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**Structural Policies  
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Technical Overview**

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**STRUCTURAL POLICIES AND GROWTH: A NON-TECHNICAL OVERVIEW**

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by  
**Alain de Serres**

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## ABSTRACT/RÉSUMÉ

### **Structural policies and growth: A non-technical overview**

In contrast to what has happened throughout the 1960s and 1970s, some of the largest EU countries and Japan are no longer closing the income gap *vis-à-vis* the United States. Worse, the gap may even be widening since the mid-1990s. While in the case of Japan the gap in GDP *per capita* is essentially due to the lagging performance in labour productivity, the European Union is trailing mainly in terms of labour resource utilisation, reflecting both lower employment rates and fewer hours worked. This paper provides a brief overview of the main structural factors thought to have contributed to differences in the degree of labour resource utilisation, as well as in the intensity of physical and human capital use and in the pace of technological progress. In doing so, it provides a set of performance and policy indicators which can be used to assess progress achieved in structural reform.

*Keywords: structural policies; regulation; growth; productivity; employment rates.*  
*JEL classification: J20, J30, E24, O30, L50.*

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### **Politiques structurelles et croissance : Une vue d'ensemble non-technique**

Contrairement à la tendance observée durant les années 60 et 70, certains des principaux pays de l'union européenne et le Japon ne referment plus l'écart qui les sépare des États-Unis en termes de revenu par habitant. Cet écart est peut-être même en train de se creuser davantage depuis le milieu des années 90. Alors qu'au Japon l'écart de PIB par habitant *vis-à-vis* des États-Unis est dû essentiellement au retard de la productivité, dans le cas de l'union européenne il s'explique largement par une plus faible utilisation des ressources de main d'œuvre, reflétant à la fois des taux d'emploi moins élevés et un nombre inférieur d'heures ouvrées. Cette étude donne une vue d'ensemble des liens entre les politiques structurelles et la performance des marchés du travail et des produits. Ce faisant, elle fournit un certain nombre d'indicateurs de performance et de politique qui peuvent être utilisés pour évaluer le progrès réalisé sur le plan des réformes structurelles.

*Mots clés : politiques structurelles ; réglementation ; croissance ; productivité ; taux d'emploi.*  
*Classification JEL : J20, J30, E24, O30, L50*

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## STRUCTURAL POLICIES AND GROWTH: A NON-TECHNICAL OVERVIEW

Alain de Serres<sup>1</sup>

### 1. Introduction

1. Throughout the 1960s and 1970s, countries with lower GDP *per capita* were generally growing relatively faster than richer ones, leading to a gradual convergence in income levels. This convergence process appears to have reversed during the 1990s, at least among the largest OECD economies, as growth in the United States rose above that observed in Japan and in the major European Union countries. The US growth revival and the related reversal in the convergence process have led to a renewed interest in analysing the relative contribution of institutions, structural policies and other fundamental factors to the growth performance over time and across countries. During the past few years, the OECD has completed a major programme of analysis and empirical research on the sources of economic growth, leading to a broad set of policy recommendations and priority areas for reforms contained in the recent OECD publication, *The Sources of Growth in OECD Countries*.<sup>2</sup> Building on this as well as on previous in-depth analysis conducted in the context of the *OECD Jobs Strategy*, this paper provides an overview of the links between structural policies and labour and product market performance. More specifically, after describing the recent growth trends (section 2), it reviews the main factors thought to have contributed to differences across countries in the degree of labour resource utilisation (section 3), in the intensity of physical and human capital use (section 4) as well as in the pace of technological progress (section 5). In doing so, it provides a set of performance and policy indicators which can be used to assess progress achieved in structural reform.<sup>3</sup>

### 2. Diverging growth trends

2. During the 1960s and 1970s, the pattern of growth across countries was broadly consistent with the conventional view according to which countries lagging in terms of labour productivity and GDP *per capita* gradually close the gap *vis-à-vis* the leading country (the United States). After stalling during the 1980s, the convergence process appears to have reversed during the 1990s, at least among the largest OECD economies, with trend GDP *per capita* growing faster in the United States than in Japan and the large EU member countries (Table 1). In contrast, a number of other countries have seen GDP *per capita* rising faster than in the United States after the mid-1990s, allowing several of them (Canada, Spain, Australia, Sweden, Finland, Ireland and Greece) to narrow the income gap.

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1. The author is grateful to Jean-Philippe Cotis, Mike Feiner, Jørgen Elmeskov, Sven Blondal and numerous other colleagues as well as delegates to the OECD Economic Policy Committee for helpful comments and suggestions. He also thanks Anick Bouchouchi-Lotrous, Laure Meuro and Catherine Chapuis for statistical assistance and Veronica Humi and Paula Simonin for secretarial assistance.
  2. A short summary of the detailed analysis can be found in *The Policy Agenda for Growth* (available on line at: <http://www.oecd.org/pdf/M00040000/M00040320.pdf>).
  3. A version of this paper containing a subset of indicators was recently published in Chapter V of the OECD *Economic Outlook* No. 73, June 2003.

**(Table 1. Average trend growth in GDP *per capita* over selected periods)**

3. A closer examination of the proximate sources of change in GDP growth after 1995 shows that while trend labour productivity accelerated in the United States, it slowed in the European Union and Japan, resulting in a convergence of productivity growth rates across the three major economies (Figure 1). In the case of the European Union, the impact on GDP growth from the slowdown in productivity per hour was partly offset by an increase in employment growth. Despite such improvement in labour market performance, even faster employment growth in the United States has accounted for most of the differences in growth in GDP *per capita* between the two economies. Japan is the only country having faced a deceleration in both productivity and labour resource utilisation. Conversely, only a few countries (Canada, Sweden, Finland, Ireland and Greece) enjoyed a clear improvement in both sources of growth in GDP *per capita* after 1995.

**(Figure 1. Sources of growth in trend GDP *per capita*)**

4. Considering that GDP *per capita* in both the European Union and Japan remains around 30 per cent behind that in the United States, the pause -- and even reversal -- in the convergence process points to the need for changing policies so as to stimulate growth in the two lagging areas (Figure 2). Differences in the sources of the real income gap *vis-à-vis* the United States suggest, however, that the policy priorities faced by the European Union and Japan may be different. In the case of Japan, the gap in GDP *per capita* is due entirely to the lagging performance in productivity. In the EU case, while the process of catch-up in GDP *per capita* had already stalled in the 1980s, convergence in productivity levels continued until the mid-1990s, narrowing the gap to less than 10 per cent (although this partly reflected the shedding of low-skilled labour). As a result, the relatively low employment rates, combined with the smaller number of hours worked per person employed, account for most of the difference in GDP *per capita*.

**(Figure 2. The sources of real income differences)****3. Factors contributing to the differences in labour resource utilisation**

5. To the extent that it seems natural for people to demand more leisure as their real income levels go up, an increasing use of labour potential both in terms of employment and hours worked does not necessarily imply a welfare improvement. It is likely, however, that the large discrepancies observed in cross-country employment rates have more to do with the pervasive influence of structural policies on incentives both to hire and to take-up work than with differences in preferences for leisure.

6. A look at the sources of growth in labour resource utilisation in EU countries since the mid-1990s shows that the continued decline in average hours worked per person employed was more than offset by the positive impact from rising participation and employment rates (Figure 3). While such positive trends cannot go on indefinitely, there is still scope in some countries for employment and participation rates to offset the projected negative contribution from demographics. In fact, despite the considerable progress achieved in some of the member countries (the United Kingdom, the Netherlands and Ireland) during the past decade, structural unemployment still remains relatively high in the European Union, leaving significant room for improvement (Figure 4). Related to this, the incidence of long-term unemployment remains quite high in EU countries compared with Japan and the United States and it has not diminished during the 1990s despite an overall improvement in labour-market performance on the basis of alternative indicators (Figure 5).

**(Figure 3. Sources of growth in trend labour resource utilisation)****(Figure 4. Structural unemployment rates -- NAIRUs)**

**(Figure 5. Incidence of long-term unemployment)**

7. Furthermore, the problem of high unemployment in several EU member countries is compounded by low participation rates, resulting in even larger cross-country differences in overall employment rates (Figure 6). This is in contrast with the performance of other European countries (Iceland, Switzerland and the Scandinavian countries) which have the highest employment rates among OECD countries. The decomposition across age and gender shows that the situation of prime-age males is fairly similar across countries. The problem of low labour resource utilisation in the European Union is thus concentrated in much lower participation and employment rates of young, old and female workers.

**(Figure 6. Participation and unemployment rates by age and gender)**

8. The key structural policies responsible for the diverse labour market performance are well known and their influence has been the object of a comprehensive analysis in the context of the *OECD Jobs Strategy* (OECD, 1999a). They can be regrouped into two broad categories: *i*) the tax and benefit system which includes unemployment support and tax wedges and *ii*) labour and product market regulation which covers employment protection legislation, rules regarding minimum wages and other working conditions as well as administrative burdens on the start-up of firms and other barriers to competition. Some of the policy instruments, such as the minimum wage and the level of the out-of-work benefits relative to in-work net income, may have a direct impact on structural unemployment *via* wage floors or by raising workers' reservation wage. For many other policies, however, the main impact is rather indirect, operating *via* their combined effects on the speed and extent of real wage adjustment, the persistence of unemployment and the resilience of labour markets to shocks. In all cases, such policies have been introduced with specific objectives in mind and negative employment effects as an unintended side-effect. Nonetheless, in many cases those objectives may be obtained through other policy instruments with less undesirable side-effects. In other cases, consideration of the negative consequences would justify some compromise in terms of the primary objectives.

**3.1 Tax and benefit system**

9. In reforming the system of tax and benefits, policymakers are frequently confronted with a trade-off between meeting social objectives and minimising disincentives to work. For instance, unemployment benefits provide needed support to individuals and households experiencing job losses. However, high replacement rates can raise the structural unemployment rate by lowering the gap between the income from work and the income received on support. This is particularly the case if high replacement rates are accompanied by a lengthy entitlement period. An extended benefit period can contribute to lengthening the average unemployment spell, thus leading to a loss of human capital and a reinforcement of insider-outsider mechanisms, potentially reducing the overall wage sensitivity to labour market conditions.

10. Indicators combining replacement rates and duration of benefits show that unemployment income support relative to the wage level can be quite high in several countries (Figure 7, panel A), especially in the case of the long-term unemployed whose earnings' potential in the labour market is often less than that of the average production worker (Figure 7, panel C). Yet, despite empirical evidence that high replacement rates and long benefit duration can have a sizeable impact on structural unemployment, reform in this area has proved to be difficult.<sup>4</sup> In fact, the gross replacement rate indicator has continued to rise in many countries between 1995 and 1999 (Figure 7, panel B).

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4. For empirical evidence on the effect of replacement rates on unemployment rates in OECD countries, see Elmeskov *et al.*, 1998 and Nickell and Layard, 1998.

**(Figure 7. Estimates of gross and net replacement rates)**

11. Most countries have nevertheless taken measures to improve the trade-off. While the level and duration of benefits have generally been maintained to avoid adverse social consequences, eligibility and work-availability requirements have been tightened. For instance, the minimum amount of time spent in employment required to satisfy qualifying criteria has been raised and the scope for turning down job offers repeatedly without facing some penalty has been reduced. Furthermore, eligibility to benefits for certain groups has been made conditional on enrolling in various schemes such as schooling, vocational training, voluntary work or a subsidised job. In return, governments are providing more intensive job-search assistance, including personalised job counselling and follow-ups so as to improve matching. Some countries have managed to combine high replacement rates with high employment rates (Denmark, Switzerland and Iceland). The majority of countries have raised active support to the unemployed in order to reduce long-term dependence on benefits, although the amount of resources spent on active labour market policies (ALMPs) varies substantially across countries both in terms of GDP and as a per cent of total expenditures on active and passive measures (Figure 8). Past experience has shown that ALMPs need to be both well designed and well targeted (Martin, 2000).<sup>5</sup> Otherwise, the cost can rise quickly and the higher employment prospects of participants may be more than offset by significant dead-weight losses and the adverse effect of raising taxes to finance such programmes.

**(Figure 8. Public spending on labour market measures)**

12. In any case, for active measures to be effective, in-work net income must look sufficiently attractive relative to out-of-work benefits. There, the trade-offs involved in the case of low productivity workers at the margin of the labour market can be particularly painful considering their low earnings potential. First, a significant reduction in out-of-work benefits could push many into poverty. Second, to avoid this many countries have chosen to provide in-work benefits or payroll tax rebates combined with a minimum wage, in both cases incurring fiscal costs. Third, to limit the fiscal costs, the benefits are typically means-tested, but a rapid withdrawal as earned income increases generates high marginal effective tax rates, lowering incentives to increase work effort beyond a certain threshold (poverty trap). Fourth, raising the threshold for benefit withdrawal and/or lowering its pace pushes the problem of high marginal effective tax rates further up the earnings scale and can rapidly increase the budgetary cost, which may imply higher tax rates.

13. These concerns notwithstanding, several countries have favoured measures to top-up wages of low-income households with in-work benefits. In addition, even though these benefits remain for the most part means-tested, the phasing-out has been made more gradual. While the Earned Income Tax Credit and the Working Family Tax Credit programmes implemented respectively in the United States and the United Kingdom represent well-known examples of schemes aimed at improving in-work benefits of low-wage earners, similar measures also exist in France, Canada, Australia, Finland, Belgium, Ireland and New Zealand.

14. In order to lower the cost of low-paid jobs and stimulate labour demand, several countries have reduced the wedge between the wage paid by the employers and the take-home pay of employees by cutting labour taxes (in particular employers' and/or employees' contributions to social security). After rising steadily from the mid-1970s to the mid-1990s, tax wedges have been reduced in several countries, including in some EU member countries (France, Italy and the Netherlands) where wedges were (and still

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5. For instance, a recent study assessing the various programmes available in Sweden for unemployed adults found that employment subsidies are by far the most effective in having a sustained impact on labour market attachment, though the cost-effectiveness of such measures remains highly questionable owing to large negative displacement and dead-weight effects (Sianesi, 2002).



are) relatively high (Figure 9).<sup>6</sup> In fact, the reduction in tax wedges in the late 1990s may have been a key factor behind the relatively strong EU employment performance, especially in countries where the measures were indeed targeted at the low paid jobs.<sup>7</sup> In these countries, high payroll taxes had had particularly deleterious employment effects on low productivity workers, since they could not be shifted to labour in the form of lower wages, owing to statutory or negotiated wage floors. However, in a context of deteriorating public finances, the scope for further reductions in tax wedges may be limited without tighter control on expenditure.

**(Figure 9. Tax wedges on labour)**

15. Considering the particularly high rate of inactivity among workers aged between 55 and 65, one area which could be given particular attention concerns the incentives for early retirement resulting from existing public pension and other benefit schemes.<sup>8</sup> Indeed, in a large number of countries where the official retirement age remains at 65, the average effective withdrawal age is up to several years lower (Figure 10). The effective retirement age has declined over time even as life expectancy at that age has increased significantly. In many countries, such patterns have been encouraged by public pension policies of high replacement rates combined with a low return on extra years spent in work beyond a certain age or number of years of contributions. Perhaps more importantly, special early retirement programmes, unemployment-related benefits and disability schemes have provided older workers with an early route out of the labour market. Yet, in countries where participation rates of older workers are high, so are their employment rates suggesting no inherent barriers to employment at an old age. Considering that the burden of early retirement on output and public finances is set to intensify over the next decades, the disincentives to work at older ages should be removed.

**(Figure 10. Effective and official age of retirement in OECD countries)**

### 3.2 *Labour and product-market regulation*

16. Employment protection legislation (EPL) provides a good example of the possible effect of labour market institutions on structural unemployment *via* their influence on the shock transmission mechanism. By raising the cost of dismissal it reduces the incidence of lay-offs and hence the flow into unemployment. On the other hand, strict firing restrictions make firms more hesitant in their hiring process, making it harder for the unemployed to re-enter the labour market (Boeri *et al.*, 2000). The direct net effect of EPL on unemployment is thus ambiguous (OECD, 1999*b*).

17. Even so, EPL may have adverse indirect effects by reducing the speed of real wage adjustment as well as aggregate wage flexibility. The lower job turnover associated with strict EPL often implies an increase in the average duration of unemployment and the proportion of long-term unemployment, raising persistence and potentially reducing the impact of unemployment on wage setting. As noted earlier, it is striking to observe that countries with rising shares of long-term unemployed are also the ones generally facing increases in structural unemployment rates (Figure 11). While this says nothing about the direction of causality, it is at least consistent with the notion that adverse shocks, even temporary ones, are more

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6. The tax wedges shown in the first two panels of Figure 9 do not take into account indirect taxes.

7. While reductions in labour taxes usually have a positive impact on employment, whether or not they also stimulate labour supply depends on the extent to which part of the benefits accrues to employees in the form of higher after-tax wages. Hence, the net effect on unemployment may depend on employers' and employees' respective bargaining power and, at least in the short run, on the labour market situation at the time the cuts are introduced.

8. For a discussion of policies and institutions having an impact on the retirement age, see Chapter V in OECD (2002*a*).

likely to raise unemployment persistently in countries where policies contribute to strengthen insider-outsider mechanisms.

**(Figure 11. Changes in long-term unemployment and structural unemployment rates)**

18. Although reform of EPL has taken place in Europe during the past decade, the general tendency has been towards the easing of regulations affecting temporary contracts, with little change on regular contracts (Figure 12). This has been accompanied since the mid-1990s by a substantial increase in many countries in the share of temporary jobs in total employment (Germany, France, Italy, Spain, the Netherlands and Portugal).<sup>9</sup> While these developments may have contributed to lower labour adjustment costs, the burden of adjustment is heavily concentrated on one category of workers, raising equity concerns. At the same time, the power of “insiders” (who are typically employed on permanent contracts) in wage bargaining may have increased as they could feel even more sheltered from unemployment than before, possibly reducing the responsiveness of wages to shocks.

**(Figure 12. Strictness of unemployment protection legislation)**

19. As in the case of EPL, the net direct incidence of a statutory minimum wage on overall employment could arguably be limited, especially when it is set at a moderate level relative to the average wage. Combined with in-work benefits and measures to reduce the non-wage cost of low-paid jobs, a statutory minimum wage may raise labour supply at the margin without adversely affecting demand, thus having a net positive impact especially for workers whose attachment to the labour market is tenuous at best. However, even though the level beyond which the adverse employment effects dominate is bound to vary across groups and regions, a uniform rate is often applied nation-wide, with the risk of affecting disproportionately specific categories of workers, such as youth in search of a first job experience. While any negative impact of statutory minimum wages is likely to have fallen in the past decade, owing in many cases to their gradual erosion in relative terms, they remain high in some countries, which may prevent relative wages from reflecting productivity differentials (Figure 13). This, combined with low labour mobility, may contribute to a high dispersion of regional unemployment rates.

**(Figure 13. Ratio of minimum wage to full-time median earnings)**

20. While many countries do not have a statutory minimum wage, binding floors on the wage of less productive workers are sometimes imposed via an extension of collective agreements from unionised to non-unionised segments of particular sectors or industries. In some cases (*e.g.* the Netherlands and Belgium), these floors can significantly exceed the statutory minimum wage. Comparing the coverage rate of collective bargaining agreements and the union density rate, three groups of countries emerge (Figure 14); one group (essentially English-speaking countries and Japan) where both rates are low, a second group (Nordic countries) where they are both high and a third group (euro area countries and Australia) where the percentage of workers covered by collective bargaining agreements significantly exceeds that represented by trade unions. While a high coverage rate may have detrimental effects on employment *via* wage floors and insider-outsider mechanisms, it has been argued that the impact may be limited in the case where the coverage rate is matched by a similarly high union density rate. The reason is

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9. The combination of easier regulation for temporary contracts with strict EPL for permanent ones is only one among several factors behind the rise in the share of temporary employment (See Chapter III in OECD, 2002b). Some evidence of a significant impact has been found in the cases of Spain (Dolado, *et al*, 2001), France, (Blanchard and Landier, 2001) and Italy (Nannincini, 2001).

that, in the latter case, the potential industry- or economy-wide impact of wage outcomes on employment is more likely to be internalised and taken into consideration under a broader union representation.<sup>10</sup>

**(Figure 14. Coverage rate of collective bargaining agreements and union density rate)**

21. Empirical evidence has shown that labour market performance can also be influenced by product market regulations, in particular those having an impact on the degree of competition. Regulatory reforms aimed at lowering trade barriers, the stringency of state control and firms' entry costs can stimulate output and employment by raising the elasticity of product demand and by reducing price mark-ups. Progress in reforming such regulation may have boosted employment rates by between ½ and 2½ percentage points across OECD countries over the past two decades (Nicoletti *et al.*, 2001). Clearly, an increase in product market competition puts downward pressures on wages in the short run, especially in highly protected sectors where the scope for rent-seeking behaviour by workers is largest.<sup>11</sup> Indeed, one of the reasons why reforming labour market policies has proved difficult in many countries is the associated rent enjoyed by specific groups that are well positioned to resist (Blanchard and Giavazzi, 2001). In the longer run, however, stronger competition tends to boost real wages *via* its favourable impact on productivity (see section 5).

**4. Factors contributing to differences in the intensity of physical and human capital formation**

**4.1 Physical capital**

22. Business investment (particularly in machinery and equipment) has long been identified as one of the key drivers of output growth (Ahn and Hemmings, 2000; Harris, 1999; De Long and Summers, 1992).<sup>12</sup> First, an increase in the quantity of physical capital has a direct positive, albeit transitory, influence on labour productivity growth through capital deepening. Second, investment in new machinery and equipment can also lead to a sustained increase in productivity growth if capital-embodied technical changes are introduced more quickly. However, this presumes that investment takes place in an environment that is conducive to innovation and where profitable opportunities exist, lest capital formation translates into diminishing returns rather than a strong output performance. In this regard, investment rates may look excessive in some countries in light of the growth performance over the past several years (Figures 15).<sup>13</sup>

**(Figure 15. Fixed investment rates and their main components)**

23. A comparison of aggregate measures can mask significant differences in the composition of investment. Of particular interest is the relative importance of information and communication technologies (ICT) given their alleged contribution to the US growth performance of the late 1990s. Indeed, all countries have since the early 1980s experienced a significant increase in the share of ICT in

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10. This is a similar argument to that used to characterise the link between the degree of centralisation/co-ordination of wage bargaining and unemployment, often described as a hump-shaped relationship (OECD, 1997 and Calmfors and Driffill, 1988).

11. For evidence that more stringent product market regulation leads to higher wage *premia* in OECD countries, see Jean and Nicoletti (2002).

12. Empirically, the correlation between physical investment (as a share of GDP) and growth in GDP *per capita* and/or labour productivity stands out as particularly significant and robust (OECD, 2003a).

13. See Pelgrin *et al.*, (2002) for a quantitative assessment of the contribution of fundamental determinants to the rise in business investment rates in the late 1990s. Investment rates shown in Figure 15 are ratios of nominal values. While the ratio in volume terms could show larger cross-country variations, they would not be comparable due to differences in price measurement and aggregation methods.

total investment, albeit to an extent that varies substantially across countries (Figure 16).<sup>14</sup> The United States appears to maintain a significant lead.

**(Figure 16. ICT investment in selected OECD countries)**

24. In several countries, a low rate of ICT investment can be partly explained by a relatively high purchasing price of computer and telecommunication hardware (Figure 17). Even though ICT equipment is an internationally traded good, substantial cross-country price variations have persisted, reflecting in part differences in taxation, but also the presence of significant non-tariff barriers related to technical standards, import licensing and public procurement.

**(Figure 17. The price of ICT investment in 1999)**

25. Cross-country differences in the level and composition of investment continue to be shaped by domestic factors having an influence on the overall cost of capital and access to finance, although FDI and other capital flows may be growing in significance. Recent empirical work has underscored the importance of domestic financial market development on output growth performance, *via* its impact on risk-diversification and investment (Leahy *et al.*, 2001). As well, financial markets and institutions play an important role in the monitoring of corporate performance and in imposing discipline on corporate governance. One area where access to finance can play a critical role is in the development of new, innovative products or technologies which by nature tend to be high-risk activities. In this regard, the contribution of venture capital to strong entrepreneurial activity in the United States has been recognised as an important ingredient behind the growth performance<sup>15</sup>, although this influence is difficult to assess with precision.

26. Data on venture capital investment show that substantial cross-country variations prevailed over the period 1998-2001, both in terms of the overall amount invested and the share devoted to activities in the early stage and the expansion phase of developments, with euro area countries generally trailing significantly behind the United States and Canada (Figure 18). Similar divergences are reflected in less formal indicators such as the funding of activity by business angel networks. Yet, the development of an active venture capital market in the euro area would seem particularly important given the prevalence of a bank-based financial system and the difficulty of new firms with risky projects and little collateral to attract bank loans.<sup>16</sup> Several countries have introduced tax incentives and have more actively supported the business angel network.<sup>17</sup> This notwithstanding, investment in venture capital in several European countries has been limited by the absence of large pension funds and, where such funds exist, by rules preventing these as well as other institutional investors from investing in venture capital. In comparison,

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14. The differences shown in the shares could partly reflect discrepancies in the measurement and treatment of software investment across countries.

15. See Kortum and Lerner (2000). Exploiting firm-level data, the authors found that a dollar of venture capital had a bigger impact on patenting in the United States than a dollar of business R&D, although this may reflect the influence of other factors (such as the quality of research infrastructures) not properly controlled for in the empirical analysis.

16. See Audretsch and Lehmann (2002) for evidence that technology-based start-ups are more likely to suffer from financing gaps and lower performance if their access to finance is largely restricted to traditional banks.

17. Tax incentives tend to have a limited impact on venture capital activity owing to the fact that the largest investors are often tax-exempt (see Baygan, 2003).

pension funds have been an important source of venture capital in the United States, the United Kingdom, Australia, Sweden, Finland and New Zealand (OECD, 2001).<sup>18</sup>

**(Figure 18. Venture capital investment by stages)**

27. The development of venture capital also requires the support of well-functioning secondary financial markets for high-tech firms to allow investors to recover their funds *via* the flotation of start-ups. While the demise of the Neuer Market may, in this respect, be seen as a setback, its failure may also be a consequence of the lack of economies of scale of European secondary markets. More generally, the financing of new firms and innovative activity raises the difficulty of assessing prospects based on most accurate information. In this regard, principles of sound management, contract enforcement and transparency are essential features of financial markets.

**4.2 Human capital**

28. As is the case for physical capital, the accumulation of skills and competencies -- broadly referred to as human capital -- has a direct, though temporary, impact on output growth *via* the improvement in the "quality" of labour input. In fact, recent empirical work suggests that one extra year of average education (roughly equivalent to a 10 per cent rise in human capital) has in the past raised output *per capita* in the long run by around 4 to 7 per cent on average across OECD countries (Bassanini and Scarpetta, 2001).<sup>19</sup> Human capital formation may also have a permanent impact on output growth if a higher level of skills and knowledge facilitates the adoption of new technologies and/or the process of innovation, leading to an acceleration of technical progress. While the empirical literature has so far produced only mixed support for the latter assumption (Temple, 2001) -- at least among developed countries -- recent evidence based on a more comprehensive data set suggests that the economy-wide returns to investment in primary and secondary education may be larger than those enjoyed by individuals (OECD, 2003a).

29. Given the absence of direct measures, human capital is usually assessed in terms of educational attainment. The latter can in turn be measured on the basis of various indicators, such as the average number of years of education or the percentage of population that has reached a certain level of education (Figures 19 and 20).<sup>20</sup> Both indicators suggest that educational achievements have improved significantly in most countries over the past two or three decades and that the cross-country variations have also narrowed. Nevertheless, the percentage of the population having completed at least upper secondary education varies from over 90 per cent in the group of leading countries, to less than 70 per cent in others. The gap is particularly large in the case of Portugal, Turkey and Mexico.

**(Figure 19. Average years of education in OECD countries)**

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18. The absence of a venture capital industry has been cited as one of the factors behind the slowdown in R&D productivity in Japan during the 1990s. The reason is the greater difficulty for established firms to partner with more entrepreneurial and efficient firms to foster product development in the absence of venture capital (Branstetter and Nakamura, 2003).

19. These results were obtained over a period during which low-educated cohorts were being replaced by workers with higher levels of education. It is not clear that additional schooling will have as large an impact on average across OECD countries in the future.

20. For purposes of comparison, the levels identified are usually determined on the basis of the International Standard Classification of Education (ISCED), which classifies educational programmes according to various objective criteria. Under this classification, upper secondary education corresponds to level 3 and tertiary education to levels 5A and 6.

**(Figure 20. Percentage of the population that has attained a certain level of education, 2001)**

30. The broad recognition of the benefits for society of widespread basic educational services has led governments in all countries to be involved not only as a source of financing but in most cases as a direct provider. In 1999, OECD countries spent from 2.7 per cent of GDP (Japan) to over 5 per cent (Sweden) of what are essentially public funds on schooling at the primary and secondary levels, which typically correspond to the years of compulsory education (Table 2). As is the case for physical capital the appropriateness of the amount invested should, to some extent, be judged against some measures of return on capital. While the latter can be particularly hard to measure in the case of compulsory education, the absence of a clear correspondence between the amounts invested and the performance in terms of educational attainment and student abilities across countries is suggestive of the potential efficiency gains that could be reaped by further reform. Indeed, the results from tests of 15 year-old students' abilities in reading, mathematics and sciences show that the countries doing relatively well are not necessarily the ones spending the most per student (Figure 21).

**(Table 2. Spending at various levels of education)****(Figure 21. Educational performance of 15-year olds and spending on education)**

31. At the tertiary level, an important share of the return on investment in human capital appears to accrue to individuals, raising questions about the extent of government involvement. In addition, given the significant sociological barriers that have historically kept children from poor and less-educated families away from tertiary education, low tuition fees often imply a redistribution from poor to middle and upper-middle class families, raising equity concerns. The risk that a significant increase in tuition fees would lower private returns and hence participation in tertiary education could be lessened by an easier access to government-backed unsubsidised student loans.<sup>21</sup>

32. Indicators of educational attainment represent only one facet of human capital development. Maintaining or improving workers' mobility generally requires providing them with opportunities and incentives to up-grade their skills throughout their professional life *via* vocational training or adult education. Training is thus an important aspect of labour market flexibility as the lack of mobility may inhibit the scope for firms to bring about the changes in work practice and organisational structures that are often required to better exploit technologies, limiting thereby their own incentive to invest in the latter (OECD, 2003*b*). Even though the importance of adult education has grown during the past two decades, the share of adults aged over 35 in total enrolments remains fairly low, except in Australia, the United Kingdom and Sweden (Figure 22). This is partly due to the fact that, under existing institutional arrangements, which in many countries favour earlier retirement, financial incentives to invest in adult education diminish rapidly with age (Blondal *et al.*, 2002).

**(Figure 22. Adult share of total enrolments in formal education, 1998 )**

33. As regards vocational training, given the various forms that it can take and also considering the problems in measuring on-the-job training, comparable indicators of performance are more difficult to develop. Nevertheless, drawing on different sources of survey-based training statistics, an OECD study found significantly different levels of formal training across countries, with relatively low levels observed in southern European countries such as Greece, Italy, Portugal and Spain and relatively high levels in the United Kingdom, France and most Nordic countries (OECD, 1999*b*).

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21. Higher tuition fees may also help to reduce the time spent by some students in education over and above the statutory duration required to obtain a diploma, which is a problem in some countries.

34. Perhaps more significantly, the study also confirmed earlier findings that in most countries, less-educated workers and those working on a part-time and/or temporary contract basis are much less likely to receive training, especially when employed by a small firm. Many countries pursue policies to enhance training *via* subsidies or mandated employer spending on the premise that too little is provided. However, the appropriate amount of training is difficult to assess, suggesting that a focus on giving the right incentives might be more appropriate.

## 5. Factors contributing to differences in technological progress

35. Strong investment, in particular in new technologies such as ICT, has a direct impact on output and productivity growth *via* capital deepening or embodiment effects. However, the positive growth impact from the latter is likely to be transitory and last the time required to complete the transition to a higher level of capital intensity. Hence, for investment to have a durable impact on output and productivity growth, it must generate positive externalities over and above the direct benefits from raising employees' skills or equipping them with more powerful machines. The significance of externalities, also referred to as *disembodied* technological progress, is often assessed using estimates of multi-factor productivity (MFP). Such estimates show that while MFP growth increased in English speaking and Nordic countries during the 1990s, it fell in Continental Europe and Japan, albeit in several cases from a relatively high level (Figure 23).

### (Figure 23. Multi-factor productivity growth over selected periods)

36. MFP growth usually arises from eliminating the slack in the use of inputs, from the adoption of state-of-the-art technology and related organisational practices (catching-up to technological frontier) and/or from direct innovations in either goods produced or the production process (pushing out the frontier). While numerous factors can affect MFP *via* either channel, recent empirical work based on sectoral data has underscored the important influence of product market competition, R&D intensity as well as labour market regulation and institutions (OECD, 2003a).

37. There is a broad consensus that the incentives to actively seek efficiency gains *via* the *catching-up* process can be underpinned by policies and institutional settings strengthening product market competition. In particular, overly stringent product market regulation can have a key influence on the strength of competition in domestic markets either by exerting a direct control on economic activities, by imposing various barriers to entrepreneurial activity (through legal restrictions on market access or administrative burdens on new firm creation), or by maintaining high barriers to trade and foreign direct investment. In this regard, the parallel increase in market size (allowing firms to benefit from economies of scale) and exposure to foreign competition is seen as one of the benefits from growing international trade and may explain the significant impact of cross-border activities on output growth observed in most empirical studies.

38. While all OECD countries have eased anti-competitive regulation (barriers to entry or operational restrictions) during the 1980s and 1990s, some have gone much further than others (Figure 24), not least those that have benefited from an acceleration in MFP during the 1990s (United States, Australia, Finland and New Zealand).<sup>22</sup> Indeed, a positive link between pro-competition regulation and MFP growth is supported by cross-country evidence at the industry level, even after controlling for R&D investment and industry-specific factors (Nicoletti and Scarpetta, 2003). Regulatory measures having an impact on entry costs are particularly relevant for industries facing rapidly-changing technology, such as ICT-producing or ICT-using industries, given that the contribution of new firms to productivity growth appears to be much

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22. The chart showing the change over time in regulation concerns non-manufacturing (network) sectors where reforms were deepest. The broad index shown in Panel B has been constructed only for 1998.

stronger in these industries than in the rest of the economy. And, there is some evidence that strong ICT investment has played an important role in fostering MFP performance in several countries (Figure 25).<sup>23</sup>

**(Figure 24. Indicators of product market regulation)**

**(Figure 25. Pick-up in MFP growth and increase in ICT investment)**

39. The strong and positive impact of R&D intensity on innovation and productivity growth has also been shown in various studies, both on the basis of aggregate and sectoral data.<sup>24</sup> Indeed, because of the perceived externalities, most countries provide support to R&D *via* direct expenditure and, in some cases, *via* tax incentives on private R&D. This notwithstanding, the intensity of both public and private R&D expenditure varies significantly across countries (Figure 26). In the case of private R&D, the variations reflect also factors such as market size and industrial structure which are not directly amenable to innovation policy. Nevertheless, authorities in a growing number of countries have established explicit R&D targets to narrow the gap *vis-à-vis* leading countries.<sup>25</sup> Yet, although a certain proportion of public R&D funding is considered as necessary to stimulate private R&D, the stimulating effect may diminish beyond a relatively low threshold estimated in one study at around 13 per cent of business R&D (Guellec and van Pottelsberghe, 2000).

**(Figure 26. Expenditure on R&D in OECD countries)**

40. The differences in private R&D spending across countries within comparable industries could partly reflect the important influence that the policy environment may have on the private incentives to engage in innovative activity. Indeed, a significant part of cross-country variations in R&D intensity within industries can be attributed to differences in product market regulation, underscoring the importance of competition in fostering MFP gains *via* the innovation channel.<sup>26</sup> The evidence suggests that labour market regulation also plays an important role. This may be especially the case in industries where taking advantage of new opportunities requires significant labour re-allocation. By raising the cost of labour adjustment, stringent employment protection legislation reduces both the return to innovation and the incentive to spend on R&D. The positive impact on R&D from a reduction in the stringency of EPL is estimated to be particularly strong in the case of high-tech industries (usually requiring higher turnover) in countries where the industrial system is characterised by low or intermediate levels of co-ordination (*e.g.* France, Spain and Portugal).<sup>27</sup> In addition to these effects on R&D intensities in individual sectors, structural policy may also affect overall R&D investment through changes in the industry mix. Indeed, analysis indicates that the sectoral composition of the economy matters, as the bulk of R&D activity is concentrated in specific industries.

41. Although strong investment in R&D is a key determinant of innovation, other factors are important. For instance, the use and development of new technology requires firms to be able to experiment, and hence to be given the possibility of failure and re-entry. In this regard, having a bankruptcy regime allowing firms to exit with a limited social and financial stigma or burden on firms'

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23. The correlation illustrated in Figure 25 is supported by econometric evidence using sectoral data (Pilat *et al.*, 2003).

24. See Guellec and van Pottelsberghe (2001) for evidence based on aggregate data and Scarpetta and Tresselt (2002) for empirical support based on sectoral data.

25. See Sheehan and Wyckoff (2003) for a review of the economic and policy implications of efforts to meet targets for R&D spending.

26. See Chapter VII in OECD (2002c).

27. See Chapter VI in OECD (2002a).



owners and managers may boost innovative activity. However, stimulating entrepreneurial activity by facilitating both entry and exit may bring benefits beyond the impact on innovation. For instance, it may lessen the incentives for managers to make business decisions so as to delay as much as possible declaring bankruptcy even when the latter becomes inevitable, improving thereby resource allocation. Furthermore, the threat of exit, combined with competitive pressures from potential entrants, may stimulate productivity growth within firms by raising managerial effort. However, facilitating exit while providing investors with adequate protection in case of business failures may represent a difficult policy challenge.

## 6. Conclusion

42. In contrast to what has happened throughout the 1960s and 1970s, not only are some of the largest EU countries and Japan no longer closing the income gap vis-à-vis the United States but the latter may even be widening since the mid-1990s. While in the case of Japan the gap in GDP *per capita* is essentially due to the lagging performance in labour productivity, the European Union is trailing mainly in terms of labour resource utilisation, reflecting both lower employment rates and fewer hours worked. This paper has provided a brief overview of the main structural factors thought to have contributed to differences in the degree of labour resource utilisation, as well as in the intensity of physical and human capital use and in the pace of technological progress.

43. The key structural policies affecting the participation and employment rates include the design of the tax and benefit system, and the implied effect on incentives, as well as product and labour market regulation. Most countries have taken measures to reduce the adverse effect of unemployment benefits on work incentives by tightening eligibility criteria and, in some cases, by providing in-work benefits in particular for the low-income households. Several countries have also cut labour taxes for the low-paid to stimulate labour demand and have achieved some success. However, reform of employment protection legislation has generally been limited to employees on temporary contracts. Besides raising equity issues, such partial reform may have contributed to strengthening insider-outsider mechanisms, especially in those countries where high firing costs have led to a low job turnover and a relatively high incidence of long-term unemployment.

44. Empirical evidence suggests that labour market regulation may also have a negative impact on productivity growth by lowering incentives to invest in ICT and to engage in private R&D, in particular in industries where taking advantage of new opportunities requires significant labour re-allocation. Another important factor affecting productivity growth is product market competition, which in many countries could be stimulated by lowering the stringency of regulation restricting market access or burdening the creation of new firms. Overall, the paper has stressed that many of the countries which have improved their economic growth performance, including the United States, Canada, Australia, Sweden, Finland and Ireland, shared many common characteristics. These included labour productivity gains, generally improved skill levels and the rapid adoption of ICT.

45. Besides enjoying higher trend growth rates, most of these countries seem to better resist the economic slowdown that has followed the unwinding of the financial excesses of the late 1990s. In contrast, the slowdown appears to be more protracted in Japan and some of the large EU countries, even though they were less affected initially by the economic downturn. Such weaker resilience to adverse shock may well be another consequence of structural policies, insofar as they tend to generate longer unemployment spells, slower wage adjustment and labour reallocation and a more rapid decline in consumer and business confidence.

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## Tables and Figures

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Table 1. Average trend growth in GDP per capita over selected periods

	1980-1995	1995-2002	Change between first and second period
Australia	1.7	2.6	0.8
Austria	2.0	1.9	0.0
Belgium	1.9	2.0	0.2
Canada	1.3	2.5	1.3
Czech Republic	..	2.0	..
Denmark	1.8	2.0	0.2
Finland	1.6	3.5	1.9
France	1.5	1.9	0.4
Germany <sup>a</sup>	1.6	1.4	-0.3
Greece	0.6	3.0	2.4
Hungary	..	3.9	..
Iceland	1.2	2.3	1.1
Ireland	3.8	7.1	3.3
Italy	2.0	1.5	-0.5
Japan	2.9	0.6	-2.3
Korea	6.7	4.3	-2.4
Luxembourg	4.2	3.7	-0.6
Mexico	0.2	2.3	2.1
Netherlands	1.7	2.2	0.5
New Zealand	1.3	2.2	1.0
Norway <sup>b</sup>	1.5	2.0	0.4
Poland	..	4.1	..
Portugal	3.1	2.5	-0.6
Slovak Republic	..	1.7	..
Spain	2.3	2.7	0.4
Sweden	1.3	2.5	1.2
Switzerland	0.9	0.8	-0.1
Turkey	2.1	0.4	-1.8
United Kingdom	2.1	2.2	0.1
United States	2.0	2.3	0.3
<i>Weighted averages</i>			
European Union	1.8	2.0	0.2
Total OECD <sup>c</sup>	2.1	1.9	-0.2

a) West Germany before 1991. For 1980-1995 average excludes 1991.

b) Mainland only.

c) Excluding Czech Republic, Hungary, Poland and Slovak Republic.

Source: OECD (2002a).

Table 2. **Spending at various levels of education**

1999

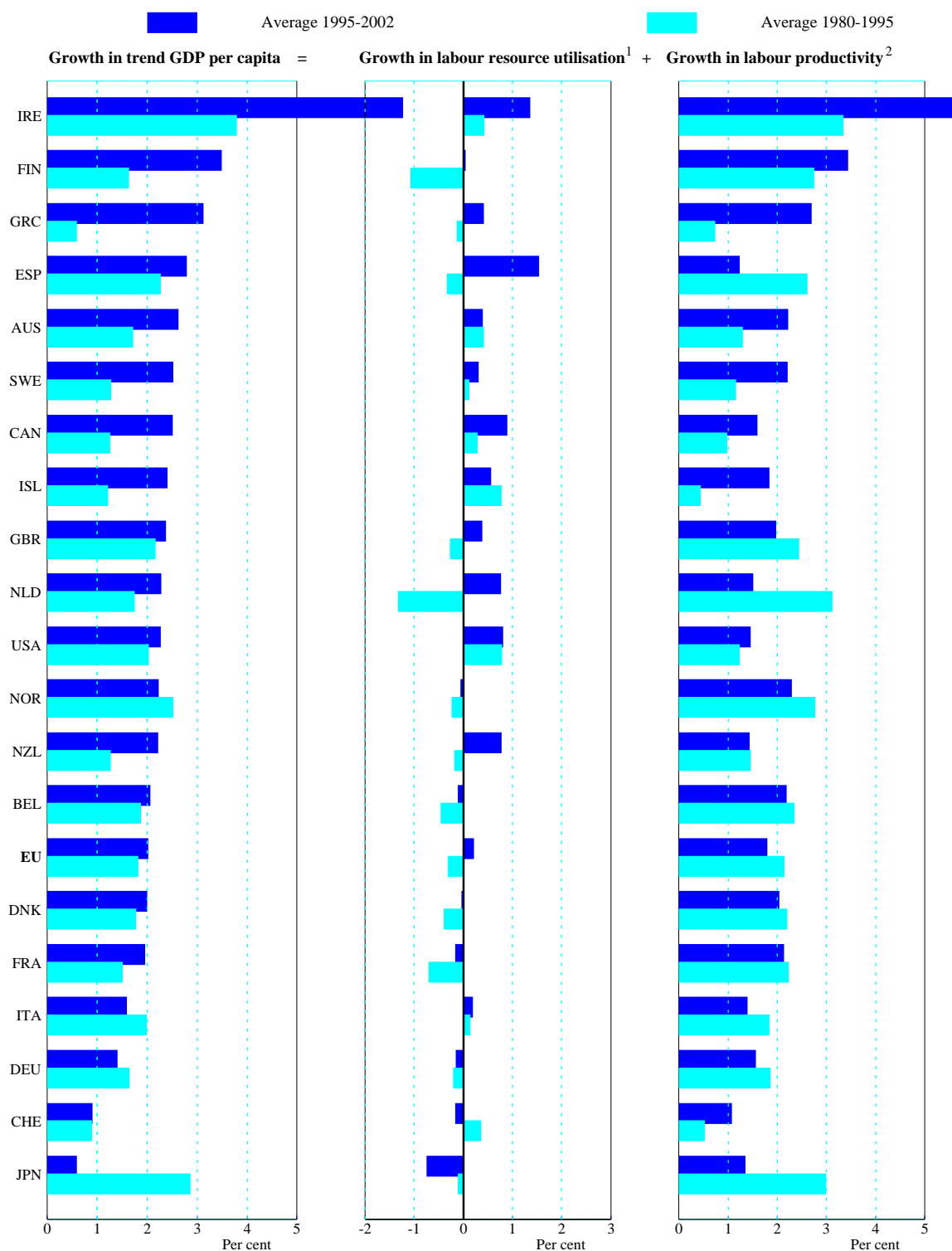
	Public spending on education				Total spending on educational institutions
	Primary and secondary <sup>a</sup>	Tertiary	<i>of which:</i> Student grants <sup>b</sup>	All levels of education	All levels of education
Per cent of GDP					
Australia	3.8	1.2	0.4	5.0	5.8
Austria	4.1	1.7	0.2	6.3	6.3
Belgium	3.5	1.5	0.2	5.5	5.5
Denmark	4.8	2.4	0.8	8.1	6.7
Finland	3.8	2.1	0.3	6.2	5.8
France	4.2	1.1	0.1	6.0	6.2
Germany	3.0	1.1	0.1	4.7	5.6
Greece	2.4	1.1	0.0	3.6	3.9
Ireland	3.1	1.2	0.2	4.3	4.6
Italy	3.2	0.8	0.1	4.5	4.8
Japan	2.7	0.5	0.0	3.5	4.7
Netherlands	3.1	1.3	0.3	4.8	4.7
New Zealand	4.8	1.2	0.3	6.3	n.a.
Norway	4.6	2.0	0.6	7.4	6.6
Portugal	4.2	1.0	0.1	5.7	5.7
Spain	3.3	0.9	0.1	4.5	5.3
Sweden	5.1	2.1	0.6	7.7	6.7
Switzerland	4.0	1.2	0.0	5.5	5.9
United Kingdom	3.3	1.1	0.4	4.7	5.2
United States	3.5	1.4	0.3	5.2	6.5
<b>Country mean</b>	<b>3.7</b>	<b>1.3</b>	<b>0.3</b>	<b>5.5</b>	<b>5.6</b>

a) Includes post-secondary non-tertiary education.

b) Scholarships/other grants to households and student loans.

Source: OECD, *Education at a Glance*, 2002; OECD.

**Figure 1. Sources of growth in trend GDP per capita**

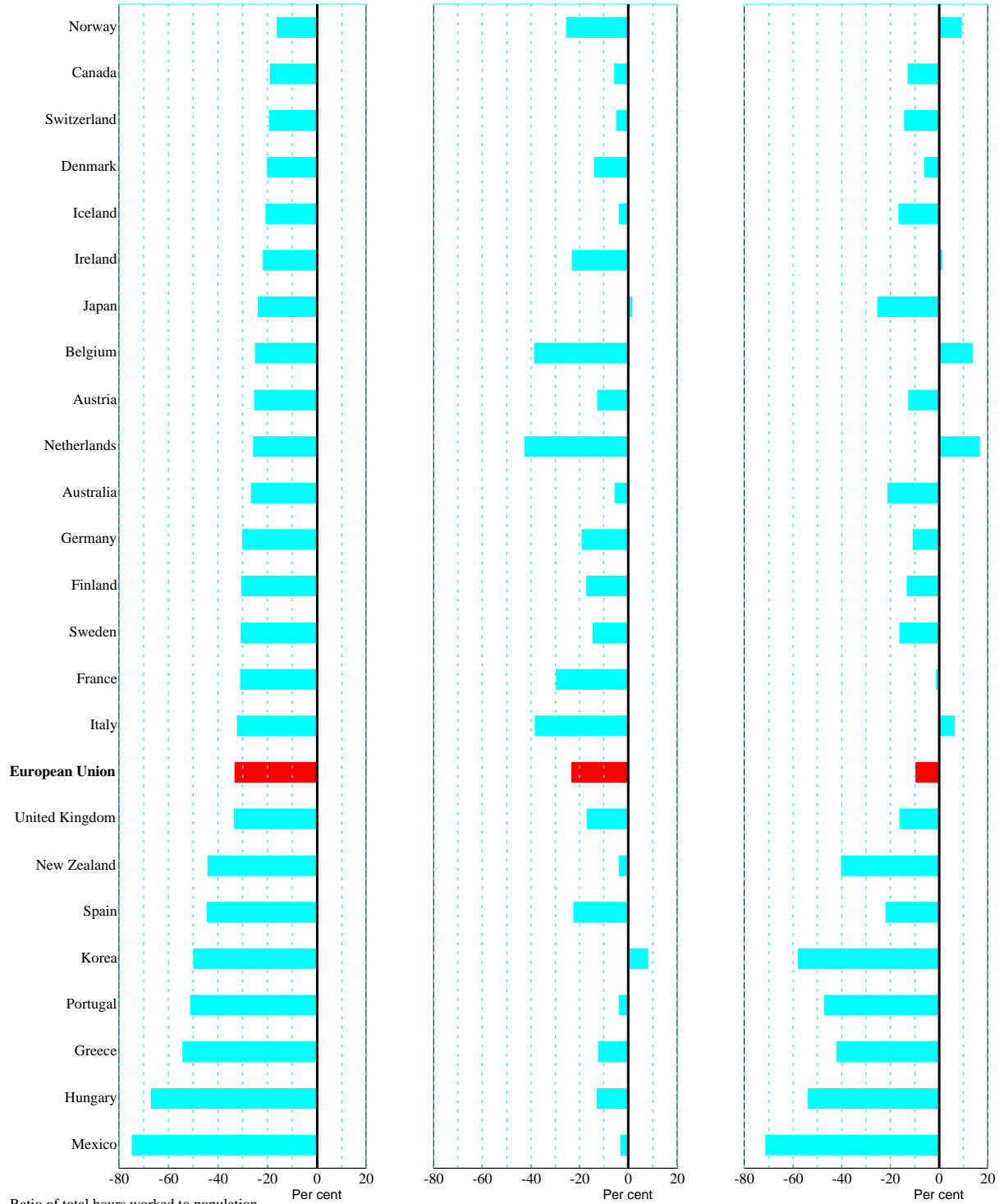


1. Growth rate of total trend hours worked as a ratio of total population.  
 2. Growth of trend GDP per hour worked.  
 Source: OECD.



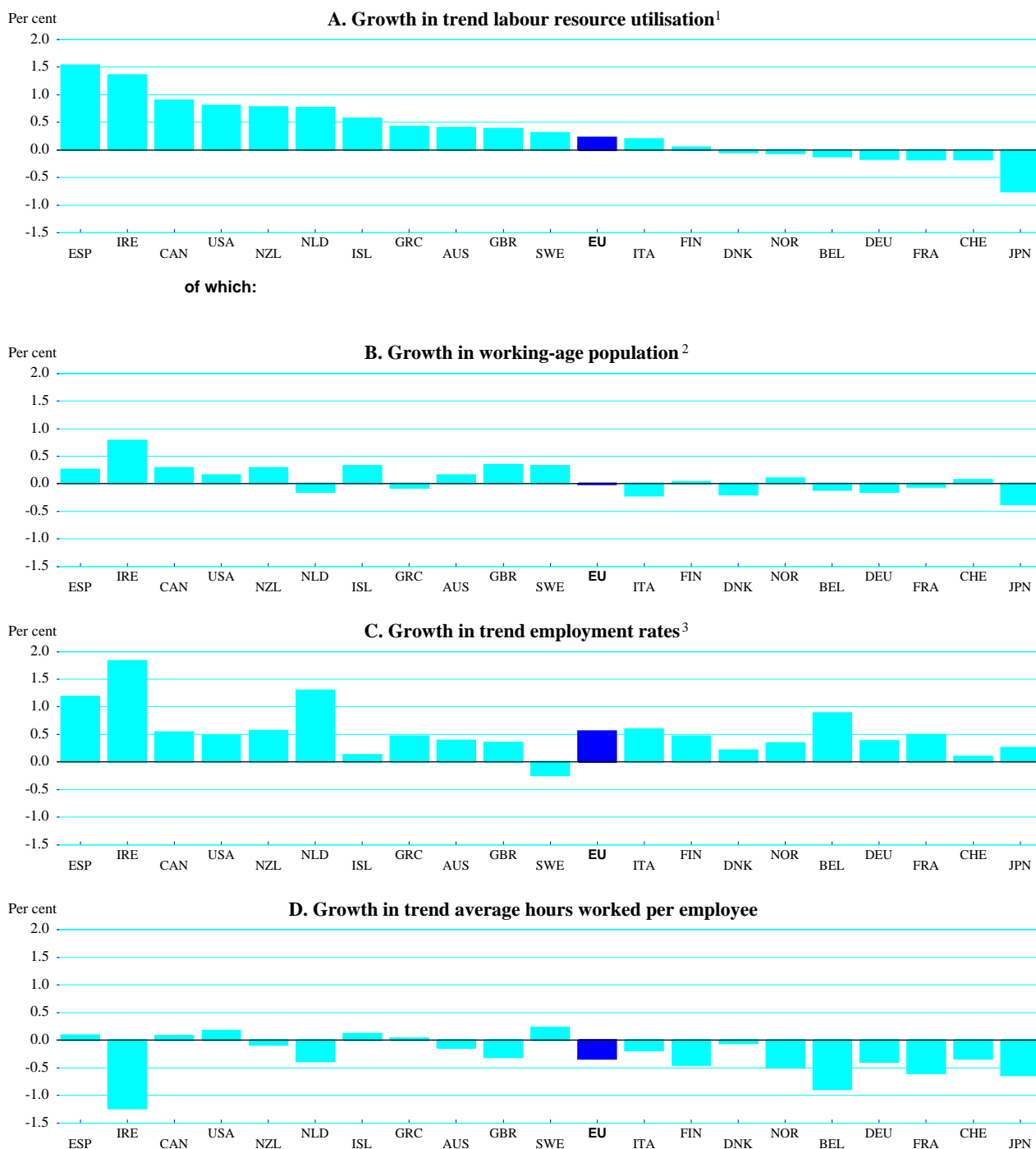
**Figure 2. The sources of real income differences**  
 Percentage points difference in PPP-based GDP per capita with respect to the United States, 2000

Percentage gap with respect to US GDP per capita = Effect of labour resource utilisation (1) + Effect of labour productivity (2)



1. Ratio of total hours worked to population.  
 2. GDP per hour worked.  
 Source : OECD.

**Figure 3. Sources of growth in trend labour resource utilisation**  
Average over 1995-2002



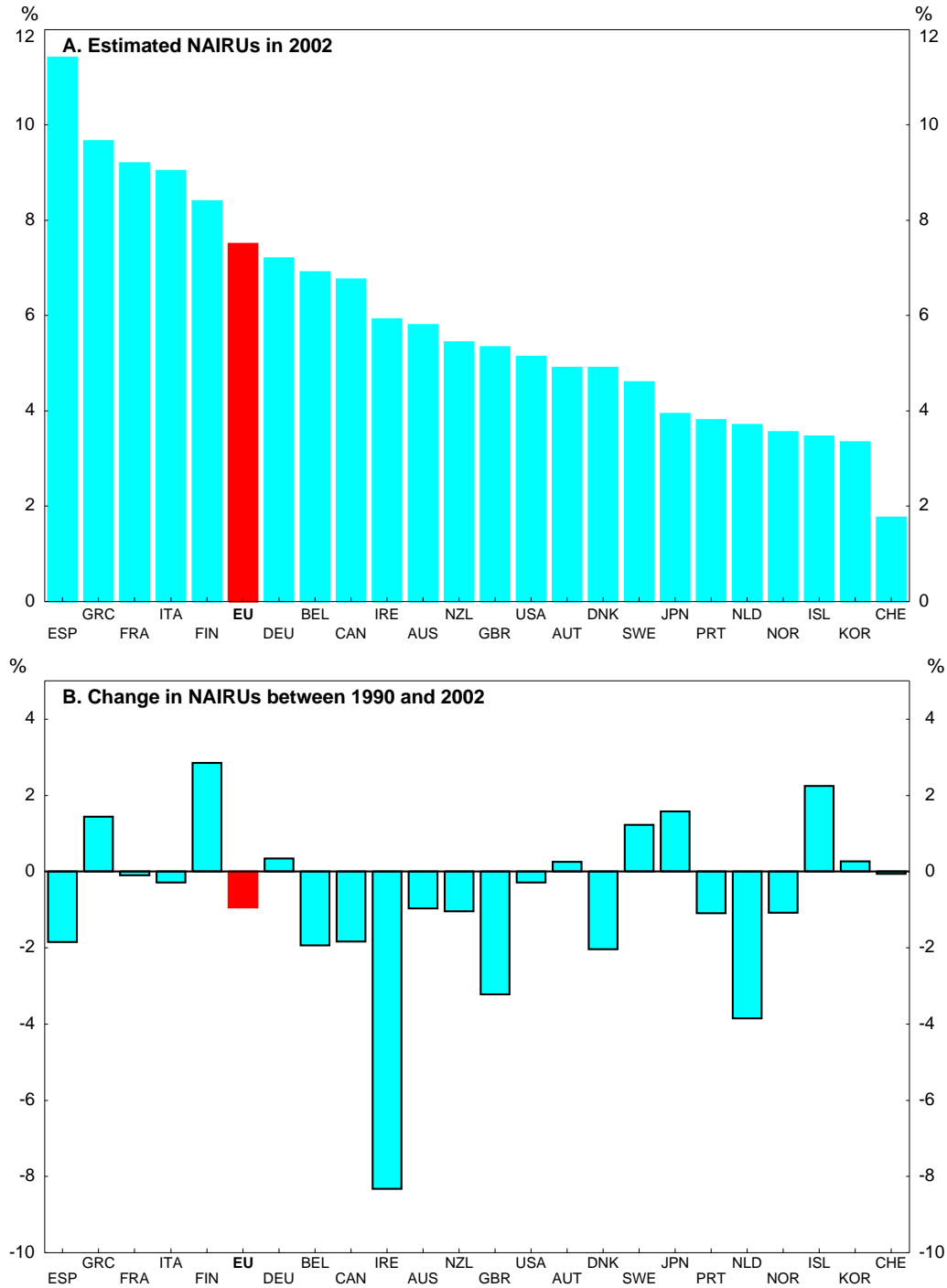
1.  $A=B+C+D$ . Trend labour resource utilisation is measured as the trend total number of hours worked in a year divided by total population.

2. Measured as the growth rate of the ratio of the population of working age to the total population.

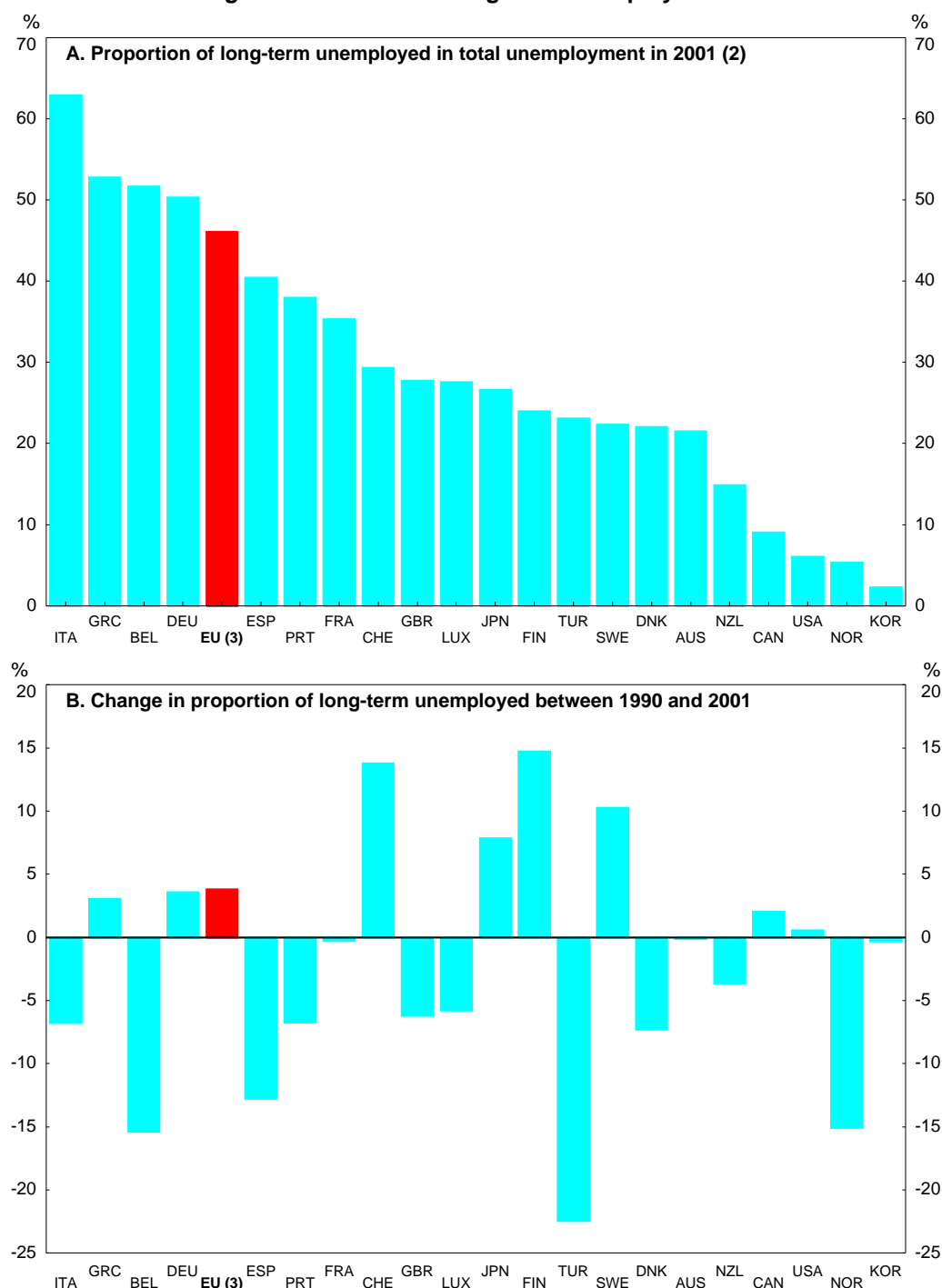
3. Measured as the growth rate of the ratio of trend total employment to working-age population.

Source: OECD.

Figure 4. Structural unemployment rates (NAIRUs) <sup>1</sup>

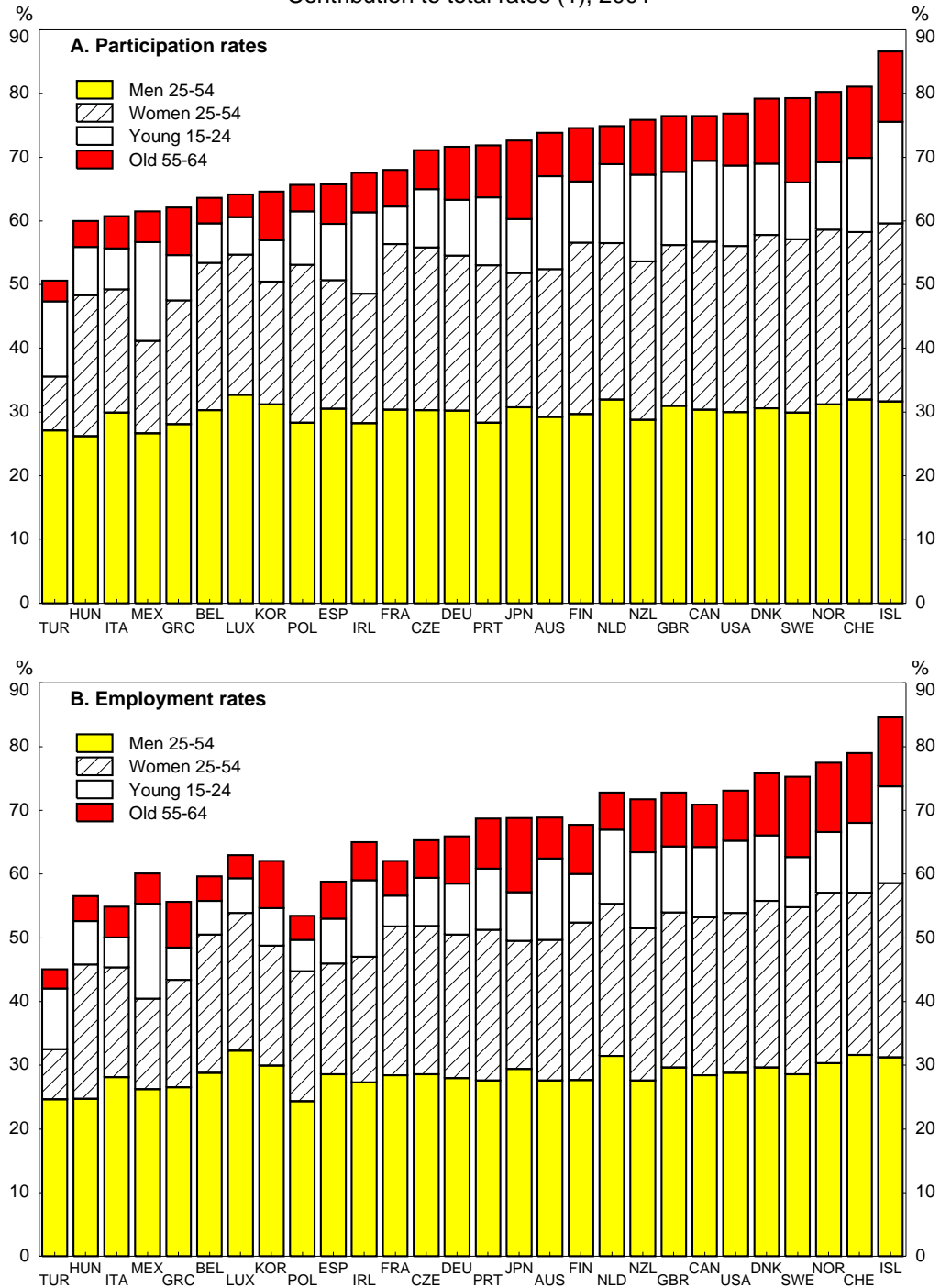


1. See Economic Outlook n°68, December 2000, for a description of the methodology used to estimate structural unemployment. Source: OECD.

Figure 5. Incidence of long-term unemployment<sup>1</sup>

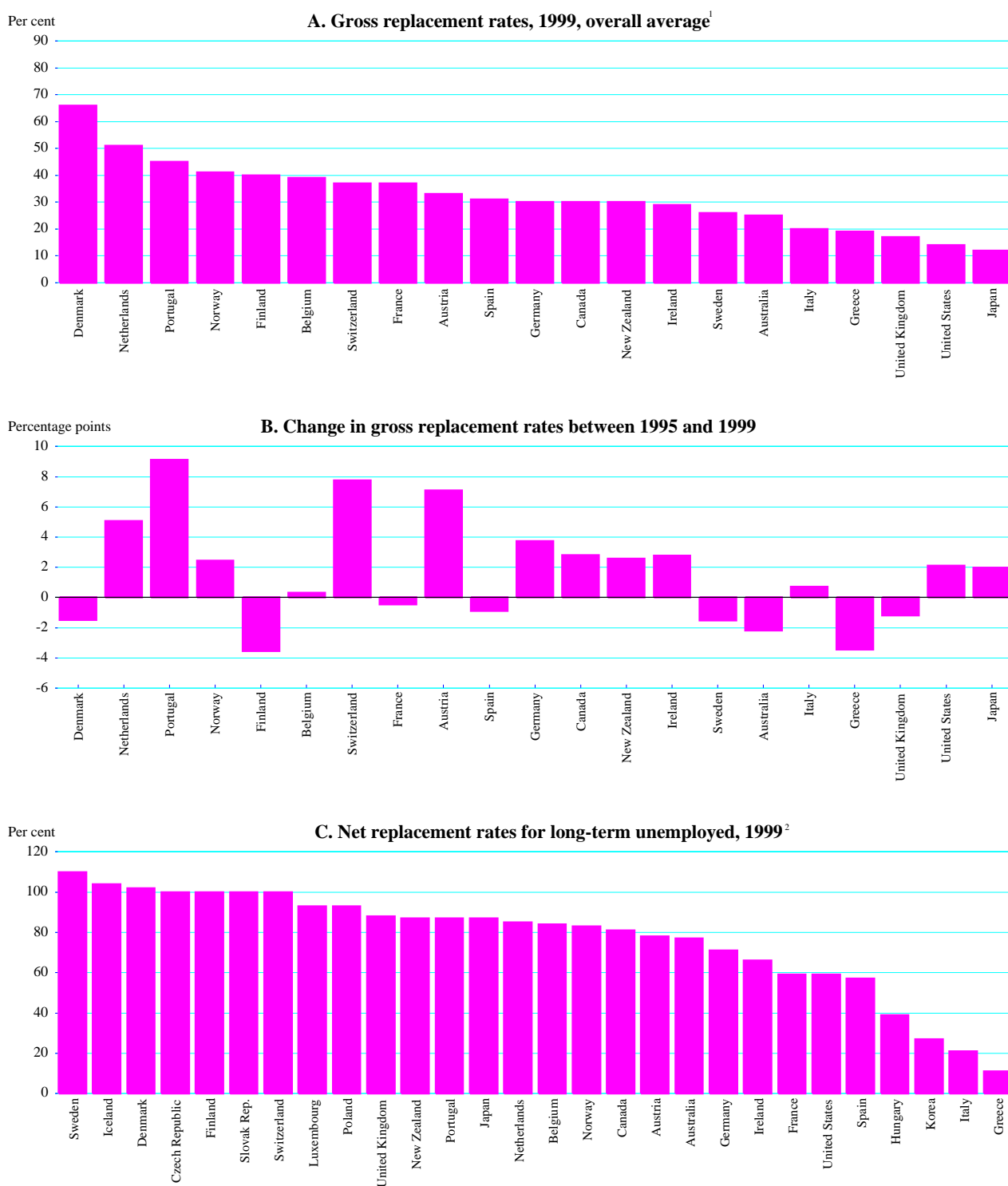
1. Long-term unemployment is defined as one year or more.  
 2. 2000 for Germany and European Union.  
 3. European Union excluding Austria, Ireland and Netherlands.  
 Source: OECD.

**Figure 6. Participation and employment rates by age and gender**  
Contribution to total rates (1), 2001



1. The contribution of individual demographic groups to the overall employment and participation rates were calculated as the group-specific rates multiplied by the share of individual groups in the population of working age.  
Source: OECD.

Figure 7. Estimates of gross and net replacement rates

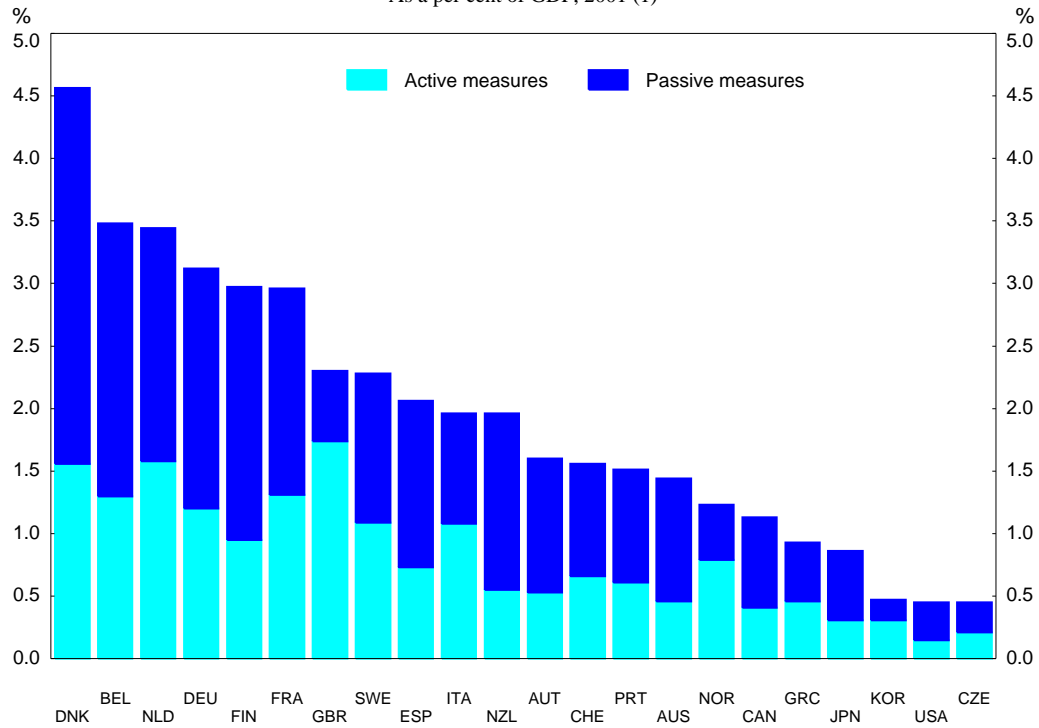


1. Average of gross rates computed for different family situations, earning levels and durations of unemployment.

2. After tax and including family and housing benefits for long-term benefit recipients; situation corresponding to a couple with 2 children and a single earner paid 66.7% of the average production worker's salary.

Source: OECD.

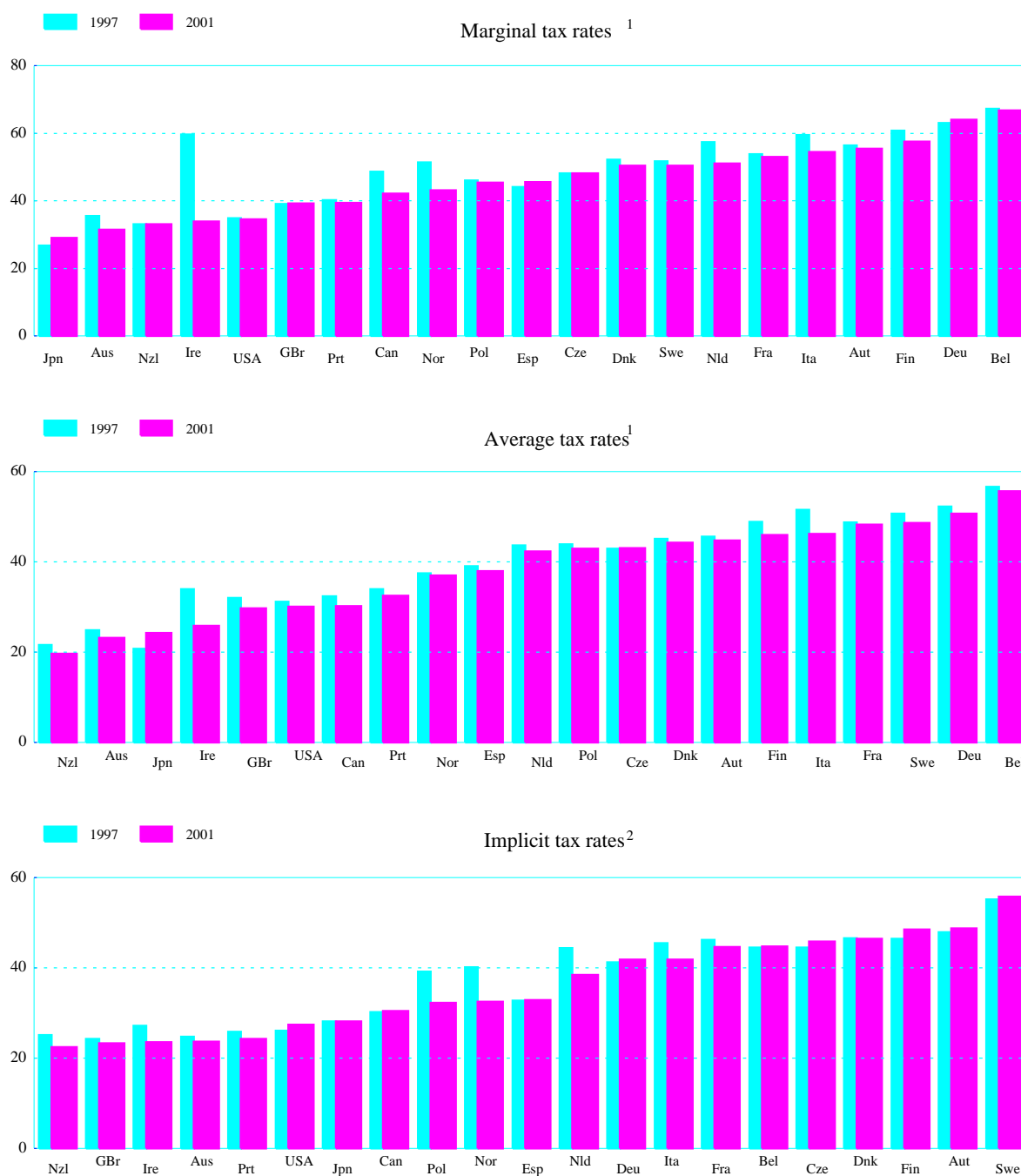
**Figure 8. Public spending on labour market measures**  
As a per cent of GDP, 2001 (1)



1.1996 for Italy, 1998 for Greece, 1999 for Switzerland and 2000 for Belgium, Denmark, France, Portugal and UK.

Source: OECD (2002b).

Figure 9. Tax wedges on labour



1. For a single individual at the income level of the average production worker. Tax wedges are calculated by expressing the sum of personal income tax, employee plus employer social security contributions together with any payroll taxes as a percentage of labour cost. The effect of indirect taxes is not taken into account.

2. Measured as the difference between the total labour compensation paid by the employer in term of the production price and the net take-home pay of employees in terms of consumption price, as a ratio of total labour compensation. The calculation is based on National Accounts data and reflects the effect of indirect taxes and terms-of-trade. See de Serres et al. (2002) for more details.

Source: OECD.

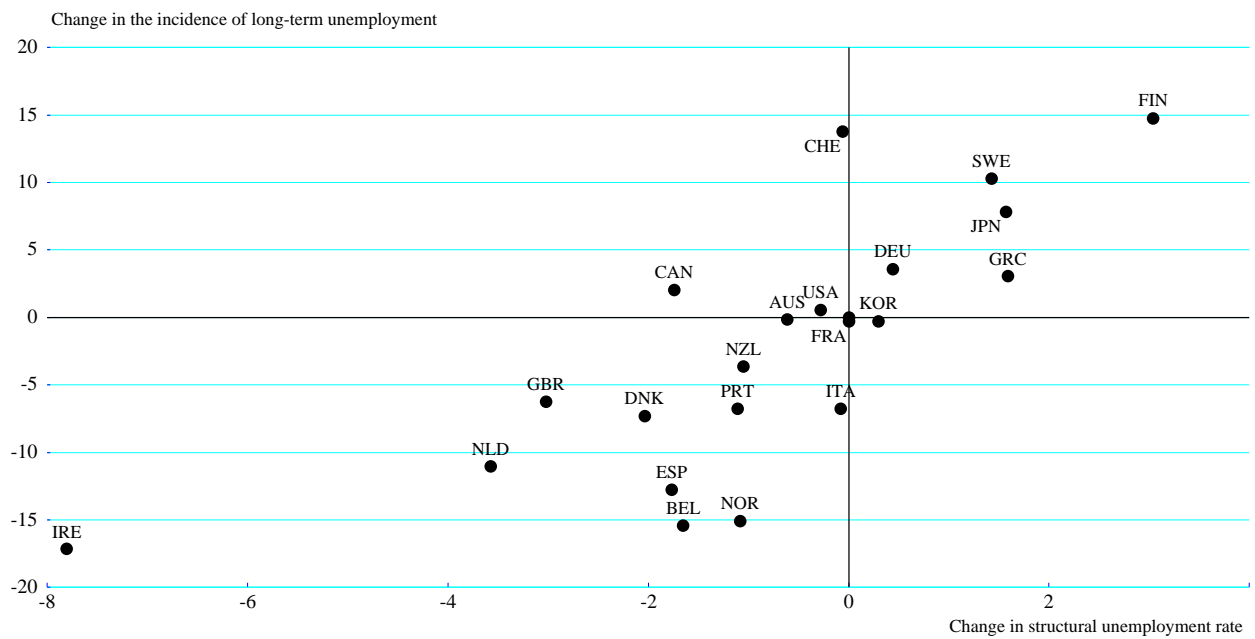


**Figure 10. Effective and official age of retirement in OECD countries<sup>1</sup>**



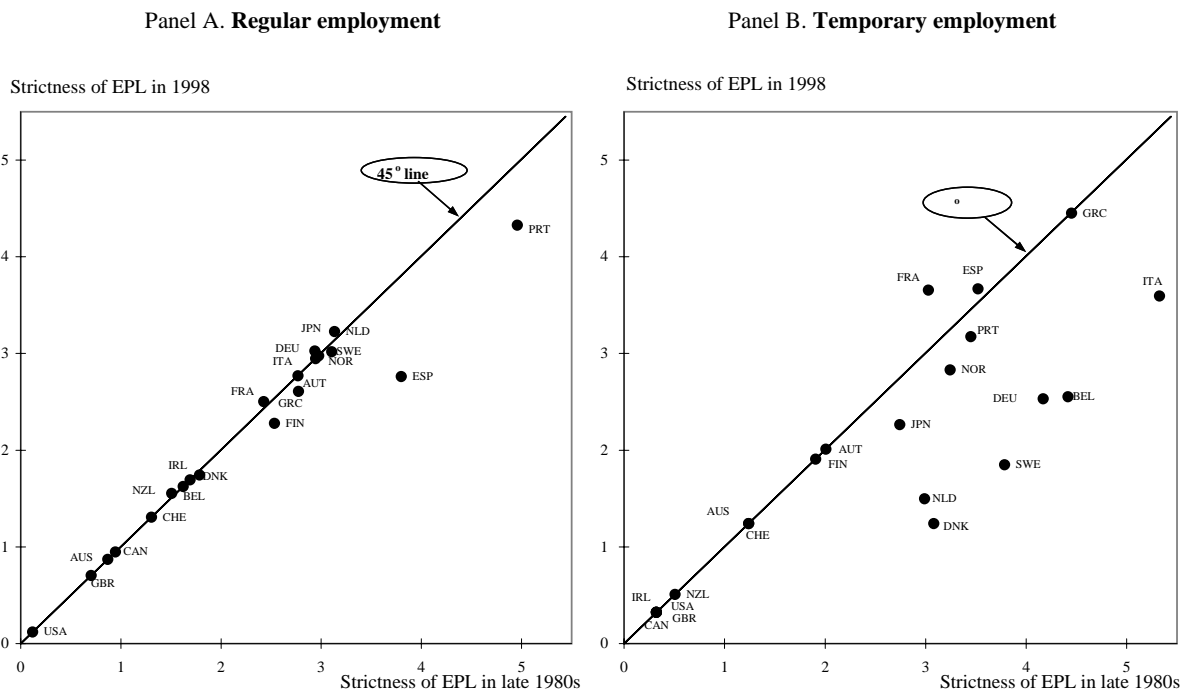
1. The effective age of retirement refers to the average age at which persons initially aged 40 and over left the labour force during the period 1994-1999, after controlling for cohort-size effects. The official age of retirement refers to the earliest age at which workers are currently entitled to a full old-age pension. Source: Scherer, 2002.

**Figure 11. Changes in long-term unemployment and structural unemployment rates**  
Between 1990 and 2001<sup>1</sup>, in percentage points



1. 1991-2001 for Finland and Switzerland; 1990-1999 for Ireland, Netherlands; 1990-2000 for Germany.  
Source: OECD (2002a,b).

Figure 12. **Strictness of employment protection legislation**  
 Synthetic OECD indicators of restrictiveness<sup>1</sup>



1. For definition, see Source. A higher indicator value implies a more restrictive policy stance.  
 Source: OECD (1999b).

**Figure 13. Ratio of minimum wage to full-time median earnings**  
Per cent, 2000

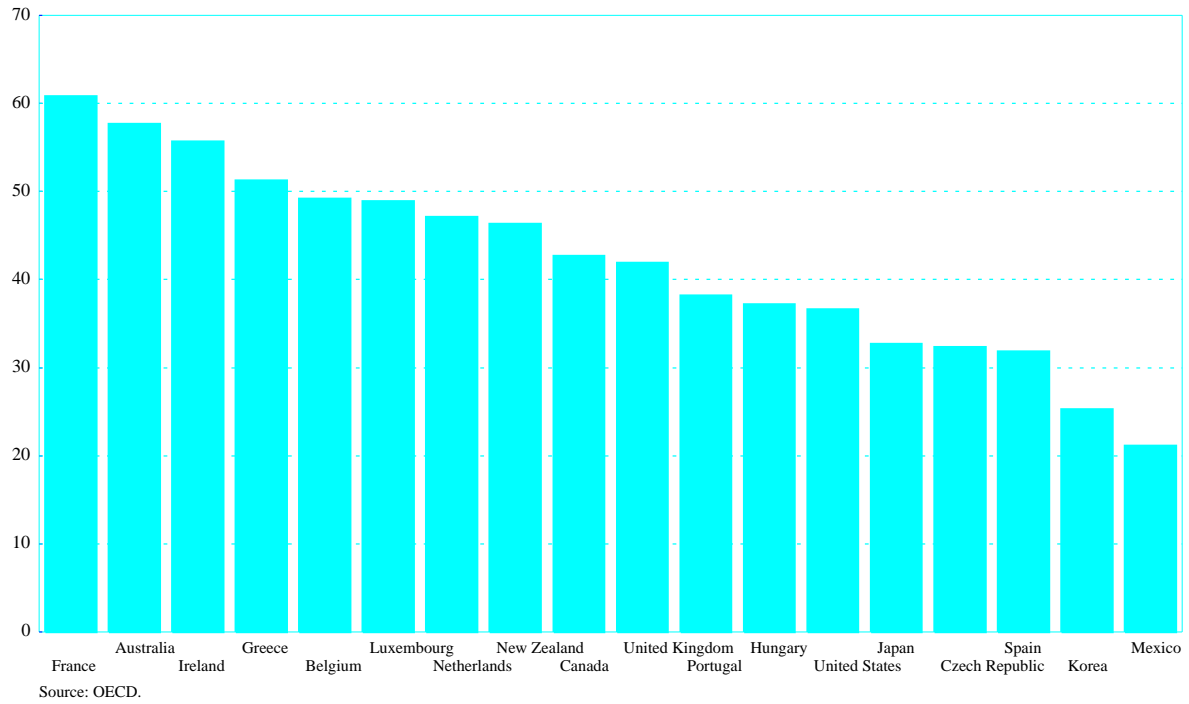
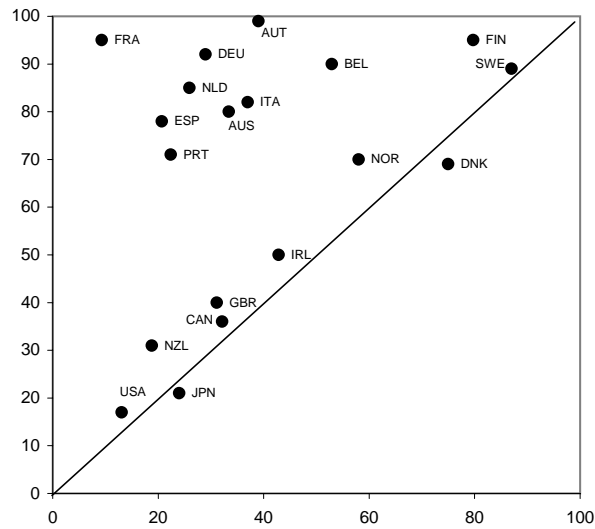
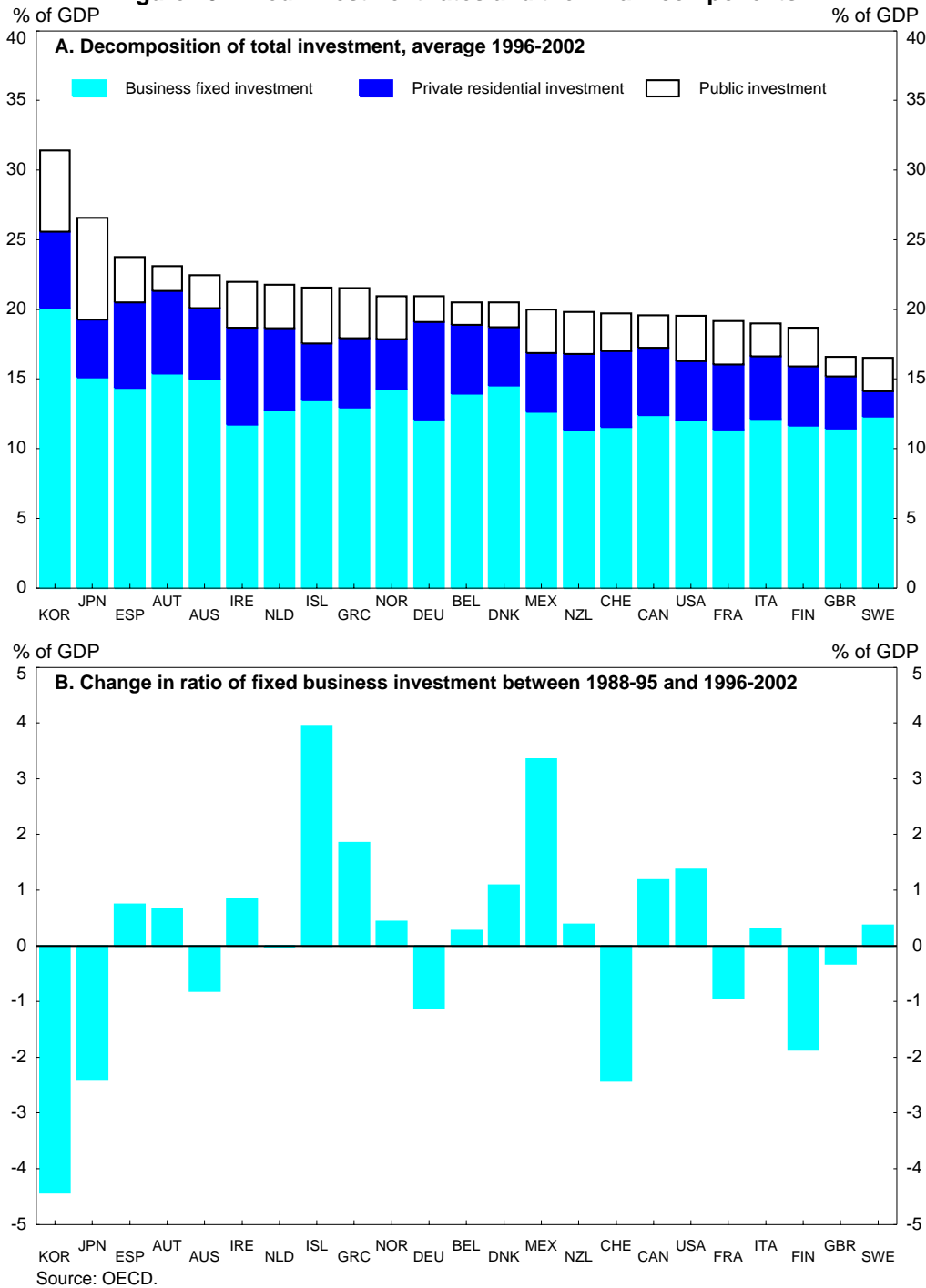


Figure 14. Coverage rate of collective bargaining agreements and union density rate <sup>1,2</sup>

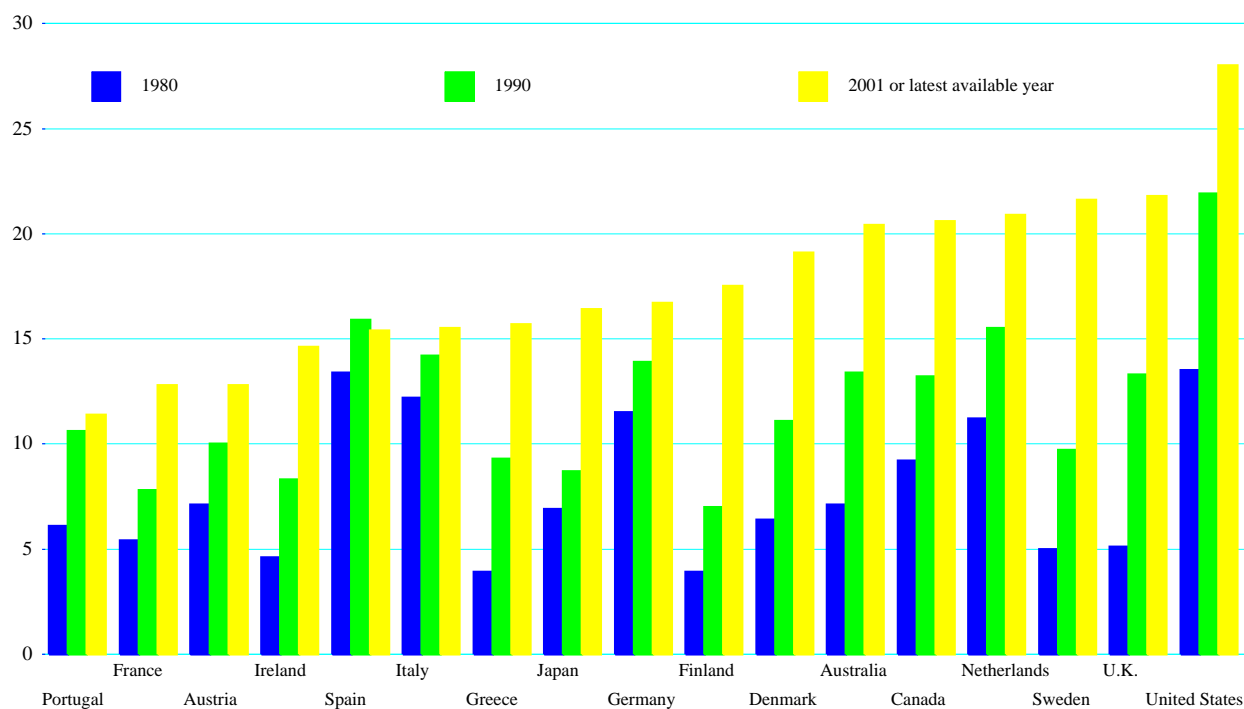


1. The coverage rate is measured as the percentage of workers who are covered by collective bargaining agreements, regardless of whether or not they belong to a trade union. Union density is the percentage of workers belonging to a trade union.  
 2. All data refer to 1994 except: collective bargaining coverage in Canada, Italy, Norway and Portugal (1993), Finland, France and Japan (1995), and trade union density in Portugal (1990), Italy and Switzerland (1992), Denmark, Germany, Netherlands and Sweden (1993), Finland (1995).  
 Source: OECD, 1997.

**Figure 15. Fixed investment rates and their main components**

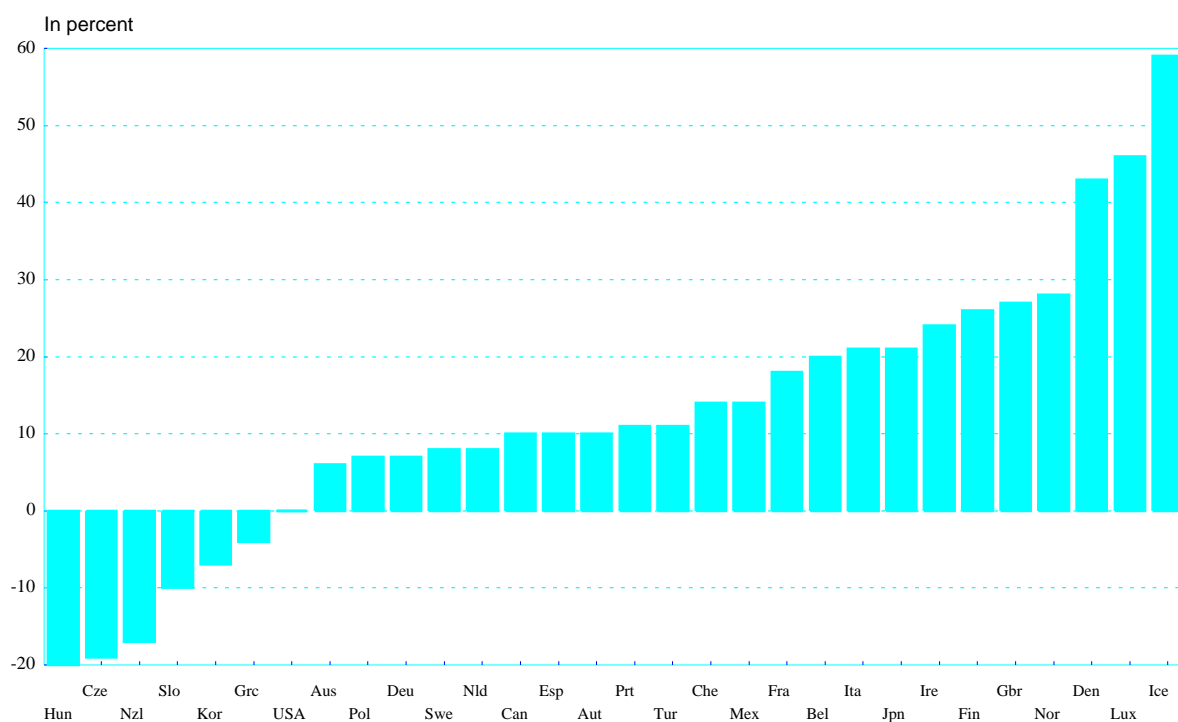


**Figure 16. ICT investment in selected OECD countries**  
 In current price, as a percentage of non-residential gross fixed capital formation, total economy



Source: OECD (2003b).

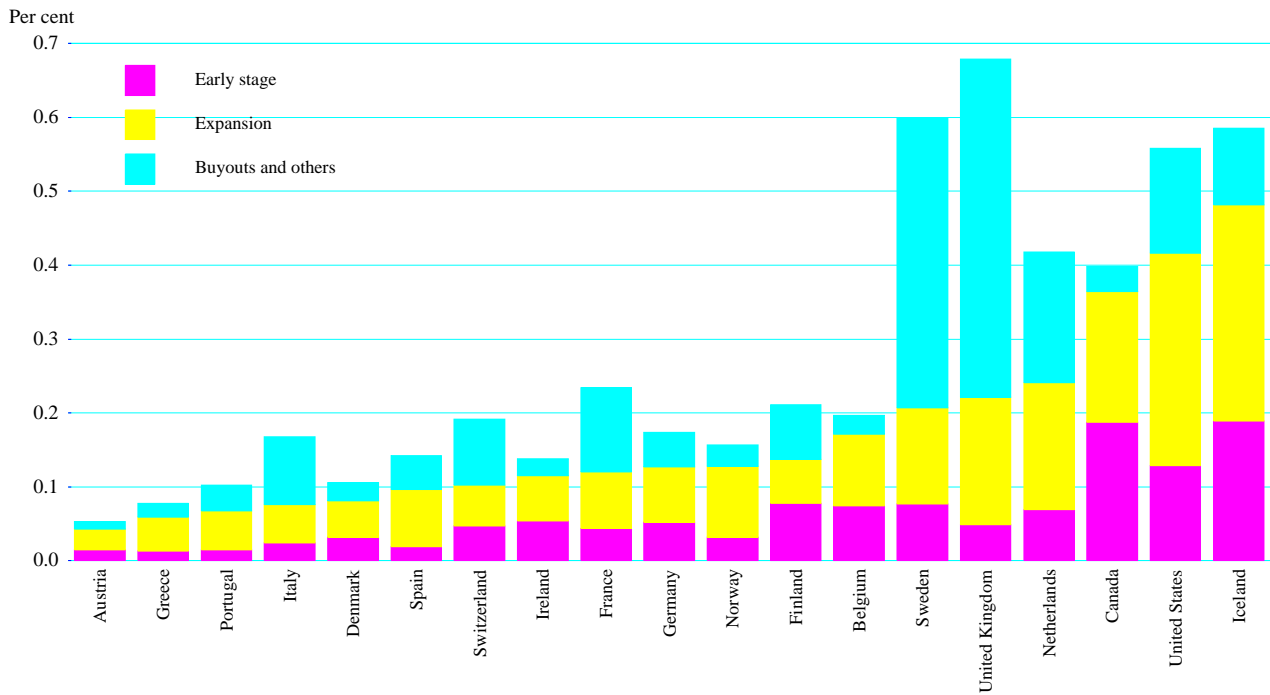
**Figure 17. The price of ICT investment in 1999<sup>1</sup>**  
 PPP-based price differential with the United States



1. Price differential covers offices and data processing machinery.  
 Source: Purchasing power parities and real expenditures, 1999 Results, Paris.

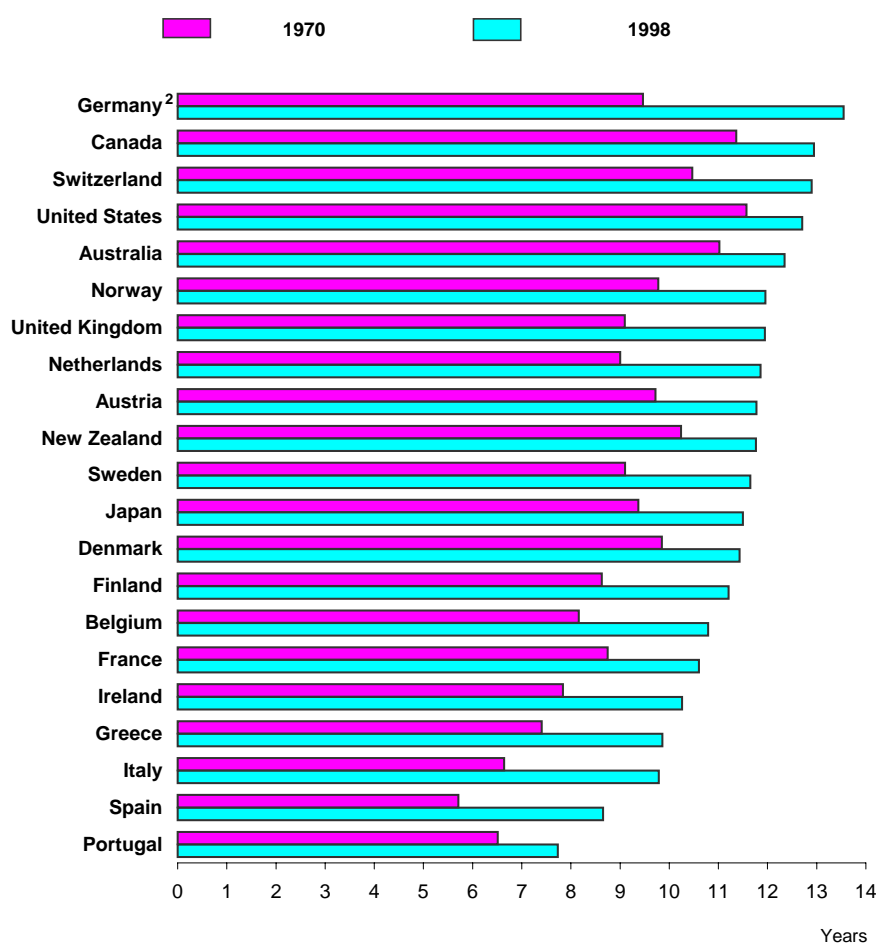


**Figure 18. Venture capital investment by stages**  
Per cent of GDP, 1998-2001



1. The definition of private equity/venture capital varies across countries. Countries are ranked according to the sum of early stage and expansion.  
Source: OECD; Baygan and Freudenberg (2000).

**Figure 19. Average years of education in OECD countries<sup>1</sup>**  
1970 and 1998

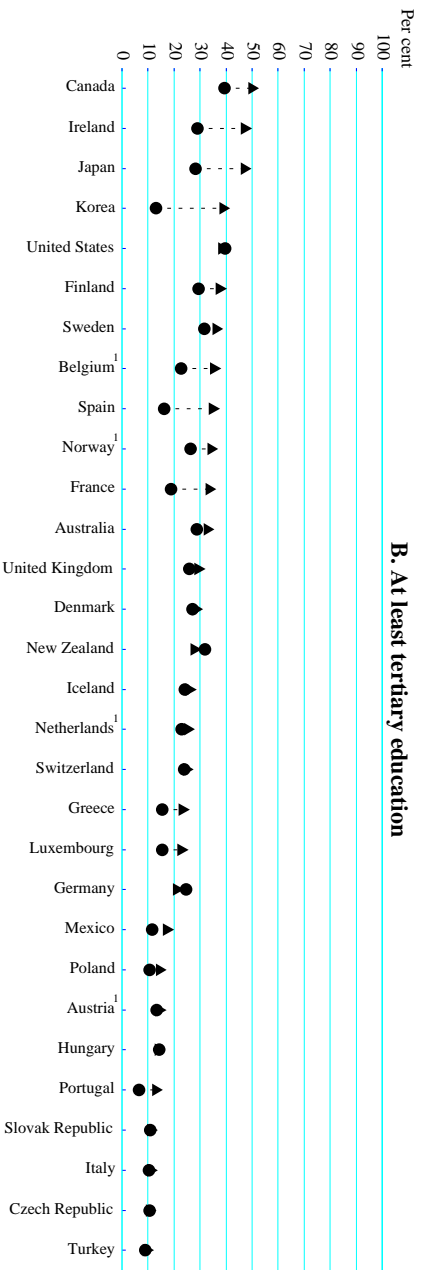
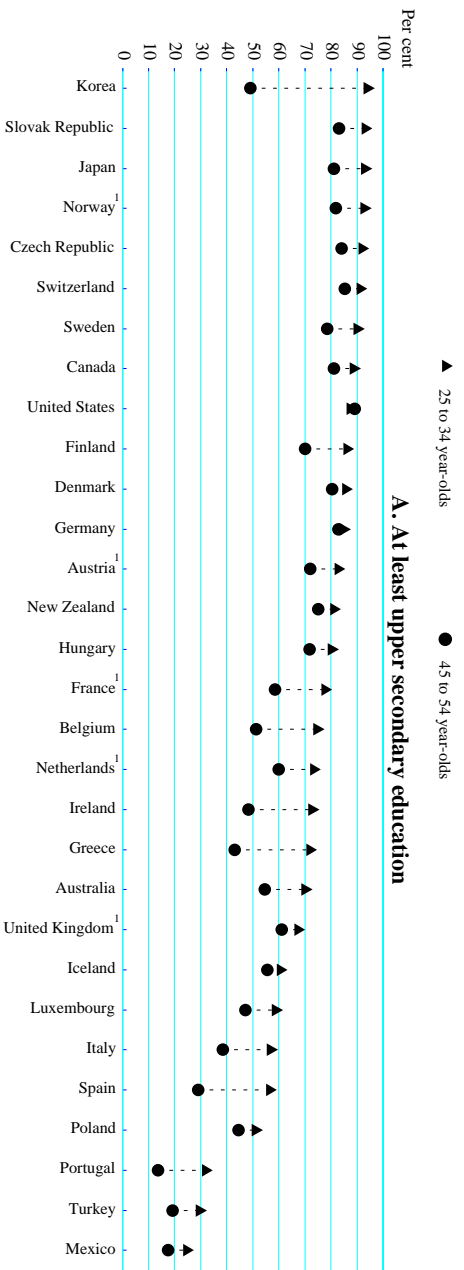


1. Average number of years of education in the population aged 15-64 years, based on data on level of education attained and assumptions about the number of years of education implied by different levels of education attainment.

2. West Germany in 1970.

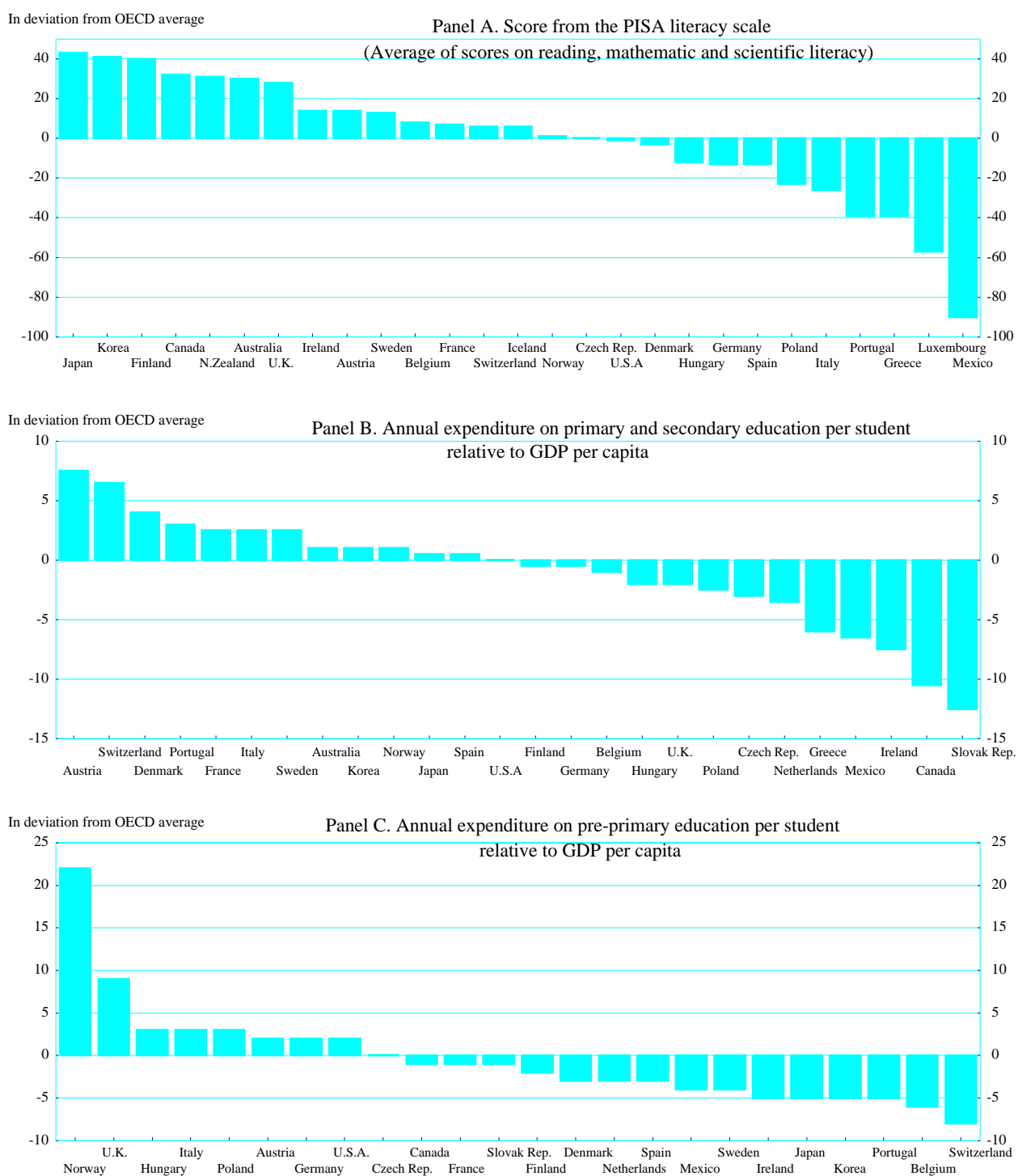
Source: OECD.

**Figure 20. Percentage of the population that has attained a certain level of education, 2001**  
By age group



<sup>1</sup>. Year of reference 2000.  
Source: OECD.

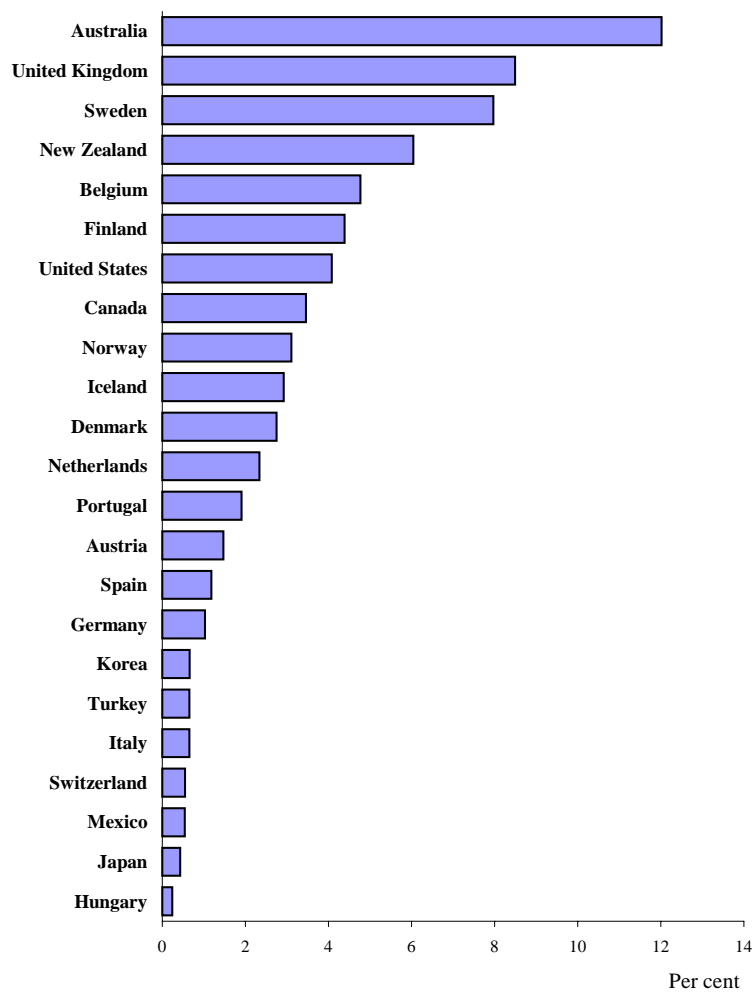
**Figure 21. Educational performance of 15 year-olds and spending on education**



Sources: OECD, Education Policy Analysis, 2002, and Knowledge and skills for life, PISA, 2001.

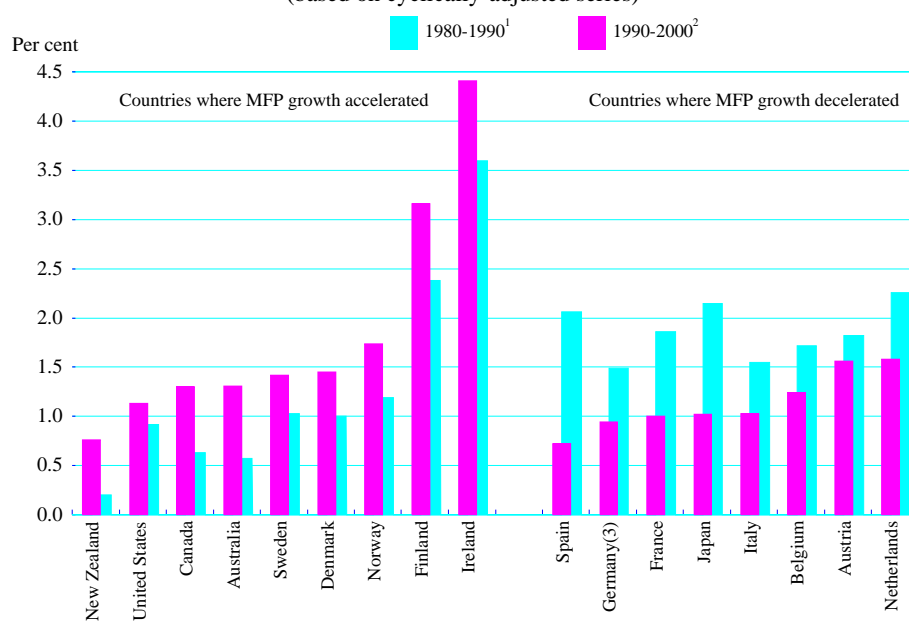
Figure 22. **Adult share of total enrolments in formal education, 1998**

Number of enrollees aged 35 and over, divided by number of total enrollees



Source: OECD (2001).

**Figure 23. Multi-factor productivity growth over selected periods**  
 Business sector, 1990s and 1980s  
 (based on cyclically-adjusted series)



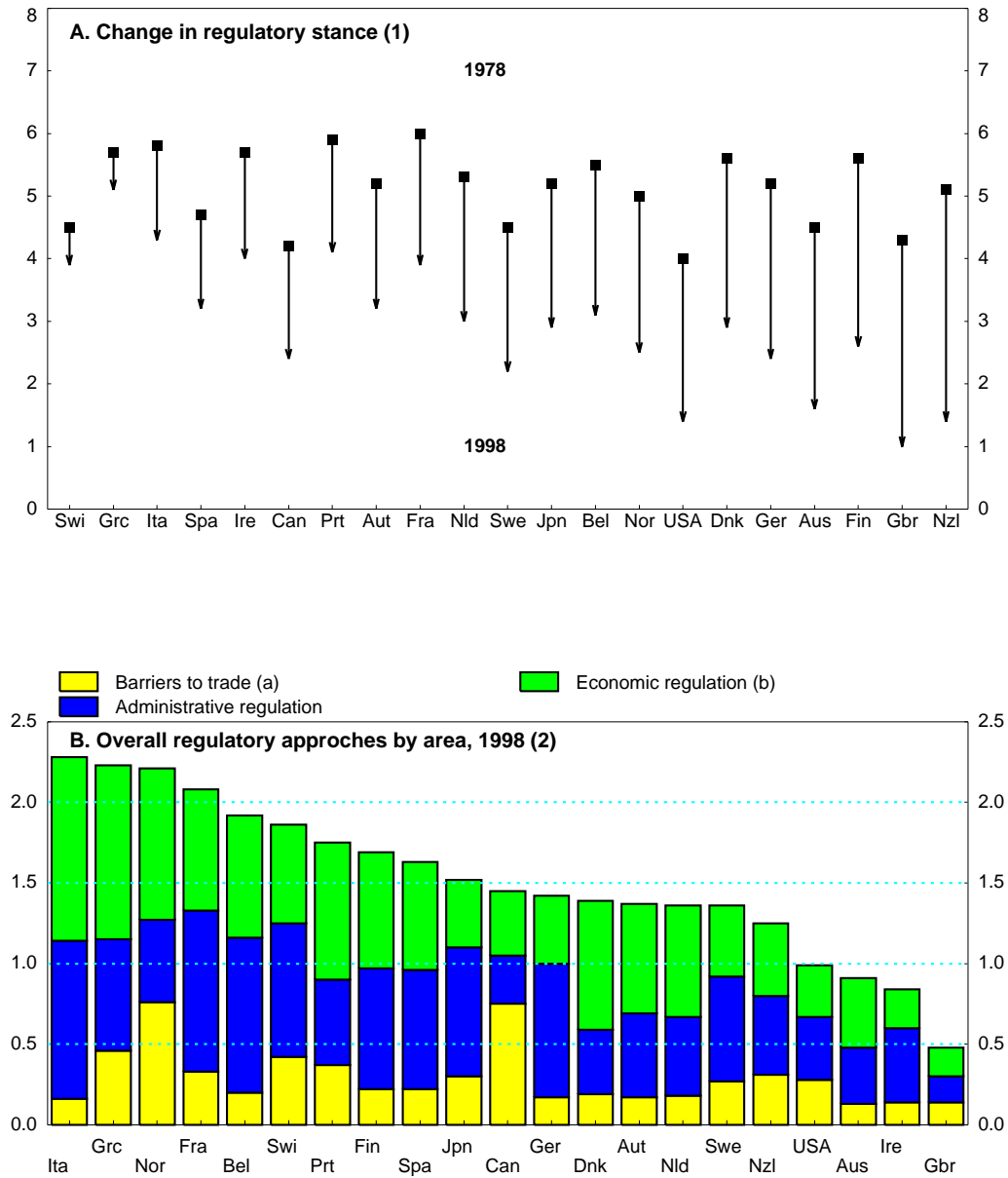
1. 1983-1990 for Belgium, Denmark and Ireland, 1985-1990 for Austria and New Zealand.

2. 1990-1996 for Ireland and Sweden, 1990-1997 for Austria, Belgium and New Zealand, 1990-1998 for Netherlands, 1990-1999 for Australia, Denmark, France, Italy, Japan and 1991-2000 for Germany.

3. West Germany before 1991.

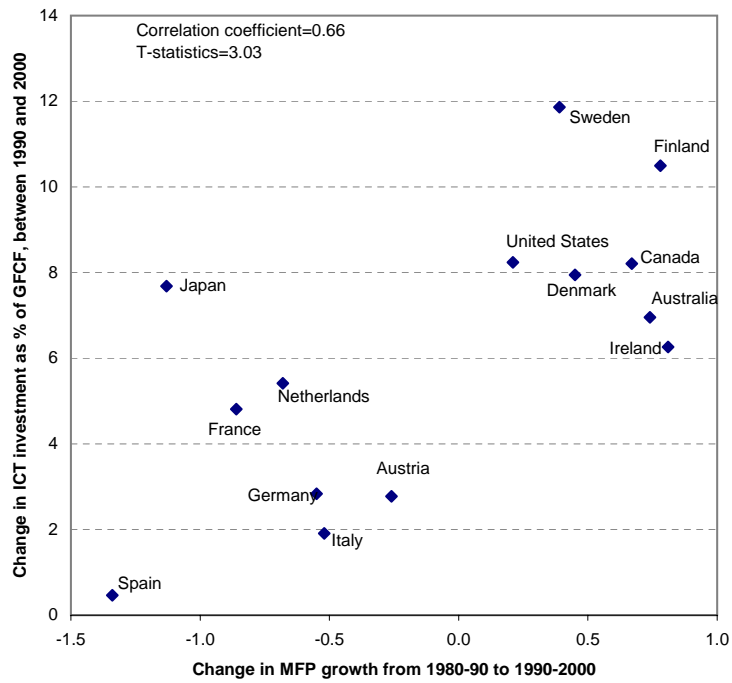
Source: OECD.

Figure 24. Indicators of product market regulation



1. Reports changes in the regulatory stance in seven non-manufacturing industries (gas, electricity, post, telecommunications, passenger air transport, railways and road freight) between 1978 and 1998. The regulatory stance is measured by a synthetic indicator ranging between 0 (least restrictive) and 6 (most restrictive).  
 2. 0-6 indicator from least to most restrictive. a) Includes trade and FDI restrictions. b) Includes barriers to competition and state control.  
 Source: Nicoletti et al. (2001).

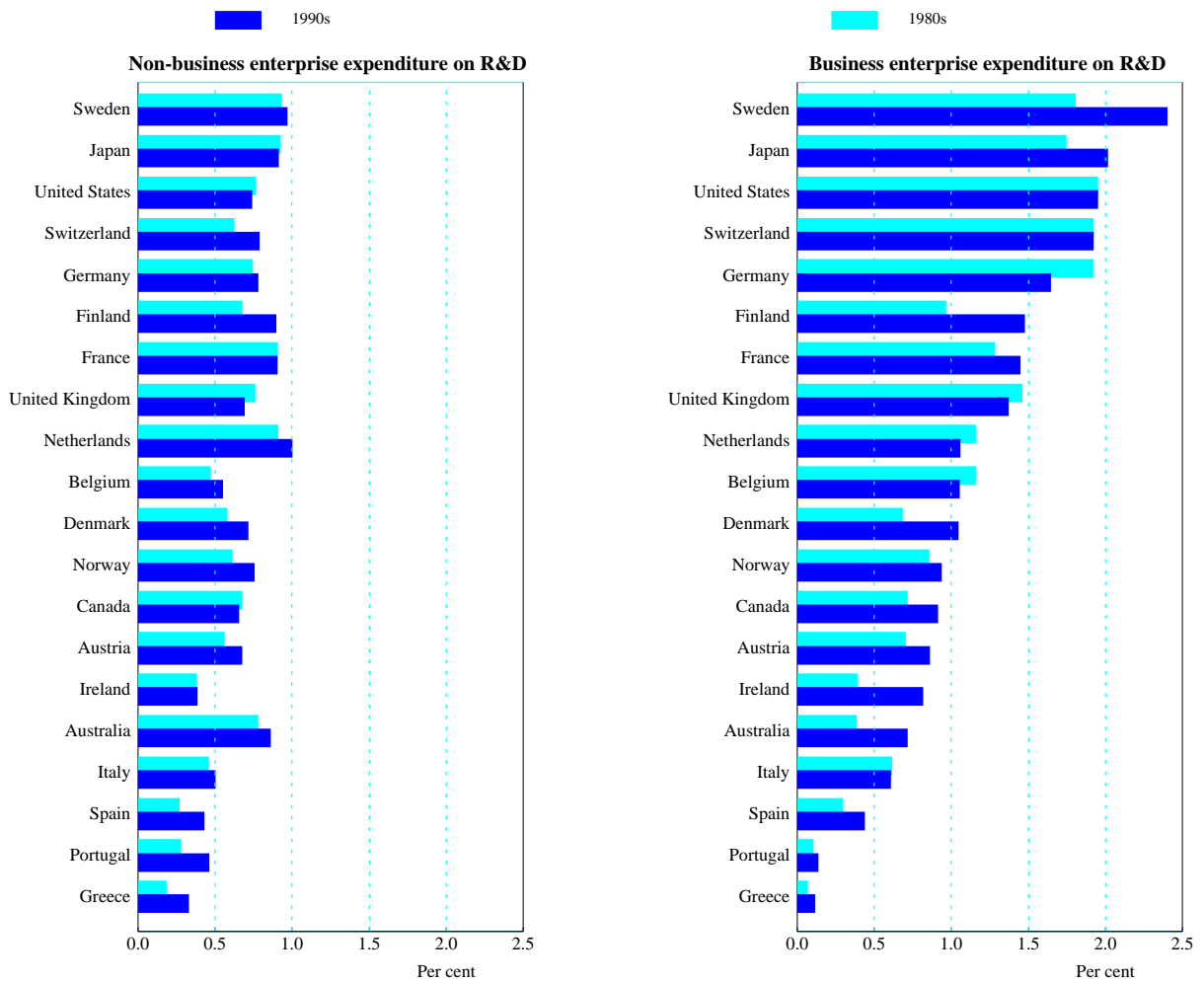
Figure 25. Pick-up in MFP growth and increase in ICT investment



Source: OECD (2003b).



**Figure 26. Expenditure on R&D in OECD countries**  
 Total expenditure on R&D as a percentage of GDP, 1980s and 1990s



Source: OECD (2003a).

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