8 Female participation, employment and fertility in euro area countries, 1992 and 2006 [1]

x-axis: participation and employment (in percentage); y-axis: fertility rate (average number of children per woman)

- participation rate (in percent)
- employment rate (in percent)
- denotes the average participation rate for the euro area
- ····· denotes the average employment rate for the euro area
- ---- denotes the average fertility rate for the euro area

Source: Eurostat.
Note:
1) 2005 for Spain and Italy fertility figures.
2) Countries for which no data were available for 1992 or before have been omitted.

Table 16 Principal type of childcare used by employed mothers during hours of work

(this refers to children under 15, where at least one child is under 6 years old, in percent)

	Market child care system	Mother	Partner	Family, friend, Neightbour
Belgium	66	3	6	25
Germany	51	6	23	20
Spain	37	22	11	30
France	46	13	11	30
Italy	35	8	20	37
United Kingdom	34	20	17	29
Total % in all 6 countries	40	15	15	30

Sources: Micheaux, S and O. Monso (2007), European LFS 2005 and ad hoc module 2005. Data are only available for the six countries presented.
Note: "Market" child care system includes both public and private provision. The column "mother" includes the case where no alternative child care is available.

These different country groups reflect differences in policies affecting labour market participation and fertility across countries. Policies that aim to simultaneously increase both fertility and labour market participation rates must focus on two issues: first, increasing the labour supply of parents that do not yet participate in the labour market; and second, working females (or future parents) who are considering the fertility decision. Here, the opportunity cost of having a child, in terms of labour market withdrawal and possible negative consequences for the female career, may have a particularly strong impact on the fertility rate of highly skilled women. Different, non-exclusive, systems can be implemented, including the following three possible solutions – increasing the availability and lowering the cost of child care, parental leave and part-time work opportunities. Interestingly, two of the success stories, in terms of female employment rates, namely the Netherlands and Finland, use very different policy mixes. In the Netherlands, flexible working hours and a high percentage of part-time work in total employment appear important for both high participation and fertility (most children do not attend full time childcare), while in Finland, high full-time employment and fertility is supported by a developed childcare and extensive parental leave system (see Box 7). The next sections will consider these systems and their effect on participation and fertility decisions in greater detail.[86]

4.2.2 AVAILABILITY AND COST OF CHILDCARE

It is widely documented that well-designed childcare opportunities have a positive impact on female participation (see, for example Bassanini and Duval, 2006) and allow parents to continue with full- or part-time work after having a child. However, the availability and financial cost of childcare systems are important. When childcare provided through the market is too scarce or too expensive, one parent, usually the mother, often stays at home to take care of the children until they go to school. This not only keeps the parent away from market work during the leave, but can also affect the parent's employment situation after the leave due to lack of relevant professional experience. Table 16 provides figures on the type of childcare system most frequently used by working mothers in some European countries. Eurostat (2007) finds that when no market-based childcare system is used, the main reason given by families across the European Union is that it is too expensive. This can lead low-paid employees to leave the labour market, or to accept that a large proportion of their wage will be re-channelled into childcare.[87] Note that in Finland, the price paid for childcare is linked to family income (see Box 7).

86 The European *ad hoc* module of the 2005 LFS focused on conciliation between family and professional life. A report issued by Eurostat in 2007 called *Reconciliation between work and family life* gives very interesting insights on the availability of those different solutions across the European Union. We will refer to their main results, especially for childcare availability.

87 Increasing childcare opportunities is in line with one of Barcelona targets. The European Council stated that "Member States should remove disincentives to female labour force participation and strive, taking into account the demand for childcare facilities and in line with national patterns of provision, to provide childcare by 2010 to at least 90% of children between 3 years old and the mandatory school age and at least 33% of children under 3 years of age".

It is important to recall that there are a number of possible means available to lower the fees charged for market childcare systems. These include: increasing publicly provided and financed child care opportunities; subsidising private provision directly; or introducing a voucher system. Given the high costs of childcare systems together with the need for a balanced government budget, the efficient use of resources is crucial. The voucher system supports a market-based childcare system with the benefits of free competition and choice, but has generally not been used in the euro area countries so far. Private efforts and investments associated with raising and educating children have positive "external" effects for society (e.g. in the form of future tax payments). These can justify certain subsidies for families raising children. However, direct child-related transfer payments to parents may decrease incentives to participate in the labour market. The Austrian extension of the "Kindergeld" (child allowance) scheme in 2002 is an example of such an effect[88] and may help to explain a negative relationship between fertility and labour market participation at the individual level.

[88] For more information, see OECD (2007a). In 2002, the Austrian government extended the period of entitlement for the so-called "Kindergeld" scheme from 18 to 30 months. The maximum duration can be extended by six months if the partner also decides to take part in the program. Men, however, rarely take the opportunity. The generosity of the scheme (it pays approximately €430 per month) and the rather low threshold for any work-related income induce most women to stay at home for quite a long time. Empirical research has shown that the Kindergeld scheme significantly decreases women's participation rates. It has also been criticised on the grounds that it is likely to lower women's re-entry prospects in the labour market. Critics also argue that the subsidy should be in the form of childcare vouchers rather than a money transfer. Recently, the Austrian government has enacted a reform to make the Kindergeld more flexible. Starting from 2008, parents may chose between different lengths of payment and thus trade off benefit duration and monthly transfer payments.

Table 17 Length of parental leave and level of benefits

Country	Maternity leave duration, weeks	Parental leave duration, weeks	% of salary during maternity leave	Paternal leave duration, days
Austria	16		100	
Belgium	15		82[1]	
Finland	17.5	26.5	70[2]	18
France	16		100	11
Germany[3]	14	60 (52)	100	
Greece	17		100[7]	2
Ireland	18		80	
Italy	21		80	
Luxembourg	16	26[8]	100	2
The Netherlands	16		100	
Portugal[4]	20	5	100	
Slovenia[5]	15	37	100	15
Spain[6]		16 (10)	100	2

Sources: Social security programmes throughout the world, 2006 and information from the national central banks. The periods of leave listed here refer to leave granted in connection with childbirth, which usually includes a period of leave prior to and after the birth of a child. Maternity leave refers to the weeks of leave from work which can only be taken by mothers. Parental leave refers to leave that can be taken by either the mother or the father of a child. Paternal leave is optional leave that can be taken by the father in order to allow both parents to be on leave at the same time - the mother on maternity or parental leave and the father on paternal leave. In general, leave systems are complex. This table attempts to summarise the key points of the systems in place in each country.
1) For 30 days, 82% of salary; thereafter, 75%.
2) Payment up to a ceiling of €28,402 plus 40% of daily earnings for annual earnings between €28,404 and €43,698, and 25% of daily earnings for annual earnings of €43,699 or more. The minimum daily benefit is €15.20.
3) At the beginning of 2007, the so called "Elterngeld" – a subsidy to parents who leave their job to take care of a child - was introduced. The maximum duration of 14 months requires that the leave period is shared between parents, with a minimum leave period of at least 2 months for each parent. Part-time work up to 30 hours a week is possible.
4) If the maximum leave period of 25 weeks of maternity and parental leave is opted for, the percentage of salary paid for the whole period falls to 80%.
5) The parental leave in Slovenia is known as a childcare benefit.
6) Of the 16 weeks of parental leave, the mother must use 6; the remaining 10 can be used by either the mother or father. In 2007, paternal leave increased to 15 days.
7) 50% of salary is covered by the maternity benefit, but mothers receive 100% of their salary while on maternity leave.
8) 13 weeks can be taken by the mother and 13 weeks by the father of a child up until the child's 8th birthday. This is generally unpaid leave, although in certain collective agreement arrangements may be partly paid.

4.2.3 MATERNAL AND PARENTAL LEAVE OPPORTUNITIES

Parental leave exists in every country of the euro area; however, benefits and their duration differ from one country to another (see Table 17).[89] Maternal and parental leave schemes generally tend to positively affect the labour supply of females and parents (Jaumotte, 2003). Having the right to suspend a work activity, with the option to come back to work afterwards without suffering a wage loss during the leave period, can have a positive influence on the decision to have a child. Furthermore, parental leave may help redistribute the time needed for childcare more evenly between parents. However, Genre et al (2005) show that parental leave has a positive effect on employment as long as the leave period is for less than 10 months. In addition, parental leave schemes have been found to incur a cost in terms of (mainly female) career progression[90] and to the extent that they are financed by firms, may impose a cost on employers.[91]

4.2.4 PART-TIME WORK OPPORTUNITIES

Part-time work is a further policy option to conciliate family and professional lives, under certain conditions. Indeed, some evidence in the literature points to a positive impact of part-time work on employment[92] and Section 3.3.2 has highlighted the increase in part-time work since the early 1990s, which coincided with a strong increase in female labour supply.

At first sight, working part-time seems to offer a popular opportunity to arrange family and work, since women choose to work part-time far more frequently (as can be seen in Chart 9). However, although part-time work opportunities increase labour market participation, this does not necessarily result in higher employment when measured in average weekly (or annual) hours of work (see Section 3.3.2). As shown in Chart 9, rates of involuntary part-time work are relatively high for females.[93] For parents, high costs or unavailability of childcare may force workers to work part time rather than full time. Furthermore, part-time work is estimated to have a negative impact on career

Chart 9 Part-time workers in euro area countries in 2006 as a percentage of total employment, including involuntary part-time.

(in percent)

- part-time
- including involuntary

m males	4 Ireland	9 Luxembourg	14 Finland
f females	5 Greece	10 Netherlands	15 United Kingdom
1 Euro area	6 Spain	11 Austria	
2 Belgium	7 France	12 Portugal	
3 Germany	8 Italy	13 Slovenia	
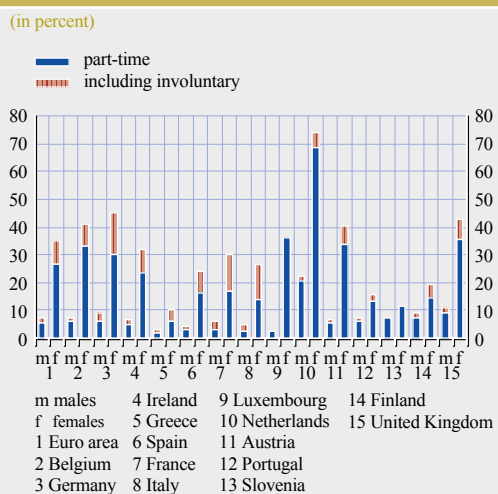
Source: Eurostat.
Notes: Data on involuntary part-time work are not available for males in LU and the euro area. In these cases, only data on voluntary part-time employment as a percentage of total employment is shown (by the dotted histograms).

progression.[94] Balancing the rights of part-time and full-time workers, allowing flexibility for both firms and employees through the equal access of all working groups to part-time work and discouraging the negative stigma that can sometimes be associated with working part time in some cases should be beneficial for all parties. Furthermore, favouring flexible working arrangements and teleworking could provide an alternative to part-time work for reconciling family and professional life.[95]

89 The information presented in Table 17 refers to parental leave related to the birth of a new child, not leave for childcare more generally.
90 See Mincer & Polachek (1974), Gronau & Weiss (1981) and Stoiber (1990).
91 Possibly introducing a bias by firms against the hiring of women.
92 Genre et al. (2005) document that part-time work positively and significantly affects the labour supply of the young, and Pissarides et al. (2003), inter alia, emphasise the positive effects of part-time work on female labour supply.
93 Generally, part-time workers have been shown to suffer detrimental effects of their shorter working week on career progression (see for instance International Labour Review (1997), or Tam (1997)).
94 See for instance International Labour Review (1997) and Tam (1997).
95 For example, in the Netherlands, flexible working arrangements and a low rate of (involuntary) part-time work coincide.

REFORM OF CHILDCARE AND FLEXIBLE WORKING ARRANGEMENTS. CASE STUDY: FRANCE AND FINLAND.[1]

This box examines one important determinant of female labour market participation, namely the childcare and flexible working arrangement schemes in two euro area countries, Finland and France. Finland experiences the highest female participation rate in the euro area and a high fertility rate. France also has very high fertility rates but has female participation rates below 65%. This box gives an overview of the Finnish system and presents the most recent reform, the 2004 PAJE-reform, in France.

In Finland, a record 67.3% of women worked outside the home in 2006, compared with 71.4% of men. Most mothers of young children work full time and only 19.2% of working women work part-time, compared with the euro area average of around 35%. Some of the explanations for the high female employment rate can be found in a relatively successful mix of flexible working arrangements for the parents of young children and efficient childcare services.

The childcare system in Finland started in 1973 with a law on childcare encouraging municipalities to provide childcare for all children up to the age of 6. In contrast, from 1990 onwards, municipalities were obliged to arrange childcare for all children up to the age of 3, and since 1996 the same is true for all children below school age (the year the child turns 7). Roughly 50% of children below school age use the municipality childcare service. Of these, 77% are in full-time day care. Only 3.5% of all children in childcare attend private childcare. There are also part-time childcare services and around-the-clock childcare for children whose parents work in shifts. The cost of childcare borne by parents is linked to family income - the highest fee is €200 per month, falling with each additional child. Low-income families do not pay childcare fees.

The Finnish family leave system builds on the principle that both parents should have equal opportunities to take part in the caring of a child. For each newborn child, family leave is a maximum of 263 days. This is split into maternal leave (105 days) and parental leave (158 days). In addition, there is a short paternal leave (18 days). The financial support paid to parents during the leave period is tied to regular income and is at least €15.20 per day. Paternal leave allows the father to stay at home, together with the mother, when the child is born. The popularity of paternal leave has grown steadily, with 69% of all fathers using their right to paternal leave in 2005. After the parental leave period, one parent is allowed to get an unpaid leave from his or her job for nursing his or her child until the child turns 3. The monetary support for one child is roughly 300 euros per month but grows with the number of children.

In France, the fertility rate is high (at 1.93 children per woman), but female labour market participation remains significantly below that of males. Before 2004, allowances aimed to increase fertility by lowering the "cost" of having a child. In 2004, the allowances designed to raise fertility were reformed in order to also raise female participation.

The French allowance scheme, PAJE, consists of a birth grant, a monthly allowance paid until a child's first birthday and two allowances for the "free choice" to reduce working time (paid to parents who stop or reduce their paid employment to take care of their child)[2] and of third-party

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1 Prepared by M. Ravanel and H. Schauman.
2 A very similar system was implemented in Germany in 2007, where parents can, under certain conditions, receive an allowance.

childcare (which pays part of a childminder's wage). Since 2004, the aim has been to develop participation through part-time work. Thus, the two allowances paid to part-time working parents have been increased. This has had a positive effect on participation, but 60% of parents still choose not to work at all. 98% of them are women, and 84% of these are blue collar workers. 37% of parents who chose to stay at home say that another choice would have been too expensive (CNAF, 2006). Thus, participation of low-paid mothers has not dramatically risen since the PAJE reform. Crèches (in other countries also known as nurseries) remain the cheapest system. However, availability in crèches is low and the opening hours do not cover a complete working day. Because availability is so scarce, crèches are the principal childcare system for only 8% of children under 3 years of age.

In sum, the availability of affordable (e.g. subsidised) formal child care services and municipal day care services, including crèches, in general has a positive impact on female participation (Jaumotte, 2003; Gustafsson and Stafford, 1992; and Viitanen, 2005). Allowance packs such as PAJE can, on the other hand, have negative effects on participation, especially of low-skilled women. Increased availability of municipal day care services, or possibly a voucher system to pay for private day care services, would allow for better work/family reconciliation and support future female labour market participation.

4.3 IMMIGRATION POLICIES [96]

As argued in Chapter 3, immigration can help to fill skill shortages, contributing to the reduction in wage pressures stemming from an increased demand for particular skills. This suggests that an effective immigration policy should take into account the skills demanded in the labour market. As discussed in Box 2, migrants can bring skills which natives lack and cannot acquire to a sufficiently large scale in the short run. Accordingly, a number of countries utilise migration policies that select the type and amount of immigrants let into a country over a specified time period, and design mechanisms that attempt to facilitate the rapid integration of immigrants with a more permanent status. Moreover, at least in the short run, the entry of a sizeable number of foreign workers may help to alleviate the reduction in the size of the labour force in the near future (see Box 1), provided that markets are sufficiently flexible and policies sufficiently efficient to ensure their smooth integration into the labour market. However, there is general agreement that immigration alone clearly cannot solve the longer-term problems of Europe's ageing population on the pension and health care schemes.[97]

The contribution of immigration to labour supply is regulated through immigration policies.

Traditionally, most EU governments have selected the type of immigrants and length of residence that suit their country's needs. Usually there is an annual limit (quota) for non-EU and some EU immigrants who fulfil a selection criterion. As is evident from Chart 7, labour demand has encouraged an increase in the quotas since the beginning of the 1980s in euro area countries.[98] Furthermore, immigrants from the EU15[99] have the right to freely move across the euro area[100] and the EU enlargement in 2004 contributed to the increase in immigration within the EU. Countries have tended to recognise rights regarding asylum seekers, the marriage with a

96 Prepared by A. Lacuesta.
97 European Commission (2002a). This conclusion is also evident in the Council Opinions on the Stability Program Updates of many European countries.
98 As it is further explained in OECD (2007e) (also see Box 2), during the 1980s migrants generally concentrated in traditional immigration countries (mainly Germany and Austria), while in the 1990s, the number of immigrants increased the most in new immigration countries (Spain, Ireland and Italy).
99 That is, Belgium, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Denmark, Sweden and the United Kingdom.
100 The free movement of persons is one of the fundamental rights guaranteed to EU citizens, and includes the right to work and live in another EU Member State. Temporary restrictions on the mobility of migrants to and from a new EU Member State are possible for up to seven years following EU enlargement. Such restrictions have been in place for some non-EU-15 EU countries since the 2004 and 2007 EU enlargements. Moreover, regulations such as minimum wages effectively undermine free movement.

foreign partner, adoption of foreign children and reunification of a foreigner's family. This last mechanism is an endogenous source of growth for migration. In traditional European immigration countries, immigrants from family reunification account for more than half of the total annual inflow of immigrants (OECD, 2006b).[101] In addition, income differences between origin and destination countries combined with the fall in transportation costs have encouraged illegal immigration. Increased cooperation among Member states and with countries of origin is needed to decrease illegal migration. Furthermore, firms need to be discouraged from illegal hiring of migrants (since a large fraction of undocumented migrants are immigrants that have over-stayed their legal residence rather than new entrants; OECD, 2007e). In sum, the abovementioned factors emphasise that active immigration policies have some limitations in immigrant selection; however, many euro area countries have selected their immigrants according to employment-based migration policies described below.

Employment-based migration policies aim to attract particular skills in short supply on the national labour market. Usually employers are responsible for hiring directly, strengthening the link between immigration and the needs of the national labour market through ensuring a job for the immigrant upon arrival. Governments typically have to approve a migrant's entry following consideration of the country's labour market situation.[102] Since the system is intended to solve a limited shortage, the visa awarded is usually temporary, although in some cases it is possible to apply for permanent residency after several years of residence in the destination country. The system works fairly well for skilled migrants, since entrepreneurs do not generally experience problems in finding good candidates from abroad. However, firms are more likely to find unskilled workers from the pool of already residing migrants - encouraging illegal migration and over-stays of unskilled workers (OECD, 2007e). In this regard, it is important that public agencies reduce the costs of hiring workers from abroad. Another particularity of the system is the strong link

between the immigrant and the job held, since the visa is cancelled as soon as a particular job is over. The migrant cannot move from firm to firm to find a better match, and this potentially limits the productive output of the migrant and creates incentives for firms to offer lower wages to immigrants relative to natives (due to their reduced mobility and thus bargaining power). In order to avoid this situation, some public supervision of potential discrimination against foreign workers may be required.

One alternative system, not currently implemented in euro area countries, is the point system. Such a system is in place in Canada, New Zealand, Australia and Switzerland and is being discussed in the UK. This system seeks the admission of mainly long-term immigrants. Immigrants are screened on the basis of a set of characteristics that are considered to make them more likely to assimilate in the destination country.[103] The system has been found to be successful in attracting higher percentages of highly skilled migrants relative to other countries without such a system.[104] One important drawback, however, is that the national government needs to verify ex-ante the characteristics of the immigrant. This is especially difficult with regard to characteristics such as education, where there is no good system for comparing and evaluating the relative quality of foreign degrees.[105] Moreover, such a system may reduce the flexibility with which

101 Notice that family reunification affects the quantity but also the quality of immigration since the skills that are sought with a particular selection policy do not need to apply to the individuals who are reunified.

102 In most cases, governments set additional quotas by region and occupation once they have identified particular shortages (for example, France and Spain have a "shortage occupation list" as opposed to a general cap as in Italy). Usually, there are difficulties with matching ex-ante and ex-post needs (see OECD, 2007e).

103 The system awards points to an individual's characteristics (e.g. education level), with a minimum number of points required to allow an immigrant to enter the country.

104 Baker and Benjamín (1994) and Borjas (2001).

105 In order to overcome this problem, some countries such as the United Kingdom have incorporated the salary at origin of a person, depending on the age and educational degree, in their valuation. This information is expected to capture the different productivity of the person, although unfortunately it also links the allocation of visas to the origin country labour market behaviour.

firms are able to hire immigrants in the face of labour shortages.

4.3.1 POLICIES AFFECTING IMMIGRANTS ONCE IN A COUNTRY
INTEGRATING LEGAL IMMIGRANTS

A number of studies have found that immigrants' skills tend to be underutilised upon arrival (Chiswick and Miller, 2005; see also Box 2), and during the initial years after arrival, migrants may face higher unemployment than natives. This poor initial performance could be due to language problems, a limited transferability of their human capital acquired abroad, lack of familiarity with a host country's institutions, or discrimination. Moreover, depending on the degree of integration, this situation could perpetuate over time, affecting not only the migrants themselves but also their descendants. Countries have encouraged several initiatives to help better integrate resident immigrants and to encourage the education of their children.

COURSES DEDICATED TO IMPROVING LANGUAGE SKILLS AND PRESENTING COUNTRY'S ADMINISTRATIVE SYSTEM

Much research stresses the importance of language in the assimilation of immigrants (Chiswick and Miller, 1995; González, 2005). Thus, many countries, e.g. Germany and Austria, encourage immigrant participation in language programs. In some cases, however, there are questions regarding the effectiveness of such courses.[106] In a broader initiative, France created an office for the reception of foreigners and migration (ANAEM) in 2005 to facilitate the reception and integration of foreigners. However, it is still too soon to evaluate it. Some countries have linked complete assimilation with the right to reside permanently and reunify some family members. For example, since March 2006, in the Netherlands anyone who wants a long-term permit must pass a test including a language exam and questions about Dutch society. This measure has significantly increased the efforts required for individuals to be granted permanent residence in the Netherlands, and according to the OECD (2007e) it is a factor

underlying a decrease in the willingness of immigrants to enter the country.

FACILITATING THE EDUCATION AND INTEGRATION OF IMMIGRANTS' CHILDREN

Education and language skills of the second or even third generation of immigrants play a role in the future success of these individuals in the labour market. This is especially the case for children who enter a country at a later stage of their childhood, since the completion of an educational level becomes more difficult with age of entry (see National Research Council, 1995; and Kate, Bachnan and Morrison, 2001). Moreover, poor economic conditions and any lack of assimilation of their parents can also negatively affect children's educational performance. Therefore, policies to monitor an immigrant's progress at school and particularly in basic subjects such as language and mathematics seem of crucial importance. In order to encourage school participation, governments have tended to promote policies such as subsidising some costs incurred while a child is at school (such as transportation or food). Some have also randomised the distribution of foreign students among different schools in order to increase the benefits of being schooled with native peers from other socio-economic conditions.

REGULARISATION OF ILLEGAL MIGRANTS

This procedure is usually used as an exception, but due to large numbers of illegal immigrants in recent years, it has been recently implemented in many European countries including Spain, Portugal, Belgium, Greece, the Netherlands and France, and has been debated in Germany. The procedure usually targets certain categories of foreigners.[107] As for the positive effects of such

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106 To improve language skills of permanent immigrants, compulsory courses to learn basic German were introduced in Austria in 2006. However, the effectiveness of such measures are subject to heavy debate.

107 But its effectiveness depends crucially on the amount of red tape involved and the conditions set out for regularisation, since the compulsory presentation of many documents can affect the number of participants. For example, the OECD (2007f) has suggested that the relatively low participation in Greece's regularization could have been due to the high amount of paper work required and a requirement that a certain number of days had been worked.

programs, literature documents an increase in productivity following a change in the legal status (Kossoudji and Cobb Clark, 2002; and Rivera Batiz, 1999).[108] A disadvantage of regularisation programs is that they do not stop illegal migration and might even encourage it, if migrants believe that a government is likely to repeat the process again at a later date.

Summing up, the economic benefits that a host country can derive from immigration depend on both the number and the characteristics of migrants that are allowed to enter the country, and the incentives created by national institutional frameworks for these immigrants to find work and to integrate into society rather than rely on social security or unemployment benefits. Although immigration policy does not ensure a perfect control over immigration flows, the design of national policies and institutions are crucial to facilitating the integration of immigrants and their children into the labour market and society.

4.4 EDUCATION SYSTEMS AND INCENTIVES [109]

The design of the education system, incentives to invest in education and the amount and efficiency of national resources devoted to education play a key role in encouraging young people and workers to invest in education and training, and therefore in determining the quality of the labour force. Tax and benefit systems affect incentives to build up human capital, and thus the quantity and quality of education demanded by society.[110] Despite

108 This research finds an increase in migrants' labour opportunities after legalisation, allowing individuals to find a better match for their characteristics. Moreover, legalisation tends to lead to an increase in the investment of immigrants in country-specific human capital.

109 Prepared by N. Leiner-Killinger and M. Ward-Warmedinger.

110 For example, through subsidies paid for participation in education, tuition fees or taxing persons with high incomes, all of which differ widely across euro area countries (see Table 18). Generally, the impact on overall human capital accumulation is difficult to quantify, as it depends crucially on the efficiency of the resources spent. A highly progressive tax system associated with high tax wedges for low-, middle- and high-income groups (here displayed for both 67% and 167% of the average wage) is usually assumed to reduce incentives to increase earnings and thus also to improve skills (via time and financial resources) in human capital accumulation.

Table 18 Selected indicators of tax and benefit systems affecting education incentives

	Public subsidies for education in tertiary education [1] (in % of public expenditure on tertiary education) 2004	Average tuition fees in public institutions (in USD, using PPPs) academic year 2004-2005	Tax wedge Single earner [4] 67% of average worker wage		Tax wedge [2] Single earner 167% of average wage	
			level 2006	change (p.p) 2001-2006	level 2006	change (p.p) 2001-2006
Belgium	15.7	853 (Fl.) 658 (Fr.) 3)	49.1	-1.6	60.7	-1.6
Germany	17.9	n.a.	47.4	-0.3	53.8	-1.2
Ireland	14.8	no tuition fees	16.3	-1.1	34.2	-1.6
Greece	5.2	n.a.	35.4	0.3	47.7	3.4
Spain	7.8	668 to 935	35.9	0.6	42.6	0.8
France	7.9	160 to 490	44.5	-3.1	53.2	1.2
Italy	16.7	1,017	41.5	-1.2	49.8	0.0
Luxembourg	n.a.	n.a.	30.6	-0.6	43.5	-1.4
Netherlands	27.0	n.a.	40.6	1.7	46.0	4.5
Austria	18.1	837	43.5	0.6	50.7	0.1
Portugal	5.4	868	31.7	-0.5	41.7	0.3
Finland	16.7	no tuition fees	n.a.	n.a.	49.9	-2.2
Slovenia	n.a.	n.a.	38.9	-2.5	n.a.	n.a.
Euro area	13.9		38.0	-0.6	47.8	0.2
Denmark	30.3	no tuition fees	39.3	-1.2	49.5	-1.5
Sweden	28.2	no tuition fees	46.0	-1.8	54.6	-0.5
United Kingdom	23.9	n.a.	30.4	2.3	37.6	2.3

Sources: OECD (2006a), "Education at a glance" and OECD (2007h), "Taxing wages 2005-2006".
Notes: Unweighted averages for the euro area. n.a. not available.
1) Public subsidies for education to households and other private entities as a percentage of total public expenditure on tertiary education including student loans, scholarships and other grants to households.
2) See footnote 1 in Table 13.
3) Academic year 2003-04.
4) See also Table 13.

Table 19 Expenditure on education

	Change in expenditure on educational insitutions for all services per student (1995 to 2004)[3]		Expenditure on educational insitutions for tertiary education as a % of GDP in 2004		Annual expenditure per student in euros 2004[4]			
	Primary, secondary and post-secondary	Tertiary	Public	Private	Primary education	All secondary education	All tertiary education including R&D activities	Primary to tertiary education
Belgium	n.a	n.a	1.2	0.1	5267	6152	9398	6364
Germany	105	107	1.0	0.1	3927	6015	9726	6192
Ireland	181	126	1.0	0.1	4303	5643	8104	5328
Greece[2]	192	151	1.1	n.a	3647	4137	4439	4075
Spain	136	167	0.9	0.3	3940	5318	7443	5237
France	n.a	n.a	1.2	0.2	4033	6934	8467	6254
Italy[1),2)]	105	130	0.7	0.3	5865	6225	6129	6129
Luxembourg	n.a	n.a	n.a	n.a	10681	14187	n.a	n.a
Netherlands	136	101	1.0	0.3	4938	5985	10989	6348
Austria	n.a	122	0.8	0.8	6087	6476	11140	7780
Portugal[1),2)]	154	98	0.9	0.1	3715	4895	6144	4610
Finland	122	110	1.7	0.1	4429	5906	9925	6189
Euro area	141	124	1.0	0.2	5069	6489	8355	5864
Denmark	121	123	1.8	0.1	6413	7023	12083	7751
Sweden	117	99	1.6	0.2	5928	6380	12871	7210
United Kingdom	120	93	0.8	0.3	4715	5627	9114	5770
United States	130	132	1.0	1.9	6988	7887	17838	9597

Source: OECD (2007d), "Education at a Glance".
Note: euro area average is unweighted.
1) Data on annual expenditure per student refer to public expenditure only.
2) Data on change in expenditure per student refer to public expenditure/institutions only.
3) Index of change between 1995 and 2004 (Expenditure is expressed in 2004 constant prices, deflated by GDP deflator; values represent an index with 1995=100).
4) Converted using PPPs for GDP, based on full-time equivalents, converted from US dollars to euro at January 2004 rates.

marginal reductions in tax wedges in some euro area countries (see Table 18), for the euro area as a whole, incentives to increase the quality of labour supply as measured by this indicator have generally remained unchanged.

As discussed in Chapter 3, investment in the quality of tertiary education is also important for innovation and research, to the benefit of countries' growth potential (see also Box 3). Table 19 presents information on euro area education expenditure. It shows that all euro area countries increased their education expenditure over the last decade, in line with the increase in educational level of labour supply described in Chapter 3. While expenditure per student in non-tertiary education rose by 41% on average in the euro area between 1995 and 2004, expenditure per student in tertiary education rose less, by 24%, partly due to expanding student numbers. By 2004, 1.2% of

euro area GDP was spent on tertiary education, with the vast majority of funds coming from the public sector, and annual expenditure per student was highest for tertiary level students.

However, comparison with figures for the United States suggests that the euro area spends a significantly smaller proportion of annual GDP on tertiary education, predominantly due to far fewer funds from the private sector, and that the level of expenditure per student in the euro area is generally lower, particularly so at the tertiary level. Furthermore, it is very important how efficiently money is spent[111], and to what extent education expenditure affects the public purse or is funded by the private sector. Recent work by Aghion et al (2007) suggests a significantly positive link between a university's

111 Chart 13 in Annex 3 shows the lack of a clear correlation between aggregate Pisa scores and annual expenditure per student for euro area countries.

level of private funding and its autonomy in spending its budget on research performance. Some studies (for instance, Hanushek and Luque, 2003) find little or no evidence of a positive link between more resources being allocated to the education system and test performance. The OECD points to the existence of relevant inefficiencies in public spending on (secondary) education. In other words, governments could either provide the same level of education outputs with less public spending or, for the existing level of public spending, increase the education sector's performance and efficiency. It seems that much can already be achieved if existing public funds are used more efficiently and if incentives for private funding are enhanced.

Chapter 3 has shown that labour market participation rates for young people are generally low while they invest in their education, and that the participation rate of higher educated individuals is generally high. This suggests that a lower participation rate of the younger group does not present a problem, provided that this is due to time invested in quality education that both maximises their chances of direct entry into the labour market and facilitates a successful future career.[112] Alongside the amount and efficiency of expenditure on educational systems in Europe, an improved organisation of the educational process is of key importance to ensure the best quality outcome and facilitate the transition from education to working life. Organisational aspects include staff-to-student ratios, total hours of tuition, the organisation of these hours across semester and the mixture of study and work experience. Most important in this context are governance issues and the incentives created by educational systems for directors, teachers and professors to invest into the human capital and skills of students. Wößmann (2007) finds that student performance is better in countries where private schools increase competition; in schools that have the freedom to make autonomous process and personnel decisions, combined with a system of external exams that hold schools accountable for their performance;

and in schools where teachers have both the freedom and incentives to select the best teaching methods. Furthermore, individual incentives to participate in higher education, vocational training and lifelong learning are influenced by the costs of education relative to returns (see also Box 9), which include the expected length of time spent in education, tuition fees and access to finance. Also, on the job training (Box 8) is expected to contribute to improvements in productivity and thus could potentially explain differences in developments across countries. Some reforms to support vocational training, life long learning and education have been undertaken in recent years.[113] Although the availability of data on these characteristics is somewhat limited, Table 20 shows considerable cross-country variation in both staff-to-student ratios and typical graduation dates across the euro area countries. On average however, tertiary education classes tend to be somewhat larger and typical graduation ages higher than comparable figures for the United States.[114]

Other institutions that matter for the effective quality of labour supply include wage-setting institutions (to ensure appropriate private return) and the flexibility of labour contracts (as determinants of the appropriate allocation of human capital).

The Bologna process (or Bologna accords) aims to create the European higher education area by making academic degree standards and quality assurance standards more comparable and compatible throughout Europe. Through

112 Information available in the EU-LFS on student status suggests that the overall (for 15-64 year olds) participation and employment rates would be 6.3 percentage points higher at 77.0% and 71.0% respectively (instead of the observed 70.7% and 64.7%) if all inactive students were to work. The effect of the inactive student population is larger for 15 to 24 year olds and would increase the participation and employment rates of this group by 31.4 percentage points to 76.0% and 68.6% respectively (instead of the observed 44.6% and 37.2%).

113 For details, see the European Commission's LABREF database.

114 In comparing graduation ages, one should keep in mind that in Germany, compulsory military or civil service generally takes place after school and increases the age at which individuals start their studies, and thus also tends to increase graduation ages by up to one year.

Table 20 Ratio of students to teaching staff in educational institutions and typical graduation ages

	Ratio of students to teaching staff in educational institutions (2005)[1]			Typical graduation ages in tertiary education	
	Primary	**Secondary**	**Tertiary**	**Tertiary education programmes of 3 to 5 years**[2]	**Advanced research programmes**[3]
Austria	14.1	10.9	15.3	22	25
Belgium	12.8	9.8	19.6	22-24	25-29
Finland	15.9	13.9	12.5	22-26	29
France	19.4	12.2	17.3	n.a.	25-26
Germany	18.8	15.1	12.2	25	28
Greece	11.1	8.3	30.2	21-22	24-28
Ireland	17.9	15.5	17.4	21-22	27
Italy	10.6	10.7	21.4	22	27-29
Luxembourg	n.a.	9.0	n.a.	n.a.	n.a.
Netherlands	15.9	16.2	n.a.	22-23	25
Portugal	10.8	8.1	13.2	22	n.a.
Spain	14.3	10.6	10.6	20	25-27
Euro area	14.7	11.7	17.0	22.2	26.4
Denmark	n.a.	n.a.	n.a.	22-24	30-34
Sweden	12.2	13.0	8.9	23-25	27-29
United Kingdom	20.7	14.1	18.2	21	24
United States	14.9	15.5	15.7	21	28

Source: OECD (2006a, 2007d), "Education at a glance".
Note: euro area average is unweighted.
1) By level of education, based on full-time equivalents, for Luxembourg public institutions only; the United Kingdom includes only general programmes in upper secondary education.
2) Tertiary-type A (ISCED 5A), data are available by duration of programme.
3) ISCED 6.

the implementation of the Bologna process, higher education systems in European countries should be organised in such a way that: (a) it is easy to move from one country to another (within the European Higher Education Area) for the purpose of further study or employment and (b) the attractiveness of European higher education is increased so many people from non-European countries also come to study and/or work in Europe. The European Higher Education Area aims to provide Europe with a broad, high-quality and advanced knowledge base; and promote greater convergence between the United States and Europe.

In summary, educational systems and the efficiency of national resources devoted to education play a key role in ensuring a smooth transition from education to working life and providing the labour force with relevant skills for the future, for innovation capacity and thus for overall labour quality within the euro area. It is important that national education systems are well funded and efficient and provide positive incentives for young people and workers to invest in education and training, and for directors, teachers and professors to invest into the human capital and skills of students. Introducing elements of competition and external tests or exams may enhance such incentives. It is important that such measures also include incentives to enhance the education of pupils with lower skills or fewer talents.

INCENTIVES FOR FIRMS AND WORKERS TO INVEST IN HUMAN CAPITAL ACCUMULATION AND LIFE-LONG LEARNING[1]

The importance of education for productivity and performance cannot be overemphasised. A discussion of the relationship between the quality of human capital and growth has already taken place in earlier sections of this report (see, for example, Chapter 2 and Section 3.5). In those sections, the focus has been on formal education. But human capital improvements take place not only before individuals start working but also while they are in work in the form, for example, of continuous vocational training (CVT) and life-long learning (LLL). The average annual hours spent on CVT in European enterprises (Table A), the percentage of the population engaged in LLL activities (Table B) and the percentage of secondary level students enrolled in apprenticeship schemes (Table C) suggest, however, that only a small percentage of the population receives structured training outside formal education or combines studying with vocational training. This is true even if one looks at only large firms or at younger individuals, as suggested by the data presented in Tables A and B, despite the fact that the need for continuous human capital improvement is becoming ever more pressing in view of rapid technological progress and population ageing. That said, it should be noted that these measures in general, and specifically those on CVT, do not include some more informal types of training such as, e.g. learning-by-doing or on-the-job training, which may lie outside structured training programmes.

The limited extent to which structured training (which in a general sense also includes life-long learning activities) takes place is often attributed to market failures; most training is of a general nature, i.e. transferable across firms (at least within the same industry), capital market imperfections prevent individuals from borrowing against human capital since returns are uncertain (Becker, 1962), and it is difficult to enforce detailed contracts designed to ensure the quality (and incentive-compatible financing) of training. For example, firms have little incentive to provide general training, since they are faced with the risk that their trained staff may be poached by competitors who, having not incurred the training costs, are in a position to offer higher wages. Despite these factors, however, a number of firms provide both firm-specific and general training (e.g. German firms), while a number of individuals also participate in LLL activities. The significant diversity in the extent of training provided, both among firms and, moreover, across countries (see Table A), is attributed to differences in industrial organisation and to institutional features introduced to deal with market failures (see, inter alia, Acemoglu and Pischke, 1998 and 1999; Finegold and Soskice, 1988; and Stevens, 2001)[2]. For example, firms in certain countries are encouraged to provide general training through tax breaks and the provision of subsidies etc., while incentives are also provided to individuals to engage in life-long learning through, for example, reductions in taxes, subsidised loans to trainees etc. Differences in the extent of training also depend on the quality of the education system in each country, since training builds on the skills that have already been provided in schools.

1 Prepared by D. Nicolitsas and H. Stahl.
2 More specifically, recently proposed models in the economics literature (see, inter alia, Stevens, 1996; Acemoglu and Pischke, 1998) suggest that labour market frictions arising from mobility costs between jobs, the nature of skills, or search frictions in the skilled labour market could explain why some firms do provide general training. Mobility costs arise since it takes time to find an alternative job or because employers providing the general training have an informational advantage over prospective employers regarding the true productive capabilities of the workers they have trained. This gives these firms some monopsony power, which explains their decision to invest in general training.

It appears, however, as also suggested by the theory (see Acemoglu and Pischke, 1999) that one of the most important factors in determining the extent and quality of training provided is the existence of a monitoring mechanism. In the absence of a detailed contract between the employer and the employee to ensure that the latter has received the training paid for, it seems that the state usually fulfils this role by introducing a curriculum and setting standards (exams, monitoring boards). One of the best examples of this kind is the German dual apprenticeship system, a concise description of which is provided below.

The German dual apprenticeship system

This system (mainly for pupils aged 15 to 19 with lower and middle educational levels) combines apprenticeships in a company with vocational education at a vocational school. It covers almost all sectors of the economy; currently about 2/3 of apprentices are working in service sector firms. The training period lasts for between two and three and a half years. For the practical part, students receive training in a company for three to four days a week, while the theoretical part, which is both general (language, politics, economics, religious education and sport) and trade-specific, takes place at a vocational school. The quantity and quality of both the theoretical and the practical parts are strictly regulated, and companies have to teach a broad spectrum of tasks related to the particular apprenticeship (in other words there is a large amount of general training involved). Students need a "vocational education contract" (Berufsausbildungsvertrag) to begin an apprenticeship and are paid during the apprenticeship while final exams are held, for example, by the Chambers of Industry and Commerce and the Chambers of Handicrafts. In

Table A Hours in Continuous Vocational Training [1] courses per 1,000 hours worked (all enterprises) by size class, 1999 [2]

Country	Size class (Number of employees)				
	20-49	50-249	250-499	500-999	1,000+
Belgium	5	8	9	9	13
Germany	4	5	4	6	6
Ireland	8	8	9	24	7
Greece	1	2	4	3	6
Spain	4	5	9	9	11
France	5	7	9	12	16
Italy	3	4	5	7	10
Luxembourg [3]	n.a.	5	n.a.	13	n.a.
Netherlands	7	10	11	12	14
Austria	4	4	5	5	8
Portugal	1	3	5	10	8
Slovenia	2	3	3	7	7
Finland	9	8	10	12	13
Euro area	4.4	5.5	6.9	9.9	9.9
Denmark	11	14	10	13	15
Sweden	10	8	11	16	14
United Kingdom	6	7	14	17	6

Source: Eurostat.
Notes: n.a is not available. Euro area averages are unweighted.
1) Apprenticeship schemes are not included.
2) In January 2008, Eurostat data for a later date (2005) were available for only a few countries. From the available data, it appears that the number of hours spent on CVT courses was still low, yet higher than in 1999.
3) The figure for firms with between 500 and 999 employees refers to firms with over 250 employees.

Table B Percentage of all individuals participating in any kind (formal, non-formal or informal) of training activity by age [1]

(percentage, 2003)

	Age				
	25-34	35-44	45-54	55-64	Total
Belgium	51	45	41	27	42
Germany	50	45	41	32	42
Ireland	51	52	47	42	49
Greece	27	19	13	7	17
Spain	33	26	20	14	25
France	61	55	51	32	51
Italy	57	52	47	35	49
Luxembourg	86	84	79	75	82
Netherlands	51	44	39	30	42
Austria	90	88	87	93	89
Portugal	54	46	39	33	44
Slovenia	86	83	80	78	82
Finland	85	82	76	66	77
Euro area	60.2	55.5	50.8	43.4	53.2
Denmark	82	83	80	72	80
Sweden	77	74	71	62	71
United Kingdom*	44	42	39	23	38
United States	n.a.	n.a.	n.a.	n.a.	n.a.

Sources: Eurostat, LFS and ad hoc module on lifelong learning 2003 (see Kailis and Pilos, 2005).
Note: 1) Figures refer to the whole population over the age of 25 independent of activity status.
* Informal training not included for the UK. Informal training differs from non-formal training because it corresponds to self-learning through, for example, books, computers, learning centres or educational broadcasting.

Table C Percentage of upper secondary education students enrolled in apprenticeship schemes (combined school and work-related schemes), 2005

BE	DE	IE	GR	ES	FR	IT	LU	NL	AT	PT	SI	FI	Euro area	DK	SE	UK	US
3.3	45	3.8	n.a.	2.8	11.3	n.a.	13.6	20	32.7	n.a.	3.7	10.5	14.7	47.7	n.a.	n.a.	n.a.

Source: OECD (2007d), "Education at a glance", Table C.1.1. p. 277.
Notes: n.a is not available. Euro area unweighted average calculated on the basis of available information.

2002, an estimated 62% of apprentices found a full-time job once they had passed the final exam, while 32% were unemployed.[3]

The dual apprenticeship system has a long tradition in Germany. Recently, however, certain reform needs have been identified. A significant problem is that the supply of vocational education contracts is persistently lower than demand. Only 25% of firms offer apprentice opportunities. Many firms are too small to participate and firms face the risk of losing their investment (including the sometimes relatively generous apprenticeship wages) if apprentices are not retained at the end of their training period.[4,5] A lack of quality applicants can also be an obstacle. Apprenticeship schemes (356 of them) are considered overly specific and discussions are underway to consider reducing them to about 40 broader occupations. Companies would then have to teach only those skills that are central to a particular apprenticeship. In an effort to modernise the dual apprenticeship system, the Vocational Training Reform Act was enacted on 1 April 2005.[6] This act facilitates the accreditation of qualifications acquired outside the dual apprenticeship system, for example at full-time vocational schools.

3 These employment and unemployment figures should be interpreted with great care since some agreements with trade unions explicitly specify that firms must offer to those apprentices who pass the exam at least a temporary job. After two months of having completed the apprenticeship scheme, male apprentices of German nationality do quit their job, probably in order to do their military or civil service, although this cannot be identified with the available data.
4 Monthly wages for apprentices range from €200 in transport to €1,000 for apprentices in hotels and restaurants.
5 According to a survey of 2,500 firms, total costs per year and per student are €16,435, half of which are labour costs. Subtracting the gains from the students' labour input, there remains a loss of €2,400 per year. However, the firm can save €5,800 in the opportunity costs of hiring an external applicant if the student stays at the firm after having received his/her apprenticeship.
6 A more detailed presentation of the reform of the German dual apprenticeship system can be found in the site of the Federal Ministry of Education and Research, "Reform of Vocational Education and Training" (http://www.bmbf.de/en/1644.php).

5 MATCHING LABOUR SUPPLY AND DEMAND[115]

A well functioning labour market requires a good match between labour supply and labour demand, which should in turn support high employment rates. In the absence of a shift in relative demand, an increase in the relative supply of a particular group of workers, such as the high skilled, will result in lower wages (i.e. returns) or higher unemployment for those workers relative to workers with less education. Generally, sector specific shocks in an environment of matching inefficiency and wage rigidities will lead to general wage increases in excess of productivity growth and upward pressure on prices. An efficient matching process, combined with flexible wages, should therefore reduce the risk of upward pressures on wages and inflation resulting from shocks to relative labour demand and support employment creation and output, facilitating adjustment to monetary policy actions and economic shocks.[116]

This chapter reviews the evidence on returns to education and the relative unemployment of particular groups in the labour market. It aims to consider the extent of mismatches between labour demand and labour supply in the euro area, updating and extending some of the analysis undertaken by the European Central Bank (2002). It includes a brief overview of how labour and product market institutions affect the matching of labour supply with labour demand. It concludes with a discussion of the implications of globalisation and demographic and technological change for future labour supply. The main findings of this chapter include only limited evidence of increasing returns to education, high rates of unemployment for low-skilled workers in some countries (e.g. 9.3% overall, but 17.6% in Germany in 2007) and non-EU nationals (14.7% in the euro area), persistent labour market shortages of some skill groups (e.g. those involved in teacher training and education, engineering and manufacturing, and health and welfare qualifications), and high rates of youth unemployment in the euro area (19.3% for 15-19 year olds in 2007).

Furthermore, unemployment rates vary significantly by geographical region, suggesting a lack of cross-regional labour mobility and insufficient regional wage differentiation. There is evidence that euro area countries may have been underutilising the increases in female and non-national labour in recent years. The challenges facing the euro area imply that labour markets must not only be adequately prepared with an appropriately enhanced quantity and quality of labour supply, but must also rise to the task of ensuring an efficient match between its workforce and labour demand.

5.1 RETURNS TO EDUCATION

Returns to education are a function of the quality of labour (education and skills) and of the matching of labour demand with labour supply. Chapter 3 has shown that an increase in the supply of highly educated workers has been an important trend in euro area countries over the last 20 years. In the face of skill-biased technological change and a rapid increase in the demand for skilled workers, empirical studies have shown a significant upward shift in returns to education in the United States, whereas studies for other (including European) countries do not find such a shift[117] (see Box 9). Chart 10 suggests that for the United States, an increase in total hours worked by the highly skilled has been accompanied by an increase in the group's hourly wage, whereas in the euro area, the increase in total hours worked by the highly skilled has, on average, not been matched by a significant increase in hourly wage.[118] A possible explanation for this evolution in hourly wages and in returns to education for the euro area is that the higher relative supply of skills was not matched by an increase in relative demand for skills in Europe. Alternatively, the quality of education in Europe may not match that in the United States (as discussed in Chapter 4), or Europeans may have tended to

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115 Prepared by M. Ward-Warmedinger.
116 See, e.g. Christoffel, Kuester and Linzert (2006).
117 Ashenfelter et al. (1999).
118 Although trends in total hours and hourly wages by skill group vary across euro area countries.

Chart 10 Hours worked and hourly real wages by educational attainment-based measure of skill

x-axis: years
y-axis: 1990 = 100

— hours high skilled
····· hours low skilled
--- real wage high skilled
— real wage low skilled

Euro area

United States
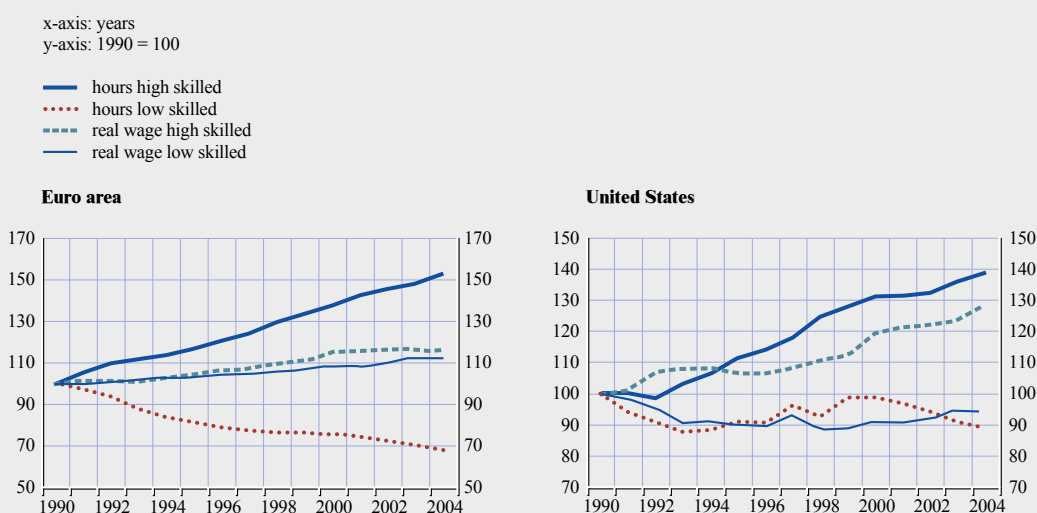
Source: ECB calculations based on EU Klems data.
Note: Skill data are derived from national data on educational attainment, with "high skilled" comprising those with university level education and "low skilled" comprising those with primary and/or secondary education (depending on the country). Total economy data, i.e. manufacturing plus services.

invest more in particular subject areas that are less rewarded by the market. Other possible explanations are a lack of wage differentiation or relative wage flexibility between different skill groups, relatively high taxes on higher incomes or an increase in competitively priced labour from abroad, which has led to an adjustment via quantities instead of wages, thus provoking an increase in the unemployment of low-skilled relative to high-skilled workers. In a similar fashion, an increase in the relative supply of workers with more experience, for example as the baby-boom cohort reaches prime working age, and an increase in female labour supply both have implications for returns and unemployment rates of these labour input types, depending on the existing labour market rigidities in those particular subgroups. The unemployment rates of different groups of workers are considered further in the next section.

RETURNS TO EDUCATION IN THE EURO AREA COUNTRIES [1]

Markets provide incentives for individuals to invest in skill acquisition through offering higher wages or earnings for higher levels of education and/or a specialisation in particular fields. A lack of skill acquisition, either to a higher level or within particular fields, may reflect net returns to education that are too low. Policies that aim to increase the overall skill level, or the supply of particular skills in an economy, must therefore be confident that the supply of skill will be met by an adequate demand from firms, and thus that appropriate rates of return to investment in education are in place.

1 Prepared by J. Turunen and M.Ward-Warmedinger.

A driving factor in the trend of mean returns to education for many countries has been changing returns to higher education. A review of available cross-country evidence on so-called Mincerian returns to higher education, i.e. the premium in earnings for those with a tertiary (university level) education relative to those with primary education (Budria and Pereira, 2005) or high school education (Acemoglu, 2003), suggests that returns to higher education appear to have increased only in three out of twelve euro area countries considered since the 1980s. Thus, over the period 1980 to the mid 1990s, at least, there was no general increase in the returns to education in the euro area, as could have been suggested by a potential increase in relative demand for highly educated workers owing to skill-biased technological change. A possible reason for this includes that demand was more or less met by the increase in the supply of skills described in Chapter 3.

Individuals' decisions to acquire human capital, in principle, involve a substantial forward-looking component and a complex calculation weighing the costs of an additional year spent in education against the expected benefits from the investment over an entire lifetime. For example, if the alternative involves possibly longer periods of future unemployment, higher (expected) unemployment benefits may contribute to reduced investment in education/human capital. Furthermore, there may be high "opportunity costs" attached to study or work vis-à-vis leisure for those young people with a high preference for leisure. Mincerian returns do not take into account the cost of investing in education borne by the individual, and a useful alternative measure of the returns to education is thus the internal rate of return.[2] Although measurement difficulties suggest that such estimates should be read with caution, the OECD (2006a) estimates that the private internal rate of return for individuals obtaining a university-level degree directly following an upper secondary and post secondary non-tertiary level of education exceeds 8% in a sample of 11 OECD countries in 2003. Rates of return were estimated to be as high as 16% in Finland and up to 15% in Belgium (see Table 33 in Annex 3). Furthermore, this study finds lifelong learning to be worthwhile, as the estimated rates of return to a 40-year-old resuming the next level of their higher education on a full-time basis were above 6.5% in all countries in 2003, significantly higher than the rates of return for a younger student in some countries.[3]

National studies also show that the returns to investment in higher education vary by gender and subject group. For example, evidence for Germany (Lauer and Steiner, 2000) suggests higher rates of return to education at technical universities. Ammermüller and Weber (2005) find higher rates of return to law, business and medicine subjects, and lowest rates of return to education, arts, agriculture and theology. Studies for Germany and Greece find higher returns to education for women.[4] Furthermore, some countries show that within-group income inequality is increasing for the most educated workers (Luxembourg, Finland, Austria and Portugal). In this context it should be noted that well-designed education and high skill levels also provide non-pecuniary returns to benefiting individuals (e.g. social status, social contacts), as well as positive external effects to society (e.g. through learning within social groups and integration effects). Although

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2   Defined as the rate that equates the costs to individuals of attaining the next highest level of education with the present value of an individual's lifetime stream of additional earnings associated with the higher level of attainment.

3   One possible explanation for this finding is the existence of cohort effects in educational level. Chapter 3 has shown that over the last two decades, the supply of workers with a university degree has increased significantly. However, for older workers, higher returns to higher education may reflect the relatively short supply of degrees within this cohort. Similarly, investment in education that is well matched to individual career plans and firms' needs may yield higher returns.

4   See, e.g. Ammermüller and Weber (2005), Kanellopoulos et al. (2004), Magoula and Psacharopoulos (1999), Papapetrou (2007).

not usually included in estimates of the returns to education, such factors are also important for assessing benefits to education.

Returns to education are important in giving incentives for young people to invest in education and training. To ensure the future efficiency of education and training programmes, it is furthermore important that those investing in higher education are well-placed by ability and subject.

5.2 RELATIVE UNEMPLOYMENT RATES OF DIFFERENT GROUPS OF WORKERS

This section presents evidence of mismatch between labour supply and labour demand[119] in the euro area and euro area countries, through the presentation of unemployment rates for different labour market groups – i.e. a measure of excess labour supply[120] - and of the range of group-specific unemployment rates.[121] This latter measure describes the difference between the highest and lowest subgroup unemployment rates. A greater range implies a larger relative labour market imbalance. Information on the persistence of such imbalances is acquired by considering the range over time. Large ranges which persist over time may be indicative of serious labour market imbalances. This section first briefly reviews institutional elements which may contribute to labour market mismatch. It then considers the extent of labour market mismatch by: (i) Educational level and subject area – here mismatch may occur when the level and/or specialisation of workers' qualification do not match those demanded by employers. This may result in groups of workers experiencing problems in finding or keeping a job due to under- or overeducation or inappropriate subject specialisation. (ii) Region – here mismatch occurs when the workers in one region experience excess demand for their services and workers in another are in excess supply, related to, for example, language or other barriers which prevent cross-border and other geographical labour mobility. (iii) Age, gender and nationality – Chapter 2 has shown that the largest changes in the composition of labour supply are driven by these characteristics. Differences in unemployment rates by age, gender and nationality may therefore be informative about both the impact of labour market rigidities and the extent to which increases in labour supply over the recent period are met by demand. Such labour market mismatches may reflect both objective economic reasons (such as adjustment costs, regulations, skill level, specialisation, work experience) and other factors (such as discrimination or prejudices against certain groups).

5.2.1 INSTITUTIONS AFFECTING THE MATCHING OF LABOUR SUPPLY WITH LABOUR DEMAND

A number of institutions may slow down or inhibit the matching of labour supply with labour demand. First, wages that are not sufficiently differentiated, for example, by skill

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119 Two broad types of mismatch of the supply and demand for labour can be identified. First, although it may appear that labour supply is available to feed existing labour demand, it may take time for unemployed workers to find jobs, given that workers do not have full information about available positions and firms do not have full information about available labour. Some amount of this "frictional" labour market mismatch may be unavoidable, even in a well-functioning labour market, and its size is determined by the efficiency of the process of collecting, processing and assessing the necessary information for both employers and the unemployed, and by labour market and product market rigidities. Labour market mismatch can also be caused by "static" mismatch, where the supply of and demand for labour do not match, for example as a result of asymmetric information or time-inconsistent expectations by workers of firms' skill demand and/or a one-off increase in demand or supply of, e.g. particular skills. Such one-off shocks may arise from business cycle developments and/or from inflexible adjustment mechanisms, e.g. through strict EPL or wage rigidity. The less flexible markets are, the more persistent mismatches tend to be.

120 Alternatively, one could consider measures of excess labour demand, such as vacancy rates. However, no reliable data on excess labour demand exists for all euro area countries. For example, in Belgium and Luxembourg, vacancy data suffers from, for instance, double counting, underreporting and/or selective sampling problems. An alternative measure of labour market imbalances could be provided by data on the number of firms restricted in their activity due to labour shortages. This data is however not available for all countries and for all sectors of economic activity. From the available data, it appears that in the period 2004-2007, this percentage has been increasing, and the percentage of firms constrained in their activity is higher in services than in industry.

121 For an alternative measure based on variance of group specific unemployment rates, see Lipsey (1960) and European Central Bank (2002).

or region may contribute to increasing the mismatch between labour supply and labour demand (e.g. by not providing the incentives for capital to shift to the area/regions with high unemployment or for workers to move to regions with labour market shortages), thus increasing the unemployment rates of some skill groups and in some regions.[122] If relative wage compression is too strong, low-skilled workers or workers living in low-productivity regions in particular may remain unemployed. Similarly, minimum wages which are too high may price young and lower skilled workers out of the labour market. This suggests that wages and labour costs must adjust flexibly to reflect local and sectoral labour market conditions – such as regional unemployment rates, productivity growth and workers' skills.[123]

Second, non-wage costs that are too high, or fall too heavily on one type of labour, may contribute to wage compression and also increase the labour market mismatch of certain groups. For example, if taxes fall on employees in the form of lower wages, this may have negative effects on the labour supply of particularly low-wage earners such as the low skilled. High labour taxes also reduce the possible incentive and re-allocation effects of a wage change.

Third, overly strict employment protection legislation (EPL) has been found to increase the costs to firms of adjusting their workforce, reducing labour market turnover, and can create a barrier to hiring. A number of studies have found that overly strict EPL reduces particularly employment of workers experiencing problems entering the labour market, such as young workers and women (Bertola et al 2002, Jimeno and Rodriguez-Palenzuela 2002, OECD 2004). This suggests that EPL should be designed to distort labour turnover to the lowest extent possible and coordinated with other policies, such as unemployment benefit systems and active labour market policies[124]. In addition, creating more individually tailored and flexible contracts would be advantageous[125] (for example, giving workers the choice to negotiate more or less employment protection

from firms, based on their individual situation and preferences).

Fourth, the inflexibility of working hours per employee may reduce the matching of labour supply and labour demand, in particular for older workers and women. On the demand side, firms may prefer to adjust hours of work rather than employment over the business cycle. Similarly, some workers may prefer flexible hours or part-time work in order to combine family and working life responsibilities (see also Chapter 4, section 4.2) or to adjust working time with shifts in leisure preferences or other activities over their lifetime. Increased working time flexibility, which allows the combination of work and family life and of phased retirement, may facilitate the matching of labour supply and demand.

Fifth, product market regulation has been found to restrict employment in the OECD countries (Nicoletti and Scarpetta, 2005; Nicoletti et al., 2001).[126] Furthermore, the presence of start-up costs (in particular administrative burdens on the creation of new companies) may hinder the growth of some sectors or industries, creating bottlenecks in the process of matching the demand and supply of workers in different sectors of an economy (see Lopez-Garcia, 2003; and Rogerson, 2003). Policies to increase competition in product markets, such as reductions in administrative burdens on start-ups and the removal of statutory barriers to entry in certain sectors should help to support employment creation through the creation of

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122 Many studies highlight the insider-outsider theory of the labour market (e.g. Amable et al., 2007; Bertola et al., 2002). According to this theory, the labour supply of labour market "insiders" are not so much affected by union density and centralisation and employment protection. This means that institutions have a more limited effect on the supply of prime-age males. In turn, they predominantly affect young workers and females in particular, since these are not so attached to the labour market (outsiders).

123 This may include giving firms greater scope to adjust wages to these local conditions, for example through the greater use of opening clauses and ensuring that wage floors such as minimum wages are not set too high to negatively affect employment and/ or are differentiated by region or age.

124 See also footnote 82 for a discussion of policies to support flexicurity.

125 See, for example, Carnoy et al. (1997)

126 Product market regulation can affect the labour supply through different channels.

new firms, but also by constraining the wage rents of insiders due to increasing competition.[127]

Finally, mismatches that result from a deficit of certain skills in the labour market may be eased through higher investment in human capital acquisition – through increased lifelong learning and training and educations systems which put a greater emphasis on identifying future skill needs.

5.2.2 EDUCATIONAL MISMATCH

In all euro area countries, the unemployment rate decreases significantly with the level of educational attainment. Table 21 shows that in 2007, the euro area unemployment rate[128] was 9.3% for those with lower secondary education, compared with 6.4% for those with upper secondary education and 4.1% for those with tertiary education. The unemployment rate for

those with lower secondary (tertiary) education was therefore significantly higher (lower) than

127 On the one hand, lower barriers to entry for new firms and increased real wages due to lower prices may positively affect activity. On the other hand, employees' bargaining position may be weakened by reducing wage rents. Bassanini and Duval (2006) document a negative effect from a decline in regulation on the employment of females. Fiori et al. (2007) document a significant negative effect from product market regulation (PMR) on overall employment, implying positive effects from deregulation. These authors also show that labour and product market regulation interact in two respects. First, PMR has a larger negative impact on employment when labour markets are also regulated. Second, rigid PMR has facilitated labour market deregulation, but not vice versa. Furthermore, wage moderation has a strong yet positive impact on employment if product market regulation is low.

128 It should be noted that methodological changes due to, e.g. census revisions, changes in concepts and in a change from the use of annual to quarterly or more frequent surveys and data, have resulted in breaks in the LFS survey over time in many euro area countries, which may affect trends in unemployment over time for some countries (see Annex 2). However, it should also be noted that data on unemployment levels, presented in this section for spring 2007, are well-harmonised.

Table 21 Unemployment rates and mismatch by the level of educational attainment in the euroarea and euro area countries [1]

| | Unemployment rate in 2007 (%) | | | | | Educational mismatch | | | | | |
| | | | | | | Change in range between highest and lowest rate (p.p) [6] | | | | | |
Country	Low	Medium	High	Weighted average of subgroups	Range 2007	1993-1995 [2]		1996-2001		2002-2007	
Belgium	11.7	6.2	3.4	6.5	8.3	2.5	**0.8**	-2.4	**-0.4**	2.0	**0.3**
Germany	17.6	8.3	3.6	8.2	13.9	3.2	**1.1**	-0.2	**0.0**	5.2	**0.9**
Ireland	**6.4**	**3.5**	**2.3**	**3.8**	4.1	-3.1	**-1.0**	-7.8	**-1.3**	0.0	**0.0**
Greece	7.1	8.0	5.8	7.1	**2.3**	0.5	**0.2**	0.2	**0.0**	-0.8	**-0.1**
Spain	8.4	6.5	4.7	6.7	3.7	-0.2	**-0.1**	-2.4	**-0.4**	0.1	**0.0**
France [4]	11.2	6.8	4.8	7.4	6.3	n.a.	**n.a.**	-0.4	**-0.1**	-0.6	**-0.1**
Italy	6.0	3.8	4.2	4.7	**2.3**	0.3	**0.1**	1.9	**0.3**	-1.5	**-0.3**
Luxembourg	**4.2** [7]	**2.4** [7]	**2.9** [7]	**3.1**	**1.8** [7]	n.a.	**n.a.**	n.a.	**n.a.**	n.a.	**n.a.**
Netherlands [5]	**4.1**	**2.7**	**1.7**	**2.6**	2.4	n.a.	**n.a.**	-3.4	**-0.6**	1.7	**0.3**
Austria [3]	8.4	3.6	2.4	4.1	6.0	n.a.	**n.a.**	1.2	**0.2**	1.2	**0.2**
Portugal	8.2	6.7	6.0	7.6	**2.2**	n.a.	**n.a.**	-2.2 [7]	**-0.4** [7]	0.8 [7]	**0.1** [7]
Slovenia [5]	7.1 [7]	4.4 [7]	2.7	4.3	4.4 [7]	n.a.	**n.a.**	0.4 [7]	**0.1** [7]	-1.3 [7]	**-0.2** [7]
Finland [3]	8.9	5.9	3.4	5.4	5.5	n.a.	**n.a.**	-3.0	**-0.5**	-1.5	**-0.3**
Euro area	9.3	6.4	4.1	6.6	5.2	1.7	**0.6**	-1.4	**-0.2**	0.3	**0.1**
Denmark	4.0	2.4	2.9	3.0	1.6	-0.9	**-0.3**	-3.6	**-0.6**	-0.3	**0.0**
Sweden [3]	6.9	4.3	3.5	4.4	3.4	n.a.	**n.a.**	-3.2	**-0.5**	0.2	**0.0**
United Kingdom	6.0	3.6	2.0	3.6	4.0	-1.3	**-0.4**	-1.9	**-0.3**	0.2	**0.0**

Sources: EU-LFS (spring data) and ECB calculations. For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data[8]. In bold are the best three performers in terms of (i) a low level and (ii) a low range of unemployment rates. The weighted average of subgroups may not equal the total unemployment rate due to missing data.
1) 25 to 64 years old; the education levels refer to low: lower secondary education and less, medium: upper secondary education, high: tertiary education.
2) Education data start in 1992.
3) Data start in 1995.
4) Data start in 1993.
5) Data start in 1996.
6) The range refers to the difference between the highest and lowest sub-group unemployment rate. Average annual changes are presented in yellow.
7) Based on figures smaller than the Eurostat reliability limit.
8) The underlying figures for the mismatch indicator (based on the unemployment rate) are unemployment and employment. For every country and the euro area, these figures are compared with the respective Eurostat limits. Whenever the numbers are smaller than the publication limit, they are omitted from the published table (these cases are labelled n.a.). Whenever the numbers are larger than the publication limit but below the reliability limit, they are flagged separately.

Table 22 Unemployment rates and mismatch by type of education in the euro area and euro area countries [1]

Country	Unemployment rate in 2006 (%)										Mismatch (range)		
	General	Teacher training and education	Humanities languages and art	Social science business, law	Science math computing	Engineering manufacturing	Agriculture	Health and welfare	Services	Weighted average of subgroups[2]	2006	Change (p.p)[5]	
												2006	2003-2006[3]
Belgium	5.4	2.4	7.8	5.6	4.4	4.6	n.a.	3.4	8.2	7.0	5.8	-1.2	-0.6
Germany	7.3	4.3	7.6	7.4	6.5	10.4	9.1	5.2	9.2	9.8	6.1	-1.9	-0.6
Ireland[4]	2.9	1.6	4.3	1.8	2.9	2.7	0.4	1.5	2.5	3.4	4.0	n.a.	n.a.
Greece	7.8	4.2[7]	9.2	9.1	9.4	5.2	8.4[7]	9.2	8.1	7.6	5.2[7]	-0.6[7]	-0.2[7]
Spain	6.7	5.1	7.8	6.7	7.2[7]	4.2	4.1	5.6	8.8	7.3	4.6	-0.9	-0.3
France	14.9	n.a.	9.3	7.2	6.1	5.9	4.5	3.7	9.8	8.1	n.a.	n.a.	n.a.
Italy	n.a.	4.5	6.5	5.2	6.4	3.3	4.2	2.5	6.0	5.6	n.a.	n.a.	n.a.
Luxembourg	6.3	n.a.	n.a.	3.2	n.a.	1.9	n.a.	n.a.	4.6	4.0	n.a.	n.a.	n.a.
Netherlands	n.a.	2.1[7]	3.8[7]	2.9	3.7[7]	3.7	2.0	2.5	3.3	3.9	3.4	n.a.	n.a.
Austria	4.4	n.a.	5.0[7]	3.8	n.a.	3.2	n.a.	2.2[7]	4.4	4.1	n.a.	n.a.	n.a.
Portugal	n.a.	n.a.	8.2	6.0	5.9	6.4	n.a.	n.a.	n.a.	7.2	n.a.	n.a.	n.a.
Slovenia	8.0[7]	n.a.	7.4[7]	5.9	n.a.	4.5	4.8	3.4[7]	4.5	5.3	n.a.	n.a.	n.a.
Finland	8.0	n.a.	8.4	5.3	6.9[7]	5.1	5.5	2.0	6.9	6.3	n.a.	n.a.	n.a.
Euro area[6]	7.1	4.0	7.7	6.5	6.3	7.1	5.7	4.3	8.0	7.5	4.0	-0.4	-0.1
Denmark	n.a.	n.a.	5.7	3.2	n.a.	2.1	n.a.	2.5	3.5	3.3	n.a.	n.a.	n.a.
Sweden	6.0	2.8	7.7	5.2	n.a.	4.7	4.4[7]	3.0	4.8	5.2	4.8	-2.4[7]	-1.2[7]
United Kingdom	n.a.	1.5	3.5	3.0	3.4	2.5	n.a.	1.8	5.1	3.9	3.6	0.9[7]	0.5[7]

Sources: EU-LFS (spring data) and ECB calculations. For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data.
Notes: data stem from different LFS sources than in the case of the other breakdowns and are therefore not fully comparable. The detailed education breakdown is only available for 2006.
1) 25 to 64 years old.
2) The weighted average of subgroups may not equal the total unemployment rate due to missing data.
3) Starting 2004 for AT, BE, IE, PT, SE, UK.
4) Data for Ireland is 2005.
5) the range refers to the difference between the highest and lowest sub-group unemployment rate. Average annual changes are presented in yellow.
6) EA without Ireland.
7) Based on figures smaller than the Eurostat reliability limit.

the total unemployment rate of 6.6%, indicating the much greater unemployment problems experienced by people without good academic or vocational qualifications and the stronger demand for employees with a higher level of education, relative to the supply of such workers.

The range in unemployment rates across educational levels was 5.2 percentage points in 2007 for the euro area as a whole, having narrowed in the generally favourable cyclical environment of the late 1990s. In recent years, there have been pronounced differences in country-specific developments. In Germany, overall unemployment increased rather steeply, and the gap in unemployment rates by educational level widened markedly to 13.9 percentage points in 2007[129]. In contrast, Ireland, which experienced a more favourable trend in

total unemployment, saw a decline in the gap between the unemployment rates of low-educated and highly educated persons in the second half of the 1990s.

Unemployment rates also vary significantly across type of education in the euro area and euro area countries (see Table 22). Workers with humanities and services specialisations typically experience unemployment rates around or slightly higher than the national total unemployment rate. On the other hand, workers with teacher training and education; engineering and manufacturing; and health and welfare qualifications typically experience

129 In Germany, from 2005 onwards, persons capable of work applying for basic social security had to register at the employment office as unemployed and actively seek work. This might have contributed to the number of low-skilled unemployed in the German LFS.

unemployment rates lower than national total unemployment rates. These broad patterns also hold for tertiary level education holders only and young people aged 15 to 29 years (see Table 34 and 35 in Annex 3). These latter specialisations therefore present areas where the labour demand for skills is high relative to supply. Furthermore, there are large labour market imbalances in some subject areas across countries.[130] In general, shortages in the supply of particular skills may suggest national education and training systems' failure to identify and/or provide the skills demanded by firms. Alternatively, they may indicate that a subject area is relatively unattractive to workers – for example due to low rates of return and/or a lack of relative wage flexibility.

The broadly stable range in unemployment rates shows that mismatch by subject specialisation in the euro area as a whole remained almost constant over the period considered, again suggestive of a persistent labour market misbalance.

[130] For example, many unemployment rates in 2006 are significantly lower than international estimates of the average NAIRU for the euro area, which tend to cluster around 8% in 2006 (see European Central Bank, 2006).

Table 23 Regional mismatch in the euro area

Country[1]	Unemployment rate in 2006 (%)			Regional mismatch (range)						
					Change[3] (percentage points)					
	Min	Max	Weighted average of subgroups	2006[2]	1984-1995[4]		1996-2001		2002-2006	
Belgium (11)	4.2	17.7	8.3	13.5	4.2	0.3	-4.0	-0.7	4.1	0.8
Germany (41)	5.4	19.7	10.3	14.3	6.1	0.6	6.4	1.1	-5.1	-1.0
Ireland (2)	4.3	4.7	4.4	0.4	-4.5	-0.8	-3.0	-0.5	-1.1	-0.2
Greece (13)	7.2	14.4	9.0	7.2	2.4	0.2	0.6	0.1	-2.5	-0.5
Spain (17)[5]	5.3	13.5	8.6	8.2	3.7	0.4	-6.3	-1.1	-5.8	-1.2
France (22)[6]	6.1	12.9	9.1	6.8	2.4	0.2	-1.4	-0.2	-2.3	-0.5
Italy (21)	2.7	13.6	6.9	11.0	9.0	0.7	2.2	0.4	-13.0	-2.6
Luxembourg (1)	4.7	4.7	4.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands (12)	2.7	5.2	3.9	2.5	-2.4	-0.2	-2.4	-0.4	0.3	0.1
Austria (9)	3.0	8.9	4.8	5.9	n.a.	n.a.	0.8	0.1	1.9	0.4
Portugal (7)	3.9	9.5	8.1	5.6	-2.8	-0.3	-2.9	-0.5	1.0	0.2
Slovenia (1)	6.1	6.1	6.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Finland (5)	3.5	11.4	7.8	7.9	n.a.	n.a.	-5.5	-0.9	-4.6	-0.9
Euro area (162)[7]	2.7	19.7	8.4	17.0	2.5	0.3	-6.3	-1.0	-7.3	-1.5
Denmark (1)	4.0	4.0	4.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sweden (8)	6.0	8.5	7.1	2.5	n.a.	n.a.	-1.2	-0.2	-1.0	-0.2
United Kingdom (37)	2.6	9.0	5.4	6.4	-3.5	-0.3	1.8	0.3	0.5	0.1

Sources: EU-LFS (annual, regional data, at NUTS2-level) and NBB calculations. For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data. The weighted average of subgroups may not equal the total unemployment rate due to missing data. In bold are the three best euro area performers who attain (i) a relatively low level and (ii) low range of unemployment rates. Average annual changes are presented in yellow.
Notes: 15 to 64 years old.
1) Number of regions in 2006 between parentheses.
2) No regional mismatch indicator available for Luxembourg, Slovenia and Denmark, as those countries consist of only 1 NUTS2-region. The result for Ireland has to be taken with caution, as this country only consists of 2 NUTS2-regions.
3) The developments of the mismatch indicator can be biased by changes in the number of regions considered, or by changes in their territories. This is especially the case in Greece, where the number of regions increased from 9 to 13 in 1988; in Germany, with changes in 1991 (after the reunification), 1996, 2001, 2002 and 2004; and finally in Ireland, where in 1998 8 regions were regrouped into 2. As such, the euro area figures must also be considered with caution. In the UK, the number of regions increased strongly in 1996.
4) 1985-1995 for Germany, 1987-1995 for Spain, Portugal and the euro area, and 1990-1995 for Ireland.
5) Ceuta and Melilla are considered to be part of the Andalucia region.
6) Excluding the French overseas departments, for which data are only available from 2001 onwards. As those departments have very high unemployment rates, including them would lead to a strong increase of the mismatch indicator over time, which does not provide a correct view.
7) The euro area figure reflects the dispersion of unemployment rates within and among the 13 euro area countries. It is not available before 1996.

5.2.3 REGIONAL MISMATCH [131]

Table 23 presents information on regional differences in unemployment rates across the euro area countries. Mismatch between the demand and supply of labour across regions can have a number of origins, including uneven regional economic development, concentrations of the resident population and changes in a country's industrial structure. However, if labour is geographically mobile and wages are flexible, such mismatches should be short-lived as unemployed workers move from one region to another or regional wages adjust to reflect local labour market conditions, and investment flows to regions with cost advantages. In this respect, persistent regional mismatch can therefore provide some evidence on wage inflexibility and/or labour immobility. Indeed, Table 23 shows that unemployment rates generally vary considerably across regions of the euro area. Looking at the 2006 levels, there are relatively large ranges of unemployment rates in a number of countries. Whilst regional mismatch appears limited in the Netherlands and Ireland[132], it is very high in Germany, Belgium and Italy, suggesting a combination of low regional mobility and low wage flexibility to local conditions[133]. In a number of these countries clear regional subdivisions appear. For example, in Belgium[134] and Italy, unemployment is much higher in the southern regions[135]; in Germany unemployment is high in the eastern part of the country and relatively low in the south.

Regional disparities as measured by the change in the range of unemployment rates increased slightly in the euro area over the 1984-1995 period. During the last decade however[136], regional mismatch in the euro area decreased strongly; in particular, favourable developments were recorded in Spain, Italy and Finland. Since 2001, regional dissimilarities also diminished strongly in Germany and only clearly increased in Belgium. The decreases in the regional variation in unemployment rates are most likely driven by improvements in the

economic environment. However, they may also provide an indication of some improvements in the mobility of labour and regional wage flexibility, albeit from a low level.

5.2.4 MISMATCH BY AGE, GENDER AND NATIONALITY [137]

Table 24 shows that the unemployment rate of young people is very high and higher than that of other age groups in the euro area. In 2007, youth unemployment (those aged 15 to 24) stood at almost 15%, nearly three times the unemployment rate of both prime-aged workers (aged 25 to 54) and those aged 55 to 64. Furthermore, unemployment among teenagers aged 15 to 19 reached 19.3% and was higher than among young adults aged 20 to 24.[138] High rates of youth unemployment are of particular concern since young people should arguably constitute the group most interested in building up their human capital and career and who are most flexible, both in terms of their subject specialisation and geographical mobility. Table 36 in Annex 3 shows that rates of unemployment are particularly high for young people with lower secondary education and less, across all euro area countries. But in some countries rates are also very high for those with upper secondary and even tertiary education. High youth unemployment therefore seems to reflect a major failure of education systems in identifying and providing the appropriate level and area of skill demanded

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131 Prepared by J. De Mulder.

132 In addition, the average unemployment rate is also low in the Netherlands and Ireland.

133 See Vamvakidis (2008).

134 In Belgium, part of the regional mismatch may also be due to language barriers between the northern and southern regions, where different languages are spoken.

135 In Belgium, the regions Brussels and Wallonia experience relatively higher unemployment. In Italy, unemployment rates are proportionally high in the whole southern part of the country (Mezzogiorno) and on the islands of Sicily and Sardinia.

136 The number of regions considered hardly changed over the period 1996-2006, so the recorded developments for the euro area are more reliable for this period.

137 Prepared by M. Ward-Warmedinger.

138 Although for some countries it should be noted that while the unemployment rate for this group is high, the participation rate is quite low.

Table 24 Unemployment rates and mismatch by age groups in the euro area and euro area countries [1]

Country	Unemployment rate in 2007 (%)					Mismatch by age (range)						
							Change (p.p) [5]					
	15-19	20-24	25-54	55-64	Weighted average of subgroups	2007	1984-1995		1996-2001		2002-2007	
Belgium	30.2	17.6	6.8	3.8	7.7	26.3	2.9	0.2	-11.2	-1.9	8.2	1.4
Germany	13.5	11.6	7.8	10.1	8.6	**5.6**	-8.7	-0.7	1.8	0.3	-0.1	0.0
Ireland [2]	**13.9**	**7.4**	**4.0**	**2.6**	4.6	11.3	-1.3	-0.1	-13.9 [6]	-2.3 [6]	5.2 [6]	0.9 [6]
Greece	24.9	21.5	7.6	3.4	8.2	21.5	8.8	0.7	-0.1	0.0	-9.2	-1.5
Spain	29.1	14.9	6.9	5.6	8.0	23.5	-1.9	-0.2	-13.9	-2.3	-0.5	-0.1
France	28.6	18.6	7.5	6.6	8.7	22.0	-1.3	-0.1	-6.9	-1.2	4.6	0.8
Italy [3]	29.2	16.3	5.0	2.3	5.8	26.9	0.3	0.0	-4.2	-0.7	-3.9	-0.7
Luxembourg	**n.a.**	**11.9** [6]	**3.3**	**n.a.**	3.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands [4]	**8.7**	**4.0**	**2.5**	**3.5**	3.2	**6.2**	13.9	-1.2	-7.1 [6]	-1.2 [6]	1.3 [6]	0.2 [6]
Austria	8.9	7.5	4.2	3.3	4.7	5.7	n.a.	n.a	0.2	0.0	2.6	0.4
Portugal [4]	24.8	13.2	7.8	6.8	8.4	17.9	-6.7 [6]	-0.7 [6]	-3.2 [6]	-0.5 [6]	9.0 [6]	1.5 [6]
Slovenia [5]	7.4 [6]	8.0	4.4 [6]	3.1 [6]	4.7	**5.0** [6]	n.a.	n.a	-5.7 [6]	-0.9 [6]	-12.8 [6]	-2.1 [6]
Finland	33.7	14.6	5.3	5.8	7.8	28.4	n.a.	n.a	-7.9	-1.3	-3.5	-0.6
Euro area	19.3	13.8	6.6	6.5	7.5	12.8	-7.2	-0.6	-6.9	-1.1	3.1	0.5
Denmark	9.4	5.4	2.7	4.2	3.6	6.7	-9.8	-0.8	0.5	0.1	1.5	0.3
Sweden [6]	37.8	15.3	4.5	4.0	7.0	33.9	n.a.	n.a	1.0	0.2	19.6	3.3
United Kingdom	20.7	10.6	3.7	3.3	5.2	17.4	-7.6	-0.6	0.2	0.0	7.2	1.2

Sources: EU-LFS (spring data) and ECB calculations.
Notes: For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data. In bold are the three best euro area performers who attain (i) a relatively low level and (ii) low range of unemployment rates. The weighted average of subgroups may not equal the total unemployment rate owing to missing data.
1) 15 to 64 years old.
2) Data start in 1995.
3) Data start in 1986.
4) Data start in 1996.
5) Average annual changes are presented in yellow. The range refers to the difference between the highest and lowest subgroup unemployment rate.
6) Based on figures smaller than the Eurostat reliability limit.

by firms. It may also reflect institutional barriers that prevent job creation and can cause a (further) deterioration of human capital, demoralisation and future labour market difficulties for the affected individuals. The pattern of higher rates of youth unemployment is consistent across all euro area countries, with particularly high rates in Belgium, Spain, France, Italy, Luxembourg and Finland in 2007. Relatively low rates seem to coincide with countries that have a strong vocational training system (such as Austria and Germany – see also Box 8). Unemployment rates of those aged over 55 were also relatively high in Germany compared with other euro area countries.

Whilst the range of unemployment rates across age groups in the euro area decreased significantly over the 1983 to 2001 period, it has increased again since then (mismatch across the level of education has also increased

for the young, see Table 36 in Annex 3). It stood at a high level of 12.8 percentage points in 2007. Overall, this is suggestive of a persistent and structurally driven labour market imbalance for the euro area as a whole. The lack of a positive development in recent years is worrisome, not least since unemployment rate differences between age groups are affected by demographic factors. Following an ageing and shrinkage of the euro area population and an associated decrease in the labour supply from the young (see Chapter 3), these factors might have been expected to even out the variation in unemployment rates across age groups to some extent. In addition, this aggregate figure masks particularly high levels of and rapidly growing mismatches in some countries in recent years.

Two other important changes in the composition of labour supply in the euro area over the past 25 years are worth consideration with regard

Table 25 Unemployment rates and mismatch by nationality in the euro area and euro area countries [1]

| | Unemployment rate in 2007 (%) | | | | | | Mismatch (range) | | | | |
| | | | | | | | | Change (p.p) [7] | | | |
Country	Nationals	Other EU15	Non-EU15	of which 12 NM	of which non-EU27	Weighted average of subgroups	2007	1996-2001		2002-2007	
Belgium	6.9	9.7	27.1	12.7	30.2	7.7	20.2	-8.0	**-1.3**	-1.0	**-0.2**
Germany	7.9	9.3	19.2	13.2	20.3	8.6	11.4	-1.7	**-0.3**	3.7	**0.6**
Ireland [2]	4.4	n.a.	n.a.	n.a.	n.a.	4.4	n.a.	n.a.	**n.a.**	n.a.	**n.a.**
Greece	8.2	n.a.	8.0	8.4	7.9	8.2	n.a.	n.a.	**n.a.**	n.a.	**n.a.**
Spain	7.3	10.7	12.1	11.5	12.3	8.0	4.8	2.9	**0.5**	-3.0	**-0.5**
France	8.2	7.0	28.0	21.2 [8]	24.4	8.3	17.3	-0.5	**-0.1**	-1.2	**-0.2**
Italy [3]	5.7	n.a.	7.7	7.3	7.8	5.8	n.a.	n.a.	**n.a.**	n.a.	**n.a.**
Luxembourg	**3.7**	**3.3 [8]**	**n.a.**	**n.a.**	**n.a.**	3.9	n.a.	3.1 [8]	**0.5 [8]**	n.a.	**n.a.**
Netherlands [4]	**3.1**	**n.a.**	**10.0**	**n.a.**	**10.4**	3.2	n.a.	n.a.	**n.a.**	n.a.	**n.a.**
Austria	**3.9**	**5.3**	**12.3**	**7.2**	**13.5**	4.7	8.4	n.a.	**n.a.**	3.2	**0.5**
Portugal [4]	8.1	n.a.	14.7	n.a.	15.2	8.4	n.a.	n.a.	**n.a.**	n.a.	**n.a.**
Slovenia [5]	4.6	n.a.	n.a.	n.a.	n.a.	4.7	n.a.	n.a.	**n.a.**	n.a.	**n.a.**
Finland	7.6	n.a.	21.0	n.a.	26.4	7.8	13.4	n.a.	**n.a.**	n.a.	**n.a.**
Euro area	7.0	8.2	14.7	11.0	15.5	7.5	7.7	-0.1	**0.0**	-1.6	**-0.3**
Denmark	3.4	n.a.	11.9	n.a.	12.2	3.7	8.5	n.a.	**n.a.**	n.a.	**n.a.**
Sweden [6]	6.7	6.1	19.6	24.5	18.9	7.0	13.5	n.a.	**n.a.**	2.8	**0.5**
United Kingdom	5.0	7.1	8.2	6.0	9.1	5.2	3.2	-1.9	**-0.3**	-3.5	**-0.6**

Sources: EU-LFS (spring data) and ECB calculations. For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data. In bold are the three best euro area performers who attain a low level of unemployment rates. The weighted average of subgroups may not equal the total unemployment rate due to missing data. See also Tables A11 and A12 in Appendix 3 for information on unemployment by educational level for non nationals.
1) 15 to 64 years old; the non-national population is separated into non-national EU15 citizens and non-national non-EU15 citizens. For the period 2005-07, this last group is further split into the 12 new member states (which together with the EU15 form the EU27) and non-national non-EU27 citizens.
2) Only data for 1998-2004.
3) Only data for 2005-07.
4) Data start 1999.
5) Data start 2002.
6) Data start 1997.
7) The range refers to the difference between the highest and lowest subgroup unemployment rate. Average annual changes are presented in yellow.
8) Based on figures smaller than the Eurostat reliability limit.

to mismatch – namely the rapid increase in the labour participation of women and in immigration to the euro area (for details of these developments see Chapter 3).

Table 25 shows that the unemployment rate of non-nationals was above that of nationals in 2007, particularly so for non-EU nationals, and across most countries of the euro area.[139] The high rate of unemployment for non-EU nationals may partly reflect country-specific immigration experiences with, e.g. asylum seekers and/or the magnitude of immigrant stocks, and flows and should be compared with the information on the size of the non-national group presented in Table 7 and Table 30 in Annex 3. For example, high rates of unemployment for non-nationals may reflect temporary bottlenecks in the employment of new immigrants, resulting from increases in immigrant flows. However, the

generally relatively high rates of unemployment for non-nationals may also suggest major inefficiencies in the institutions governing the integration of non-nationals into the labour market and/or policies determining immigration in some countries of the euro area. They could also highlight the difficulties that some countries may face if migration increases, but institutions/policies do not change. The range of unemployment rates by nationality stood at a very high level in many euro area countries, particularly Belgium, Finland and France in 2007, although trends over the 1996 to 2007 period are suggestive of decreasing labour market imbalances in the euro area as a whole.

139 Table 38 in Annex 3 shows rates of unemployment are generally higher for non-nationals across both educational level and age group. Unfortunately the lack of data prevents a more detailed breakdown of unemployment rates based on many dimensions at once.

THE GENDER PAY GAP AND DISCRIMINATION [1]

The promotion of a lifecycle approach to work includes increasing female labour market participation and reducing gender gaps in pay. The Lisbon Strategy for Growth and Jobs stresses the need to narrow gender pay gaps as a component of providing the appropriate incentives for workers to enter the labour market and fostering employment, improved work quality and productivity, and social cohesion. Eurostat's structural indicators show that the unadjusted gender pay gap [2] has decreased only very slightly in the euro area, from 15% in 1995 to 14% in 2005. Furthermore, while many countries in the euro area experienced a significant decrease in gender pay differentials over this period, in a few euro area countries, the gap between average male and female pay actually increased [3].

Part of the unadjusted gender pay gap in the euro area may be explained by differences in the average levels of human capital, such as work experience, education and training, or other characteristics such as the average age of working men and women. Microeconomic studies have therefore attempted to estimate to what extent observable characteristics (such as age, work experience and educational level) explain the unadjusted gender pay gap. Weichselbaumer and Winter-Ebmer (2005) undertake a meta-analysis of 260 of these studies, finding that the average "explained" component of the unadjusted gap stands at about 30%, the remaining 70% being "unexplained" - which in this literature is often attributed to discrimination.

Reasons for the persistence in the gender wage gap include gender segregation by sector, occupation and function. It is still the case that girls more frequently study traditionally female subjects such as languages and crowd into lower paying sectors and occupations, and part-time employment, which tend to lead to lower paying careers [4]. Furthermore, in areas where technological change results in increases in relative demand and higher relative wages (such as IT and engineering – see also Box 9), women are typically underrepresented in both universities and firms. The gender pay gap also tends to increase throughout the professional career, with the male/female wage gap widening with age, experience and rank. This can be explained first of all by the fact that women tend to interrupt their professional career more often than men, as they often take more family and household responsibilities than their partners, and second by the fact that women's educational levels were lower in the past. Gender differences in promotion propensities (the "glass ceiling") and job-to-job mobility also play a role, having a marked positive influence on wage changes and thus on the development of gender wage gaps.

All in all, weaknesses in the labour market situation of women exist that may reduce their incentives and opportunity for participating in the labour market and ascending the career paths it offers. Encouraging girls to invest in education and in a greater variety of fields are steps in the right direction, but will not suffice unless contemporaneous measures are undertaken to improve equal opportunities at work. It is necessary to enhance incentives (and reduce rigidities which hinder firms) for paying wages in line with individual productivity; it is also necessary to continue promoting gender equality

1 Prepared by M.Ward-Warmedinger.
2 The unadjusted gender pay gap is given as the difference between average gross hourly earnings of male paid employees and of female paid employees as a percentage of average gross hourly earnings of male paid employees. The population consists of all paid employees aged 16-64 that are 'at work over 15 hours per week'.
3 For more information and data, see Eurostat's Structural Indicators.
4 See, for example, European Commission (2002b) for a survey of national evidence on these issues.

in male and female-dominated sectors and access to higher functions (such as managerial positions) to allow women to progress in their careers. Increased accessibility to childcare should allow women to more easily combine work and family (see Section 4.2). Finally, in some cases improvements in the effectiveness of legislation against discrimination may also be necessary.

Table 26 presents the relative unemployment rates for men and women in the euro area. This shows a higher unemployment rate for women relative to men in most euro area countries in 2007, which suggests that also the increase in female labour supply has not been fully matched by labour demand (despite the generally lower average wages of female workers – see Box 10), resulting in the inefficient use of some of this increased pool of labour supply in the euro area. This gap between male and female employment rates has decreased somewhat in the euro area as a whole and in many of the euro area countries over the period 1983 to 2007. While higher unemployment rates for

women and non-nationals may reflect objective economic reasons and mismatch due to, e.g. skill acquisition, and subject specialisation, they may also be due to other factors (e.g. discrimination).

5.3 THE FUTURE DEMAND FOR LABOUR

It is impossible to fully anticipate future labour demand needs, and the problem of matching labour demand and labour supply will remain. Nevertheless, some components of future labour demand that have general implications for the desired composition of labour supply can be expected.

Table 26 Unemployment rates and mismatch by gender in the euro area and euro area countries [1]

| | Unemployment rate in 2007 (%) | | | Mismatch (range) | | | | | |
| | | | | | Change (p.p)[6] | | | | |
Country	Male	Female	Weighted average of subgroups	2007	1984-1995		1996-2001		2002-2007	
Belgium	6.7	8.8	7.7	2.0	-4.8	**-0.4**	-3.6	**-0.6**	0.7	**0.1**
Germany	8.5	8.8	8.6	**0.3**	-0.7	**-0.1**	-2.6	**-0.4**	0.3	**0.0**
Ireland	**4.9**	**4.3**	4.6	**0.6**	-1.4	**-0.1**	0.2	**0.0**	0.3	**0.0**
Greece	5.0	12.8	8.2	7.7	1.5	**0.1**	1.5	**0.2**	-1.4	**-0.2**
Spain [3]	6.1	10.5	8.0	4.4	7.2	**0.6**	-5.1	**-0.8**	-3.3	**-0.6**
France	8.2	9.3	8.7	1.0	-0.3	**0.0**	-0.6	**-0.1**	-2.5	**-0.4**
Italy	4.6	7.5	5.8	2.8	-1.6	**-0.1**	-1.4	**-0.2**	-2.8	**-0.5**
Luxembourg	**4.1**	**3.5[7]**	3.9	**0.6[7]**	-0.5	**0.0**	-1.7	**-0.3**	-0.0[7]	**-0.0[7]**
Netherlands	**2.8**	**3.7**	3.2	0.8	-0.3	**0.0**	-1.8	**-0.3**	0.1	**0.0**
Austria [2]	4.4	5.0	4.7	0.7	n.a.	**0.0**	-0.8	**-0.1**	0.5	**0.1**
Portugal [3]	6.9	10.0	8.4	3.1	-3.7	**-0.3**	0.9	**0.1**	0.9	**0.1**
Slovenia [5]	3.7	5.9	4.7	2.2	n.a.	**0.0**	0.1	**0.0**	1.6	**0.3**
Finland [2]	7.5	8.1	7.8	**0.6**	n.a.	**0.0**	-0.9	**-0.1**	-0.2	**0.0**
Euro area	6.6	8.6	7.5	1.9	0.3	**0.0**	-1.6	**-0.3**	-1.0	**-0.2**
Denmark	3.3	4.1	3.6	0.8	1.8	**0.1**	-1.8	**-0.3**	-0.4	**-0.1**
Sweden [4]	6.5	7.5	7.0	0.9	n.a.	**0.0**	-1.4	**-0.2**	0.2	**0.0**
United Kingdom	5.5	4.9	5.2	0.7	1.0	**0.1**	-2.2	**-0.4**	-0.4	**-0.1**

Sources: EU-LFS (spring data) and ECB calculations. For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data. In bold are the three best euro area performers who attain (i) a relatively low level and (ii) low range of unemployment rates. The weighted average of subgroups may not equal the total unemployment rate due to missing data.
1) 15 to 64 years old.
2) Data start in 1995.
3) Data start in 1986.
4) Data start in 1995.
5) Data start in 1996.
6) The range refers to the difference between the highest and lowest subgroup unemployment rate. Average annual changes are presented in yellow.
7) Based on figures smaller than the Eurostat reliability limit.

First, an increasing demand for higher skills resulting from technological developments can be expected. While this evolution could help to ease some of the tensions in countries or regions with an over-education[140] problem, *ceteris paribus* it will aggravate the existing mismatches in others. Furthermore, a change in the production structure of the economy owing to technological progress may lead to relative changes in demand for educational groups.

Second, the consequences of an ageing population and the rising proportion of the elderly will affect both the size and the composition of the euro area labour force. The shrinking of the total labour force and the ageing of society will increase demand for certain subject-specific skills such as medical workers and caregivers in the euro area.

Third, the ongoing process of globalisation may influence the structure of future labour demand. Changes in the structure of international trade in goods and services may lead to changes in labour demand. For example, increased trade with countries with a large supply of relatively low-wage, low-skilled labour is likely to induce a decrease in demand for low-skilled workers in the production of tradable goods in the euro area. Similarly, this may increase the demand for high-skilled workers in the euro area as emerging markets seek to import capital goods and technology from abroad. The effects of demographic change and the increased demand for services may mean that the demand for labour in services, including caregivers and medical workers, will further increase.

These factors mean that the euro area labour markets must not only be adequately prepared with an appropriately enhanced quantity and quality of labour supply, but must also rise to the task of ensuring a sufficient match between this workforce and labour demand. This may imply, for instance, greater investment by national authorities in education systems and greater incentives for schools, universities and firms to identify and cultivate those skills sought by firms. More general competences will also be needed to allow individuals/students to adapt flexibly to new developments in labour demand. Globalisation presents a risk to low-skilled people by increasing the supply of foreign goods produced using lower wage low-skilled labour abroad. It is important that wages are flexible – to provide clear signals with regard to which skills are demanded by firms and to reduce wage rents, which privilege 'insiders' thereby supporting employment creation. Furthermore, regulations and institutions should be reformed to reduce the costs and inefficiencies of the labour marketing process. Lastly, more coordinated efforts across the euro area to eliminate the remaining barriers to geographical mobility (languages, transfer of pensions, etc.) are needed.

140 Over-education refers to a situation where workers are undertaking tasks of a lower level than that for which they are qualified.

ANNEX I MEASUREMENT ISSUES[141]

When addressing labour supply, it has to be noted that official statistics may potentially mis-measure the true employment and labour market participation rates. This annex briefly reviews the main measurement issues relating to accurately capturing labour supply. First, the labour force is equal to the sum of the population at work and unemployed job-seekers. In the LFS, the ILO-definitions of "at work"[142] and "unemployed" are used (see also Annex 2). However, some individuals who do not work but are available for employment, and thus are a part of actual labour supply, are not captured by the standard definition of unemployment, which results in an underestimation of actual labour supply. Box 11 discusses the ILO definition of unemployment and considers how this affects measured employment.

Second, some work is not captured by statistics on employment because individuals work in the unofficial (or "shadow") economy. This results in an underestimate of employment, and to the extent that these workers are measured as inactive, an underestimate of actual labour supply, when supply is measured by the participation rate.

Third, some services that could be provided through the market or by government are produced in the household instead. Different propensities for household production across countries or over time may influence measures of labour supply. In particular there has been an increasing trend towards market-based or government provision of services that have been traditionally produced within the household (e.g. childcare). This trend has affected female labour supply in particular. Freeman and Schettkat (2005) collect and assess information on the amount of hours worked in the household across countries based on time-diaries. They conclude, for example that there is a more significant provision of services typically considered as a part of household production through the market in the United States than in European countries. The extent to which household production is provided via the market is also likely to depend on the supply of suitable, typically low-skilled and low-wage labour. Furthermore, part of services that are "outsourced" from the household may rather fall into the shadow economy. Generally as female labour supply increases these effects may become more important.

141 Prepared by J. Turunen and M.Ward-Warmedinger.
142 Persons who during the reference period performed work for a wage or salary, or for profit or family gain, in cash or in kind, for at least one hour. This includes those with a job or enterprise who are not at work due to temporary absence.

Box 11

ILO DEFINITION OF UNEMPLOYMENT [1]

Information on labour market status is computed from data collected by national labour force surveys in many developed countries. Labour force statistics generally divide the adult population into three mutually exclusive groups: the employed, the unemployed, and the inactive (i.e. people out of the labour force). The European Community Labour Force Survey is based on the ILO-definition of "at work" and "unemployed". Under this definition, the employed comprise all persons aged 15 and over[2] who, during some reference period, were engaged in paid employment (including those working in a family business). The LFS additionally specifies that individuals are employed if they engage in paid employment for at least one hour per week. This includes those with a job or enterprise who are not at work due to temporary absence. In the LFS, people between the ages of 15 and 74[3] are classified as "unemployed" if they meet all of the following requirements: (1) they are without

1 Pepared by E. Viviano.
2 16 and over in Spain, the United Kingdom and Sweden (1995-2001); 15-74 years in Denmark and Sweden (from 2001 onwards).
3 Those aged 16-74 in Spain, Sweden (1995-2000) and the United Kingdom.

work (work less than one hour per week); (2) they state that they are seeking employment for at least one hour per week; (3) they are available to start work within the following two weeks; (4) they sought employment at some time during the previous four weeks (see Eurostat 1996). People neither employed nor unemployed are considered inactive (and are excluded from the labour force).

People out of the labour force are thus a composite group formed by persons who do not want a job, persons who are not searching but might take up a job if offered, and persons who are searching for a job but took their last step to search for one more than four weeks ago. Brandolini et al. (2006) calculate that, on average in European countries, about a fifth of all people who declared they were seeking work in the 1990s were left out of the labour force on the basis of this four-week requirement. Because of the sheer size of this group – also labelled "potential labour force" or simply "potentials" – Brandolini et al. investigate the role of the four-week criterion in determining the size of unemployment and conversely of the potential labour force. They test whether transition probabilities differ among the unemployed, the potentials, and the other inactive persons in European countries and find that the (annual) transition probabilities of potentials are always different from those observed for other people out of the labour force, whereas in some cases they can be considered similar to those of the unemployed. On this basis, they conclude that in the European labour markets a sizeable "grey area" exists between the states of unemployment and inactivity. The European labour markets would be better described by four distinct states (employed, unemployed, potentials, and other inactive population) than by the three-way characterisation of the ILO guidelines, confirming the conclusion reached by Jones and Riddell (1999) for Canada and by Centeno and Fernandes (2004) for Portugal.

The ILO four-week requirement can be viewed as a minimum level of search intensity that job seekers must show in order to be classified as unemployed: at least one search action – such as sending an application to a potential employer, visiting an employment agency, or (in Europe) simply looking at newspaper advertisements – must be undertaken in a four-week period.[4] However, this condition may be exceedingly rigid. From the theoretical standpoint the total effort put into a job search depends on individual resources, search costs, and expected returns; moreover, it is endogenously determined, given the labour market conditions. As a consequence, whether this arbitrarily set minimum level of search intensity is a good criterion for distinguishing between active and less-active job seekers is ultimately an empirical question. Brandolini et al. (2006) identify the search intensity that separates the unemployed from the potentials by looking at the Italian data. They proxy search intensity by the "number of months since the last search action" using data from the Italian labour force survey, the only EU survey where this information is available. They compare the (quarterly) transition probabilities of the unemployed with those of a group comprising the most-intensive job seekers among the potentials. They find that the potentials turn out to be behaviourally indistinguishable from the unemployed when their last search action occurred "not long before" the ILO four weeks (up to 11 months for certain groups in the population). Letting the boundary between unemployment and potential labour force be determined by the data, rather than by the arbitrary four-week criterion, would raise the Italian unemployment rate in 2000 from 11% to 13%. Four weeks may be too short a period to identify the unemployed, especially in some demographic groups, like people living in the Southern part of Italy and older women.

The same exercise, repeated for the years 2004, 2005 and 2006, suggests that, by letting the size of unemployment be determined by the data, would increase the Italian unemployment rate by 1.5 percentage points (see Bank of Italy, 2006).

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4   Alternatively, search intensity may be identified with the probability of applying for a job during a given period or with the number of applications sent per unit of time (as in Petrongolo and Pissarides, 2001).

ANNEX 2 DATA SOURCES AND DESCRIPTIONS

A2.1 THE LABOUR FORCE SURVEY:

Euro area data presented and used in this paper are drawn from the European Community Labour Force Survey, which has been conducted since 1983. The annual data used consist of the spring surveys (quarter 1 surveys for France and Austria, quarter 2 for all other countries) up to the first quarter of 2007. Eurostat compiles these data, and a detailed description of the sampling methods and adjustment procedures can be found in "The European Union Labour Force Survey – Methods and Definitions, 2001" (http://circa. europa.eu/irc/dsis/employment/info/data/eu_lfs/ index.htm). The available variables are listed and described in the "EU Labour Force Survey database – User guide". The need to preserve an international comparability of the data means that the LFS dataset uses standardised and widely accepted definitions of, e.g. employment and unemployment, as adopted by the ILO. These constitute the basis of the Eurostat LFS. It should be noted that these definitions differ from those adopted by countries in their national definitions of labour market status, where international comparability is not a necessity. No data are available for Spain and Portugal prior to 1986, for Austria and Finland prior to 1995 and for Slovenia prior to 1996.

The LFS is based on the ILO-definition of "at work" and "unemployed". In the LFS, persons aged 15 and over[143] are defined as "*at work*" or employed if during the reference period they performed work for a wage or salary, for profit or family gain (e.g. in a family business), in cash or in kind, for at least one hour.[144] This includes those with a job or enterprise who are not at work due to temporary absence. People aged 15 to 74[145] are classified as "*unemployed*" if they meet all of the following requirements: (1) they are without work (work less than one hour per week); (2) they state that they are seeking employment for at least one hour per week; (3) they are available to start work within the following two weeks; (4) they sought employment at some time during the previous four weeks. People neither employed nor unemployed are considered inactive (and are excluded from the labour force). According to the LFS definition, "*inactive people*" are a group formed by persons who do not want a job, persons who are not searching but might take a job if offered, and persons who are searching for a job but took their last step to find one more than four weeks before the interview. Box 11 discusses the implications of these definitions further.

Nationality is interpreted as citizenship. Citizenship is defined according to national legislation of each country. *Education level* is classified according to the International Standard Classification of Education 1997 (see below). The expression 'level successfully completed' is associated with obtaining a certificate or a diploma, when there is a certification. In cases where there is no certification, successful completion must be associated with full attendance. When determining the highest level, both general and vocational education/training is taken into consideration.

Data on the hours of work measure the number of *hours usually worked* per week. This covers all hours including extra hours, either paid or unpaid, which the person normally works, but excludes travel time between home and workplace and time taken for the main meal break (usually at lunchtime). Persons who usually work from home are asked to include the number of hours they usually work there. Apprentices, trainees and other persons learning a job are asked to exclude any time spent at college or in other special training centres. Some persons, particularly self-employed persons and family workers, may not have usual hours, in the sense that their hours vary considerably from week to week or month to month. If a respondent is unable to provide a figure for usual working hours for this reason, the average of hours actually worked per week over

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143 16 and over in Spain, the United Kingdom and Sweden (1995-2001); 15-74 years in Denmark and Sweden (from 2001 onwards).

144 This group therefore includes employees, employers employing one or more employees, the self-employed and family workers.

145 Those aged 16-74 in Spain, Sweden (1995-2000) and the United Kingdom.

the past four weeks is used as a measure of usual hours. The distinction between full-time and part-time work is based on a spontaneous response by the respondent (except in the Netherlands, where part-time is determined if the usual hours are fewer than 35 hours and full-time if the usual hours are 35 hours or more, and in Sweden where this criterion is applied to the self-employed).

It has to be noted that methodological changes due to, e.g. census revisions, changes in concepts and a change from the use of annual to quarterly or more frequent surveys and data, have resulted in breaks in the LFS survey in many euro area countries. Details of these breaks can be found at: http://circa.europa.eu/irc/dsis/employment/info/data/eu_lfs/F_LFS_COMPARABILITY.htm. Comparability of developments over time in this report is optimised through the use of the spring surveys for all countries over the relevant time period considered.

DATA EXTRAPOLATION
In the case of Germany, data prior to 1991 have been obtained on the basis of the developments in West Germany. The euro area aggregate refers to the 13 countries that formed the euro area in 2007. Data prior to 1996 have been obtained on the basis of the growth rate of the largest aggregate available (i.e. 13 countries since 1996, 12 countries in 1995, 10 countries from 1986 to 1994 and 8 countries for 1983 to 1985).

DEFINITION OF EDUCATIONAL LEVELS IN THE EU-LFS
In the EU-LFS, the ISCED 1997 classification is used. Respondents are considered as low, medium or high skilled if their most advanced diploma is respectively ISCED 0, 1 or 2; ISCED 3 or 4; and ISCED 5 or 6.

ISCED 1 - PRE-PRIMARY EDUCATION
Programs at level 0, (pre-primary) defined as the initial stage of organised instruction are designed primarily to introduce very young children to a school-type environment, i.e. to provide a bridge between the home and a school-based atmosphere. Upon completion of these programs, children continue their education at level 1 (primary education).

ISCED 2 - PRIMARY EDUCATION OR FIRST STAGE OF BASIC EDUCATION
Programmes at level 1 are normally designed on a unit or project basis to give students a sound basic education in reading, writing and mathematics along with an elementary understanding of other subjects such as history, geography, natural science, social science, art and music. In some cases religious instruction is featured. The core at this level consists of education provided for children, the customary or legal age of entrance being not younger than five years or older than seven years. This level covers, in principle, six years of full-time schooling.

ISCED 3 - LOWER SECONDARY EDUCATION OR SECOND STAGE OF BASIC EDUCATION
The contents of education at this stage are typically designed to complete the provision of basic education which began at ISCED level 1. In many, if not most countries, the educational aim is to lay the foundation for lifelong learning and human development. The programmes at this level are usually on a more subject-oriented pattern using more specialised teachers and more often several teachers conducting classes in their field of specialisation. The full implementation of basic skills occurs at this level. The end of this level often coincides with the end of compulsory schooling, where it exists.

ISCED 4 - (UPPER) SECONDARY EDUCATION
This level of education typically begins at the end of full-time compulsory education for those countries that have a system of compulsory education. More specialisation may be observed at this level than at ISCED level 2 and often teachers need to be more qualified or specialised than for ISCED level 2. The entrance age to this level is typically 15 to 16 years. The educational programmes included at this level typically require the completion of some 9 years of full-time education (since the beginning of level 1)

for admission, or a combination of education and vocational or technical experience.

ISCED 3A: Programmes designed to provide direct access to ISCED 5A;

ISCED 3B: Programmes designed to provide direct access to ISCED 5B;

ISCED 3C: Programmes not designed to lead to ISCED 5A or 5B.

ISCED 5 - POST-SECONDARY NON TERTIARY EDUCATION

ISCED 4 captures programmes that straddle the boundary between upper secondary and post-secondary education from an international point of view, even though they might clearly be considered as upper secondary or post-secondary programmes in a national context. These programmes can, considering their content, not be regarded as tertiary programmes. They are often not significantly more advanced than programmes at ISCED 3 but they serve to broaden the knowledge of participants who have already completed a programme at level 3.

Typical examples are programmes designed to prepare students for studies at level 5 who, although they have completed ISCED level 3, did not follow a curriculum which would allow entry to level 5, i.e. pre-degree foundation courses or short vocational programmes. Second cycle programmes can be included as well.

ISCED 4A: See text for ISCED 3

ISCED 4B: See text for ISCED 3

ISCED 4C: See text for ISCED 3

LEVEL 6 - FIRST STAGE OF TERTIARY EDUCATION (NOT LEADING DIRECTLY TO AN ADVANCED RESEARCH QUALIFICATION)

This level consists of tertiary programmes with a more advanced educational content than those offered at levels 3 and 4. Entry to these programmes normally requires the successful completion of ISCED level 3A or 3B or a similar qualification at ISCED level 4A. They do not confer an advanced research qualification (ISCED 6). These programmes must have a cumulative duration of at least two years.

ISCED 5A: Programmes that are largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes and professions with high skills requirements.

ISCED 5B: Programmes that are practically oriented/occupationally specific and are mainly designed for participants to acquire the practical skills and know-how needed for employment in a particular occupation, trade or class of occupations or trades, the successful completion of which usually provides the participants with a labour-market relevant qualification

ISCED 7 - SECOND STAGE OF TERTIARY EDUCATION (LEADING TO AN ADVANCED RESEARCH QUALIFICATION)

This level is reserved for tertiary programmes which confer an advanced research qualification. The programmes are therefore devoted to advanced study and original research and not based on course-work only. They typically require the submission of a thesis or dissertation of publishable quality which is the product of original research and represents a significant contribution to knowledge. They prepare graduates for faculty posts in institutions offering ISCED 5A programmes, as well as research posts in government, industry, etc.

A2.2 US DATA

Total population data stems from the AMECO database. Working age population, employment and unemployment are from the US Bureau of Labour Statistics (BLS). Each month, the BLS analyses and publishes statistics on the labour force, employment, and unemployment, classified by a variety of demographic, social,

and economic characteristics. These statistics are derived from the Current Population Survey (CPS), which is conducted by the Census Bureau for the BLS. This monthly survey of the population uses a sample of households that is designed to represent the civilian noninstitutional population of the United States.

The data used in Table 17 are based on the publication Social Security Programs Throughout the World: Europe, 2006. This information is compiled by the US social security administration and the International Social Security Association (ISSA). The publication is available through: http://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html. This publication contains an overview of the different social security programs in the world, including parental leave structures.

A2.3 PISA
The OECD's Programme for International Student Assessment (PISA) is an internationally standardised assessment that was jointly developed by participating countries and administered to 15-year-olds in schools. The assessment conducted by PISA in 2006 covers the domains of reading, mathematical and scientific literacy, with the major focus on scientific literacy. Paper-and-pencil tests are used, with assessments lasting a total of two hours for each student. Test items are a mixture of multiple-choice items and questions requiring students to construct their own responses. Students also respond to a background questionnaire, and additional supporting information is gathered from the school authorities. Fifty-six countries and regions, including all 30 OECD member countries, took part in the PISA 2006 assessment. The assessment takes place every three years.

A2.4 OECD DATA ON YEARLY HOURS WORKED
The OECD uses information from labour force surveys: for European countries this is the EU-LFS.

Annual hours are estimated by annualising usual weekly hours and then by adding or subtracting all "unusual" events that occurred during the year, such as additional overtime work, public holidays, sick, maternity, paid and other leave. The number of weeks corresponding to each of the events can be estimated by using the differences between actual and usual weekly hours reported in the survey and extrapolating them over the year. However, for events that are not randomly distributed over the year, such as paid leave and public holidays, statutory information is used. For the European countries, information concerning collectively agreed paid leave and public holidays are taken from the Working Time Developments of the European Industrial Relations Observatory (EIRO).

The estimation of average annual hours worked is done separately for full-time employees, part-time employees and self-employed persons. Average annual hours for total employment are then calculated as a weighted average of the three categories.

ANNEX 3 DETAILED TABLES AND CHARTS

Chart 11 Employment rates in the euro area and the United States by gender

(percentages)

— Euro area
····· United States
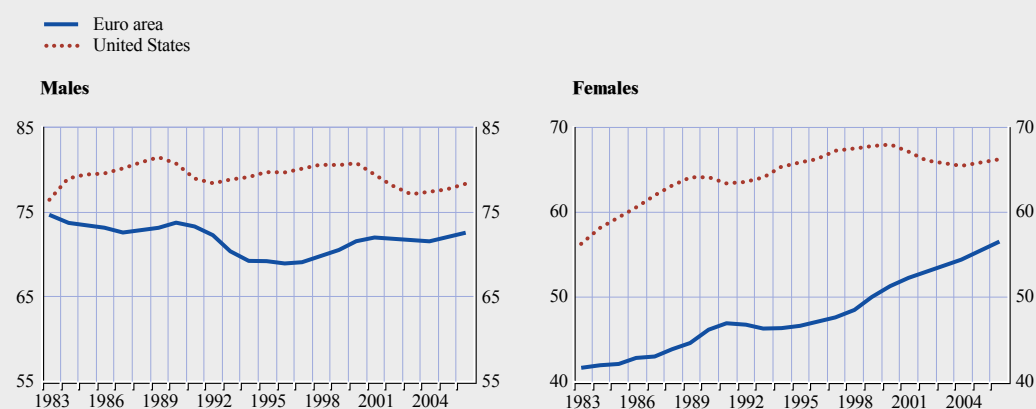
Males

Females

Sources: Eurostat and ECB calculations.
Note: 15 to 64 year olds.

Table 27 Participation and employment rates for five-year age groups in the euro area

	Males				Females			
	1983	1995	2001	2007	1983	1995	2001	2007
Participation rates								
Total	80.4	76.4	77.1	78.4	46.9	54.3	57.9	63.2
15-19	37.9	24.8	26.4	25.4	31.6	19.5	20.9	20.4
20-24	80.3	67.6	68.0	68.1	66.0	59.8	58.2	59.7
25-29	93.2	88.6	88.1	88.7	63.8	72.0	73.9	77.4
30-34	97.5	95.0	94.7	94.4	58.9	70.1	73.6	77.9
35-39	97.7	96.0	95.6	95.5	55.5	69.6	73.3	77.7
40-44	97.2	95.6	95.1	94.8	51.9	69.3	73.6	78.1
45-49	95.5	93.6	93.5	93.3	49.4	62.9	70.4	76.4
50-54	90.6	87.2	87.8	89.9	41.8	53.9	60.2	69.7
55-59	73.6	66.1	66.7	71.6	30.4	35.8	41.0	51.7
60-64	40.3	28.2	30.0	36.3	13.2	11.3	13.3	20.5
Employment rates								
Total	73.5	69.1	71.8	73.2	40.9	46.6	52.3	57.8
15-19	28.3	19.3	22.4	20.8	21.0	13.9	16.9	16.1
20-24	64.9	53.8	58.8	59.3	51.5	45.1	48.8	50.8
25-29	83.9	77.8	80.3	81.3	54.5	59.8	65.1	69.7
30-34	91.3	86.9	88.8	88.7	53.3	60.5	66.4	71.3
35-39	93.0	89.5	90.7	90.7	51.0	61.3	67.1	71.7
40-44	92.8	89.3	90.6	90.0	48.3	62.2	67.8	72.8
45-49	91.2	87.6	89.0	88.8	46.6	57.1	65.5	71.3
50-54	86.1	81.5	83.3	85.2	39.3	48.7	55.8	64.8
55-59	69.7	60.2	61.6	67.0	28.7	32.1	37.1	47.9
60-64	38.0	26.7	28.2	34.2	12.8	10.9	12.7	19.3

Sources: EU-LFS (spring data), ECB and NBB calculations.

Table 28 Participation rates (and employment rates in brackets) by country and subgroup

a) Subdivision according to gender

| | Average annual change (percentage points) | | | | Level (%) |
| | Trend developments | | Recent developments | | |
	1984 – 1995[1]	1996 – 2007[2]	1996 – 2001[3]	2002 – 2007	2007
Males					
Belgium	-0.3(-0.2)	0.1(0.1)	0.1(0.3)	0.1(-0.1)	73.2(68.2)
Germany	-0.2(-0.1)	0.1(0.0)	-0.1(-0.2)	0.4(0.3)	81.4(74.4)
Ireland	-0.6(-0.4)	0.4(0.9)	0.5(1.6)	0.3(0.2)	81.2(77.2)
Greece	-0.4(-0.4)	0.1(0.2)	0.0(-0.1)	0.3(0.5)	78.9(74.9)
Spain	-0.4(-0.1)	0.5(1.2)	0.5(1.8)	0.6(0.7)	81.6(76.6)
France	-0.5(-0.7)	0.0(0.1)	0.0(0.4)	-0.1(-0.3)	74.3(68.2)
Italy	-0.5(-0.7)	0.1(0.4)	0.1(0.3)	0.1(0.5)	74.5(71.1)
Luxembourg	-0.4(-0.4)	0.0(-0.2)	0.0(0.1)	-0.1(-0.4)	75.5(72.4)
Netherlands	0.2(0.5)	0.4(0.6)	0.7(1.3)	0.1(-0.1)	84.7(82.3)
Austria	n.a.(n.a.)	0.0(-0.1)	-0.3(-0.3)	0.2(0.1)	80.2(76.7)
Portugal	-0.7(-0.6)	0.2(0.2)	0.5(0.9)	0.0(-0.6)	79.0(73.6)
Slovenia	n.a.(n.a.)	0.4(0.6)	0.3(0.5)	0.6(0.8)	76.0(73.2)
Finland	n.a.(n.a.)	0.4(1.0)	0.8(1.7)	0.0(0.3)	79.3(73.4)
Euro area	-0.3(-0.4)	0.2(0.3)	0.1(0.4)	0.2(0.2)	78.4(73.2)
Denmark	0.1(0.4)	-0.1(0.0)	-0.4(-0.1)	0.1(0.2)	84.0(81.3)
Sweden	n.a.(n.a.)	0.2(0.4)	0.1(0.8)	0.3(0.1)	82.0(76.7)
United Kingdom	-0.1(0.0)	-0.1(0.2)	-0.2(0.5)	-0.1(-0.1)	81.6(77.1)
Females					
Belgium	0.6(0.8)	0.7(0.8)	0.5(0.9)	0.9(0.7)	60.2(54.9)
Germany	0.7(0.7)	0.7(0.7)	0.4(0.6)	1.0(0.8)	69.8(63.7)
Ireland	0.6(0.7)	1.3(1.6)	1.5(2.1)	1.2(1.1)	63.1(60.3)
Greece	0.4(0.3)	0.9(0.8)	0.9(0.6)	0.9(1.1)	55.1(48.1)
Spain	1.3(0.7)	1.3(1.9)	0.8(1.8)	1.8(2.0)	61.2(54.8)
France	0.4(0.1)	0.4(0.6)	0.3(0.6)	0.5(0.6)	65.1(59.0)
Italy	0.2(0.1)	0.7(0.9)	0.8(0.9)	0.6(1.0)	50.6(46.8)
Luxembourg	0.3(0.3)	0.9(0.9)	1.3(1.4)	0.6(0.4)	55.4(53.5)
Netherlands	1.5(1.6)	1.2(1.4)	1.4(2.0)	0.9(0.7)	72.2(69.6)
Austria	n.a.(n.a.)	0.4(0.4)	0.0(0.1)	0.8(0.7)	67.2(63.8)
Portugal	0.6(0.8)	0.8(0.6)	0.9(1.2)	0.7(0.1)	68.6(61.7)
Slovenia	n.a.(n.a.)	0.5(0.5)	0.2(0.2)	0.8(0.8)	67.2(63.3)
Finland	n.a.(n.a.)	0.5(0.9)	0.9(1.4)	0.1(0.4)	75.3(69.2)
Euro area	0.6(0.5)	0.7(0.9)	0.6(0.9)	0.9(0.9)	63.2(57.8)
Denmark	0.1(0.2)	0.3(0.5)	0.3(0.7)	0.2(0.3)	76.4(73.3)
Sweden	n.a.(n.a.)	0.2(0.2)	0.0(0.5)	0.3(-0.1)	77.7(71.9)
United Kingdom	0.8(0.8)	0.2(0.3)	0.3(0.6)	0.1(0.0)	68.6(65.2)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Notes: 15 to 64 years old. The figures corresponding to employment rates are given in brackets.
1) 1987-1995 for Spain and Portugal.
2) 1997-2007 for Slovenia.
3) 1997-2001 for Slovenia.

Table 28 Participation rates (and employment rates in brackets) by country and subgroup (cnt'd)

b) Subdivision according to age

15-24 years old

	Average annual change (percentage points)				Level (%)
	Trend developments		Recent developments		
	1984-1995 [1]	1996-2007 [2]	1996-2001 [3]	2002-2007	2007
Belgium	-0.8 (-0.6)	-0.1 (0.0)	0.0 (0.3)	-0.1 (-0.3)	33.1 (26.8)
Germany	-0.2 (0.2)	-0.2 (-0.4)	-0.3 (-0.3)	-0.1 (-0.5)	49.7 (43.7)
Ireland	-1.3 (-0.9)	0.7 (1.0)	0.8 (1.7)	0.5 (0.3)	53.1 (48.4)
Greece	-0.5 (-0.5)	-0.5 (-0.2)	0.0 (0.0)	-0.9 (-0.3)	31.0 (24.2)
Spain	-0.6 (-0.1)	0.5 (1.2)	0.1 (1.6)	0.9 (0.9)	47.8 (39.1)
France	-1.5 (-1.4)	0.1 (0.3)	0.0 (0.6)	0.3 (0.0)	37.3 (29.6)
Italy	-0.8 (-0.7)	-0.6 (0.0)	-0.4 (0.1)	-0.9 (-0.1)	31.0 (25.3)
Luxembourg	-1.6 (-1.5)	-1.3 (-1.3)	-1.1 (-1.0)	-1.4 (-1.7)	26.0 (22.1)
Netherlands	1.1 (1.3)	0.9 (1.2)	1.9 (2.6)	-0.1 (-0.3)	73.0 (68.6)
Austria	n.a. (n.a.)	-0.2 (-0.3)	-1.2 (-1.1)	0.8 (0.5)	59.2 (54.5)
Portugal	-2.0 (-1.4)	-0.2 (-0.1)	0.6 (1.0)	-0.9 (-1.3)	40.9 (34.7)
Slovenia	n.a. (n.a.)	-0.2 (0.2)	-1.3 (-1.0)	0.7 (1.2)	40.4 (37.2)
Finland	n.a. (n.a.)	1.0 (1.6)	2.2 (2.8)	-0.1 (0.4)	62.1 (48.6)
Euro area	-0.7 (-0.5)	0.0 (0.3)	0.0 (0.6)	0.0 (0.0)	44.0 (37.3)
Denmark	0.7 (1.1)	0.0 (0.1)	-1.0 (-0.7)	0.9 (1.0)	72.6 (67.4)
Sweden	n.a. (n.a.)	0.8 (0.5)	1.2 (1.6)	0.5 (-0.7)	55.1 (42.1)
United Kingdom	-0.1 (0.2)	-0.4 (-0.2)	-0.3 (0.3)	-0.4 (-0.8)	59.2 (50.8)
25-24 years old					
Belgium	0.5 (0.5)	0.4 (0.5)	0.1 (0.5)	0.7 (0.5)	85.1 (79.3)
Germany	0.4 (0.3)	0.4 (0.3)	0.4 (0.4)	0.4 (0.2)	87.7 (80.8)
Ireland	0.5 (0.6)	0.8 (1.2)	1.0 (1.9)	0.6 (0.4)	82.2 (78.9)
Greece	0.5 (0.4)	0.7 (0.6)	0.6 (0.4)	0.7 (0.8)	82.0 (75.7)
Spain	1.1 (0.5)	0.7 (1.5)	0.3 (1.7)	1.1 (1.3)	82.8 (77.1)
France	0.4 (0.0)	0.1 (0.3)	0.0 (0.4)	0.3 (0.3)	87.7 (81.1)
Italy	0.1 (-0.1)	0.5 (0.7)	0.5 (0.6)	0.4 (0.8)	77.5 (73.6)
Luxembourg	0.4 (0.4)	0.8 (0.7)	1.0 (1.1)	0.5 (0.2)	82.8 (80.1)
Netherlands	0.9 (1.0)	0.7 (0.9)	0.8 (1.4)	0.6 (0.4)	87.6 (85.4)
Austria	n.a. (n.a.)	0.3 (0.3)	0.3 (0.4)	0.2 (0.1)	86.7 (83.0)
Portugal	0.7 (0.7)	0.4 (0.2)	0.3 (0.7)	0.4 (-0.2)	87.7 (80.9)
Slovenia	n.a. (n.a.)	0.3 (0.4)	0.2 (0.4)	0.3 (0.3)	89.9 (85.9)
Finland	n.a. (n.a.)	0.2 (0.9)	0.5 (1.4)	0.0 (0.3)	88.3 (83.7)
Euro area	0.5 (0.2)	0.4 (0.6)	0.3 (0.7)	0.5 (0.5)	84.6 (79.1)
Denmark	-0.2 (0.0)	0.1 (0.4)	0.1 (0.5)	0.2 (0.3)	88.5 (86.1)
Sweden	n.a. (n.a.)	0.0 (0.3)	-0.3 (0.3)	0.4 (0.3)	90.3 (86.3)
United Kingdom	0.4 (0.4)	0.1 (0.3)	0.0 (0.5)	0.1 (0.1)	84.5 (81.3)

Sources: EU-LFS (spring data), ECB and NBB calculations. Corresponding figures for employment rates between brackets.
1) 1987-1995 for Spain and Portugal.
2) 1997-2007 for Slovenia.
3) 1997-2001 for Slovenia.

b) Subdivision according to age

55-64 years old

| | Average annual change (percentage points) | | | | Level (%) |
| | Trend developments | | Recent developments | | |
	1984-1995 [1]	1996-2007 [2]	1996-2001 [3]	2002-2007	2007
Belgium	-0.5 (-0.5)	0.9 (0.9)	0.3 (0.3)	1.5 (1.4)	35.2 (33.8)
Germany	0.2 (-0.1)	1.3 (1.2)	0.0 (0.0)	2.5 (2.4)	57.9 (52.0)
Ireland	-0.4 (-0.4)	1.0 (1.2)	0.8 (1.2)	1.3 (1.2)	55.5 (54.0)
Greece	-0.5 (-0.5)	0.1 (0.1)	-0.4 (-0.4)	0.6 (0.7)	43.6 (42.1)
Spain	-0.6 (-0.5)	0.9 (1.1)	0.9 (1.2)	1.0 (0.9)	47.4 (44.8)
France	-0.6 (-0.6)	0.8 (0.7)	0.2 (0.2)	1.3 (1.2)	40.5 (37.8)
Italy	-0.5 (-0.5)	0.5 (0.5)	-0.1 (-0.1)	1.1 (1.2)	34.8 (34.0)
Luxembourg	-0.1 (-0.1)	0.9 (0.9)	0.1 (0.1)	1.6 (1.6)	34.5 (34.3)
Netherlands	-0.2 (-0.1)	1.9 (1.8)	1.7 (1.7)	2.2 (2.0)	52.8 (51.0)
Austria	n.a. (n.a.)	0.7 (0.7)	-0.2 (-0.3)	1.6 (1.6)	38.3 (37.1)
Portugal	0.2 (0.1)	0.5 (0.4)	0.8 (0.9)	0.3 (-0.1)	54.0 (50.3)
Slovenia	n.a. (n.a.)	1.4 (1.4)	0.8 (0.7)	1.9 (1.9)	36.0 (34.9)
Finland	n.a. (n.a.)	1.6 (1.7)	1.7 (1.9)	1.5 (1.6)	58.8 (55.4)
Euro area	-0.3 (-0.4)	0.9 (0.9)	0.2 (0.3)	1.5 (1.5)	46.4 (43.4)
Denmark	0.0 (-0.1)	0.6 (0.8)	0.9 (1.2)	0.4 (0.4)	61.3 (58.7)
Sweden	n.a. (n.a.)	0.5 (0.7)	0.4 (0.7)	0.6 (0.6)	72.9 (69.9)
United Kingdom	-0.1 (0.0)	0.7 (0.8)	0.4 (0.8)	0.9 (0.9)	59.3 (57.4)

Sources: EU-LFS (spring data), ECB and NBB calculations. Corresponding figures for employment rates between brackets.
1) 1987-1995 for Spain and Portugal.
2) 1997-2007 for Slovenia.
3) 1997-2001 for Slovenia.

c) Subdivision according to education level

| | Average annual change (percentage points) | | | Level (%) |
| | Trend developments | Recent developments | | |
	1996-2007 [1]	1996-2001 [2]	2002-2007	2007
Low				
Belgium	0.2 (0.2)	0.0 (0.3)	0.4 (0.2)	55.9 (49.3)
Germany	0.9 (0.6)	0.7 (0.7)	1.1 (0.4)	66.4 (54.7)
Ireland	0.4 (0.8)	0.3 (1.3)	0.4 (0.3)	62.8 (58.7)
Greece	0.4 (0.3)	0.3 (0.1)	0.5 (0.6)	64.5 (59.9)
Spain	0.6 (1.2)	0.4 (1.3)	0.9 (1.0)	66.5 (60.9)
France	0.1 (0.3)	0.2 (0.4)	0.1 (0.1)	64.6 (57.4)
Italy	0.2 (0.4)	0.2 (0.2)	0.3 (0.5)	56.1 (52.7)
Luxembourg	0.4 (0.3)	0.5 (0.6)	0.2 (0.0)	60.7 (58.1)
Netherlands	0.6 (0.8)	0.8 (1.5)	0.5 (0.3)	64.1 (61.4)
Austria	0.0 (-0.1)	-0.8 (-0.9)	0.9 (0.7)	61.6 (56.4)
Portugal	0.5 (0.3)	0.7 (1.0)	0.3 (-0.3)	77.5 (71.2)
Slovenia	0.5 (0.5)	1.1 (1.0)	0.0 (0.1)	61.5 (57.2)
Finland	0.0 (0.5)	0.2 (0.8)	-0.1 (0.2)	65.1 (59.3)
Euro area	0.4 (0.6)	0.3 (0.7)	0.5 (0.5)	63.5 (57.6)
Denmark	0.5 (0.9)	0.3 (0.8)	0.8 (0.9)	70.3 (67.5)
Sweden	-1.3 (-0.9)	-2.3 (-1.5)	-0.2 (-0.4)	71.5 (66.6)
United Kingdom	-0.4 (-0.1)	-0.6 (-0.1)	-0.1 (-0.1)	68.6 (64.4)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Notes: 25 to 64 years old. EU-LFS data concerning education level are only available from 1992 onwards. The figures corresponding to employment rates are given in brackets.
1) 1997-2007 for the Netherlands and Slovenia.
2) 1997-2001 for the Netherlands and Slovenia.

Table 28 Participation rates (and employment rates in brackets) by country and subgroup (cnt`d)

c) Subdivision according to education level

	Average annual change (percentage points)			Level (%)
	Trend developments	Recent developments		
	1996-2007 [1]	1996-2001 [2]	2002-2007	2007
Medium				
Belgium	0.0 (0.1)	0.0 (0.4)	0.1 (-0.2)	78.8 (73.9)
Germany	0.5 (0.5)	0.2 (0.2)	0.8 (0.8)	81.6 (74.8)
Ireland	0.7 (0.9)	1.2 (1.7)	0.2 (0.0)	80.2 (77.5)
Greece	0.5 (0.5)	0.7 (0.5)	0.3 (0.6)	75.7 (69.6)
Spain	0.2 (1.0)	-0.3 (1.2)	0.7 (0.8)	81.9 (76.6)
France	-0.2 (0.0)	-0.2 (0.1)	-0.2 (-0.2)	80.3 (74.9)
Italy	0.1 (0.3)	0.1 (0.2)	0.1 (0.5)	78.1 (75.1)
Luxembourg	0.4 (0.4)	0.7 (0.8)	0.1 (0.0)	75.9 (74.1)
Netherlands	0.4 (0.6)	0.7 (1.2)	0.2 (0.1)	82.6 (80.4)
Austria	0.0 (0.0)	-0.2 (-0.1)	0.3 (0.2)	78.5 (75.7)
Portugal	0.2 (0.2)	0.4 (0.9)	0.0 (-0.5)	85.4 (79.7)
Slovenia	0.0 (0.0)	-0.3 (-0.1)	0.1 (0.1)	78.6 (75.1)
Finland	0.1 (0.7)	0.4 (1.3)	-0.2 (0.2)	81.8 (77.0)
Euro area	0.2 (0.4)	0.1 (0.3)	0.4 (0.4)	80.4 (75.3)
Denmark	0.1 (0.4)	0.1 (0.5)	0.2 (0.3)	84.2 (82.2)
Sweden	-0.3 (0.0)	-0.9 (-0.2)	0.2 (0.2)	87.1 (83.3)
United Kingdom	0.0 (0.2)	0.1 (0.7)	-0.1 (-0.2)	84.2 (81.1)
High				
Belgium	0.1 (0.1)	0.0 (0.1)	0.2 (0.1)	87.8 (84.9)
Germany	0.2 (0.3)	-0.1 (0.0)	0.5 (0.5)	89.8 (86.5)
Ireland	0.2 (0.3)	0.3 (0.7)	0.1 (0.0)	89.0 (87.0)
Greece	0.3 (0.3)	0.2 (0.0)	0.3 (0.5)	88.4 (83.3)
Spain	0.1 (0.8)	-0.2 (1.0)	0.4 (0.6)	88.8 (84.6)
France	-0.1 (0.1)	0.0 (0.3)	-0.1 (-0.1)	87.2 (83.0)
Italy	-0.3 (-0.1)	-0.2 (0.1)	-0.4 (-0.2)	84.1 (80.6)
Luxembourg	0.3 (0.1)	0.5 (0.5)	0.0 (-0.3)	86.5 (84.0)
Netherlands	0.3 (0.4)	0.3 (0.8)	0.2 (0.2)	89.6 (88.1)
Austria	-0.2 (-0.2)	-0.4 (-0.3)	0.1 (0.0)	88.9 (86.7)
Portugal	0.0 (-0.2)	0.0 (0.2)	0.0 (-0.6)	92.5 (86.9)
Slovenia	0.3 (0.3)	-0.1 (0.0)	0.6 (0.5)	91.6 (89.1)
Finland	0.0 (0.3)	0.2 (0.7)	-0.2 (-0.1)	88.2 (85.2)
Euro area	0.0 (0.2)	-0.1 (0.3)	0.2 (0.2)	88.3 (84.7)
Denmark	-0.1 (0.1)	-0.2 (0.1)	0.0 (0.1)	90.2 (87.6)
Sweden	-0.1 (-0.1)	-0.7 (-0.4)	0.4 (0.2)	91.9 (88.6)
United Kingdom	0.0 (0.1)	0.0 (0.3)	0.0 (0.0)	89.8 (88.0)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Notes: 25 to 64 years old. EU-LFS data concerning education level are only available from 1992 onwards. The figures corresponding to employment rates are given in brackets.
1) 1997-2007 for the Netherlands and Slovenia.
2) 1997-2001 for the Netherlands and Slovenia.

d) Subdivision according to nationality

Nationals

	Average annual change (percentage points)			Level (%)
	Trend developments	Recent developments		
	1996-2007	1996-2001	2002-2007 [1]	2007
Belgium	0.4 (0.4)	0.3 (0.5)	0.4 (0.3)	67.0 (62.4)
Germany	0.5 (0.4)	0.2 (0.2)	0.8 (0.7)	76.7 (70.6)
Ireland	n.a. (n.a.)	n.a. (n.a.)	0.6 (0.5)	71.4 (68.2)
Greece	0.6 (0.6)	0.5 (0.3)	0.6 (0.8)	66.6 (61.1)
Spain	0.8 (1.5)	0.6 (1.8)	1.1 (1.3)	70.5 (65.3)
France	0.2 (0.3)	0.2 (0.5)	0.2 (0.1)	70.0 (64.2)
Italy	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	61.9 (58.4)
Luxembourg	0.4 (0.3)	0.5 (0.6)	0.3 (0.0)	61.7 (59.4)
Netherlands	n.a. (n.a.)	n.a. (n.a.)	0.4 (0.3)	79.1 (76.7)
Austria	0.3 (0.3)	-0.1 (-0.1)	0.7 (0.6)	74.2 (71.3)
Portugal	n.a. (n.a.)	n.a. (n.a.)	0.3 (-0.2)	73.4 (67.5)
Slovenia	n.a. (n.a.)	n.a. (n.a.)	0.6 (0.8)	71.7 (68.4)
Finland	0.4 (1.0)	0.8 (1.6)	0.0 (0.4)	77.4 (71.6)
Euro area	0.3 (0.5)	0.4 (0.8)	0.2 (0.3)	70.9 (65.9)
Denmark	0.1 (0.3)	0.0 (0.4)	0.2 (0.3)	81.2 (78.5)
Sweden	n.a. (n.a.)	n.a. (n.a.)	0.3 (0.0)	80.4 (75.1)
United Kingdom	0.0 (0.2)	0.0 (0.5)	0.0 (-0.1)	75.2 (71.4)
Other EU15 citizens				
Belgium	0.5 (0.9)	0.2 (1.0)	0.8 (0.7)	69.1 (62.4)
Germany	0.2 (0.2)	0.1 (0.3)	0.3 (0.0)	76.7 (69.6)
Ireland	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)
Greece	0.6 (-0.6)	0.4 (-0.6)	-1.6 (-0.6)	53.6 (48.8)
Spain	0.7 (1.1)	0.5 (1.8)	1.0 (0.4)	70.2 (62.7)
France	0.1 (0.3)	-0.1 (0.3)	0.4 (0.4)	72.8 (67.8)
Italy	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	60.0 (57.9)
Luxembourg	0.4 (0.4)	0.7 (0.9)	0.1 (-0.1)	71.6 (69.3)
Netherlands	n.a. (n.a.)	n.a. (n.a.)	0.2 (0.2)	78.0 (75.8)
Austria	0.8 (0.5)	0.4 (0.0)	1.1 (1.0)	77.2 (73.1)
Portugal	n.a. (n.a.)	n.a. (n.a.)	1.7 (1.3)	74.6 (69.3)
Slovenia	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)
Finland	1.5 (2.2)	2.7 (4.9)	0.3 (-0.4)	85.1 (77.8)
Euro area	0.2 (0.3)	0.0 (0.5)	0.4 (0.2)	73.7 (67.6)
Denmark	0.1 (0.3)	1.4 (1.1)	-1.2 (-0.5)	76.6 (73.8)
Sweden	n.a. (n.a.)	n.a. (n.a.)	0.6 (0.3)	75.4 (70.8)
United Kingdom	0.4 (0.6)	0.1 (1.0)	0.7 (0.3)	76.9 (71.5)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Notes: 15 to 64 years old. EU-LFS data concerning nationality are only available from 1995 onwards. The figures corresponding to employment rates are given in brackets.
1) 2003-07 for Slovenia.

Table 28 Participation rates (and employment rates in brackets) by country and subgroup (cnt'd)

d) Subdivision according to nationality

Non EU15 citizens

	Average annual change (percentage points)			Level (%)
	Trend developments	**Recent developments**		
	1996-2007	**1996-2001**	**2002-2007 1)**	**2007**
Belgium	1.1 (1.1)	0.0 (0.8)	2.1 (1.5)	55.7 (40.6)
Germany	0.0 (-0.1)	-0.3 (0.0)	0.3 (-0.2)	63.8 (51.5)
Ireland	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)
Greece	0.1 (0.5)	0.3 (0.7)	0.0 (0.4)	73.8 (67.9)
Spain	0.7 (1.4)	1.2 (2.2)	0.2 (0.5)	79.7 (70.0)
France	0.1 (0.4)	0.2 (0.6)	0.1 (0.2)	59.3 (44.9)
Italy	n.a. (n.a.)	n.a. (n.a.)	n.a. (n.a.)	73.0 (67.4)
Luxembourg	0.9 (0.5)	1.5 (1.2)	0.2 (-0.2)	64.9 (57.7)
Netherlands	n.a. (n.a.)	n.a. (n.a.)	0.9 (0.4)	57.6 (51.8)
Austria	-0.7 (-1.0)	-0.3 (-0.5)	-1.2 (-1.5)	67.8 (59.5)
Portugal	n.a. (n.a.)	n.a. (n.a.)	1.3 (0.4)	82.8 (70.6)
Slovenia	n.a. (n.a.)	n.a. (n.a.)	2.1 (1.3)	65.7 (59.7)
Finland	0.7 (0.9)	1.6 (1.0)	-0.2 (0.9)	67.8 (53.6)
Euro area	0.6 (0.8)	0.2 (0.5)	1.1 (1.1)	69.6 (59.3)
Denmark	0.2 (0.9)	-0.9 (0.7)	1.4 (1.2)	61.1 (53.9)
Sweden	n.a. (n.a.)	n.a. (n.a.)	0.3 (-0.2)	65.1 (52.3)
United Kingdom	0.8 (1.2)	-0.1 (0.6)	1.7 (1.9)	71.0 (65.2)

Non EU15 citizens: level (%) in 2007

	Citizens of the 12 new EU member states	Non EU27 citizens
Belgium	71.1 (62.1)	53.2 (37.1)
Germany	73.3 (63.7)	62.4 (49.7)
Ireland	n.a. (n.a.)	n.a. (n.a.)
Greece	71.7 (65.6)	74.2 (68.4)
Spain	82.4 (72.9)	79.0 (69.2)
France	68.0 (53.6)	58.9 (44.5)
Italy	76.7 (71.1)	72.2 (66.6)
Luxembourg	63.4 (61.4)	65.4 (56.4)
Netherlands	72.3 (67.7)	56.3 (50.4)
Austria	75.1 (69.6)	66.3 (57.3)
Portugal	72.9 (67.8)	83.5 (70.8)
Slovenia	n.a. (n.a.)	65.1 (59.0)
Finland	80.0 (74.4)	63.9 (47.0)
Euro area	77.1 (68.7)	68.3 (57.7)
Denmark	76.3 (71.8)	60.3 (52.9)
Sweden	74.1 (56.0)	63.9 (51.9)
United Kingdom	84.7 (79.6)	66.7 (60.7)

Sources: EU-LFS (spring data), ECB and NBB calculations.
Notes: 15 to 64 years old. EU-LFS data concerning nationality are only available from 1995 onwards. The figures corresponding to employment rates are given in brackets.
1) 2003-07 for Slovenia.

Chart 12 Annual and weekly hours worked in the EU15 countries and the United States in 2005

x-axis: usual weekly hours worked
y-axis: annual hours worked
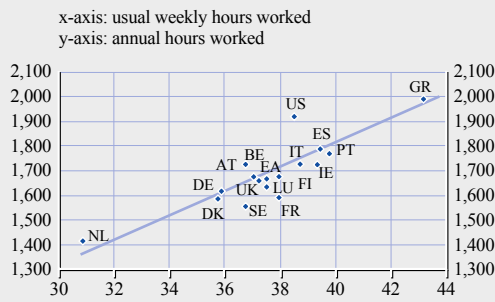
Sources: EU-LFS (spring data) and OECD.

Table 29 Developments in the percentage of nationals and non-nationals in the working age population, participation and employment, by country

	Nationals			% of working age population Other EU15 citizens			Non EU15 citizens		
Country	average annual change		level	average annual change		level	average annual change		level
	1996-2001	2002-2007	2007	1996-2001	2002-2007	2007	1996-2001	2002-2007	2007
Belgium	-0.1	0.1	90.9	0.1	-0.1	5.3	0.0	0.1	3.8
Germany	-0.1	-0.1	89.6	0.0	0.0	2.8	0.1	0.1	7.6
Ireland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spain	-0.5	-1.5	87.1	0.1	0.1	1.5	0.4	1.4	11.4
Greece	-0.4	-0.4	93.8	0.0	0.0	0.3	0.4	0.4	6.0
France	0.0	0.2	94.1	0.0	0.0	2.1	0.0	-0.1	3.8
Italy	n.a.	n.a.	94.2	n.a.	n.a.	0.3	n.a.	n.a.	5.5
Luxembourg	-0.8	-0.3	57.9	0.5	0.3	37.7	0.3	0.0	4.4
Netherlands	n.a.	0.1	95.7	n.a.	0.0	1.6	n.a.	-0.1	2.7
Austria	-0.1	-0.3	88.7	0.1	0.1	2.2	0.0	0.2	9.1
Portugal	n.a.	-0.3	96.3	n.a.	0.0	0.4	n.a.	0.3	3.3
Slovenia	n.a.	0.0	99.3	n.a.	n.a.	n.a.	n.a.	*0.0*	*0.7*
Finland	-0.1	-0.1	98.0	0.0	0.0	0.4	0.1	0.1	1.6
Euro area	-0.1	-0.2	91.9	0.0	-0.1	1.8	0.1	0.3	6.3
Denmark	-0.2	-0.3	94.6	0.0	0.0	1.1	0.2	0.3	4.4
Sweden	n.a.	0.1	95.0	n.a.	0.0	2.1	n.a.	0.0	2.9
United Kindgom	-0.2	-0.4	92.2	0.0	0.0	1.8	0.2	0.4	6.0
Participation rates									
Belgium	0.3	0.4	67.0	0.2	0.8	69.1	0.0	2.1	55.7
Germany	0.2	0.8	76.7	0.1	0.3	76.7	-0.3	0.3	63.8
Ireland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spain	0.6	1.1	70.5	0.5	1.0	70.2	1.2	0.2	79.7
Greece	0.5	0.6	66.6	0.4	-1.6	53.6	0.3	0.0	73.8
France	0.2	0.2	70.0	-0.1	0.4	72.8	0.2	0.1	59.3
Italy	n.a.	n.a.	61.9	n.a.	n.a.	60.0	n.a.	n.a.	73.0
Luxembourg	0.5	0.3	61.7	0.7	0.1	71.6	1.5	0.2	64.9
Netherlands	n.a.	0.4	79.1	n.a.	0.2	78.0	n.a.	0.9	57.6
Austria	-0.1	0.7	74.2	0.4	1.1	77.2	-0.3	-1.2	67.8
Portugal	n.a.	0.3	73.4	n.a.	1.7	74.6	n.a.	1.3	82.8
Slovenia	n.a.	0.5	71.7	n.a.	n.a.	n.a	n.a.	*1.8*	*65.7*
Finland	0.8	0.0	77.4	2.7	0.3	85.1	1.6	-0.2	67.8
Euro area	0.4	0.2	70.9	0.0	0.4	73.7	0.2	1.1	69.6
Denmark	0.0	0.2	81.2	1.4	-1.2	76.6	-0.9	1.4	61.1
Sweden	n.a.	0.3	80.4	n.a.	0.6	75.4	n.a.	0.3	65.1
United Kindgom	0.0	0.0	75.2	0.1	0.7	76.9	-0.1	1.7	71.0

Source: EU-LFS (spring data).
Notes: IE: data available for 1998-2004 only. IT: for 2005-07 only. NL and PT: data start 1999 SI: data start 2002 SE: data start 1997.
The non-national population is separated into non-national EU15 citizens and non-national non-EU15 citizens. Numbers in italics are based on figures smaller than the Eurostat reliability limit.

Table 29 Developments in the percentage of nationals and non-nationals in the working age population, participation and employment, by country (cnt'd)

Country	Nationals			% of working age population Other EU15 citizens			Non EU15 citizens		
	average annual change		level	average annual change		level	average annual change		level
	1996-2001	2002-2007	2007	1996-2001	2002-2007	2007	1996-2001	2002-2007	2007
Employment rates 2007									
Belgium	0.5	0.3	62.4	1.0	0.7	62.4	0.8	1.5	40.6
Germany	0.2	0.7	70.6	0.3	0.0	69.6	0.0	-0.2	51.5
Ireland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spain	1.8	1.3	65.3	1.8	0.4	62.7	2.2	0.5	70.0
Greece	0.3	0.8	61.1	-0.6	-0.6	48.8	0.7	0.4	67.9
France	0.5	0.1	64.2	0.3	0.4	67.8	0.6	0.2	44.9
Italy	n.a.	n.a.	58.4	n.a.	n.a.	57.9	n.a.	n.a.	67.4
Luxembourg	0.6	0.0	59.4	0.9	-0.1	69.3	1.2	-0.2	57.7
Netherlands	n.a.	0.3	76.7	n.a.	0.2	75.8	n.a.	0.4	51.8
Austria	-0.1	0.6	71.3	0.0	1.0	73.1	-0.5	-1.5	59.5
Portugal	n.a.	-0.2	67.5	n.a.	*1.3*	*69.3*	n.a.	0.4	70.6
Slovenia	n.a.	0.7	68.4	n.a.	n.a.	n.a.	n.a.	*1.0*	*59.7*
Finland	1.6	0.4	71.6	*4.9*	-0.4	77.8	1.0	0.9	53.6
Euro area	0.8	0.3	65.9	0.5	0.2	67.6	0.5	1.1	59.3
Denmark	0.4	0.3	78.5	1.1	-0.5	73.8	0.7	1.2	53.9
Sweden	n.a.	0.0	75.1	n.a.	0.3	70.8	n.a.	-0.2	52.3
United Kingdom	0.5	-0.1	71.4	1.0	0.3	71.5	0.6	1.9	65.2

Source: EU-LFS (spring data).
Notes: IE: data available for 1998-2004 only. IT: for 2005-07 only. NL and PT: data start 1999 SI: data start 2002 SE: data start 1997. The non-national population is separated into non-national EU15 citizens and non-national non-EU15 citizens. Numbers in italics are based on figures smaller than the Eurostat reliability limit.

Table 30 Educational Attainment of 25-54 year olds

(% of total population)

Country	1992			1999			2007		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Belgium	44.5	31.7	23.7	37.6	33.2	29.2	27.6	38.4	34.0
Germany	16.5	61.1	22.4	17.4	58.6	24.0	14.2	61.0	24.8
Ireland	54.1	27.7	18.2	40.6	37.5	21.9	27.2	37.5	35.3
Greece	56.8	28.5	14.7	42.7	37.9	19.3	34.2	41.5	24.2
Spain	71.6	13.5	14.9	58.5	17.5	24.1	44.5	23.7	31.8
France	n.a.	n.a.	n.a.	34.6	42.4	22.9	27.2	43.1	29.6
Italy	62.3	30.1	7.6	51.5	38.1	10.4	42.8	42.5	14.7
Luxembourg	62.4	24.3	13.3	34.5	45.8	19.7	30.6	39.3	30.1
Netherlands	n.a.	n.a.	n.a.	32.2	44.0	23.8	23.3	44.5	32.1
Austria	n.a.	n.a.	n.a.	21.4	63.6	15.0	17.8	64.0	18.2
Portugal	76.8	11.2	12.0	77.9	12.1	10.0	68.7	16.1	15.3
Slovenia	n.a.	n.a.	n.a.	22.3	61.3	16.3	14.9	60.3	24.8
Finland	n.a.	n.a.	n.a.	22.6	43.7	33.8	14.6	47.2	38.2
Euro area	45.2	38.9	15.9	37.6	41.8	20.6	30.5	44.2	25.4
Denmark	21.4	57.8	20.8	18.0	53.7	28.3	21.9	43.9	34.2
Sweden	n.a.	n.a.	n.a.	19.3	50.2	30.5	11.9	55.0	33.1
United Kingdom	48.8	31.4	19.8	35.3	36.4	28.3	25.6	41.2	33.2

Source: EU – LFS (spring data).

LOW EDUCATION: This Table shows the percentage of a cohort population with a low level of education,
e.g. Belgium 20-24 = 25.6 => that 25.8 % of the 20-24 year old population in Belgium has a low level of education

1992	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Belgium	25.6	33.6	38.9	41.6	46.3	53.4	61.0	68.3	74.4
Germany	17.6	12.7	13.8	14.1	16.2	18.6	23.9	30.7	35.7
Ireland	32.5	41.8	46.3	51.9	60.2	63.3	68.2	73.2	77.6
Greece	28.8	37.4	45.1	52.4	62.2	68.1	75.4	80.2	84.1
Spain	47.3	54.3	63.1	71.4	79.3	85.0	87.5	90.9	91.9
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Italy	44.9	52.1	54.4	57.0	63.9	72.2	78.4	84.3	86.4
Luxembourg	54.4	55.2	59.7	61.9	64.0	68.2	69.5	76.9	77.3
Netherlands	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Portugal	65.0	65.3	70.2	75.1	80.6	84.2	88.0	91.2	92.1
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Finland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Euro area	34.8	35.9	39.4	42.7	48.3	53.7	54.5	63.5	68.3
Denmark	21.3	12.8	15.2	19.3	24.1	24.7	35.6	44.3	48.3
Sweden	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	42.9	46.4	46.8	46.2	47.7	51.4	56.7	61.3	58.5

1999	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Belgium	23.8	22.5	28.8	35.1	41.9	45.9	53.3	59.6	68.8
Germany	25.4	16.7	15.4	16.5	16.8	18.4	21.7	25.0	32.3
Ireland	18.0	24.9	31.0	37.5	43.4	53.2	60.0	63.0	70.8
Greece	21.4	26.5	32.9	39.0	46.3	53.5	63.3	73.2	79.0
Spain	34.8	42.7	49.1	55.3	62.7	71.4	79.0	84.0	88.9
France	20.0	22.3	26.4	33.0	38.4	42.3	46.7	54.8	63.9
Italy	33.7	40.4	47.3	48.9	50.9	58.4	67.3	74.6	81.1
Luxembourg	28.8	32.3	31.1	32.7	33.9	39.8	40.6	48.7	57.4
Netherlands	27.7	24.4	26.7	29.7	32.9	38.8	42.6	48.0	51.5
Austria	15.3	15.0	16.7	18.7	23.2	29.0	29.5	35.6	47.8
Portugal	59.9	64.6	74.7	78.7	80.0	85.0	87.9	91.3	93.5
Slovenia	14.2	12.4	18.2	18.9	26.5	27.7	31.6	36.9	46.1
Finland	13.2	15.5	13.5	15.5	21.0	27.7	38.9	48.7	59.1
Euro area	28.4	29.3	32.0	35.1	38.7	43.4	50.2	53.3	60.7
Denmark	26.8	10.6	14.8	20.2	20.5	20.2	22.0	25.2	36.4
Sweden	13.7	12.7	12.5	17.1	21.2	23.1	28.6	34.4	41.3
United Kingdom	24.7	30.7	34.8	35.5	34.6	35.7	41.0	48.2	43.8

2007	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Belgium	17.8	17.6	20.4	23.1	27.8	33.7	41.5	45.0	53.8
Germany	28.1	14.8	15.0	13.6	13.5	13.8	15.2	18.8	20.2
Ireland	13.5	14.3	20.3	24.7	31.6	35.8	45.1	55.9	60.9
Greece	17.6	23.4	25.9	29.4	35.6	42.5	50.9	59.1	68.0
Spain	39.4	34.6	36.2	41.5	46.1	53.8	60.5	68.3	75.9
France	18.4	15.7	18.8	24.2	28.8	34.5	40.6	45.1	49.5
Italy	24.0	28.0	35.3	42.0	46.9	50.4	53.8	61.8	72.1
Luxembourg	29.7	18.0	24.1	29.3	35.8	35.4	38.8	46.9	48.8
Netherlands	24.4	16.4	17.8	21.4	24.3	27.2	31.2	36.9	42.0
Austria	16.1	13.8	13.5	16.0	17.5	21.1	25.0	29.0	29.5
Portugal	47.1	51.2	60.1	69.1	75.7	77.2	81.4	85.1	88.8
Slovenia	9.1	4.5	10.0	14.4	15.7	18.7	26.2	27.5	29.2
Finland	18.2	10.5	9.8	14.8	12.4	16.0	22.5	30.7	40.3
Euro area	26.1	22.5	26.1	28.8	31.1	34.9	39.1	44.8	51.0
Denmark	28.7	15.0	14.7	18.4	23.2	28.2	30.9	31.5	39.2
Sweden	13.0	10.3	8.0	9.0	11.1	14.7	18.4	22.4	29.4
United Kingdom	21.7	19.6	20.4	26.6	27.5	29.0	29.3	34.1	31.1

Table 31 Educational Attainment of Population (% of cohort population by highest level of education attained) (cnt'd)

HIGH EDUCATION: This Table shows the percentage of a cohort population with a high level of education.

1992	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Belgium	16.2	29.0	26.6	24.6	22.7	19.7	16.2	11.0	8.2
Germany	5.1	16.3	24.1	26.0	24.9	24.2	20.2	17.0	14.6
Ireland	18.1	22.3	20.0	18.8	17.0	15.7	13.3	10.7	8.9
Greece	7.4	20.8	17.7	16.8	13.6	10.9	8.3	6.0	4.7
Spain	11.8	22.3	18.6	15.0	11.8	9.1	7.6	5.7	4.9
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Italy	1.1	5.8	8.6	10.2	9.2	6.9	5.2	4.0	4.0
Luxembourg	9.1	14.4	12.9	13.6	14.6	13.2	10.4	6.7	5.8
Netherlands	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Portugal	3.9	13.7	15.1	15.0	11.3	8.7	7.4	5.5	4.8
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Finland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Euro area	6.0	15.0	17.9	18.3	16.4	14.5	12.8	9.8	8.2
Denmark	0.6	11.6	23.1	25.8	24.7	21.3	19.3	12.6	10.6
Sweden	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	12.7	20.8	21.3	21.4	20.5	18.2	15.5	14.1	13.5
1999	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**
Belgium	15.4	37.2	32.0	30.5	27.2	25.3	22.4	18.4	13.0
Germany	4.2	17.6	24.5	25.2	26.0	25.8	23.8	21.7	17.6
Ireland	20.9	30.8	24.7	21.3	20.3	17.0	14.8	14.0	11.0
Greece	6.0	21.6	25.4	20.8	18.1	16.2	12.0	9.2	6.5
Spain	22.6	35.2	29.3	25.4	19.5	16.6	12.7	10.0	6.8
France	25.2	33.6	26.2	21.7	20.0	18.7	16.9	13.4	9.7
Italy	1.4	9.1	10.8	11.0	11.9	10.8	8.8	7.0	4.8
Luxembourg	15.9	20.6	21.7	16.9	18.4	21.2	19.3	15.6	8.1
Netherlands	7.9	24.9	25.4	23.7	25.9	23.2	19.4	18.3	15.4
Austria	5.2	14.8	16.3	16.4	14.9	13.8	12.9	12.4	9.3
Portugal	5.2	13.7	11.1	9.2	9.9	8.4	6.6	5.1	3.8
Slovenia	3.3	19.5	15.7	19.4	14.2	14.3	14.9	11.7	11.1
Finland	9.3	35.4	39.2	35.7	35.1	29.9	28.6	24.0	17.1
Euro area	11.7	23.0	22.6	21.2	20.4	19.0	16.4	14.6	11.2
Denmark	3.5	26.1	31.1	28.8	29.0	27.4	27.2	21.3	16.2
Sweden	20.1	31.9	31.8	31.1	29.1	31.8	27.7	22.7	18.3
United Kingdom	22.0	30.6	27.9	27.8	29.1	29.3	24.9	21.0	21.4
2007	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**
Belgium	18.1	38.4	39.3	37.7	34.0	29.9	25.8	23.9	20.1
Germany	3.3	18.8	26.2	25.6	25.7	25.4	26.0	23.2	22.1
Ireland	25.3	45.1	41.9	37.8	30.5	26.9	23.1	18.4	16.2
Greece	9.6	28.0	26.8	25.3	25.1	20.7	18.8	15.2	10.9
Spain	20.1	38.3	39.6	34.4	29.9	24.3	20.1	17.4	14.0
France	26.2	42.8	40.7	31.4	24.6	20.9	18.7	17.4	15.6
Italy	7.4	19.1	18.5	16.0	12.1	10.8	11.6	11.1	7.4
Luxembourg	10.4	40.1	36.3	32.3	23.1	22.7	28.5	19.0	20.2
Netherlands	14.5	36.7	36.4	31.7	29.4	30.4	29.6	27.5	23.4
Austria	3.1	16.4	21.6	18.8	17.8	17.3	17.0	13.9	12.9
Portugal	7.1	22.0	19.7	14.6	12.5	11.1	10.5	7.8	6.3
Slovenia	2.4	32.1	31.6	24.4	20.5	22.3	17.9	15.7	15.8
Finland	1.0	26.3	46.3	42.8	41.9	38.5	34.0	28.5	27.0
Euro area	12.8	29.5	30.8	26.6	23.6	21.5	20.5	18.3	15.7
Denmark	4.6	36.9	41.9	35.3	32.0	30.1	29.3	24.4	21.2
Sweden	10.1	39.0	40.6	32.9	28.9	29.1	28.9	27.8	24.5
United Kingdom	21.0	36.4	38.1	32.8	31.9	30.5	30.3	26.4	23.8

Table 32 Educational attainment expressed in average number of years in formal education 2004

| | | | | 25-to-64-year-old population | | | | | | | |
| | | | | **Males** | | | | **Females** | | | |
	Total	**Males**	**Females**	**25-34**	**35-44**	**45-54**	**54-64**	**25-34**	**35-44**	**45-54**	**54-64**
Belgium	11.3	11.4	11.4	12.4	11.7	11.1	10.3	12.8	11.9	10.7	9.5
Germany	13.4	13.7	13.2	13.6	13.8	13.8	13.7	13.5	13.4	13.2	12.5
Ireland	13.0	12.9	13.1	14.0	13.4	12.3	11.2	14.5	13.6	12.5	11.4
Greece	10.9	11.0	10.7	11.9	11.7	10.9	9.4	12.6	11.7	10.0	8.2
Spain	10.6	10.6	10.6	11.9	11.2	10.1	8.9	12.5	11.4	9.7	8.0
France	11.6	11.7	11.4	12.8	12.1	11.3	10.3	13.1	12.0	10.7	9.6
Italy	10.1	10.2	10.0	11.2	10.5	10.0	8.7	11.7	10.7	9.5	7.6
Luxembourg	13.3	13.6	13.0	14.2	13.5	13.5	13.1	14.1	13.3	12.6	11.6
Netherlands	11.2	11.4	11.1	12.0	11.5	11.3	10.6	12.5	11.4	10.5	9.8
Austria	12.0	12.3	11.7	12.4	12.4	12.2	12.0	12.3	12.0	11.4	10.8
Portugal	8.5	8.3	8.7	9.3	8.4	7.8	7.3	10.3	8.8	7.9	7.2
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Finland	11.2	10.9	11.4	12.5	12.3	10.5	8.5	13.5	13.0	11.2	8.5
Euro area	11.4	11.5	11.4	12.4	11.9	11.2	10.3	12.8	11.9	10.8	9.6
Denmark	13.4	13.5	13.3	13.6	13.6	13.4	13.6	13.6	13.3	13.3	13.0
Sweden	12.6	12.4	12.8	13.1	12.7	12.2	11.3	13.6	13.0	12.7	11.8
United Kingdom	12.6	12.7	12.4	13.0	12.6	12.7	12.4	12.9	12.4	12.3	12.0

Source: OECD "Education at a Glance, 2006" (Table A1.5).
Note: Euro area in this table is calculated as a simple average of the available Euro area countries.

Chart 13 Correlation between annual expenditure per student and aggregate Pisa scores
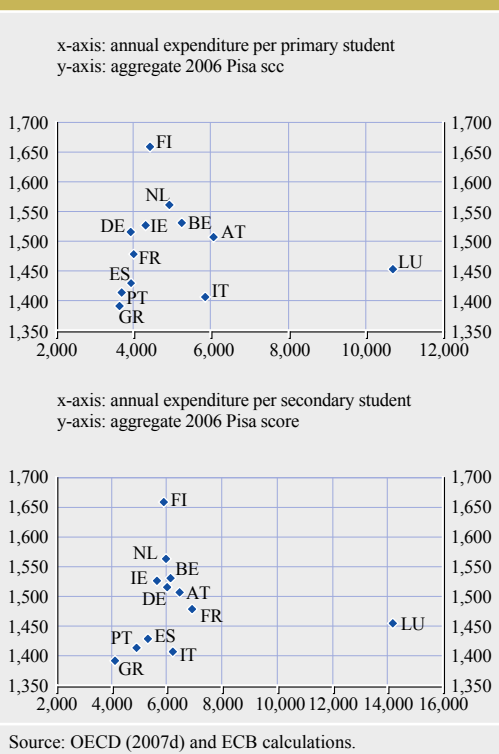
x-axis: annual expenditure per primary student
y-axis: aggregate 2006 Pisa scc

x-axis: annual expenditure per secondary student
y-axis: aggregate 2006 Pisa score

Source: OECD (2007d) and ECB calculations.

Table 33 Private internal rates of return for an individual obtaining a university-level degree, ISCED 5/6 (2003)

| | Rate of return when the individual immediately aquires the next higher level of education | | Rate of return when the individual, at age 40, begins the next higher level of education in full time studies, and the individual bears[1]: | | | |
| | | | Direct costs of foregone earnings | | No direct costs but foregone earnings | |
	Males %	Females %	Males %	Females %	Males %	Females %
Belgium	10.7	15.2	20.0	28.2	21.1	32.2
Denmark	8.3	8.1	12.4	10.2	12.5	10.5
Finland	16.7	16.0	16.2	13.2	16.4	13.4
Sweden	8.9	8.2	10.4	8.2	10.8	8.7
United Kingdom	16.8	19.6	11.4	14.9	12.5	16.8
United States	14.3	13.1	12.9	9.7	15.1	13.0

Source: OECD, "Education at a Glance, 2007".
1) Private internal rate of return: additions to after-tax earnings that result from higher education net of the additional private costs of education attainment (private expenditures and foregone earnings). Living expenses are excluded from these private expenses. Direct costs are costs of tuition as reported by the national authorities. Foregone earnings are net of taxes.

Table 34 Unemployment rates and mismatch by type of education (tertiary education only) in the euro area and the euro area countries[1]

| | Unemployment rate in 2006 (%) | | | | | | | | | | mismatch (range) | | |
| | | | | | | | | | | | | Change (p.p.)[5] | |
Country	General	Teacher training and educa-tion	Humani-ties langu ages and art	Social science business, law	Science math compu-ting	Engin eering manufac-turing	Agri-culture	Health and welfare	Ser-vices	Weighted average of sub groups[2]	2006	2004-2006[3]	
Belgium	13.1	2.3	6.2	4.4	4.2	3.5	3.1	2.2	6.1	3.8	4.0	-3.1	**-1.6**
Germany	n.a.	3.9	4.3	4.2	5.0	4.9	3.5	3.4	3.6	4.4	1.6	-1.9	**-0.6**
Ireland[4]	2.1	1.6	4.0	1.6	2.6	2.0	0.3	1.2	2.1	2.0	3.7	n.a.	**n.a**
Greece	n.a.	3.9	8.1	7.6	5.2	4.8	7.5	7.0	4.0	6.3	4.2	-1.0	**-0.3**
Spain	n.a.	4.6	7.2	6.2	7.2	4.1	4.8	4.5	6.3	5.6	3.2	-1.4	**-0.5**
France	n.a.	3.2	8.8	6.7	6.1	5.8	3.7	2.9	9.5	6	6.7	-0.9	**-0.3**
Italy[3]	n.a.	4.6	5.8	6.2	4.5	4.2	5.2	1.6	3.9	4.8	4.6	-0.6	**-0.2**
Luxembourg	n.a.	0.6	3.9	2.9	5.5	2.4	6.2	2.4	0.0	2.8	6.2	-0.2	**-0.1**
Netherlands	n.a.	1.5	3.8	2.1	2.9	2.4	1.6	2.1	2.6	2.5	2.4	-1.1	**-0.4**
Austria	n.a.	2.0	4.3	3.2	2.6	2.1	1.1	1.5	2.8	2.5	3.3	-2.3	**-1.2**
Portugal	n.a.	4.8	8.3	5.3	5.8	5.9	1.7	1.8	10.9	5.4	9.1	4.7	**2.3**
Slovenia	n.a.	1.4	7.1	3.9	1.8	1.9	2.4	2.5	4.3	3	5.7	-2.0	**-0.7**
Finland	n.a.	1.5	6.6	4.0	7.0	2.6	3.7	1.8	2.3	3.3	5.5	0.6	**0.2**
Euro area[6]	2.2	3.5	6.5	5.4	5.6	4.6	3.9	3.1	5.4	4.9	3.4	-0.9	**-0.3**
Denmark	n.a.	2.1	6.8	3.7	4.5	2.6	1.9	2.4	3.1	3.2	4.9	-8.0	**-2.7**
Sweden	n.a.	2.6	7.9	5.3	6.6	4.9	3.7	2.2	2.8	4.2	5.7	-2.3	**-1.1**
United Kingdom	n.a.	1.4	3.0	2.3	2.9	2.0	1.2	1.3	4.6	2.2	3.4	0.4	**0.2**

Sources: EU-LFS (spring data) and ECB calculations.
Notes: For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data.
1) 25 to 64 years old.
2) Differences in the total unemployment rate compared to table 4.1.a are due to missing data.
3) Starting 2004 for AT, BE, IE, PT, SE, UK.
4) Data for Ireland is 2005.
5) Average annual changes are presented in yellow.
6) EA is calculated without IE. The category "general" is excluded from this analysis due to questionable data quality.

Table 35 Unemployment rates and mismatch by type of education (15-29 year-olds only) in the euro area and the euro area countries [1]

Country	General	Teacher training and education	Humanities languages and art	Social science business, law	Science math computing	Engineering manufacturing	Agriculture	Health and welfare	Services	Weighted average of subgroups [2]	2006	2004-2006 [3]	Change (p.p.) [5]
Belgium	15.2	7.6	18.6	13.2	11.7	8.8	6.9	9.6	14.8	14.6	11.8	-5.6	-2.8
Germany	5.4	5.0	10.7	10.4	5.7	11.8	13.2	6.7	11.9	11.8	8.2	-3.2	-1.1
Ireland [4]	5.2	2.4	5.6	2.3	5.3	3.8	1.3	3.4	3.0	5.9	4.3	n.a.	n.a.
Greece	17.0	25.5	24.7	20.3	22.4	14.3	27.7	27.4	18.5	17.8	13.4	1.7	0.6
Spain	16.2	11.5	12.4	10.4	14.4	7.8	14.2	11.0	13.3	14.1	8.4	-3.6	-1.2
France	19.0	0.0	17.4	14.5	8.8	10.1	10.1	9.0	16.3	16.2	19.0	4.7	1.6
Italy	24.4	17.0	18.3	15.8	19.8	11.0	12.4	13.5	16.5	15.8	13.3	-15.3	-5.1
Luxembourg	15.4	6.1	11.0	7.5	17.4	5.8	0.0	2.9	6.0	10.4	17.4	6.9	2.3
Netherlands	7.0	3.3	7.1	3.7	5.2	3.5	5.4	3.8	3.3	6.4	3.9	-2.4	-0.8
Austria	6.8	4.2	6.9	6.1	2.9	4.6	5.2	2.3	8.3	7.5	6.0	0.9	0.5
Portugal	12.3	19.0	12.9	12.7	15.6	9.7	7.0	13.1	13.3	13.3	12.1	2.7	1.3
Slovenia	11.1	5.1	19.8	13.2	6.6	9.2	17.0	10.0	11.6	11.9	14.6	1.9	0.6
Finland	18.0	0.0	18.2	7.1	15.8	8.9	12.4	4.8	9.5	18.4	18.2	-0.2	-0.1
Euro area [6]	11.8	9.8	15.4	12.1	12.3	10.0	11.1	8.5	12.8	13.6	6.9	-1.9	-0.6
Denmark	7.7	3.3	6.3	6.1	6.3	3.8	4.2	5.0	5.7	6.7	4.4	-8.1	-2.7
Sweden	12.8	7.8	13.7	10.4	7.1	9.9	12.3	10.5	9.1	15.4	6.6	-3.5	-1.7
United Kingdom	9.7	3.6	5.5	5.9	8.5	5.1	5.6	5.7	8.2	10.4	6.1	1.7	0.9

Sources: EU-LFS (spring data) and ECB calculations.
Notes: For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data.
The detailed education breakdown is only available for 2006.
1) 15 to 29 years old.
2) Differences in the total unemployment rate to table 4.1.a are due to missing data.
3) Starting 2004 for AT, BE, IE, PT, SE, UK.
4) Data for Ireland is 2005.
5) Average annual changes are presented in yellow.
6) EA calculated without IE.

Table 36 Unemployment rates and mismatch by level of educational attainment in the euro area and the euro area countries (15-29 year olds only) [1]

Country	Unemployment rate in 2007 (%)				Educational mismatch						
					Range 2007	Change in range between highest and lowest rate (p.p)					
	Low	**Medium**	**High**	**Weighted average of subgroups**		1993-1995		1996-2001		2002-2007	
Belgium	23.9	14.2	7.5	13.9	16.4	8.4	**2.8**	0.2	**0.0**	-1.3	**-0.2**
Germany	18.2	8.2	4.7	10.9	13.6	3.1	**1.0**	0.8	**0.1**	6.6	**1.1**
Ireland	**15.0**	**6.6**	**3.3**	6.7	11.7	1.5	**0.5**	-12.2 [7]	**-2.0** [7]	3.4 [7]	**0.6** [7]
Greece	14.3	17.3	19.2	17.0	**4.9**	-1.2	**-0.4**	-4.6	**-0.8**	1.4	**0.2**
Spain	15.8	12.4	8.0	12.6	7.8	-4.2	**-1.4**	0.0	**0.0**	5.1	**0.8**
France [4]	29.7	13.4	8.1	15.0	21.5	n.a.	**n.a**	1.5	**0.2**	3.1	**0.5**
Italy	15.5	12.1	14.4	13.4	**3.4**	3.0	**1.0**	-6.4	**-1.1**	0.9	**0.1**
Luxembourg	15.2 [7]	n.a.	n.a.	7.5	n.a.	n.a.	**n.a**	n.a.	**n.a.**	n.a.	**n.a.**
Netherlands [5]	**8.4**	**2.6**	**1.5** [7]	4.5	6.9 [7]	n.a.	**n.a**	-5.3	**-0.9**	3.5 [7]	**0.6** [7]
Austria [3]	**11.5**	**5.4**	**n.a.**	6.8	n.a.	n.a.	**n.a**	0.1	**0.0**	n.a.	**n.a.**
Portugal	13.1	12.2	14.0	13.0	**1.8**	-0.2 [7]	**-0.1** [7]	-2.0 [7]	**-0.3** [7]	0.1 [7]	**0.0** [7]
Slovenia [5]	13.1	7.3	5.8	7.6	7.2	n.a.	**n.a**	5.1 [7]	**0.9** [7]	-8.4 [7]	**-1.4** [7]
Finland [3]	29.8	11.3	4.1 [7]	15.7	25.7 [7]	n.a.	**n.a**	-4.8	**-0.8**	-4.4 [7]	**-0.7** [7]
Euro area	17.6	10.3	7.9	12.0	9.7	2.4	**0.8**	-1.6	**-0.3**	2.7	**0.5**
Denmark	7.9	4.1	4.5 [7]	5.8	3.8	-5.3 [7]	**-1.7** [7]	0.9 [7]	**0.2** [7]	0.0 [7]	**0.0** [7]
Sweden [3]	33.9	11.4	7.7	16.6	26.2	n.a.	**n.a**	-1.7	**-0.3**	12.3	**2.1**
United kingdom	21.6	9.2	3.6	10.4	18.0	-0.1	**0.0**	2.0	**0.3**	5.1	**0.9**

Sources: EU-LFS (spring data) and ECB calculations.
Note: For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data.
1) The education levels refer to low: lower secondary education and less, medium: upper secondary education, high: tertiary education.
In bold are the three best performers in terms of a low level and low range of unemployment rates.
2) Education data start in 1992.
3) Data start in 1995.
4) Data start in 1993.
5) Data start in 1996.
6) Average annual changes are presented in the smaller font in yellow.
7) Based on figures smaller than the Eurostat reliability limit.

Table 37 Unemployment rates and mismatch by level of educational attainment in the euro area and the euro area countries (non-nationals, 25 to 64 year olds only) [1]

Country	Unemployment rate in 2007 (%)				Educational mismatch				
	Low	Medium	High	Weighted average of subgroups	Range 2007	Change in range between highest and lowest rate (p.p) [7]			
						1996-2001		2002-2007	
Belgium	25.2	14.6	7.9	16.0	17.3	-5.7	-0.9	6.0	1.0
Germany	21.1	13.4	11.3	16.2	9.7	1.3	0.2	4.8	0.8
Ireland [2]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Greece	6.8	9.7	7.7	8.0	3.0	n.a.	n.a.	0.7	0.1
Spain	13.9	10.4	10.7	12.0	3.6	-0.3 [8]	0.0 [8]	-3.6	-0.6
France	20.6	15.2	n.a.	17.2	n.a.	0.6	0.1	n.a.	n.a.
Italy [3]	8.8	6.3	7.2	7.6	2.5	n.a.	n.a.	n.a.	n.a.
Luxembourg	4.6	n.a.	4.0	4.0	n.a.	-1.3	-0.2	n.a.	n.a.
Netherlands [4]	11.3	5.4	6.1	6.8	5.9	n.a.	n.a.	n.a.	n.a.
Austria	16.4	8.7	n.a.	10.8	n.a.	1.0	0.2	n.a.	n.a.
Portugal [4]	18.3	n.a.	n.a.	14.0	n.a.	n.a.	n.a.	n.a.	n.a.
Slovenia [5]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Finland	29.2	14.3	10.4	17.9	18.8	n.a.	n.a.	n.a.	n.a.
Euro area	16.5	11.1	10.0	13.2	6.5	2.0	0.3	0.3	0.0
Denmark	14.5	n.a.	n.a.	9.9	n.a.	n.a.	n.a.	n.a.	n.a.
Sweden [6]	22.5	10.7	10.5	13.4	12.0	n.a.	n.a.	5.5	0.9
United Kingdom	12.4	8.0	5.3	7.9	7.1	2.5	0.4	-2.1	-0.4

Sources: EU-LFS (spring data) and ECB calculations. Note: For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data.
1) Dataset starts 1995; the education levels refer to low: lower secondary education and less, medium: upper secondary education, high: tertiary education.
2) Only data for 1998-2004.
3) Only data for 2005-07.
4) Data start 1999.
5) Data start 2002.
6) Data start 1997.
7) Average annual changes are presented in yellow.
8) Based on figures smaller than the Eurostat reliability limit.

Table 38 Unemployment rates and mismatch by level of educational attainment in the euro area and the euro area countries (non-nationals aged 15-29 years old) [1]

Country	Unemployment rate in 2007 (%)					Educational mismatch			
	Lower secondary education and less	Upper secondary education	Tertiary education	Weighted average of subgroups	Range 2007	Change in range between highest and lowest rate (p.p) [7]			
						1996-2001		2002-2007	
Belgium	36.2	23.7	8.8	24.5	27.4	2.1	**0.3**	12.4	**2.1**
Germany	24.9	12.8	9.9	17.8	15.0	0.6	**0.1**	7.7	**1.3**
Ireland [2]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	**n.a**	n.a.	**n.a**
Greece	6.4	17.8	12.3	10.4	11.3	-3.1	**-0.5**	6.5	**1.1**
Spain	17.0	12.5	8.6	14.1	8.4	-12.6	**-2.1**	-0.1	**0.0**
France	32.7	19.2	15.9	24.4	16.7	3.1	**0.5**	-0.7	**-0.1**
Italy [3]	10.3	9.3	12.2	10.1	2.8	n.a.	**n.a**	n.a.	**n.a**
Luxembourg	12.8	2.1	3.1	6.3	10.8	1.1	**0.2**	8.2	**1.4**
Netherlands	10.8	8.3	5.5	8.6	5.4	n.a.	**n.a**	-0.8	**-0.1**
Austria	20.7	10.8	11.4	14.8	9.9	-7.2	**-1.2**	5.8	**1.0**
Portugal [4]	25.9	10.5	12.2	18.6	15.4	n.a.	**n.a**	-4.8	**-0.8**
Slovenia [5]	0.0	0.0	n.a.	0.0	0.0	n.a.	**n.a**	n.a.	**n.a**
Finland	42.0	25.2	0.0	31.3	42.0	1.2	**0.2**	-2.4	**-0.4**
Euro area	19.7	12.9	10.2	15.7	9.5	1.4	**0.2**	1.6	**0.3**
Denmark	19.0	10.5	11.9	13.2	8.5	47.9	**8.0**	-41.9	**-7.0**
Sweden [6]	42.9	13.8	12.6	24.3	30.3	n.a.	**n.a**	10.6	**1.8**
United Kingdom	15.4	10.5	7.2	10.4	8.3	1.9	**0.3**	-10.0	**-1.7**

Sources: EU-LFS (spring data) and ECB calculations.
Note: For all tables on mismatch, the figures presented are those fulfilling Eurostat's publications and reliability limits for the LFS data.
1) 15 to 29 years old; dataset starts 1995; the education levels refer to low: lower secondary education and less, medium: upper secondary education, high: tertiary education.
2) Only data for 1998-2004.
3) Only data for 2005-07.
4) Data start in 1999.
5) Data start in 2002.
6) Data start in 1997.
7) In yellow are average annual changes, a negative sign indicates that mismatch has decreased.

CROSS-BORDER COMMUTING IN THE EURO AREA. CASE STUDY: LUXEMBOURG[1]

The number of outward-commuters from the euro area countries reached more than 2 million persons in 2006 and has more than tripled over the past ten years.[2] Commuters currently represent 1.6% of euro area employment, with 87% of all commuters coming from only three countries, namely Italy, Germany and France[3]. Outward-commuters are essentially men (83%) aged between 25 and 54 (81%) with generally a low or medium level of education (respectively 43% and 41%). Over the last ten years, the share of cross-border commuters from euro area countries with a "high" level of education (relative to those residing and working in the same country) has remained relatively low.

Recent work analysing the pull and push factors on regional commuting flows in the European Union[4] shows that commuting is well explained by the standard explanatory factors such as the size of origin and destination regions and wage differentials. More specifically, high unemployment and low wages in the home regions push workers towards commuting. For the host country, cross-border labour supply results in a more efficient allocation of labour across the internal market. For the country of origin, commuters act as a buffer because outward commuting reduces domestic unemployment in the case of asymmetric shocks. Moreover, commuting, as an alternative to unemployment, allows workers to keep or even improve their skills, while reducing unemployment benefit-related expenditures. The home country also benefits from commuters' incomes, which stimulate consumption.

Cross-border commuting in Luxembourg

Luxembourg does not have a continuous history of immigration, but has rather experienced three distinct immigration waves: (i) Italians from the late nineteenth century to the 1950s, (ii) Portuguese in the 1960s and 1970s - both characterised by a tendency towards permanent migration – and (iii) since the 1980s, immigrants from a larger number of countries. The most recent estimates of migration flows show Luxembourg as having the highest proportion of foreigner residents in its population. In 2006, approximately 40% of the resident population were non-nationals. The more recent phenomenon of a very rapidly growing number of commuters (the "frontaliers") is closely linked to opportunities in the labour market. In April 2007 about 39% of total employment and 68% of new jobs were occupied by cross-border workers.[5] The expansion of the service industries, notably financial services and media-related companies during the last 20 years, has continued the tendency for cross-border workers to be disproportionately over-represented in both low-skilled, manual manufacturing jobs (55.5% of total employees in that sector) and construction (47.8%), in high-skilled jobs in the financial sector (48.4%) and in real estate, renting and business activities

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1 Prepared by C. Olsommer.
2 Figures on outward commuting flows in the euro area are taken from Eurostat.
3 With respectively 1,373,284; 289,647 and 229,392 outward commuters in 2006.
4 J. Marvakov and T. Mathä (2006).
5 These high numbers are partly a reflection of Luxembourg's small size and geographical location in the middle of a large economic area. The migration over such small distances would constitute only internal migration in Luxembourg's larger neighbours. 51% of cross-border immigrants are from France, 26% from Germany and 23% from Belgium.

(57.2%). Average educational attainment differs considerably among the various nationalities of foreign residents and "frontaliers" working in Luxembourg.

The most recent studies about the determinants of cross-border migration in Luxembourg emphasise the neo-classical theory that individuals' migration decisions are determined partly by the expected income from work. Average monthly wages and the minimum wage levels in Luxembourg are higher than in the neighbouring countries.[6] This wage differential between the expected wage in Luxembourg and in the residence country might be especially important for commuters, since they are likely to spend most of their wage in their country of residence.[7] Other factors influencing the cross-border commuting decision include the financial and non-financial costs of such temporary migration. Lastly, a high probability of finding a job,[8] combined with access to social security benefits (in particular child benefits and relatively generous parental leave) increase the advantages relative to costs of temporary migration to Luxembourg.

These migrant flows have an impact on labour supply in both Luxembourg and its neighbouring countries. Luxembourg experiences a shortage of skilled labour, with more than a half of its resident unemployed being low skilled.[9] Temporary immigration helps to reduce labour shortages, particularly in the financial sector by supplying specialised and high-skilled labour. Commuters therefore complement labour supply from the resident labour force and facilitate domestic factor utilisation. Neighbouring countries also benefit from this temporary migration, since jobs seekers, by finding a job in Luxembourg, reduce the unemployment rate in their country of residence.[10] Luxembourg's experience, despite some traffic problems, provides a successful example of cross-border labour mobility helping to complement the domestic labour force.

6 OECD annual data show the monthly minimum wage (in PPS) in 2005 to be: €1,417 for unskilled workers and €1,700 for skilled workers in Luxembourg, €1,218 in France and €1,234 in Belgium.
7 Although, of course, this wage differential may be more prominent in certain sectors and thus more relevant for particular groups of potential commuters.
8 Job creation was vigorous in Luxembourg over the past twenty years, reaching on average 3.6% per year. The cross-border workers largely benefited from this, as they occupied 7/10ths of the new jobs on average since 1986.
9 Luxembourg's Beveridge curve shifted out during the 1990s and has done so again since 2005, indicating an increasing degree of mismatch between supply and demand. This conclusion is also supported by alternative measures of structural change, such as the Lilien indicator of inter-sectoral structural change and the rate of unsatisfied sectoral labour demand over unsatisfied sectoral labour supply. See also Banque centrale du Luxembourg (2004).
10 All the more since the unemployment rates in neighbouring states are higher than in Luxembourg (4.5% in 2006). Lorraine (France): 11.0%, Saarland (Germany): 9.7%, Rhineland-Palatinate (Germany): 8.2% and Wallonia (Belgium): 18.8%.

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