# Taxation and Economic Performance

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TAXATION AND ECONOMIC PERFORMANCE


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# TAXATION AND ECONOMIC PERFORMANCE

This paper reviews the theoretical and empirical literature on the effects of taxation on economic performance, adds marginally to the empirical literature, and draws conclusions for tax policy in OECD countries. Key issues covered are how, in open OECD economies, taxes may have affected economic performance via their effects on capital and labour markets, and on human capital formation. Perhaps the most important policy conclusion that emerges is that the increased integration of OECD capital markets limits the scope for using tax incentives to raise domestic savings and investment, which suggests that the tax burden in the future will have to fall increasingly on labour as the less mobile factor of production. With labour taxes having already increased sharply in recent years, contributing to a reduced demand for labour, greater labour-market flexibility is required to facilitate employers' passing labour taxes on to reductions in real wages so as to reduce labour costs; while this could reduce labour supply, such effects are likely to be relatively small given most estimates of supply elasticities.

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# FISCALITÉ ET PERFORMANCE ÉCONOMIQUE

Ce document passe en revue les études théoriques et empiriques ayant trait à l'impact de la fiscalité sur les performances économiques, les complète par quelques données empiriques et tire un certain nombre de conclusions pour la politique fiscale des pays de l'OCDE. Le question clef abordée est comment, dans des économies ouvertes comme celles des pays de l'OCDE, l'impôt a pu influer sur les performances économiques par ses effets sur les marchés de capitaux, le marché du travail et la formation de capital humain. En matière de politique économique, la conclusion la plus importante qui ressort de cette étude est peut-être que l'intégration accrue des marchés de capitaux des pays de l'OCDE limite la possibilité d'utiliser l'impôt pour stimuler l'épargne et l'investissement intérieurs. Ceci incite à penser qu'à l'avenir la charge fiscale devra de plus en plus peser sur le travail, facteur de production le moins mobile. L'impôt sur le travail s'est déjà fortement accru ces dernières années, contribuant à une réduction de la demande de travail. Une plus grande flexibilité du marché du travail s'impose donc pour faciliter la répercussion par les employeurs des impôts sur le travail par le biais de baisses des salaires réels de façon à réduire les coûts salariaux. Ceci pourrait avoir pour effet de réduire l'offre de travail, mais de façon très limitée, étant donné la plupart des estimations des élasticités de l'offre.

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# TAXATION AND ECONOMIC PERFORMANCE

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## 1. Executive summary and policy conclusions

### 1.1 Summary

1.      Many economists have sought to link the lower rates of economic growth and higher levels of unemployment in OECD countries since the mid-1970s to the general increase in the tax burden and to specific characteristics of tax systems, particularly the extent to which they interfere with incentives to save, invest and work.  Unfortunately, many important issues on the effects of taxation on economic performance remain outstanding in the theoretical and empirical literature.  This paper reviews this literature, adds marginally to the empirical evidence where feasible and appropriate, and draws conclusions for tax policy in OECD countries.  Key issues covered are how, in open OECD economies, taxes may have affected economic performance via their effects on capital and labour markets, and on human capital formation.  A complicating factor in analysing tax effects is determining who finally bears the incidence of the tax since taxes levied on a given base may end up being shifted along the production and distribution chain.  Tax shifting occurs if the price of what is taxed changes when the tax is imposed. Thus producers may be able to shift taxes on to the consumer (via higher prices), depending upon product-market conditions, or onto labour (via lower wages, including through reducing employment), depending upon labour-market conditions.  Labour may be able to shift taxes on wages and salaries to producers if labour-market conditions allow them to raise after-tax wages, or by substituting into more leisure.  Institutional differences between OECD Member countries, particularly as regards the functioning of labour markets, suggests that considerable cross-country differences of tax incidence are likely.

#### 1.1.1 Taxation, savings and investment

2.      One way that taxation may have reduced economic growth is by lowering savings and investment.  Taxation affects these aggregates mainly through its impact on the net rates of return to these activities.  In addition, taxes may affect private savings by transferring income between households with different consumption-savings patterns, by substituting public for private savings, and as a result of the interaction between household and company savings.

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3.      Reducing the net returns to saving by taxing capital income may reduce private savings, depending on whether "substitution" effects (in which households substitute between future and present consumption) dominate "income" effects (in which households target future consumption, thereby increasing savings if the return falls), although it is generally presumed that substitution effects dominate over the longer run.  Empirical studies for OECD countries have generally found it difficult to establish a statistically significant and robust role for after-tax real interest rates in estimates of savings functions.  On balance, it appears that taxing capital income reduces savings, but not by very much.  For example, results from one recent panel study of 21 OECD countries is consistent with elimination of the average capital tax rate of 40 per cent (as it exists in some countries) raising private savings by about 0.5 per cent of GDP.

4.      The increase in total taxes over the past decades may have contributed to the fall in household savings as it lowered lifetime income.  In addition, the life-cycle consumption-savings framework suggests that taxation to finance income transfers may reduce aggregate savings to the extent that the transfers are to households early in the life-cycle, at low levels of income and/or in retirement.  Similarly, the shift in taxes towards labour taxes (with the additional revenues financing social transfers, including retirement benefits) could have reduced savings, as it redistributed income from the high-saving working-age population to the older generations with low or negative savings[2].  This also reflects the fact that poorer households in OECD countries appear to face important liquidity constraints, such that virtually all income transferred to them is immediately consumed.  Thus, tax policies which seek to address equity issues, such as unequal income distribution, may conflict with policies aimed at raising private saving.  Lifetime saving will also be affected by other tax issues.  In particular, the extension of tax-financed public pension schemes in OECD countries may have led to a reduction in private savings by eliminating some of the uncertainty associated with savings for retirement.

5.      With economies becoming more open, a fall in domestic savings does not necessarily lead to a fall in investment as countries may be able to attract foreign savings through capital imports.  Also, with domestic saving and investment being less closely linked, policies aimed at increasing domestic savings may not result in the extra saving being invested domestically if rates of return are higher abroad.  However, with the OECD as a whole still being a relatively closed economy, any past tax-induced decline in household and national savings is likely to have contributed to the decline in investment in the OECD area.

6.      Taxation affects investment directly through its impact on the cost of capital (the pre-tax rate of return which the marginal investment has to earn for a given post-tax rate of return).  Assessing this effect is complicated by the fact that corporate taxation is often accompanied by partly compensating investment incentives and tax relief related to financing arrangements.  This makes the statutory corporate tax rate a poor guide to likely tax effects.  Some empirical studies of the determinants of domestic investment have found the cost of capital to be a significant influence on total physical investment (although it is usually outweighed by the importance of the growth of output), so that reducing the effective marginal tax rate should raise investment in the long term.  In particular, systematic tax effects on investment appear to be somewhat more easy to identify with respect to foreign direct investment, possibly because studies of the effects of foreign direct investment employ a greater variety of tax rates and other variables than do single-country studies of domestic investment.  In this regard, our estimates suggest that taxes may have their greatest effects on foreign direct investment that is financed out of retained earnings.  Also, shifting to a more neutral tax system for investment (by equalising marginal effective tax rates across sectors) is

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2.      Over the longer term, tax-shifting between wage taxes and consumption taxes should not affect savings as new generations adjust to the new tax mix, so that lifetime distribution of their consumption and aggregate savings are not affected.  What matters over the longer term for aggregate savings is tax effects on lifetime income.

likely to raise the efficiency of the stock of capital in the longer term. As past tax reforms affected both the level and the structure of domestic investment, it is difficult to assess their overall effects on efficiency and growth. Furthermore, in those countries where labour taxes and labour costs increased rapidly, lower *relative* capital costs may have induced a substitution from labour to capital[3].

7.      Taxes are also likely to affect the location of financial capital (corporate profits, interest and dividend earnings). There is evidence that multinational corporations show lower taxable income than domestic corporations, indicating an ability to use transfer pricing and other techniques to show that a large share of total income originated in low-tax jurisdictions, whereas losses originated in high-tax jurisdictions. In the case of individuals, the difficulties national tax authorities face in identifying the income received abroad by residents may motivate taxpayers to invest their financial savings in other countries to escape taxation in their own country. The sensitivity of financial capital to after-tax rates of return, the speed with which capital can be shifted across countries, and the distortions that may result from investment being allocated according to tax differentials rather than market forces, are important arguments in favour of greater international tax co-operation.

*1.1.2 Taxation and labour*

8.      Labour taxes, particularly for social security, have risen especially strongly in OECD countries. As a result, over 1975-95 the average effective labour-tax wedge rose from 34 to 36 per cent in the United States, 24 to 34 per cent in Japan and 47 to 53 per cent in Europe[4]. Labour taxes drive a wedge between what workers receive and what firms pay, and empirical analysis suggests that employment falls as a result, thereby lowering potential output. The extent of the fall in employment depends on labour-market institutions and the wage-bargaining framework. In countries with flexible labour markets, the taxes tend to get shifted back onto labour, reducing the take-home wage. The effect on labour supply of this lower wage appears to be empirically small for men, but appears to be significant for women, for whom tax elasticities are high. In countries with inflexible labour markets, by contrast, labour taxes tend to get shifted forward to producers, at least in the short run, and therefore reduce labour demand. This reduces employment and lowers growth if lower demand for labour is not replaced by higher demand for capital, for example if investment reacts negatively to higher costs of production. Empirical work shows that labour-demand elasticities are much higher than overall supply elasticities, so that labour taxes tend to be much more distortionary in countries where there are inflexible labour markets, and most of the tax effect falls on the demand rather than the supply of labour. The absolute level of the labour-tax burden also tends to be high in such countries.

9.      The tax reforms in OECD countries in the 1980s and 1990s, which often reduced top marginal income-tax rates and included moves toward separate taxation of spouses, mainly increased female labour supply. On the whole, however, while tax progressivity declined, the marginal tax rates of the bulk of wage-earners in most OECD countries were not reduced and actually increased at the lower end of the income scale in many instances. Some economists argue that the reduction in tax progressivity may have

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3.      Estimates of the contribution to economic growth from the different factors of production in OECD countries suggest that the contribution of capital relative to labour tends to be highest in those countries (mainly continental European) where the labour-tax wedge is highest, suggesting some substitution of labour by capital.

4.      The overall average labour-tax wedge is defined here as direct labour taxes, i.e. wage-income taxes, employer and employee social-security taxes, and indirect taxes paid out of wage income, as a proportion of total labour costs. This measure differs from the average effective tax rate on labour reported in Table 1 to the extent that it includes indirect taxes paid out of wage income.

put upward pressure on wage demand in a number of countries, as it reduced the additional tax on wage increases. Also, effective labour-tax rates are often much higher than statutory rates, especially at low income levels, because benefits are withdrawn as income increases[5]. As a result, labour supply has also been adversely affected in countries with generous social benefit schemes associated with high unemployment and high payroll taxes[6]. Indeed, total labour supply (including both participation rates and hours worked) is now far lower in Europe on average than in the United States and Japan. Generous benefits are also a major cause of inflexible wage-setting, as they raise workers' reservation wages, hence lowering labour demand and employment.

### 1.1.3 Taxation and human capital formation

10.     In recent years, the literature has given greater emphasis to the effects of taxation on human capital formation and on the link between "intangible" capital and physical capital. In particular, it is argued that taxation of physical capital may be less harmful to economic performance than generally supposed, because there may be a shift from physical capital to human capital formation. Labour taxes may also affect human capital investment. For example, if these taxes reduce the supply of labour, the utilisation of the stock of human capital declines. Furthermore, a progressive tax lowers future returns on human capital investment by more than it reduces its costs (the wage income foregone during education) and is thus likely to discourage human capital formation; accordingly, the reduction in tax progressivity in some countries should have increased investment in human capital. Furthermore, in most OECD countries corporate tax regimes generally favour intangible investment relative to physical capital, in that expenditures on such factors as education and training, and research and development receive relatively more favourable tax treatment than plant and equipment.

### 1.1.4 Total tax effects on growth

11.     Given these various effects of taxes on savings, investment (including human capital) and labour, and the possible substitution between these factors of production, attempts to quantify the overall impact of taxes on economic growth are fraught with difficulties and may only serve to illustrate the orders of magnitude involved. There are a number of studies - influenced by the new growth theories -- which have taken a "top-down" approach and attempted to assess the impact of taxes on per capita income and growth at the macro-level. Several of them purport to demonstrate a significant negative relationship between the level of the tax/GDP ratio (or the government expenditure ratio) and the growth rate of real GDP per capita, implying that high tax rates reduce economic growth. Our estimates, based on a highly simplified "top-down" approach (i.e. cross-country regression analysis), suggest that the increase in the average (weighted) tax rate of about 10 percentage points over the past 35 years may have reduced OECD annual growth rates by about ½ percentage point. Furthermore, the view has been expressed that total public expenditure could be reduced to less than 30 per cent of GDP without sacrificing much in terms of social of economic objectives (Tanzi and Schuknecht, 1996). In OECD countries, the ratio of public expenditure to GDP is now around 40 per cent and in many European countries it is between 50 and 60 per cent.

12.     The "top-down" approach has several shortcomings as a reliable basis for the assessment of tax effects on the economy. The analysis in the paper suggests that it is necessary to supplement it with a "bottom-up" approach which examines the various channels through which taxation affects economic

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5.     See OECD (1996*a*).

6.     This usually takes the form of early retirement or not looking very actively for a job while nominally unemployed. See OECD (1994*a*), Chapter 8.

growth, in particular via distortions to saving, physical and human capital formation and labour supply. Thus, in addition to the literature survey, the tax effects on economic growth were simulated by applying econometric models which incorporate these channels of transmission. While the results are model-dependent, one of the endogenous growth models finds that a cut in the tax-to-GDP ratio by 10 percentage points of GDP (accompanied by a deficit-neutral cut in transfers) may increase annual growth by ½ to 1 percentage points (a somewhat larger effect than that found by the "top-down" approach). As such simulation models do not capture the complex structural features and linkages of real world economies, these results must be viewed with caution. Nevertheless, they indicate that there may be some room for tax policy to improve economic performance.

## 1.2 Policy conclusions

13.     It is clear from the literature review and from the additional results presented here that the effects of taxes on economic performance are ambiguous in some areas and unsettled and controversial in others. Nevertheless, there would appear to be several ways in which tax policy could be adopted to improve economic performance.

### 1.2.1 Limiting or reducing the total tax burden

14.     Total taxes should be cut where it is felt that total tax distortions are particularly high. But, given the need in many countries to reduce current government deficits and to cope with the pressures on government budgets stemming from the future ageing of populations, there may be no room for any revenue losses. In fact, where raising national saving is a main target, an effective policy would be to raise it through measures aiming at increasing public saving rather than providing tax incentives to private savings as the effectiveness of the latter measures are uncertain. Higher government savings could be achieved by reductions in public expenditure, if the tax burden is not to be increased further, and if the tax burden is to be lowered spending cuts have to be larger than tax cuts.

### 1.2.2 Responding to capital-market integration

15.     With growing international mobility of both fixed investment and financial investment, there may be a need to reduce taxes on income from capital. Thus, most of the tax burden will have to fall on labour as this is the less mobile factor. Furthermore, with integrated international financial markets, increases in domestic savings (induced by lower capital income taxes if substitution effects outweigh income effects) may not lead to an increase in domestic investment: depending on the prospective returns internationally, increased savings may be invested abroad. On the other hand, reductions in effective tax rates on investment could raise domestic investment and might attract foreign savings, depending on returns available elsewhere. Furthermore, lowering statutory corporate tax rates and rates on personal capital income in countries where these are particularly high, may increase the domestic tax base as there are less incentives to shift taxable profits and capital income abroad. Thus, responding to capital-market integration may imply reducing taxes on capital income more than taxes on other income, i.e. moving away from global taxation, where one rate schedule is applied to aggregate income from different sources (the so-called Schantz-Haig-Simons principle), to a schedular tax system, where different tax rates are applied to different income sources according to different tax elasticities[7].

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7.     The link between tax competition and international capital mobility is discussed in Section 4.3.

*1.2.3 Reducing tax distortions on employment*

16.     The fact that most of the increased tax burden has fallen on labour appears to have reduced both the demand and supply of labour, particularly in continental European countries where the increase in social-security taxes has raised average labour costs significantly and where labour markets are less flexible. The most effective way to reduce the adverse impact of taxes on the demand for labour may be to facilitate employers' passing labour taxes on to reductions in the real wage so that taxes do not raise labour costs. In this regard, reforms to make labour markets more flexible would appear to have the greatest chance of reducing unemployment. While this could reduce labour supply, such effects are likely to be relatively small, given the relatively low overall elasticity of labour supply. Another option is to shift from labour taxes towards consumption taxes. But as a consumption tax is, to a large extent, a tax on labour, such a tax shift may not reduce labour costs significantly where labour markets are inflexible. Nevertheless, shifting from wage taxation to a consumption tax broadens the tax base insofar as consumption out of other income is also taxed. It would imply a windfall gain to workers if other incomes, notably transfer incomes (which are mainly financed by labour taxes), are allowed to decline in real terms so that real income is redistributed from retired (and unemployed) to working households. This would also lead to a windfall gain in household savings and increase incentives to work. While shifting the tax burden from workers to pensioners and the unemployed may raise equity concerns, it can be argued that an increasing proportion of pensioners are now relatively well off;  also, if such tax shifting increases the chances and incentives of the unemployed to get back into work, they would be better-off in the longer term.

*1.2.4 A need for fundamental tax reform?*

17.     It has been argued that the best way to improve economic performance would be to replace current wage-income and capital-income taxes by a general tax on consumption, perhaps accompanied by a green tax, or a move to an expenditure tax. This would eliminate tax distortions on intertemporal decisions (i.e. savings and investment). Indeed, most model simulations, including those included in this paper, illustrate the benefits of such tax-switching for efficiency and growth. However, the size of the effect is uncertain because current income-tax systems are often "hybrids" of income and consumption taxes[8]. Also, in any such reform many popular deductions might be retained. Thus, efficiency gains from such fundamental tax reform are likely to be smaller than those illustrated by model simulations which often adopt simplifying assumptions. Furthermore, if the revenue-neutral rate of the new consumption tax needed to be very high (which would be more likely if exemptions reduce the tax base), tax evasion would likely be a major problem. In such a case, compliance and enforcement costs could be higher than with a system with more types of tax at lower rates. It should also be considered that making significant structural changes to the tax system could involve major transitional costs which may also explain why governments hesitate to implement some of the more radical proposals of tax reform commissions.

## 2.  Overview of past tax policies

18.     While both the level and mix of taxation varies markedly between Member countries, tax measures undertaken since the early 1980s have resulted in some convergence of OECD tax systems. The

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8.     Past tax reforms did little to change this "hybridity";  while there was a tendency to increase consumption taxes, corporate income-tax reforms (which lowered tax rates and broadened the tax base by reducing depreciation allowances) often increased taxes on investment (although it reduced distortions between sectors) and lowered taxes on dividends used for consumption.

measures generally included: cuts in personal and corporate top marginal tax rates with a broadening of the tax base; increases (often substantial) in social-security contributions; more widespread use of the Value Added Tax (VAT); increases in VAT rates and broadening the VAT base. As a result of these reforms, tax systems in the OECD now look very different compared with the early 1980s, although substantial differences between countries remain.

## 2.1 Rising level of taxation

19.     From 1960 to 1980 tax revenues (including social security)[9] as a per cent of GDP increased on average in the OECD by about 5 percentage points (from around 27 per cent to 32 per cent), from 1980 to 1995 the average tax/GDP ratio continued to increase on average by 2¾ percentage points (from 32 to 34.8 per cent)[10]. The many tax reforms during this period merely slowed the rise in the tax-to-GDP ratio relative to developments in the 1960s and 1970s. The trend towards a higher tax-to-GDP ratio was most evident in Europe (with the exception of Luxembourg, the Netherlands and Norway which reduced the tax burden). In Japan, the tax ratio also rose significantly in the 1980s, although from a much lower starting point, and it declined somewhat in the first half of the 1990s. North America experienced only a moderate increase in the tax ratio and in 1995 the tax ratio was similar to that in Japan, and was about 10 percentage points lower than in Europe (see Figures 1 and 2).

**[Figure 1.  Tax levels and tax changes]**
**[Figure 2.  Trends in tax revenues]**

20.     The increase in taxes was driven by increases in public spending which were particularly sharp in the early and late 1980s and in the early 1990s. Each of these instances of fiscal expansion was followed by a brief period of consolidation, with spending levels declining somewhat as a per cent of GDP; however, on average, spending never declined to the level that existed prior to the period of increase (Figure 3). The rise in taxation generally followed a somewhat smoother pattern than that of spending. The driving forces behind higher government spending and taxes were mainly social expenditures, particularly unemployment benefits, old-age pensions, disability benefits and health-care expenditure. Public-sector wage bills and interest payments on government debt also increased in many countries. By contrast, government expenditure for infrastructure investment, education and research and development (R&D), often thought to be growth-enhancing, declined as a per cent of GDP in many countries.

**[Figure 3.  Trends in general government total outlay**s]

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9.      It could be argued that in countries where individual social-security benefits are related to individual contributions (for example, with income-related public pensions) that they are perceived as compulsory savings or insurance premiums rather than as taxes. But the relationship between individual contributions and benefits is often blurred as social-security systems include, to a large degree, redistributive elements and are therefore far from being actuarially fair insurance systems. Social-security contributions are often increased to finance higher current spending, while at the same time benefit rates may be reduced. Thus, social-security contributions may, to a large extent, be perceived as a tax and this is the treatment in this paper (and also in the OECD *Revenue Statistics*).

10.     GDP-weighted averages. Figures for 1960 are estimated on the basis of OECD *Revenue Statistics;* those for 1980 and 1995 are from Figure 2. The corresponding unweighted average tax rate increased from 26 per cent in 1960 to 36 per cent in 1980, and to almost 40.1 per cent in 1995.

*2.2 Shift towards higher taxation of labour*

21.     It is of particular economic interest to assess tax policies in terms of average effective rates of taxation on capital and labour, and on sales of goods and services.  Table 1 shows that over the past three decades, the labour tax rate, defined as the sum of wage income taxes and payroll taxes (social security-contributions) as a per cent of total labour compensation, increased the fastest in continental Europe and Scandinavia, and by much less in the United States, the United Kingdom and Australia[11]. Social-security contributions have been the fastest-growing tax revenue item for the OECD as a whole.  In 1995, these contributions accounted for about 33 per cent of total OECD tax revenue, compared with about 31 per cent in 1980 and 23 per cent in 1965.  In the majority of OECD countries (15), more revenue was raised from social security than from personal income tax.  This shift reflects the growing pressures on social-security expenditure as illustrated above.  The effective average capital tax rate (defined as personal and corporate taxes paid on capital income as a per cent of overall profits) rose at a more uniform and generally slower rate across countries, except for Japan and Finland, where it rose more strongly from low levels.  The sales tax rate (defined as value-added, sales, and excise taxes as a per cent of pre-tax consumption in VAT countries and pre-tax expenditure in other countries) rose significantly in the Scandinavian countries, moderately in Italy, the United Kingdom and Finland, and was rather stable elsewhere as the increased use of VAT tended to be offset by declines in excise taxes[12].

22.     Cross-country differences in the taxation of factors remain significant.  The United States, Japan, the United Kingdom, Canada, Australia and New Zealand all had relatively high tax rates on capital (40-50 per cent) and relatively low rates on labour (20-30 per cent), whereas continental Europe has relatively low capital-tax rates (around 25 per cent) and high labour-tax rates (35-45 per cent).  This is likely to have affected the relative rates of capital and labour intensity of production between these two groups of countries, and may have contributed to a relatively high rate of labour productivity growth in Europe and a relatively high rate of employment in the United States.  Relatively low rates of sales taxation are observed in the United States, Japan, Canada, Australia and Switzerland (4-10 per cent, compared with 15-20 per cent elsewhere).  The United States and Australia are the only OECD countries without a VAT system.

**[Table 1.  Average effective tax rates on capital, labour and sales]**

## 3.  Effects of taxation on growth ("top-down" approach)

23.     There is voluminous literature on the effects of taxes on the economy and its rate of growth.  In neo-classical economic growth models, taxation affects only the level of income but not the rate of growth (with the exception of the transition to the new level), whereas endogenous growth models suggest that taxes may affect the long-run rate of growth (see Annex 1, Technical Note B and Annex 4)[13].

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11.     The developments in statutory tax rates and tax bases are described in Annex 1, Technical Note A.

12.     The methodology used to calculate the effective tax rates shown in Table 1, based on Mendoza, Razin and Tesar (1994).  It allocates personal income-tax revenue between wage and non-wage revenue in accordance with their shares in national income.  To the extent that the structure of special credits and deductions incorporated in the personal income tax in fact deviates from these assigned weights, the estimated tax rates on capital and income may deviate from their true values.  See Ruggeri, Laroche and Vincent (1997).

13.     See also Jones, Manuelli and Rossi (1993) which merge the endogenous growth and optimal taxation literature and which find large positive growth effects from the switch to an optimal tax mix.  See also Corsetti and Roubini (1996), Lucas (1990), Pecorino (1994) and Stokey and Rebelo (1995).

24.     However, the direction of tax effects on the level and growth of income is not always clear. Taxation may, in fact, be beneficial for the economy if it provides the financial basis for the provision of public goods that improve average living standards and social welfare. More and better public goods and services may also increase the productivity of private fixed and human capital and hence increase economic growth. In addition, government transfers may reduce poverty and improve social cohesion (see Box A). On the other hand, higher taxes may increase distortions and reduce saving, investment, work incentives, living standards and economic growth. This adverse effect on economic efficiency may grow disproportionately with the increase in the tax level[14]. As the net effect of taxation on economic performance depends on the level and structure of taxation, and whether tax revenue is spent in a productive or unproductive way, the benefits and costs of taxation are difficult to disentangle empirically[15].

25.     This suggests that the assessment of particular tax increases or tax cuts should take into account the type of spending to be financed or reduced by the measure[16]. In addition, the effect of tax changes on the fiscal balance has to be taken into account. For example, a cut in taxes which is accompanied by an increase in the government deficit may lead to higher interest rates and a reduction in economic growth, while a tax cut which is accompanied by a reduction of unproductive government spending may increase growth.

26.     An attempt is made in Figure 4 to replicate some of the cross-country studies on the relationship between taxation and growth for OECD countries. This relationship is examined for three types of tax rates: an average tax rate which is equal to the tax revenue/GDP ratio, a marginal tax rate and an average direct tax rate[17]. Over the period 1980-95 all these tax rates are negatively related to the rate of growth[18]. This analysis implies that a 10 percentage point higher tax rate is accompanied by roughly ½ percentage point lower rate of growth[19].

**[Figure 4.  Tax rates and growth during the 1980s and early 1990s]**

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14.     The Ramsey rule of optimal taxation suggests that a higher level of taxation leads to a disproportionate loss in economic efficiency even if tax distortions (excess burden) of individual taxes are equalised (Ramsey, 1927; Diamond and Mirless, 1971).

15.     As Slemrod points out: "Economists are a long way from consensus on measuring either the benefits or costs of government involvement. However, even a consensus on these two questions would not settle whether the big-government era has been a mistake, because weighing the benefits against the costs inevitably involves value judgements, about which economics is mute. This said, pinning down the cost is bound to be informative in the debate, because it can then, at least qualitatively, be stacked up against the benefits" (Slemrod, 1995, p.373).

16.     For example, Westerhout and Van Sinderen (1994) note that the shift of government expenditure away from investment and towards consumption during the 1980s reduced the growth of investment, output and employment in the Netherlands.

17.     Marginal tax rates have been calculated from time-series regressions between nominal GDP and total tax revenues (similar to Easterly and Rebelo, 1993). Average direct tax rates have been calculated by weighting together the average capital income-tax rate and the average labour-tax rate (Table 1).

18.     Similar results have been achieved over the period 1970-95.

19.     Adding the initial GDP per capita to the regressions to account for convergence effects has no major effect on these results. These findings are in some contrast to those of Koster and Kormendi (1989) which examined a much larger sample of countries including OECD and non-OECD countries and found that both tax rates and initial income are significant for growth.

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Box A. **Growth and income distribution**

Governments have for decades used economic policies to redistribute income. Tax systems have often been an important redistributive instrument, though, in some cases, analysts have questioned how much redistribution actually resulted from such tax policies. In any case, statutory changes to personal income tax made during the last fifteen years have tended to make OECD tax codes less progressive. At the same time increasing share of social-security taxes has also flattened total tax schedules. Some expenditure programmes also target distributional objectives, either directly through transfers or by indirect means such as subsidisation of social services (education, health care, old-age care, etc.). The ratio of spending on social services rose in most countries over the 1980s (OECD, 1994).

The possibility that changes in earnings distributions and redistributive policies could affect aggregate growth has generated an extensive literature. Economists have proposed two mechanisms by which redistributive policies could reduce aggregate growth. First, there is the conventional argument that redistributive policies distort economic incentives and thereby lower growth. Second, Kaldor (1956, 1978) and others argue that, since a high level of savings is a prerequisite of rapid growth and the rich have a higher marginal propensity to save than the poor, policies that redistribute income from the rich to the poor would reduce savings, investment and growth.

Other arguments have been developed for a positive relationship between redistribution and growth. These sometimes emphasise the interaction between market failure and the inequality of market incomes. In the presence of capital-market failure, income redistribution policies do not necessarily distort economic activities in ways that reduce growth. Rather they may act to offset the effects of the market failure, thereby promoting growth. Some would argue, for example, that capital-market imperfections prevent poor households from borrowing to acquire human capital, even though the private and social returns to human capital investment may be high (those that can borrow against their wealth or finance education from their income are not so constrained). Redistribution toward poorer households for the purposes of increasing human capital investment may therefore be growth-enhancing. In practice, however, government intervention may not be effective. For example, Secretariat reviews of national education systems have underscored the difficulties of trying to influence education outcomes for some target populations, but have also shown that some countries are more successful than others in doing so. Thus, the key link with economic growth may be not so much in the scale of income redistribution, but in the "quality" of the redistribution.

Empirical studies on the relationship between income redistribution and growth are hampered by serious data problems. Nevertheless, the evidence that such a relationship exists is quite weak. Alesina and Rodrick (1994) and Persson and Tabellini (1994) find inequality of income to be negatively related to growth after controlling for catch-up and initial stocks of human capital and the latter (but not the former) find the effect stronger in democracies. They interpret this as support for the view that high inequality leads to growth reducing redistributive measures. However, both Persson and Tabellini (1994) and Benabou (1996) observe that there is little empirical relation between the scale of transfer payments and growth. The view that redistribution enhances growth receives support from Birdsall, Ross and Sabot (1995) who find that in East Asia low inequality of income (before taxes) increases economic growth and attribute the low inequality of income to the redistributive role of public-financed education

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27.     However, the "top-down" approach has several shortcomings as a reliable basis for the assessment of tax effects on the economy (see Box B).  In particular, tax-to-GDP ratios may be affected by statistical distortions, may not be fully comparable across countries, and are likely to be a poor proxy for tax distortions which emerge at the micro-level.  Also, tax distortions may be outweighed by other factors which affect capital or labour supply and low productivity growth (see Annex 1, Technical Note C).  In fact, although Europe and the United States recorded about the same annual average growth rates of GDP in 1960-95 (3.2 per cent), Secretariat estimates suggest that this was achieved with a different composition of factor inputs (Table 2).  The contribution from capital inputs was broadly the same in the United States and in Europe, but the contribution from labour supply was higher in the United States, and that from total factor productivity was higher in Europe.  Since unemployment was high and rising in Europe over the period, the relatively smaller contribution from labour inputs is unlikely to have reflected constraints on the supply of labour.  It may have been that higher labour taxes and less flexible labour markets in Europe reduced labour demand and encouraged a more capital-intensive production, thereby increasing labour productivity and contributing to high unemployment.  In Japan over the same period, higher average annual real GDP growth (5.4 per cent) than in the United States and Europe reflected higher contributions from capital inputs and from total factor productivity;  the low level of unemployment in Japan would be more consistent with constraints on labour supply contributing to the relatively lower contribution from labour inputs.  All this suggests that it is necessary to examine the various channels through which taxation affects economic performance, in particular via its distortions on capital and labour.

[Table 2.  Trends in selected indicators in three major OECD areas]

## 4. Taxation, saving and investment

28.     Savings and investment are essential for improving long-run economic performance.  Saving is the final constraint on investment and investment is the key link to raising productivity and economic growth.  This section examines the ways in which the higher tax burden in OECD economies over the past two decades may have adversely affected national savings and investment and, by implication, reduced economic growth.

### 4.1  How taxes affect saving

29.     There are two fundamentally different theoretical views about the prime motivation for saving.  One view sees a close link between income and consumption, with saving and investment mainly equilibrated by movements in income.  In this view, the higher tax burden in OECD countries is likely to have reduced savings mainly by having lowered after-tax current income.  In a second view, saving is seen as resulting mainly from a choice between present and future consumption.  Individuals compare their rate of time preference to the interest rate and smooth consumption over time to maximise their utility.  The interest rate is the key mechanism which equilibrates saving and investment.  In this view, the higher tax burden will also have reduced savings by lowering lifetime income and consumption, and by reducing the real rate of return on financial assets (for example, as a result of income taxes on interest earnings, corporate profits, and dividends).  In fact, the impact of changes in the rate of return from saving, and hence of taxes, is theoretically and empirically ambiguous because there are substitution effects (from future to current consumption, causing current savings to fall) and income effects (for example, if the lower net interest rate requires an increase in contributions to a defined benefit pension plan, causing current savings to rise).  If the substitution effect dominates the income effect, the interest-rate elasticity of savings will be positive so that a tax increase which lowers the net interest rate reduces savings.

*Box B.*  **Is there a negative relationship between the level of taxes and economic growth?**

Barro (1991) considers the positive role of education for human capital formation and finds a significant negative correlation between the level of government distortions (as measured by real government consumption purchases less spending on education and defence as a per cent of real GDP over the period 1970-85) and both real economic growth (averaged over the period 1960-85) and private investment.  Plosser (1992) finds a significant negative correlation between the level of taxes on income and profits (as a share of GDP) and growth of real per capita GDP.  King and Rebelo (1990) simulate changes in the income tax by applying an endogenous growth model and find that an increase from 20 per cent to 30 per cent reduces the rate of growth by 2 percentage points.  In a Solow-type neo-classical growth model, the tax effect is much smaller and the welfare loss is equivalent to a permanent drop in real consumption by only 1.6 per cent.

Levine and Renelt (1991) argue that Barro's result holds only for a very particular conditioning set and if other determinants of growth (such as, for example, exports to GDP and domestic credit growth) are included in the analysis, the government distortions variable becomes insignificant.  Agell *et al.* (1995) also conclude that the relationship between taxation (or government spending) and economic growth is not robust in OECD countries.  Similarly, Easterly and Rebelo (1993*a*) find that the level of taxes is not significant in the new growth theory-type regressions.  In their view, the reason that Barro and Plosser found significant effects is the strong positive correlation between the level of taxes (or government spending) and the initial level of income;  tax-to-GDP ratios are relatively low in poorer countries, which then start to catch up (the convergence effect).  When the initial level of income is controlled for, both Barro's and Plosser's results break down.

Slemrod (1995) finds a positive, negative or no correlation between taxes and the level of per capita income depending on specification of the parameters and the countries considered.  He finds a strong positive correlation between the level of general government tax revenue/GDP ratio and the level of real GDP per capita in time series for the United States between 1929 and 1992.  In addition, he finds a positive correlation between the level of the tax revenue/GDP ratio (or the government expenditure ratio) and the level of real GDP per capita across countries in particular when developing countries (with lower GDP per capita and lower tax rates) are included in the sample.  For OECD countries alone, Slemrod finds no obvious positive or negative relationship between the level of tax rates and the level of GDP per capita.  By looking at the relationship between changes in tax rates or expenditure ratios and growth in OECD countries, he finds a negative correlation.  He argues that in the short run, poor economic performance will trigger higher social insurance pay-outs, implying a reverse causation from income to the government and concludes that there is not much persuasive evidence that the extent of government has either a positive or a negative impact on either the level or the growth rate of per capita income.

Easterly and Rebelo (1993*a*) find that only income-tax rates have a significant negative effect on per capita growth, but no other tax measures do.  Their overall assessment of the results of such aggregate studies on taxation and growth is that taxes matter for growth, but that it is very difficult to measure tax distortions with such analysis.

Koester and Kormendi (1989) find in a cross-country analysis for the 1970s a significant negative effect of the marginal tax rates on the level of real GDP per capita, but not on the rate of growth when the latter is controlled for the initial level of income.  They suggest that holding average rates constant, a 10 percentage point decrease in marginal tax rates would increase per capita income in an average industrial country by more than 7 per cent (and in an average developing country by more than 15 per cent).  Thus, a revenue-neutral tax reform which reduces tax progressivity would raise income and lead to an upward shift in the whole growth path.  In this study, marginal tax rates are derived from time-series regressions between nominal GDP and tax revenues, while tax revenue-to-GDP ratios represent average tax rates.

30.     The empirical research on the interest elasticity of savings gives mixed and not very robust results.  A summary of some of this research for industrial countries is presented in Table 3.  Two recent studies have focused on a number of OECD countries.  Using data on 13 OECD countries, Bosworth (1993) finds a positive statistically significant interest-rate coefficient in time-series estimations in only two cases, and a negative coefficient in panel estimates.  Masson, Bayoumi and Samiei (1995) report positive interest-rate coefficients from a panel (cross-country) estimate of 21 OECD countries which suggest that an increase in real interest rates of between 4 to 6 percentage points would raise private savings by 1 per cent of GDP[20].  However, the size and significance of the interest-rate elasticities in the study were very sensitive to equation specification.  One reason that the results of recent studies may not be very robust is that financial liberalisation in many countries may have affected savings behaviour.

**[Table 3.  Empirical evidence on the relationship between savings and interest rates]**

31.     Related evidence on the interest-rate sensitivity of private savings comes from empirical work on the impact of tax-sheltered retirement savings schemes (which increase the net return on savings) on household saving.  Thus, Poterba, Venti and Wise (1996), Venti and Wise (1992) and Freeburg and Skinner (1989) conclude that in the United States most IRA savings represent a net addition to household saving.  However, this conclusion has been challenged by Gale and Scholz (1990) and Engen, Gale and Scholz (1994, 1996) who find that such savings mainly substitute for other forms of private saving[21].  In addition, if the aim is to increase not just household saving but national saving, a tax incentive must increase private saving by more than it reduces government tax revenues.  In this regard, Feldstein (1995) argues that IRAs increase personal savings, raise the corporate capital stock and, ultimately, increase corporate tax receipts.  In contrast, Engen, Gale and Scholz (1994) argue that IRAs may have contributed to lower national savings through losses in tax revenues.

32.     Taxes may also effect private savings by transferring income between households with different consumption-savings patterns, by substituting public for private savings, and as a result of the interaction of household and company savings.  Each of these mechanisms is potentially important for the level of savings in OECD countries:  there has been a significant increase in the overall tax burden;  a major shift in the (net) tax burden (taxes less transfers) from the older to younger generations;  pension schemes are mainly tax (or contribution) financed and often sheltered from taxation;  and company saving tends to be an important part of total private saving[22].

33.     The possible effects on savings of income transfers among households can be illustrated in the context of a life-cycle consumption-saving framework (Modigliani and Brumberg, 1954;  and Ando and Modigliani, 1963).  In the life-cycle, savings are low when workers are young, tend to earn less, have children, and borrow in the expectation of higher incomes later.  Savings rise later in the working life as incomes increase, children leave home, debts are repaid, and savings are needed for retirement.  Finally,

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20.     Thus, for example, for a nominal interest rate of around 6 per cent and inflation at 2 per cent, elimination of an effective 40 per cent capital-tax rate could raise private savings by around 0.5 per cent of GDP.  With a nominal interest rate of 6 per cent and a rate of inflation of 2 per cent, the real interest rate without taxes is 4 per cent;  a 40 per cent tax rate leads to a nominal interest rate after tax of 3.6 per cent and a real interest rate of 1.6 per cent.  The 2.4 percentage point increase in the real interest rate as a result of the tax cut could raise private savings by around 0.5 per cent of GDP.

21.     See also OECD (1994*b*).

22.     For example, in 1980-94 company saving averaged about 65 per cent of private saving in Spain and Sweden, 30-35 per cent in the United Kingdom, the Netherlands and Switzerland, and 20-30 per cent in the United States, Japan, France, Canada and Belgium.

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savings are run down during retirement[23].  Thus, tax policies which leave the overall tax burden unchanged, but transfer income from working families to retirees, or from "older" to "younger" working families or the unemployed, may reduce private savings in the short run, particularly if the households receiving the transfers are liquidity constrained (i.e. their incomes are low and they are insufficiently creditworthy to borrow) so that consumption is likely to rise one-for-one with the increase in income (Boadway and Wildasin, 1994).

34.     Several empirical studies (e.g. Hall, 1988;  Hall and Mishkin, 1982;  Mariger, 1986;  and Wilcox, 1989) suggest that liquidity constraints are an important determinant of private consumption and savings in OECD countries, so that income transfers might have reduced total private savings in the short run.  Also, a number of studies (Jappelli and Pagano, 1989;  and Bayoumi, 1993) suggest that the liberalisation of consumer access to bank credit may have led to a significant decline in private saving.

35.     One way that long-run equilibrium (life-cycle) savings might be restored after a tax change is through inter-generational bequests.  To the extent that such bequests reflect altruism towards one's heirs, then at the extreme -- known as the Ricardian equivalence theorem (see, for example, Barro, 1974) -- tax policies that result in inter-generational transfers, especially if they are associated with government deficits, may be completely undone by changes in bequests.  For example, a reduction in taxes in the current period (aimed, say, at stimulating private consumption) may result in the additional after-tax income being saved if households believe the tax cut will raise their future tax burden or that of their heirs, the increase in savings in the latter case being passed on to their heirs.  However, inter-generational behaviour may ensure that any decline in private savings from this motive is only temporary, as the associated later reduction in savings being likely to result in smaller involuntary bequests to future generations thereby causing them to save more out of income.

36.     Empirical studies of the private saving offset to government deficits (Ricardian equivalence effect) generally reject the hypothesis of a full offset.  Bernheim (1987) summarises much evidence for industrial countries which indicates that a unit government deficit increase would be associated with an increase in private savings of 0.4 to 0.5.  Also, Nicoletti (1992) finds that offsetting effects between private and public savings are most likely in countries with rapidly rising government debt.  A number of studies by Feldstein (e.g. 1974;  1994*ab*) suggest a direct offset between public and private savings in the case of social-security wealth in the United States.  More recently, Feldstein and Samwick (1996) find that for the United States a transition from the current pay-as-you-go social-security system to a funded system would raise private saving, while increasing real income in the long run by about 5 per cent of GDP.

37.     Household saving may also be affected by changes in the tax burden on companies.  If households, as the ultimate owners of business firms, "see through the corporate veil" and treat the retained earnings of companies as part of their own savings, they may save more when firms retain less earnings, and save less when firms increase retained earnings.  This implies that a cut in taxes on corporate retained earnings may not increase aggregate private saving by the same amount of the tax as households save less.  However, if the marginal propensity to consume among households that have substantial shareholdings is lower than that of the population at large, an increase in corporate taxation that is offset by a decrease in personal taxation could lead to a reduction in aggregate private savings.

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23.     While the life-cycle model of consumption-savings tends to dominate the literature, it is based on two strong assumptions:  that households can calculate how long they will live after retirement, and that they can calculate an optimal smoothing of lifetime consumption.  In practice, individuals face uncertain lifetimes and there is considerable empirical evidence that older people do not run down their savings very much; rather they keep their assets more or less intact to pass them on to their heirs (Kotlikoff and Summers, 1991;  Kotlikoff, 1988;  Friedman and Warshawsky, 1989;  and Bernheim, 1991).

38.    Empirical studies on the interaction between household and company savings suggests that households do adjust their savings to take account of developments with respect to companies retained earnings. Poterba (1987) finds that for the United States, a $1 increase in corporate saving increased total private saving by only about 25 cents, as households reduced their savings by 75 cents. Bosworth (1993) finds an offset coefficient for household and corporate saving of close to unity in the United States, Germany, France, Canada, Belgium and Finland[24]. Our estimates using a panel data set of five OECD countries suggest that about 60 per cent of a change in company saving (for example, by lower corporate taxes) will be offset by a change in household saving (see Box C).

39.    Although the empirical evidence is mixed, the increased tax burden in OECD economies in the past two decades may have reduced private savings available to investment, particularly by lowering lifetime incomes, reducing the returns to saving, and shifting savings between households with different savings propensities. In the first two of these cases, the effect of tax policy is likely to have been a permanent reduction in savings. In the latter case, this is less clear given the possibilities for inter-generational behaviour to affect private savings in the long run.

### 4.1.1 Tax switching and the incentive to save and invest

40.    Countries might increase the incentive to save and invest by switching to a consumption tax, or by taxing only wage income, leaving interest income exempt from taxation[25]. This would also ensure that savings and investment decisions were made on the basis of the economic merits of the alternatives, rather than the influence of the tax system. Although the rate of return to saving would be equivalent under a consumption tax and wage tax, an important distinction between the two régimes is that the former imposes a one-time tax on holders of existing wealth (see, for example, Auerbach, 1996a).

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24.    Results are also reported for the United Kingdom, Japan and Sweden which reject the hypothesis that households adjust for company savings.

25.    The way in which taxing just consumption or wages raises the incentive to save can be illustrated with a simple example taken from Slemrod and Bakija (1996). Suppose income increases by $100 and the prevailing interest rate is 10 per cent. With no taxes the choice is between consuming the $100 today or saving to have $110 to consume the following year. With a 20 per cent consumption or wage tax the choice is between consuming $80 today or $88 in the following year (in the case of the consumption tax, this is calculated as $100 plus $10 interest less $22 in consumption taxes; in the case of the wage tax it is $80 plus $8 tax-free interest), the reward for saving in both cases remaining at 10 per cent. With a 20 per cent income tax, the choice is between consuming $80 today or having $86.4 to consume the following year ($80 plus $8 interest less $1.6 tax on interest earnings), the return from saving falling to 8 per cent.

For a business, the tax base is output less depreciation (i.e. consumption plus new net investment) under an income tax, and output less gross investment under a consumption tax (or expenditure tax as it is typically called in the context of the business sector). Suppose a business earns a profit of $100, has to choose between investing in a machine with a one-year life-span at a 10 per cent return or paying out a dividend, and faces either a 20 per cent income or consumption tax. Under both tax systems the dividend payout results in a net-of-tax dividend of $80. With an income tax, taxable income after one year would be $8 ($88 in sales less $80 deduction for depreciation), leaving $86.4 ($80 plus $8 taxable income less $1.6 tax on income) to pay as a dividend, reducing the reward from investing from 10 per cent to 8 per cent. With the consumption tax, the full purchase price of the machine is deducted immediately. After one year sales are $110 and the net of tax gain is $88 ($110 minus $22), leaving the return from investing at 10 per cent, just as would have been the case in the absence of taxes.

Box C. **Private savings and the "corporate veil"**

       While most of the analysis of private saving takes place at the household level, business saving tends to be an important part of total private saving (household plus corporate) in many OECD economies. A potentially important issue for tax policy is whether households, who are the ultimate owners of firms, treat the retained earnings of firms as part of their own savings -- i.e. whether households "see through the corporate veil".  If they do, then when firms retain more earnings, households may save less by a corresponding amount.  Thus, changes in taxes on corporate earnings may not change total private savings by the same amount of the tax.  Although liquidity constraints, imperfect information to shareholders about the savings of firms, and other kinds of capital-market imperfections can limit the extent to which households actually offset the savings behaviour of firms, empirical studies (e.g. Bosworth, 1993; Poterba, 1987) tend to support the view that changes in corporate saving induce a partially offsetting change in household saving.  Using an equation similar to that employed by Poterba (1987) to test the corporate veil hypothesis on data for the United States, we test the hypothesis using a panel set of annual observations over the period 1980-93 for five OECD countries -- the United States, Japan, France, the United Kingdom and Canada.  The result was:

$$(PRS/Y) = \quad 0.2207 CON - 0.0001\ NW + 0.0007 GAP + 0.0001 SHARE65 + 0.3776 (CRE/Y) \qquad R^2 = 0.7939$$
$$\qquad\qquad (6.3858) \qquad (3.5534) \qquad (0.7035) \qquad (2.1434) \qquad\qquad (2.2370)$$

where PRS is total private saving, Y is gross domestic product, NW is net wealth, GAP is the output gap, SHARE65 is the fraction of the population over 65 years of age, and CRE is corporate retained earnings (corporate savings).  Country dummies also were included in the equation.  The result indicates that households pierce the corporate veil substantially, with each additional $1 of corporate saving raising total private saving by about 38 cents.

## 4.2  *How taxes affect domestic investment*

41.       Taxation may affect the level and allocation of domestic investment.  However, with integrated international financial markets, domestic investment is not necessarily constrained by the supply of domestic savings.  Thus, tax measures that raise the return to domestic investment may therefore raise domestic investment without a corresponding increase in domestic saving, providing foreign capital is attracted.  Correspondingly, tax measures that raise domestic savings need not result in higher domestic investment if the additional domestic savings flow abroad.  However, for the OECD as a whole, a tax-induced reduction in savings may have constrained investment owing to remaining restrictions and imperfections in international capital markets and because, until recently, the ability of non-OECD economies to absorb and provide capital may have been limited.

*4.2.1 Taxation and fixed capital*

42.     In a closed economy, savings are equal to investment and the "capital tax wedge" or marginal effective tax rate on investment (METR) reduces both savings and investment; the marginal effective tax rate reflects the difference between the pre-tax rate of the marginal investment at the level of the investor and the net return on the investment at the level of the saver. In an open economy where international financial markets are integrated, domestic saving may be different from domestic investment. In this case, there is a "world" capital market in which the interest rate is fixed independently of that in the domestic economy[26]. Thus, a tax on domestic investment would result in capital outflows to the extent that it reduced net returns from investment to below those available from investing abroad. In this case, the total capital income-tax wedge has to be decomposed into the "investment tax wedge" and the "savings tax wedge". The former reduces domestic investment by driving a wedge between the market interest rate and the pre-tax rate of return. The "savings tax wedge" (which mainly reflects the personal income tax on capital income) reduces the net return to savers below the international interest rate, which may reduce domestic savings, but may have no effect on domestic investment.

43.     In practice, the literature suggests the following with respect to the savings and domestic investment tax wedges:

−   Marginal Effective Tax Rates (METRs) vary significantly within countries which illustrates that tax systems are not neutral with respect to domestic capital allocation. Often tax systems favour investment in housing (owner-occupied housing) compared with investment in industry[27].

−   The savings tax wedge is often more important in determining the total tax wedge on capital income than the investment tax wedge (see Table 4 and Figure 5). Thus, if international mobility of capital is high, tax policies that raise savings may have little impact on investment, while tax policies aimed at raising domestic investment may be able (or have) to rely on capital imports. Although there are different views about the degree of capital mobility, it does appear to have increased over the past decades (see Box D) and is likely to increase further, particularly in Europe, after EMU is established.

−   Debt-financed business investment is generally more lightly taxed than equity-financed investment, (see Table 5 and Figure 6), mainly reflecting the fact that tax rates are lower at the level of the saver, where debt interest receipts are taxed, than at the level of the firm, where interest payments are deducted from the tax base (see King and Fullerton, 1984; Jorgenson and Landau, 1993; and OECD, 1991).

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26.     The international interest rate (and hence domestic investment) would only be affected by lower domestic savings if the country is relatively large.

27.     See, for example, the international comparison of marginal effect tax rates for business investment and housing in Jorgenson and Landau (1993). Auerbach (1996) estimates that the effective tax rate on housing investment in the United States is only around 5 per cent. The main reason is that the imputed rent and capital gains on owner-occupied housing (which is around three-quarters of total housing) are not taxed.

*Box D.* **How mobile is capital?**

In a study that spawned a vast literature, Feldstein and Horioka (1980) found that national rates of saving and investment were highly correlated in OECD countries and interpreted this as evidence that changes in domestic savings translate mostly into corresponding changes in domestic investment and not into capital flows. Later, Feldstein (1994*b*) argued that although capital is free to move among major economies, the preferences of owners and managers of capital cause most of the incremental capital that results from increased national saving to remain in the country where saving is done, mainly because of aversion to political and currency risk. If financial markets remain substantially segmented then for a typical OECD economy: a) a tax on business capital will be borne mainly by the owners of capital; b) a tax change that causes a sustained rise in domestic saving will also cause a rise in domestic investment; and c) domestic investment incentives draw little capital from abroad and only increase domestic investment to the extent that domestic saving is increased.

The Feldstein-Horioka paper involved regressing investment and saving (both as a share of GDP) for 16 OECD countries over the period 1960-74. Averaged values of the ratios were constructed for each country (in order to remove the influence of the business cycle), and a single cross-country regression estimated. However, if an open economy faces an inter-temporal budget constraint (such that the external current account must average zero over time) the use of time-average data will bias the results against capital mobility -- i.e. the offsetting changes in investment and saving over time may suggest a relationship between investment and saving that does not exist and international capital mobility may be incorrectly rejected.

In an attempt to avoid this problem, we re-estimated the investment-savings relationship using a panel set of annual observations of investment and saving ratios for 22 OECD countries. The estimated equation is of the form:

$$I_{i,t}/GDP_{i,t} = \alpha_0 + \alpha C_{1(i)} + \alpha P2_{(t)} + \beta S_{i,t}/GDP_{i,t} + \varepsilon_{it}$$

where the I, S, and GDP are investment, savings, and gross domestic product, respectively, index i represents the country, the index t represents time, and the dummy variable C(i) takes on a different value for each country, the dummy variable P(t) takes on a different value for each period. The country dummy removes fixed differences between countries (size) and the time dummy removes time-related factors common to all countries (the international business cycle). The equation was estimated by OLS the sample period 1960-94 and for the two sub-periods 1960-76 and 1977-94. The results using measures of gross investment and saving are as follows:

|          | $\alpha$ | $\beta$ | $R^2$ |
|----------|----------|---------|-------|
| 1960-94  | 0.0842   | 0.5301  | 0.76  |
|          | (7.600)  | (15.60) |       |
| 1960-76  | 0.1531   | 0.4878  | 0.76  |
|          | (9.84)   | (9.82)  |       |
| 1977-96  | 0.0946   | 0.4459  | 0.76  |
|          | (6.40)   | (4.69)  |       |

The results indicate that capital mobility is substantially higher than suggested by Feldstein and Horioka and that capital mobility has increased over time. The estimated slope coefficient $\beta$ is 0.53 for the full sample period, which declines to 0.45 for the period beginning in 1976. Results from regressions using net saving and investment are broadly similar. Thus, the results suggest that less than half of additional domestic saving remains in a typical OECD country to fund domestic investment, with the rest being added to the pool of world savings seeking the highest return. Therefore, as a practical matter, a tax policy aimed at raising investment would more usefully focus on reducing taxes on investment directly, rather than on subsidising savings.

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1. Feldstein and Horioka estimated the following equation: Ii/GDP I= $\alpha$ + $\beta$ Si/GDPi + $\varepsilon$i where I is domestic investment, GDP is gross domestic product, S is domestic saving, $\alpha$ and $\beta$ parameters and $\varepsilon$ is a stochastic error term. They argue that a classical open economy view would imply $\beta=0$, and in a closed economy $\beta=1$. A typical estimate in their paper was that $\beta=0.887$.

2. There have been several criticisms of the Feldstein-Horioka procedure, in particular: the endogeneity of national savings in the regression equation which biases upwards the coefficient on national savings in the regression equation; and the coefficient on national savings is difficult to interpret because the Feldstein-Horioka functional form is unrelated to structural models of investment which tend to explain investment as determined by the cost of capital and the expected return on investment.

- New equity-financed investment is often more highly taxed than retained earnings-financed investment, reflecting the double taxation of dividends in those countries with so-called classical corporate tax systems (i.e. where full imputation of corporate taxes is not allowed at the level of dividend receivers) and the fact that the taxation of capital gains is often low.

**[Table 4. Marginal effective tax rates on corporate earnings in nine countries]**
**[Table 5. Marginal effective tax wedge by financing and asset at the level of the firm, 1995]**

**[Figure 5. Capital income tax wedges in 1991]**
**[Figure 6. Marginal effective tax rate on corporate source income for various sources of finance]**

44.     The differences in tax treatments of the various sources of investment-financing, and the scope for firms to manage their financial structure raises the issue of which source of finance to consider for marginal investment when assessing economic effects of taxes.

45.     Shifting to a more neutral tax system (i.e. an equalisation of METRs across investment projects and sources of finance), as occurred, for example, with tax reforms in the United States, the United Kingdom and Sweden, may not lead to an immediate increase in aggregate investment (see case studies in Annex 2); in fact, investment may even fall as METRs at the corporate level rise, so that the rapidly expanding firms face a higher tax burden after tax reform. However, a level playing-field created by a neutral tax system improves the efficiency of the allocation of capital and increases the level of productivity and living standards over the longer term.

46.     While investment theory and economic analysis focuses on marginal effective tax rates, the policy debate on taxation and investment often focuses on statutory corporate tax rates. It is expected that a reduction of statutory rates would provide a stimulus to investment and growth. However, there is not always a clear relationship between "statutory" and "effective" tax rates. For example, the double taxation of corporate source income as it exists in some countries may drive a wedge between the interest rate and the pre-tax rate of return on marginal corporate investment (the "investment tax wedge") which is not visible in statutory tax rates. Similarly, if a marginal investment is financed by debt (or by new equity and there is a full imputation system of the corporate tax), the investment tax wedge would be zero, although the statutory corporate tax rate may be high. Finally, high statutory tax rates are often accompanied by such factors as favourable depreciation allowances, investment tax credits, or the favourable valuation of inventories which reduce the effective tax rate to below the statutory rate. Thus, it is clear that the statutory corporate tax rate, which is often the focus of the policy discussion, is likely to be a poor indicator of the effects of taxes on investment. (See Annex 1, Technical Note D).

47.     A number of empirical studies have been carried out to examine the impact of capital costs on actual physical investment. While many of these studies find that investment is negatively related to the costs of capital, most find that this effect is rather small relative to quantity variables, such as the growth of output in the economy. The empirical evidence is surveyed in Box E, while Table 6 provides a summary of investment interest-rate elasticities found in the key studies.

**[Table 6. Studies of the sensitivity of investment to the cost of capital]**

### *Box E.* **Capital costs and domestic investment**

While many studies find that investment is negatively related to the costs of capital, most find that the effect is small and generally less important than quantity variables. Early studies by Hall and Jorgenson (1967), and Bischoff (1971) find that investment is much more sensitive to output levels than to costs in the United States. More recent and more sophisticated studies have arrived at similar conclusions. Meese (1980) finds that the price of capital has an insignificant effect on investment, while Bernanke (1983) obtains an elasticity of current investment of only -0.2 with respect to changes in the real interest rate. Pindyck and Rotemberg (1983) find that the elasticity of the stock of capital with respect to the cost of capital is -0.13, while Morrison (1986) finds long-run price elasticities of between -0.18 and -0.15, depending on how expectations about the future are modelled. Bernstein and Nadiri (1988) and Shapiro (1986) obtain estimated long-run price elasticities of about -0.45 per cent and -0.31 per cent, respectively. In a study of business investment in seven major OECD economies Ford and Poret (1991) failed to find any significant role for the cost of capital in investment functions.

There are also a number of studies which examine the tax effects on investment directly. Broadway and Shah (1992) review a number of studies that have attempted to analyse the impact of tax incentives for investors in Brazil, Malaysia, Mexico, Korea, and the ASEAN countries as a group. They find that most of these studies conclude that the tax incentives in place did not stimulate new investment, but gave windfalls for investment that would have occurred anyway. Trela and Whalley (1991) studied the impact of the rebate of direct and indirect taxes on exports, investment tax credits, and tax holidays in Korea and find that tax policy accounted for less than one-tenth of Korea's growth over the period 1962-82. Studies of the effects on inter-state tax differentials on the location of business investment in the United States are surveyed by Wasylenko (1991), who finds that state taxes have little impact on the location of investment. For example, Carlton (1979) finds that both the combined state corporate and personal business income tax rates, as well as local property tax rates, had no significant effect on the creation either of single establishments or of branches of existing firms in three manufacturing industries in the United States between 1967 and 1971. Plaut and Pluta (1983) examine the percentage change in aggregate manufacturing employment in the 48 contiguous American states from 1967 through 1977 and find that corporate and personal income taxes had no significant effect. Bartik (1985) examines data on all new branch plants opened by *Fortune 500* firms in the 48 contiguous American states from 1972 through 1978 and finds that high corporate tax rates had a negative effect on the probability that a branch would be opened in a given state. However, using similar data as Bartik, Schmenner (1987) found that tax rates influenced only the probability that a state would appear on firms' short-lists of possible investment locations but had an insignificant effect on the ultimate selection.

### 4.3 How taxes affect international capital flows

48.      It was noted above, that in an open economy domestic investment may be different from domestic saving because domestic saving may move abroad (in search of higher returns) and foreign savings may be available to finance domestic investment.  The substantial literature on the effects of taxation on international capital flows suggests that differences in statutory tax rates will affect mainly the location of financial capital (i.e. corporate profits, interest and dividend earnings), whereas differences in effective tax rates will affect the location of foreign direct investment.  Thus, countries interested in attracting foreign financial investment (i.e. tax havens) will tend to reduce their statutory tax rates, while countries wishing to attract foreign direct investment are likely to focus more on incentives that reduce the tax base.  Also, the literature has focused on how a country's tax base may be affected adversely if there is "tax competition" to attract foreign tax bases.

#### 4.3.1 Financial capital

49.      International flows of financial capital originate mainly from corporate profits of multinational enterprises (MNEs) and from the income earned from non-resident holdings of bank deposits, bonds, shares, and other financial investments.  Many empirical studies suggest that financial capital flows are highly sensitive to tax regimes (Box F)[28].  MNEs have to partition their total income among the countries in which they operate through their branches and subsidiaries.  Companies may try to reduce their tax liabilities by shifting profits into low-tax jurisdictions and losses into high-tax jurisdictions.   One technique used by corporations for this purpose is transfer pricing, in which case tax factors are allowed to influence the setting of prices on transactions with associated enterprises.  In addition, a firm that wishes to reduce the share of its taxable income going to a particular country in which it operates, can finance the capital investment of its branch or subsidiary in that country with loans from a low-taxation country.  Other possibilities to shift profits between countries include the discretionary allocation of fixed costs (e.g. for research and development, and advertising), and royalty charges for the use of brand names and patents[29].

50.       Some indication of the relative importance of transfer pricing for taxable corporate income in the United States is given in Table 7.  The table shows taxable income as a percentage of total corporate receipts and of total corporate assets, respectively, for foreign-controlled companies operating within the United States.  The data suggest that foreign-controlled companies generally have shown lower taxable

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28.      The sensitivity of financial capital to tax regimes is a major argument against a recent proposal to implement a tax on foreign exchange trading or on short-term, cross-border bank loans (see e.g. Eichengreen, Tobin and Wyplosz, 1995).  Proponents of the tax point to the prospect of increased domestic monetary policy autonomy, increased costs of speculative attacks on fixed exchange-rate régimes and thus a reduced likelihood of an attack, and a shift in emphasis to longer-term investments rather than short-term speculative opportunities.  However, the tax would be evaded easily unless it was implemented uniformly in every country in which foreign-exchange trading can take place.  (If it were adopted by just the Group of Ten countries, for example, the taxed activities would shift to untaxed countries.)  It is also the case that it is becoming increasingly easy to create synthetic positions in derivatives markets so that taxation of "foreign exchange transactions" is not a simple matter.

29.      Ikeda (1992) and OECD (1995*a*) provide surveys of the main issues related to transfer pricing.

*Box F.* **Taxes and financial investment**

Several empirical studies suggest that financial capital flows also are sensitive to tax regimes. Bovenberg *et al.* (1990) found that bilateral flows of portfolio capital between Japan and the United States in the 1980s are explained partly by relatively higher taxes on personal savings (e.g. personal taxes on interest income) and relatively low taxes on investment (e.g. corporate taxes). Recent work by Grubert and Mutti (1991) shows that the rates of return and the profit margins for US companies operating abroad are higher in low-tax countries than in high-tax countries, which is consistent with profit shifting. Similarly, Harris *et al.* (1993) found that US companies that had subsidiaries in low-tax countries showed lower overall US tax ratios than US companies with subsidiaries in high-tax countries, which also is consistent with profit shifting. Sørensen (1992) demonstrated that the 30 per cent withholding tax imposed by the United States on the interest income of non-residents resulted in US corporations establishing financing subsidiaries in the Netherlands Antilles (whose residents were exempt from the tax under a bilateral treaty) to channel foreign funds to the United States. Also, the 10 per cent withholding tax imposed in 1989 by Germany on the interest income of residents and non-residents was abolished after just a few months in the face of a substantial flight of assets to financial intermediaries based in Luxembourg. Finally, Huizinga (1996) found that withholding taxes in the LDC loan market resulted in at least a partial mark-up of pre-tax interest rates.

income than US-controlled companies, indicating that profits are being shifted out of the United States, possibly by transfer pricing[30].

### [Table 7. United States: Taxable income reported by foreign-controlled (FCC) and other US domestic (OUSD) companies, 1981-1990]

51.     Income from financial investments (mainly in the form of interest and dividends) is generally taxed according to the residence principle, although many countries withhold some taxes on payments made to non-residents (Table 8). The difficulties national tax authorities face in identifying the income of residents received abroad may motivate taxpayers to invest their financial savings in other countries to escape taxation in their own country. Also, the existence of countries with low or no taxes on foreign-source capital income -- so-called "tax havens" -- provides a convenient "tax address", and thus a convenient tax residence for taxpayers who wish to reduce their tax liabilities.

### [Table 8. Taxes withheld on incomes paid to non-residents, 1993]

52.     Given the sensitivity of financial capital to after-tax rates of return and the speed with which financial capital can be shifted across countries, it is not surprising that increasing attention is being

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30.     There may be other explanations for the profits differential, however, including: the possibility that foreign companies have higher start-up costs; that being new they have lower profits in their earlier years; and that their share of taxable income in total assets is reduced because the book value of their capital assets is higher, having been installed more recently (Grubert, Goodspeed and Swenson, 1993).

focused on levelling the tax field internationally (see, for example, Tanzi, 1995 and 1996)[31]. The liberalisation of international capital movements in many countries means that such flows will more quickly equate after-tax rates of return. If taxes are not harmonised, there is likely to be excessive investment in countries with lower effective tax rates, thereby reducing the efficiency with which world capital is allocated. The issue would appear to be particularly pressing in the case of member countries of the European Union intent on moving to a single currency before the end of the present decade.

*4.3.2 Foreign direct investment*

53.     Foreign direct investment is mainly affected by effective tax rates. Assessing effective tax rates is complicated given the alternative sources of financing and the different characteristics of national tax systems involved -- the tax regimes in the country where the investment takes place (source country); the country where the parent company is located (residence country); and the country where funds are raised (which could also be in a third country). The OECD has developed an approach to measure tax effects on foreign direct investment (FDI) (OECD, 1991) under different assumptions regarding capital mobility. A summary of the results is presented in Table 9. The first two columns of the table give the required rate of return on a domestic investment and the other columns give the rates of return required from investment by a domestic company abroad (outward investment) and by investors from other OECD countries in the named country (inward investment). The results show that:

- The tax effects on domestic and foreign direct investment (as reflected by differences in required rates of return from the assumed real interest rate of 5 per cent) depend on the way investment is financed. For example, when domestic investment is financed by retained earnings, taxes are more distortionary than when investment is, at least partially, financed by new equity and debt, a result also cited in the studies discussed in Box F. Furthermore, financing foreign direct investment by retained earnings in the subsidiary is generally more expensive than financing by new equity or by loans from the parent company.

- Tax systems in OECD countries are generally biased in favour of domestic investment. As can be seen from comparing column B with columns C, D, E and F, the tax burden is lower if a corporation invests in its residence country rather than abroad.

- Some countries are in a better position to attract foreign investment than others. For example, the tax regime in Ireland provides a strong incentive for domestic investment compared with outward FDI, but has relatively favourable conditions for inward FDI[32].

**[Table 9.  Average real pre-tax rates of return required with a 5 per cent real interest rate]**

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31.     A related suggestion is to tax capital and labour income separately. For example, Cnossen (1995) suggests that capital income be taxed proportionately at the lowest rate of the tax on labour income. For the Netherlands he proposes a standard rate of 30 per cent on labour income and on interest income (final withholding tax at source, preferably within an EU context). The economic advisors at the German Ministry of Economics (Wissenschaftlicher Beirat) suggest taxing dividends at a rate of 30 per cent, other capital income at a rate of 15 per cent and all other personal income at rates between 10 and 30 per cent (Wissenschaftlicher Beirat, Anstehende Grosse Steuerreform, 1996).

32.     If foreign investors finance their investment in their Irish subsidiaries by retained earnings they have to earn a significantly lower return on this investment than if they invest elsewhere.

54.     Two factors make it particularly difficult to judge the responsiveness of foreign direct investment (FDI) to taxation:  the extent that multinational firms are able to reallocate taxable income (rather than investment) to the most favourable destinations (suggesting that tax rates might have little influence on investment because firms would pay little tax in the jurisdictions with high tax rates);  and governments that impose high tax rates frequently compensate firms indirectly by investment incentives such as grants, worker-training and infrastructure.  The complications involved in calculating effective tax rates also mean that firms devote resources that could be used more productively elsewhere to figuring out how "best to play the system";  with a more "level playing field", resources would be used more productively.  In a recent evaluation of the empirical literature, Hines (1996) concluded that taxation appears to exert a significant effect on the magnitude and location of FDI, with the results suggesting a unit elasticity of investment with respect to after-tax returns.  A summary of the relevant empirical literature is presented in Box G.

55.     There is some evidence that tax incentives may affect net foreign direct investment via its effect on both inward investment and outward investment (Figure 7).  But in the case of inward investment there is a positive relationship between taxation and investment only if tax rates on retained earnings are considered (upper panel of Figure 7); if it is assumed that foreign direct investment is financed equally by retained earnings, new equity and loans from the parent company, the relationship between taxation and investment breaks down (middle part of Figure 7).  This result could imply that tax rates on profit retentions are more important because most of the investment is financed by this source, or that statutory tax rates on retained earnings are important for psychological reasons for foreign investors, regardless of the structure of finance they finally choose and which determines their effective tax burden.

**[Figure 7.  Taxation and foreign direct investment]**

*4.4  How taxes affect intangible capital*

56.     Most of the literature dealing with the effects of taxation on intangible assets has focused on human capital accumulation.  Several results are worth noting:

  −   The taxation of income from physical capital may not be so harmful to economic growth because it may encourage firms or households to substitute out of physical capital into human capital formation (Heckman, 1976).  On the other hand, the taxation of human capital may not have an adverse impact on growth provided the tax is a proportional one.  This is because a proportional tax reduces the net wage - which is often both the return on and the primary cost of the investment - by the same proportion and the worker's rate of return on investment in human capital is not altered.  However, a proportional tax may lower the rate of return to human capital if the reduction in the net wage rate reduces the lifetime supply of labour, thereby reducing the rate of return on human capital by lowering its rate of utilisation.

  −   A progressive tax lowers future returns by more than it lowers current investment costs, thereby reducing the rate of return to human capital.  Therefore, progressive tax systems are likely to lower incentives to invest in human capital more than proportional tax systems do.  This suggests that the recent changes to OECD tax systems may have enhanced incentives for human capital accumulation insofar as they tended to flatten personal tax schedules.

*Box G.* **Taxes and foreign direct investment**

There have been several time-series and cross-section studies of the determinants of outward foreign direct investment (FDI), mainly looking at the activities of US corporations. Hartman (1981) estimates the responsiveness of aggregate US direct investment abroad to after-tax rates of return available in foreign countries and in the United States over the period 1965-79. For investment out of retained earnings, the study reports a positive effect of foreign after-tax rates of return (investment elasticity of 1.4) and a negative effect of domestic US after-tax rates of return (investment elasticity -0.7). Boskin and Gale (1987), using data covering 1956-84 outward FDI by US firms, concluded that a change in US tax policy sufficient to increase domestic US investment by $1 would lead to a decrease of about $0.04 in US direct investment abroad. Outside of the United States, Snoy (1975) finds evidence that intra-European FDI country flows respond negatively to higher effective corporate tax rates in the foreign host country.

Frisch and Hartman (1983) investigate the impact of host-country taxation on the cross-sectional distribution of US corporations subsidiary assets in 1972, as reported in tax returns. They pool aggregate data for 15 industries in 16 countries, reporting an elasticity of -0.3 with respect to local tax rates. Grubert and Mutti (1991) and Hines and Rice (1994) estimate the effect of national tax rates on the cross-sectional distribution of aggregate US-owned property, plant and equipment (PPE) in 1982. Grubert and Mutti analyse the distribution of PPE in manufacturing affiliates in 33 countries, reporting a -0.1 elasticity of PPE with respect to local tax rates. Hines and Rice consider the distribution of PPE in all affiliates in 73 countries, reporting that a 1 percentage point reduction in tax rates is associated with a 3 percentage point increase in PPE, corresponding to an elasticity of about -1. The higher elasticity reported by Hines and Rice probably reflects differences in the number of industries and countries (including tax havens) included in their study.

Two studies examine firm-level information on the impact of taxation on US FDI. Harris (1993) investigates whether companies whose costs of capital in the United States rose most dramatically after the passage of the Tax Reform Act of 1986 respond by investing more abroad, and he finds that firms concentrating their investment in equipment (which was particularly hard-hit by the Act) responded by expanding their investment abroad. Cummins and Hubbard (1995) estimate investment equations for foreign subsidiaries of US firms and report that taxes influence direct investment by affiliates.

A recent German study on FDI based on business surveys and regression analysis concludes that FDI is often complementary to foreign trade, although tax factors may have some impact at the margin (Köddermann and Wilhelm, 1996).

Empirical studies of how taxes affect inward foreign direct investment parallel closely in approach and results the studies of FDI abroad. The Hartman (1985) and Boskin and Gale (1987) time-series studies find that FDI financed by retained earnings responds negatively to US tax rates. Slemrod (1990) distinguishes FDI in the United States by the tax regime of its country of origin and divides foreign firms investing in the United States into investors from countries that either do not tax, or tax lightly, the US profits of their resident multinationals (Germany, France, Canada, Australia and the Netherlands), and investors from countries that do tax such profits but provide foreign tax credits for the federal and state income taxes these firms pay (Japan and the United Kingdom). However, he does not find consistent timing differences between the two groups that correspond to the incentives created by their home-country tax regimes, although high US taxes appear to discourage FDI financed by transfers of new funds.

Several studies have examined the influence of the 1986 US tax reform of FDI in the United States. Swenson (1994) analyses FDI in 18 countries over the years 1979-91 and finds that the higher US after-tax cost of capital after 1986 is correlated with greater foreign investment. However, Auerbach and Hassett (1993) find that, in acquiring American firms, investors from foreign tax credit countries do not exhibit preferences for equipment-intensive firms or industries. Finally, Collins *et al.* (1995) report that the relative tax advantages realised by Japanese and British acquirers (Japan and the United Kingdom being countries that provide foreign tax credits) are small relative to acquisition purchase prices in the period after 1986.

A number of studies examine the extent to which taxation influences the geographic distribution of foreign-owned business activity within the United States. Hines (1993) finds that the higher a state's corporate income tax rate, the higher is the share of investment that originates from firms located in countries that grant domestic tax credits for taxes paid to American states, suggesting that state taxes significantly affect the pattern of foreign direct investment; his estimates imply an elasticity of capital ownership with respect to state taxes of around 0.6. Bartik (1985) examines data on all new branch plants opened by Fortune 500 firms in the 48 contiguous American states from 1972 through 1978 and finds that high corporate tax rates had a negative effect on the probability that a branch would be opened in a given state. However, the evidence with regard to the role of state taxes in influencing inward FDI is not conclusive. Thus, studies by Carlton (1979) and Coughlin *et al.* (1991) find that state corporate and personal business income tax rates have no significant effect on plan location.

- National tax codes in many OECD countries may now favour intangible investment relative to physical capital investment following tax reforms that have reduced the highly favourable tax treatment given to plant and equipment (and hence to capital-intensive sectors), while providing tax subsidies for R&D (OECD, 1996*b*), and permitting expenses associated with human capital development and other types of intangible investment to be fully deductible.

- A shift from (proportional) labour taxes to consumption taxes which increases domestic savings and reduced interest rates will increase the attractiveness of both physical and human capital[33]. Furthermore, if the increase in capital intensity raises wages, workers will respond by increasing their lifetime supply of labour, thereby increasing the returns to human capital by increasing labour capacity utilisation. However, the shift also eliminates the implicit tax subsidy to leaving the labour market in order to study or to train, in that the government no longer pays a portion of this opportunity cost as foregone tax revenues.

### 4.5  Has taxation reduced savings and investment?

57.     In OECD economies in aggregate over the past 15 years or so, national savings have declined in relation to GDP, reflecting declines in both public and private savings. In the absence of significant inflows of capital from non-OECD countries, the decline in national savings, and high public debt levels appears to have driven up real interest rates in the OECD area to equilibrate lower savings with lower aggregate investment. With the OECD economy as a whole relatively closed to outside capital flows, raising investment requires raising public and/or private savings. The theoretical literature surveyed above suggests that increased taxation and public spending is likely to have been an important contributory factor to the fall in private savings because it reduced both the incentive to save (e.g. by reducing the rate of return to savings, providing higher public pensions) and the income stream from which savings are generated (because it increased the tax wedge on wages and salaries), and shifted the burden from the older generations (mainly pensioners) to younger generations. The empirical literature provides some support for the theory in this respect, but it remains the case that many basic empirical issues with respect to the determination of private savings are still open:  the burden of taxation rose, private savings declined, but the mechanism by which this happened is not entirely clear. This bridge between theory and empirical evidence has an important implication for the design of a policy to raise national savings, reduce real interest rates and raise investment. Given the empirical uncertainties regarding private saving, the most effective policy to raise national saving is likely to be through measures aimed at raising public saving which would have to be achieved by reductions in public expenditure if the tax burden was not to be increased further.

### 4.6  Taxation and inflation

58.     The distortions to the economy that result from taxes are exacerbated by inflation. First, changes in inflation interact with taxes to change the effective tax rate on capital gains and interest income and thus changes the real after-tax return to saving. Inflation affects mainly the nominal interest rate, leaving the real interest rate broadly unchanged, and taxes are calculated with respect to the nominal interest rate. A higher rate of inflation increases the value of tax deductions for interest payments because inflation raises the nominal interest rate, but leaves the real cost of borrowing unchanged, while lower inflation reduces the value of the tax deduction for interest payments. Changes in inflation also affect the value of tax

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33.     Many types of human capital investments made by households tend to be quite long-lived, so that the effect of lower interest rates (i.e. the lower discount rate) could be significant (Pecorino, 1994).

allowances -- for example, personal income-tax exemptions and depreciation allowances -- thereby altering the effective tax rate. At the level of the individual, an increase in the rate of inflation tends to favour investment in owner-occupied housing relative to financial investment because the boost to inflation reduces both the real after-tax cost of the former and real after-tax return from the latter. At the business level, the tax deductibility of interest payments means that inflation favours debt rather than equity financing, and may encourage firms to focus more on inventory and short-lived fixed investment.

59.     In a recent paper Feldstein (1996) tries to quantify the relative importance of these and other inflation-taxation interactions for economic growth; he finds that even with relatively small price changes the effective tax burden for households and business rises sharply as the rate of inflation rises and falls sharply as inflation declines[34]. Thus, reducing inflation also reduces the effective tax burden as well as increasing incentives to save and invest. An illustration of some of the magnitudes that might be involved at the level of the saver is given in Table 10 which shows how a hypothetical 40 per cent capital income-tax rate would have interacted with actual inflation rates and interest rates in the G7 economies in recent periods of "high" and "low" inflation. In the high-inflation period (1979-83), nominal interest rates were substantially above real rates such that a statutory 40 per cent capital income-tax rate would have translated into much higher real effective tax rates. In the low inflation period (1991-95), real and nominal interest rates were much closer together and the real effective capital income-tax rate would have more closely proximated the hypothetical statutory rate, although it would still have remained higher.

**[Table 10.  The effects of inflation with a hypothetical 40 per cent capital income-tax rate]**


**5. Taxation and labour**

60.     Labour taxes (wage income taxes and social-security contributions) now account for about half of all OECD government revenue. Such taxes influence both workers' decisions about how much labour to supply and firms' decisions about how much labour to employ. Personal income taxes and employee social-security contributions reduce the return to working, which may discourage labour supply and depress potential output. The presumed work-disincentive effects of labour taxes may be exacerbated by generous social benefits, which act as a negative tax, or subsidy, on leisure. The responsiveness of wages and employment to labour taxes depends on the institutional structure of wage bargaining, labour-market policies and the degree of competition in the product market. In the presence of labour and product-market rigidities, worker resistance to their taxes could boost wage demands, raising the labour costs of employers, while employer payroll taxes will raise labour costs directly insofar as employers are not able to offset them by lower wages. Such shifting of taxes into labour costs, in turn, lowers the demand for labour, as it lowers profitability and investment and encourages more capital-intensive forms of production. Thus, lowering the tax burden on labour while also reducing rigidities could lead to significant increases in both labour supply and demand, boosting output on the one hand and increasing employment on the other.

61.     The combined average direct and indirect tax burden on labour drives a wedge between real labour costs of employers and real incomes of workers, i.e. between the "production wage" and the "consumption wage" (Box H). Figure 8 shows the direct part this wedge, income plus social-security taxes, for the seven largest OECD countries. In most cases, the component of the wedge that has increased the most over the past decade is social-security taxes. Germany, France and Italy, with the highest direct wedges, also currently have the highest unemployment rates among the G-7 group of countries. Such data

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34.     However, King and Fullerton (1984) show that there could be a non-linear relationship between the effective tax rate and inflation, depending on the interaction of the various factors.

*Box H.*  **The labour-market tax wedge**

The taxation of any commodity drives a wedge between the supply price net of tax and the demand price gross of tax of the taxed commodity.  The resulting rise in price paid by the demander relative to the price received by the supplier prevents some mutually profitable transactions from taking place.  The full economic cost of a tax exceeds the revenue it raises because of this distortion to behaviour, termed the "excess burden" of the tax and thought to be approximately proportional to the square of the tax[1].  In the labour market, taxes drive a wedge between employers' real labour costs (real product wage) and workers' real take-home pay (real consumption wage).  Employer real labour costs equal the wage paid plus employer social security taxes and contributions to private pension plans (and in some countries to private health plans), deflated by the output price.  To arrive at workers' real take home pay, employee social-security taxes and income taxes must be deducted from wages, then deflated by the consumer price index gross of indirect taxes. Employer contributions to employee pension plans are counted as net compensation by the workers, and are tax-deductible.

If workers perceive a direct link between their contributions to social security and future benefits (pension, sickness, or unemployment), then social security schemes are viewed as insurance and employee contributions to these systems should also not be counted as part of the tax wedge but rather be viewed as an element of compensation which goes to pay the (actuarially balanced) insurance premium; they will furthermore be willing to accept wage reductions  in exchange for employer contributions.  However, this is not likely to be the case:  in most OECD countries the insurance function has been considerably weakened over the years[2]; contributions thus increasingly resemble income taxes.

The labour-market tax wedge can be calculated as the difference between the labour costs  (LC) and the consumption wage (CW), as a proportion of the former.  The consumption wage in turn equals labour cost net of all direct taxes, times 1 minus the indirect tax rate,  as the part of labour income that is not taxed directly is subject to the consumption tax:

Tax wedge   =   (LC - CW) / LC

=   LC * [1 - (1 - t1) * (1 - t2)] / LC

=   1 - (1 - t1) * (1 - t2)

where:  LC   =   wage + employers' social security tax + contribution to private pension plans
   t1   =   {employers' + employees' social security tax + income tax on wage income} / LC
   t2   =   indirect taxes / (consumption - indirect taxes)

Since LC drops out of the formula, a switch from employers' social security contribution to a contribution to private pension plans lowers t1, shrinking the wedge.  In a more general formulation for the overall labour-market wedge, which would also include the difference in the deflators used for product wage and consumption wages, the terms of trade would enter as another "tax" insofar as it creates a distinction between producer and (pre-tax) consumer prices.

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1.   See OECD (1990*a*), p. 156.  This non-linear relationship also implies that it is better to have two different taxes each with low rates than one tax with a high rate.  Also, the higher a single tax rate, the greater the likelihood of evasion as non-compliance becomes less costly.

2.   Even though unemployment, sickness, and pension benefits are generally related to contributions or income, in many countries there is no relationship between contributions at the margin and any increase in benefits which the contributor can expect to receive, as benefits may be capped or expected to be capped in the future, while general taxation is often used to supplement social security contributions in order to finance benefits.

are at best suggestive;  the next section examines in greater detail evidence for an inverse relationship between labour taxes and employment.

**[Figure 8. The direct tax wedge on labour costs]**

### 5.1 How taxes affect employment

62.     Unemployment usually implies the existence of some form of "wage-setting" behaviour reflecting the market power of employed workers[35], which interacts with labour demand to cause wages to remain above market-clearing levels[36].  Figure 9 provides a simple exposition of how taxation feeds into such a mechanism of labour-market non-clearing and expands unemployment by driving up the negotiated wage.  It may therefore be best to view the tax-employment link in terms of a two-step process:  first, how taxes affect equilibrium wages (tax shifting into wages), and second, how wages affect equilibrium employment.  As the latter question has been well-explored in other contexts, the present analysis focuses mainly on the former.

**[Figure 9.  Labour-market effects of an increase in the labour tax]**

### 5.1.1 Tax shifting into wages:  theory and evidence

63.     Figure 9 shows that the employment incidence of a tax depends entirely on the degree of "shifting forward" of the tax into producers' real labour costs, i.e. into production wages.  Such shifting forward, in turn, reflects the extent to which workers resist reductions in their real take-home pay, i.e. in consumption wages, in response to taxes:  either because they demand wage increases in response to an employee tax, or because they resist wage cuts in response to an employer tax.  The following discussion examines the various factors determining the degree of tax shifting that have been identified in the theoretical and empirical literatures.

64.     The degree of tax shifting into product wages is first and foremost likely to be inversely related to the extent of *labour-market competition*.  A low degree of competition results from rigidities such as excessive labour-market regulation (e.g. minimum wage and employment protection legislation), union bargaining power, or "insider" behaviour by employed workers, each of which stand in the way of unemployed workers being able to bid themselves into a job by working for a lower wage[37].  In terms of the analysis of Figure 9, a labour tax will push up the "wage-setting curve" to the extent that workers now require a higher product wage in order to attain a given level of consumption wage.  The extent of the response in wages depends not only on the size of the tax shock but also on the elasticities of the wage-setting and labour-demand curves.  Under competition, the wage-setting curve corresponds more closely to the true labour-supply curve (also shown in Figure 9), so that it is likely to be relatively steep or inelastic and would rise up the demand curve only to a small extent;  taxes would thus be largely borne by workers, being mainly absorbed in a lower consumption wage rather than in a higher production wage.  A

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35.     See Lindbeck (1993) for a good explanation of the various theories underlying wage-setting curves.

36.     Involuntary unemployment may also arise in the more traditional Keynesian sticky-price models and in the Lucas-type imperfect information models.

37.     "Efficiency-wage" theories would likewise explain the weakness of competitive forces in the labour market, but focus rather on the incentives facing employers to offer above market-clearing wages in order to attract qualified workers and retain their loyalty given the high costs of searching, hiring, and training.

wage-setting curve corresponding to a low-competition situation would likely be flatter or more elastic, as unions or insiders tend to put more weight on preserving incomes than on employment than would individuals. In such a case, the tax will be borne in greater part by employers in the form of a higher equilibrium product wage. Low *output-market competition* could reinforce such tax resistance, moreover. This would allow more of the tax to be shifted forward into product prices, protecting workers of the particular firm or sector from reductions in their consumption wage as they share in the "monopoly rents" of employers.

65. Empirical evidence suggests that the degree of tax-shifting varies considerably across countries in a manner that does in fact seem to be related to the nature of the underlying labour-market institutions[38]. The balance of evidence seems to suggest that tax-shifting is lower in countries where labour markets are more flexible and higher where labour markets are less flexible. For example, a study of OECD countries by Tyrväinen (1995) for the OECD *Jobs Study* finds low shifting-forward coefficients for the United States, the United Kingdom and Sweden, high shifting-forward in Canada and full (100 per cent) shifting in Germany. Other studies find intermediate levels of shifting for Sweden, (e.g. Holmlund and Kolm, 1995; and Padoa-Schioppa Kostoris, 1992), but virtually all corroborate the results for the United States and United Kingdom. Cotis *et al.* (1996) find virtually full shifting-forward of taxes for France (higher than in other studies), while Knoester and van der Windt (1987) find high tax-shifting coefficients for Italy, Australia and the Netherlands.

66. From these results, it appears that taxes have played a significantly smaller role in pushing up wages in the low tax-resistance countries, although this may also reflect the fact that tax burdens have risen relatively little in such countries; conversely, in countries showing high estimated real wage resistance, increases in tax burdens have invariably been large[39]. In France, Italy and Sweden, for example, tax wedges are estimated to have been a primary factor in real wage resistance over the past two decades (Tyrväinen, 1995). This suggests a positive relationship between the degree of wage resistance and the actual level of the tax burden and/or the magnitude of its increase, perhaps because much of the rise in tax burdens in high-tax countries has gone to finance generous social benefit schemes, which, in turn, are a major factor underpinning high real wage resistance. Insofar as high real wage resistance pushes down employment (see below), more taxes are then needed to finance non-employment, in a vicious cycle.

67. The degree of tax-shifting may also depend on which *type of labour tax* is raised. Higher employee taxes would initially be likely to reduce the after-tax consumption wage, as nominal wages may be slow to rise; in contrast, employer payroll taxes will raise the product wage of firms immediately. Lags in the wage-setting process reflect the length of wage contracts, normally one year (most European countries) to up to three years (United States and some European countries). The response to different types of employee taxes themselves may differ. For example, workers may consider their contributions to social security as insurance (pension, sickness, unemployment) and consequently do not raise their wage claims in response to an increase in their contribution rates. Also, workers may have a higher degree of "nominal wage illusion" with respect to indirect taxes, which operate through prices, as compared with direct taxes. Empirical work tends to support the theoretical predictions of different adjustment speeds, but not of intrinsic long-run differences in wage responses to different forms of taxation (the Invariance of Incidence Proposition). Tyrväinen (1995) shows that while payroll, income and consumption taxes have the same effects on wage-setting behaviour in the long run for most countries, adjustment speeds differ

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38. The evidence is reviewed in Annex 1, Technical Note E.

39. The response of wages to increases in the tax burden can be found by multiplying the tax shifting coefficient by the actual rise in the tax wedge.

considerably, with wages appearing to adjust more slowly to consumption taxes than to other taxes. Also, Knoester and van der Windt (1987) find that upward pressure from indirect taxes on real wages is much less than from equivalent income taxes or social-security contributions. Thus, there appears to be a degree of nominal wage rigidity that may benefit employers, at least for a while, in the event of an increase in consumption taxes. However, there is very little empirical evidence that employee social-security contributions have more benign effects on wage-setting than do income or consumption taxes; this may be one argument in favour of partial privatisation of social-security schemes, i.e. in order to re-establish their insurance character and thus reduce tax pressure on wages.

68.        The *treatment of benefits* also may matter for the degree of tax shifting. In bargaining models, unemployment benefits represent the fall-back position of labour, so that wage demands are influenced by the level of benefits. If both earnings and benefits are affected equally by an increase in taxes, then the wage response to taxes may actually be relatively small. That is, if unemployment benefits are indexed to the net wage, benefits would automatically decline in response to higher employee taxes, in turn weakening the union fall-back position and implying less forward shifting of taxes[40]. While there has been little formal testing of this hypothesis, it does seem to be at odds with above reported findings of high tax-shifting coefficients in countries that have indexed benefits to the net wage, such as Germany. Nevertheless, it contains some useful lessons for tax reform: when reducing labour taxes, benefits should be indexed to prices rather than net wages in order to enhance the employment response. Alternatively, complete suspension of indexing or even reductions in the generosity of benefits (e.g. replacement ratio or duration of unemployment assistance), would help to maximise the employment response[41].

69.        Another influence may arise from the *degree of centralisation or co-ordination of unions*[42]. Highly centralised or co-ordinated unions may be more likely to see the broader macroeconomic and employment implications of their wage demands, and to internalise benefits related to social-security tax increases, and thus be more willing to contain wage claims in response to an increase (often negotiated with social partners) in workers' contributions than would a number of independent but strong unions who attempt to bid up wages before the others do[43]. There is some empirical support for this hypothesis. The above reported country results suggested (for the most part) that tax resistance in Nordic countries, with highly centralised labour markets, was lower than in countries like France and Australia, with less centralised but still strong unions. Alesina and Perotti (1994) and Scarpetta (1996) have provided more direct tests of this hypothesis, and both have found that indeed the effects of labour taxation depend on the degree of centralisation of the wage-bargaining process and the co-ordination among social partners: taxes may be more distortionary in countries where wages are predominantly negotiated at the intermediate level (e.g. sectoral) and/or where co-ordination is weak as the beneficial effects of wage moderation cannot be internalised by trade unions. Both highly centralised/co-ordinated systems and decentralised systems (i.e. negotiation at the firm level) offer better results. Alesina and Perotti further show that tax resistance

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40.        This could even give rise to a *vertical* wage setting curve, i.e. if in the long-run wage equation the coefficient on benefits were the same as that with respect to taxes (Pissarides, 1996). However, the position of this vertical curve would still lie well to the left of the competitive labour-supply curve, so that equilibrium employment is lower than in the competitive solution despite the apparent "flexibility" of wages. See also Röger (1996).

41.        See OECD (1994*a*), Chapters 8 and 9.

42.        See, for example, Summers *et al*. (1993), and Calmfors and Driffill (1988).

43.        Heylen (1995) has shown that fiscal centralisation also tends to be highest in such intermediate cases, because the stronger pressures on social spending resulting from such labour-market arrangements are more easily validated by a centralised government.

in highly decentralised systems is very low (virtually nil), implying that policies which increase labour-market flexibility may also minimise the distortionary impact of any given tax level.

70.     Some authors have suggested that union wage demands may become more moderate with greater *income-tax progressivity* because the marginal (employment) cost of wage increases is raised (i.e. the incremental pay-off to nominal wage increases is smaller);  progressivity thus acts like a tax on wage increases[44].  Tyrväinen (1995), Holmlund and Kolm (1995) and Lockwood and Manning (1993) provide tests of this hypothesis and generally find that greater progressivity in income taxation tended to reduce wage claims in Japan, Italy, the United Kingdom, Finland and Sweden (though the significance of the progressivity coefficients are often weaker than those for average tax rates).  Lockwood and Manning conclude that the relatively low unemployment rates in Nordic countries may be because of their progressive tax systems rather than in spite of them, while in the United Kingdom, the big increase in earnings of high earners following the large reduction in their marginal rates had nothing to do with efficiency effects, but was rather simply the outcome of wage bargaining.  Padoa-Schioppa Kostoris (1990 and 1992), while validating the hypothesis for Germany, France and Sweden, finds that wage moderation in Italy *declined* in response to the shift to a progressive tax system in 1974 because workers were determined to maintain their real wage advantage over non-workers.  This implies that, although tax progressivity appears to reduce wage pressure in most cases, the opposite result is also possible if unions mainly target the net real wage[45].

### 5.1.2    *Tax shifting and employment*

71.     The real wage driving the demand for labour (i.e. the product wage) may diverge from that driving the supply of labour (i.e. the consumption wage) depending on the size of the tax wedge.  Whether a tax increase raises the product wage or reduces the consumption wage in turn depends largely on the degree of labour-market flexibility.  High real wage resistance in the face of a tax increase raises the product wage and reduces the demand for labour, whereas low real wage resistance reduces the consumption wage, and may reduce labour supply.  In the event that real wage resistance to a tax increase is only partial, the labour-demand effects are likely to dominate labour-supply effects because the long-run elasticity of labour demand is much higher than that for labour supply (see below).  Thus, employment is likely to fall in response to a labour-tax increase and rise in response to a tax reduction.  In the extreme case of zero real wage resistance, the decline in the consumption wage could be such that labour supply effects dominate.  In this case, the fall in employment in response to a tax increase would be reflected in a shrinkage of the labour force[46].

72.     The hypothesis of a negative tax/employment relationship can be examined more simply in terms of Figure 10, which traces the relationship between the overall (direct and indirect) tax wedge and the

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44.     See, for example, Jackman and Layard (1990), Lockwood and Manning (1993), and Calmfors (1995).

45.     High marginal tax rates tend to reduce labour supply and human capital accumulation, lowering potential output.  Therefore, the final impact of tax progressivity on employment demand remains somewhat ambiguous.

46.     A neglected factor in the analysis has been consideration of what the government does with its tax revenues.  Whereas increased spending on social transfers exacerbates the distortionary effect of taxes by shifting the supply curve for labour to the left, increased spending on human capital or infrastructure could, alternatively, raise labour productivity and push out the demand curve for labour, helping to reduce distortions.   Taxes used to retire government debt could, similarly, lower interest rates, stimulating investment and hence labour demand.

employment rate of the working-age population[47]. Panel A reveals a negative, as expected, but not statistically very significant, correlation between recent average levels of employment and taxes across 13 OECD countries. The Nordic countries have a better employment performance than would be warranted by their high tax wedges of 60 to 70 per cent, while Spain has a worse-than-expected performance in view of a relatively low (for Europe) wedge of around 40 per cent. This result reinforces the above view that non-tax factors (e.g. labour-market regulations and practices, government employment policies, migration policies) are at least as important as taxes (if not more so) in explaining cross-country differences in labour-market performance. It may also reflect that marginal tax rates affect behaviour more strongly than average rates, and these may differ significantly by income group, or that some taxes have stronger effects than others, at least in the short run.

**[Figure 10. Employment and the tax wedge]**

73.     Looking at time-series correlations between the tax wedge and hours worked within regions over the past two decades, Panel C shows a statistically significant negative correlation for Europe, but not for the United States or Japan (Panels B and D -- indeed, the correlation for the United States is perverse). Not only did the wedge rise most strongly in Europe, but also it was associated with a marked decline in employment performance, as hours worked per working-age population declined by almost 20 per cent. This, in turn, reflected both supply and demand factors, as participation rates, hours worked per employee, and employment rates all showed a declining trend (though there were marked intra-European country differences). By contrast, all three variables tended to rise in the United States. This would tend to confirm the above view that there is a direct relationship between the distortionary impact of labour taxes and the actual level of the tax burden[48].

*5.2  How taxes affect labour supply*

74.     In practice, the decision of an individual of working age to participate in the labour market occurs in two forms: whether to participate in the labour market at all and how many hours to work once working. Taxes may have important effects on both of these decisions, and the effects may differ markedly between men, married women, and lone mothers. However, the direction of these tax impacts is in theory ambiguous due to opposing "substitution" and "income" effects: a rise in the income tax lowers the price of leisure relative to work and thus discourages work effort (substitution effect); at the same time, if consumers have a targeted flow of consumption, higher income taxes reduce the disposable income of workers and necessitate an increase in work effort to recoup lost income (income effect)[49]. Thus, empirical evidence is critical in being able to predict whether cutting taxes will increase the supply of labour in the economy.

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47.     This broad measure of labour-market performance is composed of *i)* the participation rate; *ii)* the employment rate of those in the labour force; and *iii)* hours worked of employed people. It could thus be viewed as incorporating both measured unemployment and "hidden" unemployment in the form of low participation and hours worked per employee.

48.     This also reflects the Ramsey rule, i.e. that the distortionary impact of a tax rises with the square of the level of the tax. (See footnote 14 above.)

49.     The substitution effect depends on the marginal tax rate, the amount of tax taken out of the last dollar earned, while the income effect depends only on the average tax rate, the total amount of tax taken out of income. Thus, comparing two tax systems with the same average tax rate (identical income effect), the one with higher marginal rates should discourage work more because the substitution effect is necessarily larger.

*5.2.1 Women's and men's labour-supply responses*

75.     The labour-supply response to changes in taxation hinges on the elasticity of labour supply with respect to the real after-tax wage.  The main hypotheses underlying empirical research in this area are as follows:

- Men and unmarried women who are not mothers, as primary earners, have little choice about labour participation and normally work full time, so that tax considerations should have little effect on their labour supply (though not so on its *quality*;  see above discussion on human capital).

- Married women are likely to be more sensitive to the relative price between work and leisure, hence to taxation, both in their decision to work and in the number of hours worked, conditional on their husband's income, as they normally face a wider choice set[50].  Also, in countries where the basis of taxation is the household unit, the marginal tax rate applying to the first dollar earned by a secondary worker is equal to that on the last dollar earned by the primary worker (whose marginal product is likely to be higher), further increasing the price responsiveness of married women.

- Lone mothers, whose numbers are rising in OECD countries, are by definition primary earners.  Nonetheless, as they are often eligible for benefits, their participation decisions are highly sensitive to effective marginal tax rates implied by the tax-benefit system.

- All mothers, moreover, face high fixed costs connected with child care upon entering the job market, which acts like an extra tax on work and raises their overall price responsiveness.

76.     These hypotheses, which are based on high rates of male participation and low rates of female participation in the past, as well as on traditional gender roles, may be losing relevance as male participation rates have fallen and female participation rates have risen in recent years (see Figure 12 below).  Nonetheless, the female participation rate remains sufficiently below that of men, and women are still much more likely than men to work part time, that a significantly larger response by women to changes in policy remains a valid proposition -- keeping in mind that elasticities estimated on the basis of past experience may exaggerate this response[51].

77.     Table 11 shows some estimates found in the literature of the elasticity of labour supply for men and women with respect to the after-tax wage.  The estimates suggest that tax elasticities for women are generally large, around 0.5 or even higher, as substitution effects outweigh income effects, and participation elasticities are often as high as 1, though lower in the more recent studies.  Elasticities for men are negligible, or even slightly negative, as high-income effects reflecting their primary-earner status

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50.     In some countries, however, women married to unemployed men have strong incentives to quit their jobs because otherwise their husbands would not be eligible for unemployment benefits.  This phenomenon affects especially part-time working women, whose earned income cannot match the combined benefits that both spouses would be able to collect in mutual unemployment.  Married women with professional qualifications, on the other hand, are likely to be just as insensitive as men to tax or benefit considerations, and to be independent of their husbands' income, in their participation and hours worked decisions.

51.     Indeed, studies for the labour supply response of married women performed for the United States which use more recent data find smaller total wage elasticities than did earlier studies, in large part because the estimates of women' participation elasticities have declined over time.  See Table 11 below.

offset any substitution effects while participation elasticities are nil[52]. Lone mothers' income effects are much stronger than those of married women, though less strong than those of men, while substitution effects are broadly similar across both classes of women[53].

**[Table 11. Estimates of labour-supply elasticities]**

78.       However, studies also suggest that women's supply response may be uneven, as at low hours the response is large and positive (suggesting a strong substitution effect), while at the approach to full-time hours, the response drops suddenly and becomes negligible or negative (suggesting the income effect starts to dominate) producing a "backward-bending" labour supply curve. There is also evidence that female labour supply is influenced by other household income (usually that of the husband), particularly in higher-income households where the woman is the secondary income-earner[54].

*5.2.2 Impact of tax trends and reforms*

79.       In order to arrive at a total economy elasticity of labour supply, it is necessary to weight together the elasticities for men, married women and other women. The Congressional Budget Office (1996) has done this for the United States[55], using some of the estimates shown in Table 11. The result is an overall US elasticity of between 0 and 0.3 per cent. Taking the mid-point of this range suggests that a tax reduction that was sufficient to raise the after-tax wage by 10 per cent could raise the overall economy labour supply by perhaps 1½ per cent, with around half of this response coming from people joining the work force and the rest from an increase in the annual number of hours worked per person; most of the response would come from married women[56]. In Europe, where female participation is substantially lower (Figure 12 below), the supply response could be even stronger as there is more scope for the participation

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52.     The large income effects shown in Table 11 for men, especially in the case of Hausman (1981) for the United States, imply large compensated effects and correspondingly sizeable efficiency losses from taxation, though MaCurdey *et al.* (1990) suggest that this income effect is probably overestimated. In general, the lack of variation in hours worked by men leads to lack of precision in the estimates. See OECD (1995*b*), Chapter 3.

53.     The labour-supply elasticities in Table 11 show responses to changes in after-tax wages, but may underestimate the effect of pure tax changes to the extent that individuals feel they are "compensated" by better public services or higher transfers. This "budget effect" tends to counteract the income effect, thereby giving greater weight to the substitution effect. It may, in fact, imply that tax increases reduce labour supply even where the supply curve has negative slope, i.e. is backward bending (see Lindbeck, 1982).

54.     See OECD (1995*b*), pp. 45-54 for a fuller description.

55.     In the United States men account roughly for 60 per cent of the economy's total hours worked, married women who are not heads of households account for roughly 25 per cent, and unmarried women and female heads of households account for the rest.

56.     Burtless and Hausman (1978) suggest that taxes and transfer payments together may reduce total labour supply in the United States by about 5 per cent, which in the 30 per cent labour-tax rate implies an aggregate supply elasticity of around 0.12, similar to that used here. Feenberg and Rosen (1983) estimate that, for the United States, taxing working wives as individuals rather than as members of a household unit, which would substantially reduce their marginal tax rates, would lead to an increase of 5.5 per cent in total labour supplied.

effect[57]. As labour supply is a major determinant of output, potential national output would also rise according to the weight of the labour input in the production function, i.e. roughly 0.7 (labour share) times the supply increase, or by 1 per cent or more.

80.     These results suggest that all else equal, the trend rise in OECD labour taxes over the past several decades may have held down female participation in the labour force and been a dampening factor on economic growth. This adverse labour-supply effect was compounded by the fact that rising taxes went to finance greater social benefits, particularly in Europe. Moreover, in some countries (Germany, France, the Netherlands) the tax code has actually imposed higher marginal tax rates on working couples than on single-earner families earning the same income (Table 12). Ceilings to social-security contributions in many countries (Table 13) may have likewise discouraged second incomes, which are usually subject to social-security tax at the full rate, whereas the same earnings received as a pay increase by the husband will pay social-security tax at a lower rate. Even so, cross-country differences in female participation rates appear to be only weakly, and sometimes even perversely, correlated with differences in overall tax wedges (Figure 11). It is particularly surprising that the Nordic countries have the highest rates of female participation despite having also the highest tax wedges[58]. Conversely, female participation in Italy, Greece and Spain is far too low to be explained by the tax wedge. And, despite rising taxes, participation rates for women have been on a strong rising trend in OECD countries (Figure 12, Panel A), in Europe offsetting a sharp decline for men (Panel B), though this trend did accelerate following the tax reforms of the mid-1980s in the United States and Europe, and early 1990s in Japan. Thus, taxes were not the main factor driving women's participation, but may have had important effects at the margin.

**[Table 12.  Marginal tax rates of married couples with two children]**
**[Table 13.  Social security contributions]**

**[Figure 11.  The tax wedge and female labour participation rates]**
**[Figure 12.  Trends in female and male participation rates]**

81.     The 1980s income-tax reforms in the United States and a number of European countries tended to benefit upper-income earners as the top marginal tax rates were cut sharply[59]. The effects on labour supply appear to have been mainly in terms of the entry of married women into the labour force, although the higher incomes reported by both married and single upper-income taxpayers after the reforms suggests an increase in total labour supply by the upper income groups[60]. Declining inflation rates during the same

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57.     Since labour taxes account for around one-third of total compensation in the United States, the decline in taxes required to raise after-tax wages by 10 per cent would have to amount to almost 7 per cent of the wage bill, or around 4 percentage points of GDP. In Europe, as the tax wedge is higher -- more than 50 per cent on average -- the necessary tax reduction needed to achieve the same increase in after-tax wage increases would be 5 per cent of the tax bill or less than 3 per cent points of GDP.

58.     The high participation rates of women in Nordic countries could reflect both the strength of the income effects at high average tax rates, as well as subsidised child care and highly progressive tax systems combined with individual taxation (i.e. lower marginal rates on second incomes), muting the substitution effects. Participation is also high because of the access it gives to generous transfer schemes and social security, while incentive problems have been mopped up by the "employer of last resort" function of the public sector. See OECD (1996*d*), pp. 77-79.

59.     See the country case studies in Annex 2.

60.     Workers near the bottom part of the upper-income brackets may have increased their labour supply as substitution effects dominated income effects (marginal tax rates declined significantly while average tax rates declined slightly as the proportion of income subject to the top rate was small). The increase in

period reinforced the benefits of declining progressivity, as workers were less likely to be pushed into higher tax brackets due to purely nominal growth in incomes (conversely, rising inflation would raise tax distortions). The accompanying widening of the tax base through elimination of deductions or credits reduced disposable incomes, implying positive income effects for all workers, so that labour supply of lower-income workers may also have increased through this channel. In addition, some countries switched to the individual as the unit of taxation (e.g. the United Kingdom) or eliminated or narrowed the earlier tax disadvantage on working couples (France and the Netherlands), further increasing female labour supply.

*5.2.3 High effective taxation of low-income workers*

82.     The OECD tax reforms of the 1980s and 1990s did not reduce the marginal tax rates of the bulk of wage earners in most countries, who continue to pay tax at average and marginal rates at least as high as those prevailing in 1978 (Table 14). Marginal tax rates at the lower end of the income scale have actually increased in some countries, while social-security taxes, which are regressive due to contribution ceilings in many countries[61], have grown sharply. Marginal tax rates on gross labour costs, including social-security contributions have, as a result, continued to rise in a number of countries despite income-tax reforms (Table 15). Thus, the reforms have done little to address the problem of growing numbers of people not working and living on benefits, who are usually low-skill (marginal) workers most vulnerable to the high marginal effective tax rates at the bottom end of the income scale. Moreover, benefit withdrawals -- both unemployment insurance upon work entry and means-tested benefits -- combine with taxation of earned income to create extremely high marginal effective tax rates (METRs) of up to 100 per cent or more at low income levels (Table 16).

**[Table 14.  Marginal tax rates by income level]**
**[Table 15.  Marginal tax rates on gross labour costs]**
**[Table 16.  Incidence and causes of high marginal effective tax rates (METRs)]**

83.     The exceptionally high marginal effective tax rates facing those on low incomes undeniably damage work incentives[62]. The reform agenda in some countries is now turning to this problem. On the tax side, the major issues are as follows:

  – *Lowering bottom marginal tax rates*:  this would raise labour supply of lower-income workers as substitution effects are likely to outweigh income effects;  however, labour supply of upper-income workers would be likely to decline if these measures increase progressivity.

  – *Eliminating social-security contribution ceilings (eliminating regressivity of such taxes):* this would increase the tax rate levied on incomes above the current ceiling, with perhaps some adverse supply effect early on in the income schedule when substitution effects may outweigh income effects;  however, social-security rates could be reduced to maintain

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reported incomes would also be consistent with an unchanged labour supply, but less tax evasion as the result of the lower tax rates.

61.     On the other hand, benefits are normally progressive (pensions are a higher proportion of lower income workers' income than of higher income workers), tending to balance out the inequity over an individual's lifetime and perhaps attenuating the adverse labour-supply response.

62.     See OECD (1994*a*), Chapter 9 (p. 274).

revenue-neutrality which would increase labour supply of workers below current income ceilings, as well as the demand for such workers (see below).

- *Lowering social-security contribution rates:* if this is done by privatising a portion of the social-security system (i.e. replacing taxes by pension saving plans or private health insurance contributions), this could increase labour supply as contributions to private systems may not be viewed as taxes. There may be no initial demand-side response, however, if employers would still have to pay their share of the private schemes.

84. The policy response to the disincentive effects of benefits has been mainly of two kinds. First, the rate of means-tested benefit withdrawals has been reduced to try to increase the payoff to working at entry levels. Second, governments have introduced employment-conditional tax credits or benefits, such as the US Earned Income Tax Credit. These are seen as measures to stimulate work effort with lower budgetary costs than general tax cuts. These policies have had some success in stimulating job entry in some countries. However, these measures entail higher METRs in the income range where such support is phased out. In general, employment-conditional tax credits or benefits will be most effective and cost-efficient in countries with wide earnings distributions and low tax rates. Under such circumstances, they can significantly raise the family incomes of those with low incomes, without being paid to more than a minority of the population and without creating large disincentives to labour supply[63].

### 5.3 How taxes affect labour demand

85. Labour taxes alter the relative price to the firm of capital and labour, tending to induce a substitution toward capital. They also reduce profitability and output, especially of labour-intensive industries, by raising unit costs. Both effects tend to reduce the demand for labour, especially in the long run when capital stocks have had time to adjust[64]. Moreover, the effect is likely to be stronger for unskilled labour, which is more easily substituted for by capital and is probably more heavily concentrated in labour-intensive industries.

86. The magnitude of such tax impacts is captured in the elasticity of labour demand with respect to real labour cost. While the empirical research in this area has produced a wide range of estimates for many countries, Hamermesh (1993) suggests that the long-run, constant-output (i.e. substitution effects only) labour demand elasticity is around -0.3[65]. However, while the response of hours-worked demand is relatively quick (six months), large adjustment costs for employment levels (hiring, firing and training

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63. See OECD (1996*a*).

64. Falling barriers to foreign direct investment are likely to magnify the responsiveness of the capital stock, hence labour demand, to labour taxes, as firms are free to move abroad in response to rising labour costs. See Hatzius (1997).

65. With an average value of labour share ($s_L$) in developed countries of 0.7, this estimate of the elasticity of labour demand ($\eta_{LL}$) implies a value for the "elasticity of substitution" between labour and capital ($\sigma = \eta_{LL} / [1 - s_L]$) of 1, i.e. the implied production function is Cobb-Douglas. As there is ample evidence at the macro level that the Cobb-Douglas function is a satisfactory way of describing aggregate production based on capital and labour, this, in turn, provides support for the elasticity of labour demand estimates. However, Japan may be an exception to this general rule, and estimates using the OECD's INTERLINK model suggest that the elasticity of substitution is smaller than 1, so that the labour demand elasticity there is likely to be smaller (in absolute value) than -0.3.

costs) imply that adjustment lags for this form of labour demand may be as long as several years[66]. This estimate suggests that if, for example, labour taxes were to be cut sufficiently to reduce labour costs by 10 per cent -- either directly via a reduction in employer payroll taxes or indirectly via a reduction in employee taxes which would, in turn, reduce pressure on negotiated wages -- then the demand for labour would eventually go up by 3 per cent due solely to the substitution toward more labour-intensive production. On top of such factor substitution effects, the profitability increase resulting from the tax reduction is likely to further expand labour demand via increased investment[67].

87.      Another empirical regularity seems to be that capital and labour are probably price-complements in the case of skilled labour, but price-substitutes in the case of unskilled labour. Furthermore, wage-demand elasticities are found to decrease with the amount of skill embodied in labour[68]. The greater vulnerability of low-skilled workers to the factor substitution consequences of high taxes may have been exacerbated by the existence of a tax bias against lower-skill labour because of the regressive nature of social-security taxation in many OECD countries[69]. This means that such taxes represent a higher proportion of low-skill than of high-skill wages, distorting the relative price between low- and high-skill workers and inclining employers toward a high average skill to total employment ratio. Thus, removing any ceiling and reducing the tax rate would eliminate this source of bias and help to stimulate the demand for lower-skill workers.

88.      A strong degree of substitutability between labour and capital means that higher labour taxes need not dampen growth via this labour-demand channel; the same output would be produced by a more capital-intensive method and average labour productivity would be higher. On the other hand, insofar as higher labour costs drive down the demand for domestic investment, both capital and labour inputs would be lower than otherwise in the presence of labour taxes, with the level of output also lower, in line with the elasticity of demand for investment with respect to labour costs.

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66.      Such adjustment lags also appear asymmetrical with respect to the business cycle, being less rapid in the upswing than in the downswing (Hamermesh and Pfann, 1996). Adjustment lags are also found to be inversely related to the skill of workers (Hamermesh, 1993).

67.      Conversely, with a decline in capital taxation, such positive scale effects would tend to offset the adverse impact on labour demand due to factor substitution.

68.      Hamermesh (1993), *op. cit.* Hamermesh warns, however, that due to data problems (use of household survey and industry-wide data rather than micro-establishment data), and questionable treatment of wage or quantity shocks as being exogenous, these conclusions may be less firm than those about the elasticity of overall labour demand ($\eta_{LL}$).

69.      Such regressivity can be shown to be equivalent to a fixed cost, or lump-sum, element in taxation, which acts like a tax on employment that eliminates the demand for workers whose marginal productivity falls below the fixed cost barrier. The structure of any tax (T) can be formulated as the sum of a lump-sum element (a) and a proportional element (tw, where t is wage tax rate and w is wage) , i.e. $T = a + tw$. A progressive tax is equivalent to a negative "a" (employment subsidy) plus a proportional tax, i.e. as wage rises the average tax rate rises, and a regressive tax by a positive "a" (employment tax) plus a proportional tax, i.e. as wage raises the average tax rate falls; and a linear tax has $a = 0$. Under a regressive tax, therefore $a > 0$ represents a lump-sum element of labour costs, which, in turn, can be expressed as: $LC = [a + (1 + t)w]$. By the same token, a progressive tax with $a < 0$ would imply a subsidy element in labour costs which would help stimulate the demand for workers with lower marginal products. See Pissarides (1996).

### 5.4. Shifting the tax burden away from labour

89.     In some high-unemployment countries there have been calls for reducing the tax burden on labour, especially employer payroll taxes where the link to jobs is most direct, in order to help alleviate the unemployment problem. There have been proposals to fund such labour-tax reduction via increases in less distortionary taxes, notably value-added taxes or "green" taxes.

90.     Concerning a switch from labour taxes to VAT, the foregoing analysis suggests that while there would be significant short-run benefits from reducing payroll taxes in terms of reduced producer costs, the labour-demand response may be slow, and worker resistance to higher consumption taxes via higher wage claims might eventually attenuate the initial cost reduction.

91.     More sustained effects on employment might result from shifting a part of the tax burden away from workers to recipients of unearned income and social benefits. As the consumption tax base includes those who consume out of capital and transfer income as well as wage income, a net reduction in labour-tax rates is still possible so long as transfer incomes remain unindexed to any one-time increase in consumer prices resulting from the VAT rise (this would be equivalent to reducing the generosity of benefits and payroll tax rates at the same time)[70]. Such a net reduction might help to reduce wage pressure and expand employment. Insofar as the tax burden is shifted to recipients of capital income, however, investment may fall in response to the higher cost of capital, which would ultimately harm labour demand.

92.     In any event, a consumption tax is largely a tax on labour income (Auerbach, 1996*ab*). A more effective way to reduce the negative employment effects of labour taxation would be to make it easier for such costs to be passed on to workers, as would occur with greater flexibility of labour markets. Another way would be to reduce the overall tax burden via judicious reductions in government spending, in particular those which exacerbate labour-market distortions such as social spending, as discussed above.

93.     Box I discusses some of the issues involved in shifting to green taxes. It is frequently argued that shifting from labour taxes to green taxes would both raise employment and improve the environment ("double dividend"). However, while such taxes may improve the environment, the base of a green tax appears to be too small to allow much redistribution of the overall tax burden.

## 6. Results from model simulations

94.     To quantify possible effects of tax changes on economic performance, hypothetical tax measures were simulated using econometric models developed at the European Commission and the Canadian Department of Finance. The characteristics of the EC model make it particularly useful for assessing labour-market responses to tax changes, while the models of the Canadian Department of Finance are particularly suited to examining the responses of physical and human capital formation to tax changes.

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70.     There is also an implicit lump-sum tax on the existing stock of wealth resulting from an unanticipated switch to a consumption tax, as pointed out by Auerbach and Kotlikoff (1987). This, too, helps to bring about a permanent decline in the labour-tax rate.

*Box I.* **Green taxes**

Green taxes, in common with other economic instruments, can achieve environmental objectives at lower cost than traditional command-and-control measures. They are also dynamically efficient, providing a permanent incentive to reduce pollution. Finally, unlike regulations, green taxes raise revenues. Fiscal and environmental analysts have seen this as a means of financing reductions in distortionary taxes, for example on labour, to reap a "double dividend" of better economic and employment performance and an improved environment. What is the scope in OECD countries for reaping such a dividend?

The first issue in answering this question is the extent to which the environmental taxes are borne by labour. This depends on a number of factors: the impact of the country or group of countries introducing the taxes on world-wide demand for polluting products, whether border tax adjustments are possible in order to levy the appropriate tax on imports, the degree to which capital can move abroad to escape the tax, and whether capital and labour are substitutes for or complements to polluting inputs. Labour will bear some of the effect of environmental taxes, either in the form of lower consumption wages or in lower employment as polluting sectors contract or move abroad. The second issue is the extent to which cuts in labour taxes affect employment, which will -- as noted in the main text -- depend on labour-market flexibility.

A series of empirical studies have found small, positive effects of shifts from labour to green taxes. For example, the European Commission (1994) shows a 0.4 per cent short-term and 1 per cent medium-term increase in GDP from a US$10 per barrel of oil carbon/energy tax. Standaert (1992) found a 0.1 per cent reduction in GDP, and a 0.5 per cent increase in unemployment for four European economies. Shackleton's (1992) survey of results from four US models finds conflicting results, with some showing short-term reductions in GDP and some increases. The Norwegian Ministry of Finance finds that shifting to green taxes (by the amount of 1 per cent of GDP) reduced pollution significantly. The effect on total employment is small, but positive. In most cases, total employment increases in the order of magnitude of 0.5 per cent in the medium term, compared to a reference scenario. The rate of unemployment in most cases declines by 0.1-0.3 percentage points. In contrast with these positive results, Rotemberg and Woodford (1994) look at the output and employment impacts of an energy tax and find that negative effects are amplified by imperfect competition in product markets.

These modelling exercises generally assume that the revenues raised by green taxes are available to cut other taxes, and not taken in, for example, higher transfer payments to compensate for the green tax. Important feedback mechanisms, such as factor mobility, are very difficult to model. There are many grounds for interpreting these results with caution. For these reasons, the OECD *Jobs Study* (1994*a*) concluded that "the most appropriate view of the effects of a shift in labour taxes to energy taxes is that they are likely to be small and of indeterminate sign". Nevertheless, green taxes may be effective and efficient instruments for environmental protection (see OECD, 1996*c*).

*6.1 Simulations by the EC Commission*

95.      A set of simulations was run using the Commission's QUEST model[71]. The simulations explore the impacts of tax experiments on a variety of economic variables (output growth, employment growth, etc.) for the United States, Japan and the EU countries. The simulations involve 1 per cent of GDP cuts in the corporate tax, labour taxes and value-added or consumption taxes. The scenarios differ from one another in terms of how the tax cuts are financed[72]. According to these simulations, tax reductions that are accompanied by cuts in spending can be quite powerful in raising income and employment. In general, a reduction in corporate income tax gives the largest output effects, a reduction in labour taxes has the largest effect on employment, while a reduction of consumption taxes has the smallest effects. When labour income tax is reduced, GDP rises by 3.7 per cent in the United States, 2 per cent in the EU and 0.7 per cent in Japan (Table 17). The reduction in transfer spending and unemployment benefits in particular has a significant effect on employment, as it lowers the reservation wage. Even when corporate taxes are reduced, employment unambiguously increases and this is accompanied by a rise in real wages. When labour income taxes are reduced, this leads to an additional boost to employment. A reduction in consumption taxes increases consumer spending and leads to an increase in consumer prices, but the effect on output is smaller than under a direct tax reduction. Three tax-shifting experiments are also considered. The consumption tax is generally shown to be the least distortionary type of tax. Thus, the shift into consumption taxes and away from both labour and corporate taxes is shown to enhance prospects for output growth creation. The employment impact of a shift into consumption tax depends on whether the shift is out of labour taxes (in which case the employment impact is always positive) or out of corporate taxes (in which case the employment impact is negative in Europe[73]).

**[Table 17. Economic effects of tax changes:   results of model simulations]**

*6.2 Simulations by the Canadian Department of Finance*

96.      Tax-reform measures were simulated by applying three different models, a neo-classical growth model for Canada and two endogenous growth models which were calibrated using tax and government spending data for France, Canada and Sweden as provided by the Secretariat[74]. In the neo-classical model capital taxes are much more distortionary than either wage or sales taxes because investment is the main engine to growth. Sales taxes are the least distorting type of tax, although not much less than labour-income taxes. In this model reductions in capital, labour and sales taxes by 1 per cent of GDP combined with transfer reductions that maintain deficit-neutrality lead to higher income levels in all

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71.      We are grateful to Werner Röger, DGII, European Commission, for providing these simulations. See European Commission (1996) and Röger (1996) for descriptions of the model.

72.      The four scenarios are:  1) the tax cuts are financed by an equivalent reduction in transfer spending;  2) the tax cuts are financed by an equivalent cut in government consumption;  3) the cuts are financed by an equivalent cut in all government spending;  4) the cuts take place without being financed by a spending cut.

73.      This is because the increase in the consumption tax feeds into wages via indexing of unemployment benefits (which increases the reservation wage).

74.      We are grateful to Stephen James, Jing Xu and Marcel Mérette of the Department of Finance, Canada, for providing these simulations. For a description of the neo-classical growth model, see James (1994*a* and 1994*b*), and James and Matier (1995);  for a description of the two endogenous growth models, see Mérette (1996 and 1997) and Xu (1996 and 1997).

three cases with the biggest effect being in the case of capital tax reduction. The reduction in the capital-income tax reduces the user cost of capital and raises after-tax return. The boost in investment and the capital stock raise labour productivity and the real wage. This also causes a rise in labour supply. The reduction of labour-income tax and sales tax raises the after-tax real wage and labour supply.

97.     In the two endogenous growth models the tax effects on economic growth are generally small, but not negligible. In one of the models (Xu, 1996 and 1997), a tax reduction by 1 per cent of GDP accompanied by a similar cut in transfers to guarantee deficit-neutrality increases annual growth of GDP only by between roughly one-half and one decimal point[75]. But permanent growth-rate effects of this size are nevertheless significant given that they imply ever-compounding effects on the level of output. Also, applying these findings to the increase of about 10 percentage points in the OECD tax-to-GDP ratio (weighted average) that has occurred since 1960 would imply a reduction in growth in the OECD area by around ½ to 1 percentage point. Thus, up to one-third of the growth deceleration in the OECD (from around 5 per cent in 1965-73 to around 2 per cent in 1989-95) would be explained by higher taxes. In some European countries, tax burdens increased much more dramatically than the OECD average, which would imply correspondingly larger effects on their growth rates.

98.     As outlined above, there may only be limited room to cut total taxes in the coming years due to the spending requirements of ageing populations. But this still leaves open the possibility of shifting the mix of taxes. According to these models, shifting from capital to sales taxes or from labour taxes to sales taxes would lead to small permanent increases in the rate of growth that, in the long run, would have significant effects on income levels.

99.     These results must, of course, be viewed with caution. Real-world economies are complex, with structural features and linkages that simulation models do not capture. The results are very sensitive to assumptions and parameter specifications and the models sometimes produce differences in simulated growth impacts for a given tax experiment that are large and of different signs.

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75.     In the other model (Mérette, 1996 and 1997) cutting taxes and initial spending generally leads to negative long-term growth effects. This appears to be due to the view of human capital accumulation it adopts. Relatively short agent planning horizons for relatively old populations imply that with lower taxes people work more but accumulate less human capital, which reduces growth in the longer term. Although labour supply initially increases, the slowdown in human capital accumulation and growth reduces government revenues, which further reduces human capital accumulation in the long run.

Table 1. **Average effective tax rates on capital, labour and sales**

| | Capital[1] | | | Labour[2] | | | Sales[3] | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1965-75 | 1975-85 | 1985-94 | 1965-75 | 1975-85 | 1985-94 | 1965-75 | 1975-85 | 1985-94 |
| United States | 0.42 | 0.42 | 0.40[4] | 0.17 | 0.21 | 0.23[4] | 0.06 | 0.05 | 0.05 |
| Japan | 0.23 | 0.35 | 0.44 | 0.12 | 0.17 | 0.21 | 0.05 | 0.05 | 0.05 |
| Germany | 0.21 | 0.29 | 0.26 | 0.29 | 0.35 | 0.37 | 0.14 | 0.13 | 0.15 |
| France | 0.17 | 0.25 | 0.25 | 0.29 | 0.37 | 0.43 | 0.19 | 0.18 | 0.17 |
| Italy | .. | 0.22 | 0.28 | .. | 0.28 | 0.32 | 0.11 | 0.10 | 0.13 |
| United Kingdom | 0.50 | 0.60 | 0.52 | 0.24 | 0.25 | 0.21 | 0.12 | 0.13 | 0.14 |
| Canada | 0.41 | 0.38 | 0.44 | 0.17 | 0.22 | 0.28 | 0.11 | 0.11 | 0.11 |
| Australia | 0.34 | 0.42 | 0.45 | 0.13 | 0.18 | 0.19 | 0.08 | 0.10 | 0.09 |
| Austria | 0.17 | 0.20 | 0.21 | 0.33 | 0.38 | 0.41 | 0.17 | 0.19 | 0.18 |
| Belgium | 0.26 | 0.35 | 0.33 | 0.31 | 0.37 | 0.40 | 0.15 | 0.15 | 0.14 |
| Denmark | .. | 0.42 | 0.42 | .. | 0.35 | 0.41 | 0.21 | 0.24 | 0.26 |
| Finland | 0.22 | 0.32 | 0.41 | 0.23 | 0.31 | 0.38 | 0.17 | 0.20 | 0.22 |
| Greece | .. | .. | .. | .. | .. | .. | 0.08 | 0.10 | 0.16 |
| Netherlands | .. | 0.30 | 0.31 | .. | 0.43 | 0.46 | 0.14 | 0.15 | 0.16 |
| New Zealand | .. | .. | .. | .. | .. | .. | 0.08 | 0.10 | 0.16 |
| Norway | 0.25 | 0.38 | 0.37 | 0.33 | 0.34 | 0.35 | 0.21 | 0.25 | 0.24 |
| Portugal | .. | .. | 0.15 | .. | .. | 0.21 | 0.05 | 0.10 | 0.16 |
| Spain | .. | 0.12 | 0.19[4] | .. | 0.25 | 0.29[4] | 0.06 | 0.06 | 0.11 |
| Sweden | .. | 0.45 | 0.58 | .. | 0.46 | 0.48 | 0.16 | 0.17 | 0.20 |
| Switzerland | 0.17 | 0.24 | 0.25[4] | 0.19 | 0.26 | 0.26[4] | 0.06 | 0.07 | 0.08 |

1. Average effective tax rate on capital defined as household income taxes paid on operating surplus of private unincorporated enterprises and on household property and entrepreneurial income; plus tax on income, profit and capital gains of corporations; plus recurrent taxes on immovable property; plus taxes on financial and capital transactions; all divided by total operating surplus of the economy.
2. Average effective tax rate on labour defined as household income tax paid on wages plus payroll or manpower taxes, divided by wages and salaries (including income of self-employed) plus employers' contribution to social security and to private pension schemes.
3. Average effective tax rate on sales of goods and services defined as general tax on goods and services plus excise taxes, divided by private and government non-wage consumption.
4. Figure for 1993.

*Sources: OECD Revenue Statistics* and *National Accounts;* Mendoza *et al.* (1994).

## Table 2. Trends in selected indicators in three major OECD areas

Annual per cent change unless otherwise stated

| | Real GDP | Total factor productivity | Working-age population | Capital stock | *Memo. item:* Unemployment rate |
|---|---|---|---|---|---|
| **United States** | | | | | |
| 1960-73 | 4.3 | 2.5 | 1.7 | 2.0 | 4.9 |
| 1973-79 | 2.9 | 0.2 | 1.7 | 3.2 | 6.8 |
| 1979-95 | 2.4 | 0.4 | 1.0 | 2.7 | 6.9 |
| **Japan** | | | | | |
| 1960-73 | 9.4 | 5.4 | 1.7 | 14.0 | 1.3 |
| 1973-79 | 3.5 | 1.1 | 0.8 | 7.3 | 1.9 |
| 1979-95 | 3.1 | 1.3 | 0.6 | 5.4 | 2.6 |
| **15 European Union countries** | | | | | |
| 1960-73 | 4.8 | 3.3 | 0.6 | 5.6 | 2.2 |
| 1973-79 | 2.5 | 1.4 | 0.6 | 3.9 | 4.2 |
| 1979-95 | 2.2 | 1.3 | 0.7 | 2.7 | 9.4 |

*Source:* OECD.

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Table 3. **Empirical evidence on the relationship between savings and interest rates**

| Authors | Country | Period | Date frequency | Interest-rate elasticity |
|---|---|---|---|---|
| Bernheim, B.D. and Shoven, J.B. (1988) | US | 1951-1984 | annual | short-run: long-run: -0.2 to -0.4 |
| Blinder, A.S. (1975) | US | 1947-1972 | annual | very small negative value |
| Boskin, M.J. (1978) | US | 1928-1969 | annual | between 0.2 and 0.4 |
| Bovenberg, A.L. and Evans, O. (1990) | US | 1960:1-1988:4 | quarterly | semi elasticity: -0.005 |
| Caroll, C. and Summers, L. (1987) | US | 1961-1985 | annual | -0.87 |
| Friend, I. and Hasbrouck, J. (1983) | US | 1982-1980 | quarterly semi-annual | no significant effect no significant effect |
| Gylfason, T. (1981) | US | 1952:3-1978:3 | quarterly | between -0.01 and 0.01 |
| Hall, R.E. (1988) | US | 1919-1983 1947-1983 1959-1983 | annual quarterly monthly | negative value: -0.04 from -0.3 to 0.98 from 0.1 to 0.34 |
| Howrey, E. and Hymans, S. (1978) | US | 1951-1974 | annual | i-rates have little effect on savings |
| Makin, J.H. (1986) | US | 1955-1981 | annual | 0.12 (2SLS) 0.09 (OLS) |
| | Japan | 1957-1983 | annual | 0.02 (marginally significant) |
| Montgomery, E.R. (1986) | US | 1953:2-1982:4 | quarterly | no significant effect |
| Pesaran, M. and Evans, R. (1984) | UK | 1953-1981 | annual | no significant effect |
| Poterba, J.M. (1987) | US | 1948-1986 | annual | 0.05 to 0.18 |
| Summers, L.H. (1981) | US | 2-period analysis | | 0.74 to 3.71 |

Table 4. **Marginal effective tax rates on corporate earnings in nine countries**

|  |  | Effective tax rate at the corporate level | Effective tax rate at corporate and personal level combined | *Memorandum item:* Statutory corporate tax rate |
|---|---|---|---|---|
| United States | 1980 | 14.4 | 22.5 | 49.5 |
|  | 1990 | 24.0 | 19.1 | 38.3 |
| Japan | 1980 | 3.1 | 15.6 | 52.6 |
|  | 1990 | 6.1 | 23.0 | 54.7 |
| Germany | 1980 | 15.2 | 32.9 | 62.2 |
|  | 1990 | 4.6 | 28.6 | 58.1 |
| France | 1980 | -28.8 | 74.1 | 50.0 |
|  | 1990 | -34.4 | 65.4 | 37.0 |
| Italy | 1980 | -91.6 | 58.5 | 36.3 |
|  | 1990 | -72.8 | 58.2 | 46.4 |
| United Kingdom | 1980 | -31.4 | 30.7 | 52.0 |
|  | 1990 | 28.0 | 13.8 | 34.0 |
| Canada | 1980 | 16.9 | 20.0 | .. |
|  | 1990 | 25.9 | 19.3 | .. |
| Australia | 1980 | 41.8 | 23.4 | 46.0 |
|  | 1990 | 14.6 | 28.1 | 39.0 |
| Sweden | 1980 | -22.5 | 37.9 | 39.6 |
|  | 1990 | 1.0 | 27.8 | 30.0 |

*Note:* The effective tax rate at the corporate level is defined as the ratio between the difference of pre-tax real rate of return and the post-corporate tax real rate of return and the pre-tax real rate of return. The effective tax rate at the corporate and personal level combined is the ratio between the difference of the pre-tax real rate of return and the post-tax real rate of return of the saver. The pre-tax real rate of return is assumed at 10 per cent.

*Source:* Jorgenson and Landau (1993).

Table 5. **Marginal effective tax wedge by financing and asset at the level of the firm, 1995**

| | Buildings | Plant and machinery | Inventory | Retained earnings | New equity | Debt | Average |
|---|---|---|---|---|---|---|---|
| United States | 4.4 | 0.9 | 3.8 | 5.4 | 5.4 | -2.9 | 2.5 |
| Germany | 2.4 | 0.5 | 4.5 | 7.0 | -3.1 | -4.6 | 1.9 |
| France | 1.2 | -0.5 | 3.5 | 3.7 | -4.0 | -2.2 | 0.8 |
| United Kingdom | 2.0 | 0.6 | 3.9 | 4.2 | 0.5 | -1.8 | 1.7 |
| Netherlands | 1.8 | 0.4 | 2.3 | 4.0 | -0.7 | -2.5 | 1.2 |
| Average | 2.4 | 0.4 | 3.6 | 4.9 | -0.4 | -2.8 | |

*Note*:    Marginal effective tax wedge is the difference between the post-tax and pre-tax real rates of return. Assuming a 10 per cent post-tax target return, an METW of 1.2 implies that the pre-tax return must be 11.2 per cent.  Weights, from OECD (1991):  buildings 28 per cent, plant and machinery 50 per cent, inventory 22 per cent;  retained earnings 55 per cent, new equity 10 per cent, debt 35 per cent.  Assumes economic depreciation of 3.6 per cent for buildings, 12.25 per cent for plant and zero for inventory and inflation of 3.5 per cent.

*Source*:    Griffith (1996).

Table 6. **Studies of the sensitivity of investment to the cost of capital**

| Study | Method/Data | Estimates |
|---|---|---|
| Dufwenberg, Kosjenkylä and Södersten (1994) | Time series, manufacturing fixed investment in Denmark, Finland, Norway and Sweden, 1965-90 | Cost of capital negative and significant. |
| Cummins, Hassett and Hubbard (1994) | Time series, gross business investment in US, 1953-88 | Cost of capital (including taxes) negative and significant |
| Bosworth (1993) | Time series and pooled estimate, gross business investment in 14 OECD countries, 1965-90 | Small significant negative interest rate coefficient in 7 time series estimates and in pooled estimate |
| Bosworth (1993) | Time series and pooled estimate, residential investment in 14 OECD economies, 1970-90 | Small significant negative interest rate coefficient in 13 time series estimates and in pooled estimate |
| Ford and Poret (1991) | Time series, aggregate business sector fixed investment in G7 economies, 1968-88 | Cost of capital not significant or significant with wrong sign |
| Corker, Evans and Kenward (1989) | Time series; durable equipment and non-residential business investment in US, 1964-85 | Small significant negative cost of capital coefficient in both cases |
| Devereux (1989) | Time series; manufacturing investment in the UK, 1975-84 | Small significant negative cost of capital coefficient |
| Gordon and Veitch (1987) | Time series, business fixed investment in S, 1919-83 | Interest rate not significant |
| Shapiro (1986) | Time series, gross private fixed investment in US, 1955-83 | Cost of capital significant and negative when effect of supply shocks taken into account |
| Clark (1979) | Time series, investment in producers' durable equipment and non-residential structures in US, 1954-73 | Cost of capital not statistically significant |

Table 7. **United States:  Taxable income reported by foreign-controlled (FCC) and other US domestic (OUSD) companies, 1981-1990**

| | Taxable income as a percentage of: | | | |
|---|---|---|---|---|
| | Total receipts | | Total assets | |
| | FCC | OUSD | FCC | OUSD |
| 1981 | 1.4 | 2.7 | 1.4 | 2.2 |
| 1982 | 0.4 | 1.6 | 0.3 | 1.3 |
| 1983 | 0.5 | 2.3 | 0.3 | 1.6 |
| 1984 | 1.0 | 2.7 | 0.8 | 1.9 |
| 1985 | 0.6 | 2.6 | 0.5 | 1.7 |
| 1986 | -0.3 | 2.7 | -0.2 | 1.7 |
| 1987 | 0.8 | 3.1 | 0.6 | 1.9 |
| 1988 | 1.4 | 3.7 | 0.9 | 2.2 |
| 1989 | 0.9 | 3.1 | 0.6 | 1.8 |
| 1990 | 0.2 | 4.0 | 0.1 | 2.1 |

*Source:*    Tanzi (1995).


Table 8.  **Taxes withheld on incomes paid to non-residents, 1993**

Per cent

| | Banking accounts | Securities | Dividends |
|---|---|---|---|
| Germany | 0 | 0 | 15 |
| France | 0 | 0 | 15 |
| Italy | 10 | 10 | 15 |
| United Kingdom | 0 | 0 | 15 |
| Belgium | 0 | 10 | 15 |
| Denmark | 0 | 0 | 15 |
| Greece | 10 | 10 | 0 |
| Ireland | 0 | 0 | 0 |
| Luxembourg | 0 | 0 | 15 |
| Netherlands | 0 | 0 | 15 |
| Portugal | 15 | 15 | 15 |
| Spain | 0 | 0 | 15 |

*Note:*    Actual rates may be lower where there are inter-country tax treaties.  For details see OECD (1991).

*Source:*    Tanzi (1995).

Table 9. **Average real pre-tax rates of return required with a 5 per cent real interest rate[1]**

In per cent

| | Domestic investment | | Foreign direct investment | | | | | | | |
| | A | B | Outward investment[2] | | | | Inward investment[3] | | | |
| | A | B | C | D | E | F | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|
| United States | 7.6 | 5.9 | 7.9 | 7.7 | 7.0 | 7.5 | 7.9 | 7.7 | 7.0 | 7.5 |
| Japan | 9.0 | 6.4 | 7.9 | 8.1 | 8.1 | 8.0 | 8.9 | 9.4 | 6.2 | 8.1 |
| Germany | 9.5 | 5.6 | 7.8 | 6.3 | 9.6 | 7.9 | 9.5 | 5.9 | 3.9 | 6.4 |
| France | 7.3 | 5.4 | 7.9 | 6.7 | 5.3 | 6.6 | 7.3 | 8.8 | 7.6 | 7.9 |
| Italy | 9.1 | 5.9 | 7.9 | 8.9 | 9.0 | 8.6 | 9.1 | 6.7 | 5.7 | 7.2 |
| United Kingdom | 7.7 | 5.9 | 7.9 | 6.8 | 5.5 | 6.7 | 7.7 | 6.2 | 7.1 | 7.0 |
| Canada | 8.1 | 6.2 | 7.9 | 6.6 | 8.1 | 7.5 | 8.0 | 9.2 | 8.1 | 8.4 |
| | | | | | | | | | | |
| Australia | 9.0 | 7.1 | 7.9 | 7.5 | 6.6 | 7.3 | 9.0 | 7.8 | 7.7 | 8.2 |
| Austria | 7.3 | 5.5 | 7.9 | 7.1 | 6.5 | 7.2 | 7.2 | 7.7 | 6.5 | 7.1 |
| Belgium | 7.1 | 5.4 | 8.0 | 7.4 | 5.7 | 7.0 | 7.1 | 7.2 | 6.3 | 6.8 |
| Denmark | 7.5 | 5.9 | 7.4 | 6.1 | 5.9 | 6.5 | 7.5 | 7.3 | 6.7 | 7.2 |
| Finland | 8.0 | 5.6 | 7.9 | 6.0 | 5.7 | 6.6 | 8.0 | 7.3 | 6.6 | 7.3 |
| Greece | 7.3 | 5.0 | 7.9 | 9.7 | 7.3 | 8.3 | 7.3 | 7.5 | 7.8 | 7.5 |
| Iceland | 8.0 | 6.7 | 7.9 | 8.2 | 7.4 | 7.8 | 8.0 | 9.6 | 9.9 | 9.2 |
| Ireland | 5.5 | 5.1 | 8.0 | 9.8 | 8.5 | 8.8 | 5.5 | 6.3 | 8.5 | 6.8 |
| Luxembourg | 8.1 | 6.3 | 7.9 | 7.2 | 6.5 | 7.2 | 8.1 | 7.5 | 6.8 | 7.5 |
| Netherlands | 7.1 | 5.6 | 7.9 | 6.7 | 6.0 | 6.9 | 7.1 | 7.3 | 6.8 | 7.1 |
| New Zealand | 8.3 | 6.8 | 7.9 | 7.9 | 6.0 | 7.3 | 9.0 | 11.0 | 9.0 | 9.7 |
| Norway | 10.0 | 6.8 | 7.8 | 8.6 | 9.6 | 8.7 | 9.9 | 4.6 | 5.1 | 6.6 |
| Portugal | 7.5 | 5.7 | 7.9 | 12.6 | 9.2 | 9.9 | 7.5 | 9.2 | 7.0 | 7.9 |
| Spain | 7.8 | 6.2 | 7.9 | 7.4 | 6.1 | 7.1 | 7.8 | 9.0 | 7.5 | 8.1 |
| Sweden | 6.1 | 5.0 | 8.0 | 7.0 | 5.5 | 6.8 | 6.1 | 6.5 | 6.6 | 6.4 |
| Switzerland | 6.6 | 5.4 | 8.0 | 7.0 | 5.5 | 6.8 | 6.6 | 7.1 | 7.1 | 7.0 |
| Turkey | 9.6 | 7.2 | 7.8 | 8.8 | 8.3 | 8.3 | 9.7 | 8.4 | 6.6 | 8.2 |
| | | | | | | | | | | |
| Average | 7.9 | 5.9 | 7.9 | 7.7 | 7.0 | 7.5 | 7.9 | 7.7 | 7.0 | 7.5 |

A:  Domestic investment financed by retained earnings.
B:  Domestic investment financed by weighted average of retentions (55 per cent), new equity (10 per cent) and debt (35 per cent).
C:  Foreign direct investment financed by retentions of subsidiary (i.e. in the case of outward investment by foreign subsidiaries of domestic parents, and in the case of inward investment by subsidiaries of foreign parents).
D:  Foreign direct investment financed by new equity from parent. Parent raises finance by weighted average of the three sources of finance (as in B).
E:  Foreign direct investment financed by debt from parent. Parent raises finance by weighted average of the three sources of finance.
F:  Foreign direct investment financed by one-third's loans from the parent, one-third new equity from the parent, and one-third retentions by the subsidiary. Parent raises finance by weighted average of the three sources of finance.

1. Weighted average of investment in buildings (28 per cent), machinery (50 per cent) and inventories (22 per cent); rate of inflation of 4.5 per cent everywhere; no personal taxes.
2. Investment from named country into all other countries.
3. Investment from all other countries into named country.

*Source:*   OECD.

Table 10. **The effects of inflation with a hypothetical 40 per cent capital income-tax rate**

Period averages in per cent per annum

|  |  | High inflation period 1979-83 | Low-inflation period 1991-95 |
|---|---|---|---|
| **1.** | **Nominal long-term interest rate, before tax** | | |
|  | United States | 11.8 | 6.9 |
|  | Japan | 8.3 | 4.7 |
|  | Germany | 8.8 | 7.3 |
|  | France | 14.3 | 8.1 |
|  | Italy | 17.2 | 12.0 |
|  | United Kingdom | 13.2 | 8.6 |
|  | Canada | 12.8 | 8.7 |
| **2.** | **Real long-term interest rate before tax**[1] | | |
|  | United States | 4.5 | 4.8 |
|  | Japan | 4.5 | 3.3 |
|  | Germany | 4.6 | 4.1 |
|  | France | 3.8 | 5.6 |
|  | Italy | 0.4 | 6.5 |
|  | United Kingdom | 0.7 | 4.1 |
|  | Canada | 3.9 | 6.7 |
| **3.** | **Real long-term interest rate, after tax**[2] | | |
|  | United States | -0.2 | 2.0 |
|  | Japan | 1.2 | 1.4 |
|  | Germany | 1.1 | 1.2 |
|  | France | -1.9 | 2.4 |
|  | Italy | -6.5 | 1.7 |
|  | United Kingdom | -4.6 | 0.7 |
|  | Canada | -1.2 | 3.2 |
| **4.** | **Real effective tax rate**[3] | | |
|  | United States | 104.9 | 57.5 |
|  | Japan | 73.8 | 57.0 |
|  | Germany | 76.5 | 71.2 |
|  | France | 150.5 | 57.9 |
|  | Italy | 1720.0 | 73.8 |
|  | United Kingdom | 754.3 | 83.9 |
|  | Canada | 131.3 | 51.9 |

1. Long-term interest rate deflated by a weighted average of the current and previous two years' inflation rate measured by the GDP deflator.
2. Calculated as (a-[x*0.4]), where a is the real interest rate, x is the nominal interest rate and 0.4 is the hypothetical capital income-tax rate.
3. Calculated as ([x*0.4]/a), where x and a are as defined in note 2.

*Source:* OECD.

## Table 11. **Estimates of labour-supply elasticities**

| | Country | Uncompensated wage elasticity (overall effect) | Broken down into: | | Broken down into: | |
|---|---|---|---|---|---|---|
| | | | Compensated wage elasticity (substitution effect) | Income elasticity (income effect) | Average hours elasticity | Participation elasticity |
| **A. Married women's labour supply** | | | | | | |
| Rosen (1976*a*) | US | 2.3 | n.a | n.a | 0.8 | 1.5 |
| Hannoch (1980) | US | 1.4 | 2.3 | -0.9 | 0.4 | 1.0 |
| Schultz (1980) | US | 1.0 | 1.0 | 0 | 0.1 | 0.9 |
| Cogan (1981) | US | 0.65 | 0.68 | -0.03 | n.a | n.a |
| Hausman (1981) | US | 0.45 | 0.90 | -0.45 | n.a | n.a |
| Blundell and Walker (1982) | UK | 0.43 | 0.65 | -0.22 | n.a | n.a |
| Arrufat and Zabalza (1986) | US | 0.62 | 0.68 | -0.06 | n.a | n.a |
| Triest (1990) | US | 1.2 | 1.5 | -0.3 | 0.8 | 0.4 |
| Strøm and Wagenhals (1991) | Germany | 0.96 | 1.02 | -0.06 | n.a | n.a |
| Kaiser, van Essen and Spahn (1992) | Germany | 1.04 | 1.22 | -0.18 | n.a | n.a |
| Blundell, Duncan and Meghir (1992) | UK | 0.42 | 0.61 | -0.19 | n.a | n.a |
| Eissa (1995) | US | 0.8 | n.a | n.a | 0.5 | 0.3 |
| **B. Men's labour supply** | | | | | | |
| Boskin (1973) | US | -0.1 | 0 | -0.1 | -0.1 | 0 |
| Hausman (1981) | US | -0.03 | 0.95 | -0.98 | n.a | n.a |
| Ashworth and Ulph (1981) | UK | -0.33 | 0.29 | -0.62 | n.a | n.a |
| Blundell and Walker (1982) | UK | -0.23 | 0.13 | -0.36 | n.a | n.a |
| Juhn, Murphy and Topel (1991) | US | -0.2 | n.a | n.a | n.a | n.a |
| Kaiser, van Essen and Spahn (1992) | Germany | -0.004 | 0.28 | -0.28 | n.a | n.a |
| Zabel (1995) | US | 0 | 0 | 0 | -0.1 | 0.1 |
| **C. Lone mothers' labour supply** | | | | | | |
| Hausman (1980) | US | 0.47 | 0.65 | -0.18 | n.a | n.a |
| Bingley, Symons and Walker (1992) | UK | 0.76 | 1.28 | -0.52 | n.a | n.a |
| Jenkins (1992) | UK | 1.44 | 1.68 | -0.24 | n.a | n.a |

*Sources*: OECD (1995*b*), pp. 59-60; and Congressional Budget Office (1996), p. 7.

## Table 12. **Marginal tax rates of married couples with two children**

### 133 per cent of APW income

| | One-earner couple | | Two-earner couple[1] | | Difference | | Unit of taxation[2] | |
|---|---|---|---|---|---|---|---|---|
| | 1978 | 1995 | 1978 | 1995 | 1978 | 1995 | 1978 | 1995 |
| United States | 34.6 | 29.9 | 34.6 | 29.9 | 0.0 | 0.0 | Joint | Joint |
| Japan | 20.4 | 16.2 | -- | 15.0 | -- | 1.2 | Ind | Ind |
| Germany | 32.5 | 43.1 | 38.2 | 49.7 | -5.7 | -6.6 | Joint | Joint |
| France | 12.4 | 22.6[3] | 18.7 | 28.0[3] | -6.3 | -5.4[3] | Joint | Joint[3] |
| Italy | 27.8 | 40.5 | 19.5 | 34.3 | 8.3 | 6.2 | Ind | Ind |
| United Kingdom | 39.5 | 35.0 | 39.5 | 35.0 | 0.0 | 0.0 | Opt | Ind |
| Canada | 33.1 | 46.9 | 29.8 | 36.4 | 3.3 | 10.5 | Ind | Ind |
| Australia | 33.5 | 44.5 | 33.5 | 39.5 | 0.0 | 5.0 | Ind | Ind |
| Belgium | -- | 54.8 | -- | 54.8 | -- | 0.0 | Joint | Ind |
| Denmark | 55.9 | 63.5 | 41.5 | 51.7 | 14.4 | 11.8 | Ind | Ind |
| Finland | 49.3 | 58.7 | 37.5 | 46.7 | 11.8 | 12.0 | Ind | Ind |
| Netherlands | 37.5 | 55.9 | 44.3 | 48.4 | -6.8 | 7.5 | Ind | Ind |
| Norway | 47.6 | 49.5 | 37.6 | 35.8 | 10.0 | 13.7 | Opt | Opt |
| Spain | 22.7 | 28.1 | 22.7 | 30.3 | 0.0 | -2.2 | Joint | Opt |
| Sweden | 73.7 | 58.2 | 41.7 | 37.2 | 32.0 | 21.0 | Ind | Ind |

1. Husband and wife each earn 66 per cent of APW income.
2. Ind  =  independent taxation of husband and wife.
   Joint  =  joint taxation of husband and wife.
   Opt  =  option of different systems.
3. 1994 figure.

*Source:*  OECD, Directorate for Financial, Fiscal and Enterprise Affairs (DAFFE), Fiscal Affairs Division.

Table 13. **Social security contributions**[1]

1994

| Country | Annual gross earnings of an APW | Programme | Employee Rate (per cent) | Employee Floor | Employee Ceiling | Employer Rate (per cent) | Employer Floor | Employer Ceiling |
|---|---|---|---|---|---|---|---|---|
| United States | US$26 178 | Pensions, etc. | 6.2 | -- | US$60 600 per year | 6.2 | -- | US$60 600 per year |
| | | Old-age hospital insurance | 1.4 | -- | -- | 1.4 | -- | -- |
| | | Unemployment insurance | -- | -- | -- | 6.2 | -- | US$7 000 per year |
| Japan | Y 4 064 645 | Pensions, sickness, etc. | 12.5 of standard pay[2] | -- | -- | 13.21[2] | -- | -- |
| | | Work injury | -- | -- | -- | 0.6 to 14.9[3] | -- | -- |
| Germany[4] | DM 53 512 | Pensions and unemployment | 9.6 | -- | DM 91 200 per year | 9.6 | -- | DM 91 200 per year |
| | | Sickness | 6.55 | -- | DM 68 400 per year | 6.55 | -- | DM 68 400 per year |
| France | FF 115 800 | Retirement | 6.55 minus FF 42 per month | -- | -- | 8.2 up to ceiling + 1.6 on all salaries | | FF 12 840 per month |
| | | Sickness, maternity, invalidity and death | 6.8 | -- | -- | 12.8 | -- | -- |
| | | Unemployment | 3.2 up to ceiling + 0.64 between 1 and 4 times ceiling 4.94 above 4 times ceiling | -- | FF 12 840 per month | 5.34 up to ceiling, 5.47 from 1 to 4 times ceiling | | FF 12 840 per month |
| | | Complementary retirement | -- | -- | -- | minimum 2 | -- | 3 times FF 12 840 per month |
| | | Others | -- | -- | -- | 2.95 | -- | -- |
| Italy | L 30 980 000 | All programmes | 9.995 | -- | -- | | | -- |
| United Kingdom[6] | £14 607 | Health | 10.07 | £57/per week | £430/per week | 3.6 to 10.2 | £57/per week | -- |
| Canada | C$ 32 060 | | | | | | | |

# Table 13 (continued)

| | Annual gross earnings of an APW | Programme | Employee | | | Employer | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rate (per cent) | Floor | Ceiling | Rate (per cent) | Floor | Ceiling |
| Australia[8] | A$ 33 358 | -- | -- | -- | -- | -- | -- | -- |
| Austria | Sch 279 249 | All programmes | 18.2 | -- | Sch 36 000 per month; Sch 72 000 on bonuses[9] | 24.2 | -- | Sch 36 000 per month; Sch 72 000 on bonuses |
| Belgium | BF 863 458 | | | | | | | |
| Finland | Mk 721 916 | All programmes | 8.32 | -- | -- | Average = 5.31 | -- | -- |
| Greece[10] | Dr 2 420 426 | All programmes[11] | 15.8 | -- | -- | 27.45 | -- | -- |
| Iceland | Ikr 1 342 500 | Pensions | IKr 3 915 per worker per year | IKr 689 724 | -- | -- | -- | -- |
| | | All other programmes | -- | -- | -- | 3 to 6.35[3] | -- | -- |
| Ireland | Ir£ 13 550 | Employment, training and health | 2.25 | -- | -- | -- | -- | -- |
| | | Pension and social insurance | 5.50 | -- | Ir£ 20 900 | 11.3 | -- | Ir£ 25 800 |
| | | Work injury and redundancy | -- | -- | -- | 0.9 | -- | Ir£ 25 800 |
| Mexico | Pesos 18 454 | All programmes, excluding work injury | 5.15 | -- | -- | 21.42 | -- | -- |
| | | Work injury | -- | -- | -- | Average = 5.19[3] | -- | -- |
| Netherlands | Gld 55 545 | Sickness and unemployment | 3.305 | -- | Gld 74 360 | 3.7 | -- | Gld 74 360 |
| | | Invalidity | 10.6 | Gld 25 740 | Gld 74 360 | -- | -- | Gld 74 360 |
| | | Medical care[12] | Small fixed amount + 1.2 | -- | Gld 49 400 | 5.15 | -- | Gld 49 400 |
| | | General schemes[13] | Small fixed amount + 31.075 | -- | First tax bracket | -- | -- | -- |
| New Zealand[6] | NZ$ 31 895 | -- | -- | -- | -- | -- | -- | -- |
| Norway | NKr 202 410 | National insurance scheme | 7.8 | -- | -- | 0.0 to 14.3 Average = 12.8[14] | -- | -- |
| Portugal | Esc 1 192 691 | All programmes | 11.0 | -- | -- | 24.5 | -- | -- |

Table 13 (continued)

| | Annual gross earnings of an APW | Programme | Employee | | | Employer | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rate (per cent) | Floor | Ceiling | Rate (per cent) | Floor | Ceiling |
| Spain | Ptas 1 946 880 | All programmes | 6.6 | -- | -- | 31.6 | -- | -- |
| Sweden[15] | Skr 183 100 | Health insurance | 0.95 | -- | -- | 8.43 | -- | -- |
| | | Other | -- | -- | -- | 21.27 | -- | -- |
| | | Unemployment | 1.0 | -- | -- | -- | -- | -- |
| Switzerland | SF 58 300 | All programmes excluding family allowances | 11.56 | -- | -- | 11.6 | -- | -- |
| | | Family allowances | -- | -- | -- | FS 2 112 per child | -- | -- |
| Turkey | TL 181 974 814 | Pensions, sickness, etc. | 14.00 | Set twice a year | Set twice a year | 18.0 | Set twice a year | Set twice a year |
| | | Work injury | -- | -- | -- | 1.5 to 7.0[3] | | |

1. All contributions are made on the basis of gross earnings, except where otherwise noted.
2. Employees pay an additional 1.2 per cent of bonuses for pension and sickness coverage while employers pay 1 per cent.
3. Contribution rates vary by industry.
4. Some employers must contribute to an work injury fund. Rates vary by sector.
5. This is the average charged to a dependant worker.
6. Special rules apply to contract employees.
7. Employees eligible for contribution also pay 2 per cent on the first £57.
8. No compulsory social security schemes are operated within the government sector.
9. There is no ceiling on bonuses for contributions to the labour chamber and for promotion of residential building.
10. 1993.
11. Additional contributions are made by employers and employees in hazardous industries.
12. Neither workers earning above Gld 58 100 per year nor their employers contribute to this scheme.
13. Contributions levied with income tax.
14. The contribution is geographically differentiated according to the municipality in which the employee resides.
15. Special rules apply to the self-employed.

*Source:* OECD (1995*c*).

## Table 14. **Marginal tax rates by income level**

### Single person

| | 66 per cent of APW | | 100 per cent of APW | | 133 per cent of APW | | 200 per cent of APW[1] | |
|---|---|---|---|---|---|---|---|---|
| | 1978 | 1995 | 1978 | 1995 | 1978 | 1995 | 1978 | 1995 |
| United States | 31.6 | 29.9 | 37.6 | 29.9 | 43.6 | 42.9 | 46.5 | 42.9 |
| Japan | 10.1 | 15.0 | 13.7 | 19.4 | 17.9 | 16.2 | 24.4 | 28.1 |
| Germany | 38.2 | 50.6 | 53.2 | 52.0 | 53.7 | 50.6 | 48.6 | 48.8 |
| France | 23.0 | 28.02 | 29.5 | 35.62 | 30.1 | 37.02 | 30.1 | 37.02 |
| Italy | 19.8 | 34.3 | 25.3 | 34.3 | 28.1 | 40.5 | 32.7 | 41.1 |
| United Kingdom | 39.5 | 35.0 | 39.5 | 35.0 | 39.5 | 35.0 | 33.0 | 40.0 |
| Canada | 29.8 | 31.4 | 33.1 | 45.9 | 36.0 | 41.9 | 46.1 | 48.1 |
| Australia | 33.5 | 39.5 | 33.5 | 35.5 | 33.5 | 44.5 | 47.5 | 48.5 |
| Belgium | 35.5 | 54.8 | 46.1 | 54.8 | 47.1 | 59.4 | 48.8 | 61.8 |
| Denmark | 41.5 | 51.7 | 55.9 | 54.5 | 55.9 | 66.3 | 66.7 | 66.3 |
| Finland | 37.5 | 46.7 | 49.3 | 53.1 | 52.9 | 58.7 | 57.9 | 58.7 |
| Netherlands | 44.3 | 48.4 | 50.8 | 55.9 | 51.5 | 55.9 | 50.0 | 50.0 |
| Norway | 42.6 | 35.8 | 47.6 | 45.3 | 59.6 | 49.5 | 69.6 | 49.5 |
| Spain | 20.7 | 30.3 | 21.7 | 32.5 | 22.7 | 30.3 | 23.6 | 30.4 |
| Sweden | 41.7 | 37.2 | 59.7 | 37.2 | 73.7 | 58.2 | 81.7 | 56.5 |

1. Above this income level, capital income is likely to be significant.
2. 1994 figure.

*Source:*   OECD, Directorate for Financial, Fiscal and Enterprise Affairs (DAFFE), Fiscal Affairs Division.

## Table 15. **Marginal tax rates[1] on gross labour costs**

### APW income

| | Single person | | | One-earner couple with children | | |
|---|---|---|---|---|---|---|
| | 1978 | 1985 | 1995 | 1978 | 1985 | 1995 |
| United States | 41.1 | 45.1 | 34.9 | 35.5 | 35.8 | 34.9[2] |
| Japan | 22.8 | 18.7 | 25.1 | 15.7 | 12.2 | 25.1 |
| Germany | 61.0 | 61.8 | 60.4 | 46.2 | 48.0 | 51.9 |
| France | 45.3 | 52.3 | 55.4[2] | 35.2 | 43.6 | 50.2[2] |
| Italy | 43.8 | 57.3 | 55.0 | 43.8 | 57.3 | 55.0 |
| United Kingdom | 45.0 | 44.8 | 41.0 | 45.0 | 44.8 | 41.0 |
| Canada | 33.1 | 35.6 | 49.4 | 30.2 | 35.6 | 54.1 |
| Australia | 33.5 | 47.0 | 35.5 | 33.5 | 47.0 | 35.5 |
| Belgium | 50.8 | 59.2 | 66.5 | 55.12 | 55.9 | 62.4 |
| Denmark | 55.9 | 62.4 | 54.5 | 55.9 | 62.4 | 47.0 |
| Finland | 53.1 | 52.6 | 63.1 | 53.1 | 52.6 | 63.1 |
| Netherlands | 54.6 | 66.6 | 57.2 | 54.6 | 64.2 | 46.7 |
| Norway | 54.9 | 59.6 | 51.4 | 50.6 | 49.2 | 43.0 |
| Spain | 40.9 | 47.8 | 48.4 | 40.9 | 47.8 | 42.0 |
| Sweden | 69.2 | 62.1 | 52.8 | 69.2 | 62.1 | 52.8 |

1. Including employers' and employees' social security contributions.
2. 1994 figure.

*Source:*   OECD, Directorate for Financial, Fiscal and Enterprise Affairs (DAFFE), Fiscal Affairs Division.

Table 16. **Incidence and causes of high marginal effective tax rates (METRs)[1]**

One-earner couples

| | METR (per cent) | Region where METR applies (per cent of APW earnings) | Tax and benefit combinations causing high METRs |
|---|---|---|---|
| United States | 72 | 62-71 | Social security (7.65 per cent), income tax (15 per cent), local tax (5 per cent), food stamps (24 per cent), earned income tax credit (17.68 per cent for family with two children). |
| Germany | 89 | 72-82 | Milderungszone [phase out of income-tax free zone (this has now been abolished)]: income tax (51 per cent), social security (18.3 per cent), housing benefit (20 per cent). |
| France | 78 | 57-91 | Revenu minimum d'insertion (RMI) disregard (50 per cent), social security (18.7 per cent), Contribution sociale généralisée (CSG) (2.3 per cent), housing benefit (16.5 per cent average). |
| United Kingdom | 97 | 46-65 | Income tax (20 per cent), social security (10 per cent), family credit (70 per cent), housing benefit (65 per cent), Council tax benefit (20 per cent). |
| | 80½ | 65-77 | Income tax (25 per cent), social security (10 per cent), family credit (70 per cent). |
| Australia | 90 | 38-62 | Income tax (20 per cent), parenting allowance (70 per cent). |
| | 38 | 62-78 | Income tax (34 per cent), low-income rebate withdrawal (4 per cent). |
| | 104 | 78-84 | Income tax (34 per cent), Medicare payments (20 per cent), additional family payment (50 per cent). |
| | 85 | 84-100 | Income tax (34 per cent), additional family payment (50 per cent), Medicare levy (1.45 per cent). |
| Ireland | 105½ | 62-76 | Social security (5.5 per cent), income tax (40 per cent), family income supplement (60 per cent). |
| Sweden | 72 | 147-160 | Income tax (20 per cent), social security contributions (2 per cent), local tax (31 per cent), housing benefit (20 per cent). |

1. 1994 systems, except for Australia and the United Kingdom (1995).

*Source:* OECD (1996*e*).

# Table 17. Economic effects of tax changes: results of model simulations[1]

Percentage points deviation from baseline levels

| | Reduction in corporate tax rate[2] | | | Reduction in labour tax rate[2] | | | Reduction in consumption tax[2] | | |
|---|---|---|---|---|---|---|---|---|---|
| | GDP | Employment | Wages | GDP | Employment | Wages | GDP | Employment | Wages |
| United States | 5.28 | 2.79 | 2.44 | 3.67 | 3.42 | 0.02 | 2.72 | 2.53 | 0.03 |
| Japan | 2.85 | 0.38 | 2.52 | 0.72 | 0.58 | 0.12 | 0.55 | 0.44 | 0.10 |
| *European Union* | 3.09 | 1.06 | 2.18 | 2.08 | 1.83 | 0.06 | 1.46 | 1.28 | 0.06 |
| Germany | 3.16 | 1.13 | 2.12 | 2.40 | 2.10 | 0.11 | 1.64 | 1.41 | 0.10 |
| France | 2.92 | 1.00 | 2.10 | 2.29 | 2.01 | 0.03 | 1.51 | 1.30 | 0.04 |
| Italy | 2.74 | 0.78 | 2.15 | 1.69 | 1.47 | 0.06 | 1.22 | 1.05 | 0.06 |
| United Kingdom | 4.30 | 1.81 | 2.54 | 2.39 | 2.26 | -0.02 | 1.92 | 1.82 | -0.02 |
| Austria | 2.27 | 0.56 | 1.89 | 1.23 | 1.06 | 0.07 | 0.87 | 0.74 | 0.06 |
| Belgium | 2.57 | 0.53 | 2.23 | 1.53 | 1.32 | 0.10 | 0.92 | 0.77 | 0.09 |
| Denmark | 2.98 | 0.89 | 2.42 | 1.91 | 1.59 | 0.08 | 1.36 | 1.12 | 0.07 |
| Finland | 3.83 | 1.22 | 2.83 | 2.34 | 1.99 | 0.08 | 1.70 | 1.44 | 0.07 |
| Greece | 2.58 | 0.98 | 1.67 | 1.59 | 1.48 | -0.02 | 1.23 | 1.14 | -0.01 |
| Ireland | 3.94 | 1.99 | 1.94 | 3.24 | 2.89 | 0.09 | 2.51 | 2.22 | 0.09 |
| Netherlands | 2.94 | 0.95 | 2.10 | 2.38 | 2.14 | 0.05 | 1.45 | 1.29 | 0.06 |
| Portugal | 2.64 | 1.04 | 1.74 | 1.71 | 1.55 | -0.07 | 1.38 | 1.26 | -0.06 |
| Spain | 2.02 | 0.39 | 1.80 | 0.91 | 0.76 | 0.07 | 0.66 | 0.54 | 0.07 |
| Sweden | 3.90 | 0.99 | 3.34 | 2.23 | 1.85 | 0.13 | 1.56 | 1.27 | 0.12 |

1. Simulations are based on the European Commission's Quest II model. The magnitude of each simulated tax change (reduction or shift) is equivalent to 1 per cent of GDP.
2. Financed by a reduction in government transfer payments.

Table 17 (continued)

| | Shift from corporate income tax to consumption tax | | | Shift from labour income tax to consumption tax | | | Shift from labour to corporate income tax | | |
|---|---|---|---|---|---|---|---|---|---|
| | GDP | Employment | Wages | GDP | Employment | Wages | GDP | Employment | Wages |
| United States | 2.49 | 0.26 | 2.41 | 0.96 | 0.91 | -0.01 | -1.64 | 0.59 | -2.46 |
| Japan | 2.28 | -0.06 | 2.42 | 0.17 | 0.15 | 0.02 | -2.16 | 0.20 | -2.44 |
| **European Union** | 1.60 | -0.22 | 2.13 | 0.64 | 0.57 | 0.00 | -1.04 | 0.76 | -2.16 |
| Germany | 1.49 | -0.28 | 2.01 | 0.79 | 0.71 | 0.01 | -0.79 | 0.97 | -2.03 |
| France | 1.39 | -0.30 | 2.05 | 0.80 | 0.73 | -0.02 | -0.67 | 1.00 | -2.10 |
| Italy | 1.50 | -0.27 | 2.09 | 0.50 | 0.44 | 0.00 | -1.07 | 0.69 | -2.12 |
| United Kingdom | 2.32 | -0.02 | 2.56 | 0.49 | 0.46 | 0.00 | -1.93 | 0.44 | -2.61 |
| Austria | 1.39 | -0.18 | 1.83 | 0.37 | 0.33 | 0.01 | -1.06 | 0.50 | -1.85 |
| Belgium | 1.63 | -0.24 | 2.14 | 0.63 | 0.57 | 0.01 | -1.07 | 0.79 | -2.17 |
| Denmark | 1.58 | -0.23 | 2.35 | 0.56 | 0.48 | 0.01 | -1.11 | 0.69 | -2.38 |
| Finland | 2.08 | -0.22 | 2.76 | 0.66 | 0.57 | 0.01 | -1.54 | 0.75 | -2.80 |
| Greece | 1.32 | -0.16 | 1.68 | 0.38 | 0.36 | -0.01 | -0.99 | 0.51 | -1.71 |
| Ireland | 1.39 | -0.23 | 1.86 | 0.76 | 0.69 | 0.01 | -0.71 | 0.90 | -1.88 |
| Netherlands | 1.46 | -0.33 | 2.04 | 0.94 | 0.87 | -0.01 | -0.61 | 1.17 | -2.07 |
| Portugal | 1.24 | -0.21 | 1.80 | 0.35 | 0.32 | -0.01 | -0.95 | 0.51 | -1.83 |
| Spain | 1.35 | -0.15 | 1.74 | 0.26 | 0.23 | 0.01 | -1.12 | 0.38 | -1.75 |
| Sweden | 2.29 | -0.29 | 3.22 | 0.70 | 0.59 | 0.02 | -1.74 | 0.85 | -3.28 |

*Source*: Submission by the European Commission.

**Figure 1. Tax levels and tax changes**



Total tax revenue as% of GDP 1995[1]

Change 1965-1980

Change 1980-1995[1]
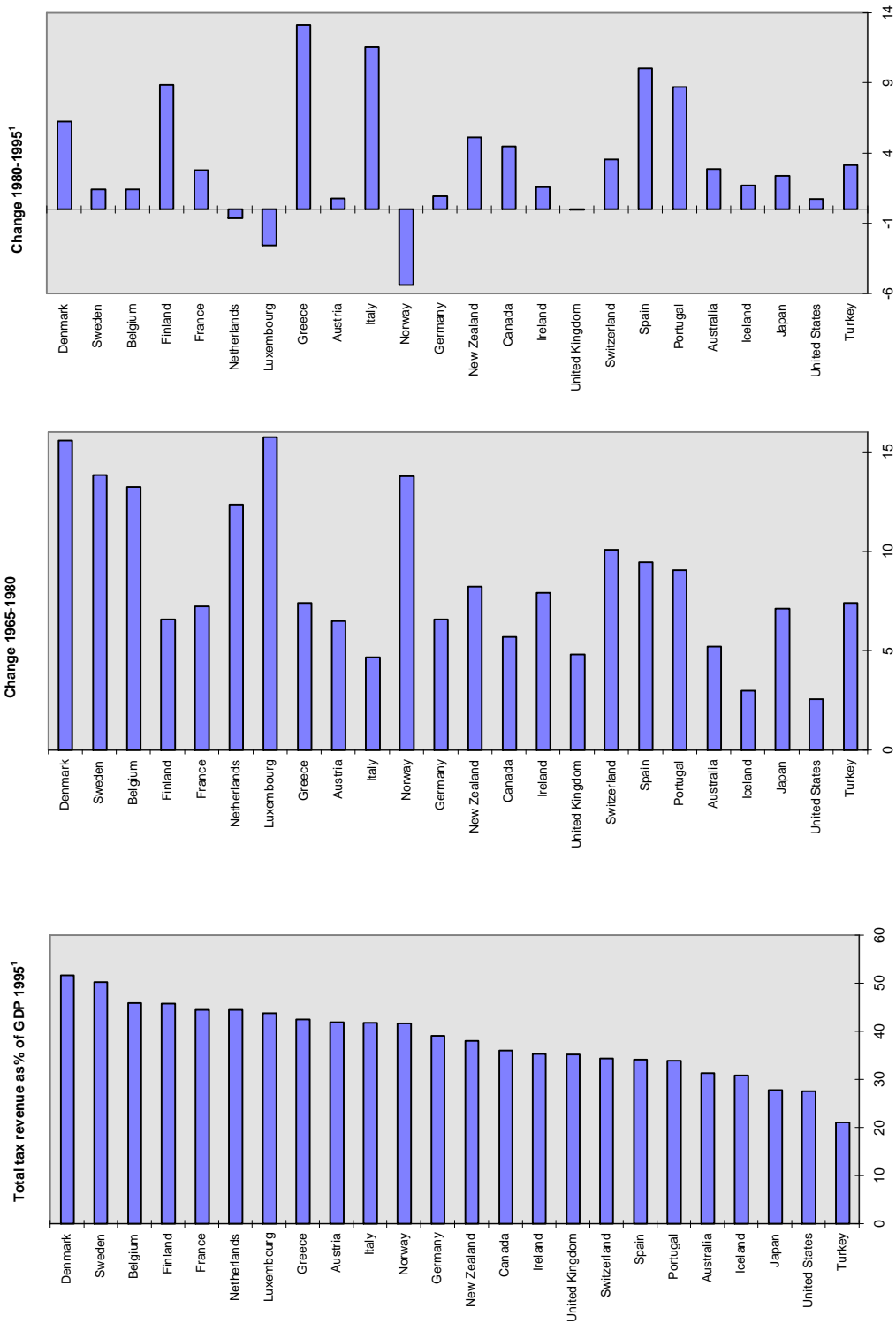
1 : 1994 instead of 1995 for Canada, Japan, Greece, Iceland, and the United States.

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Figure 2   Trends in general government tax revenues
as a percentage of nominal GDP

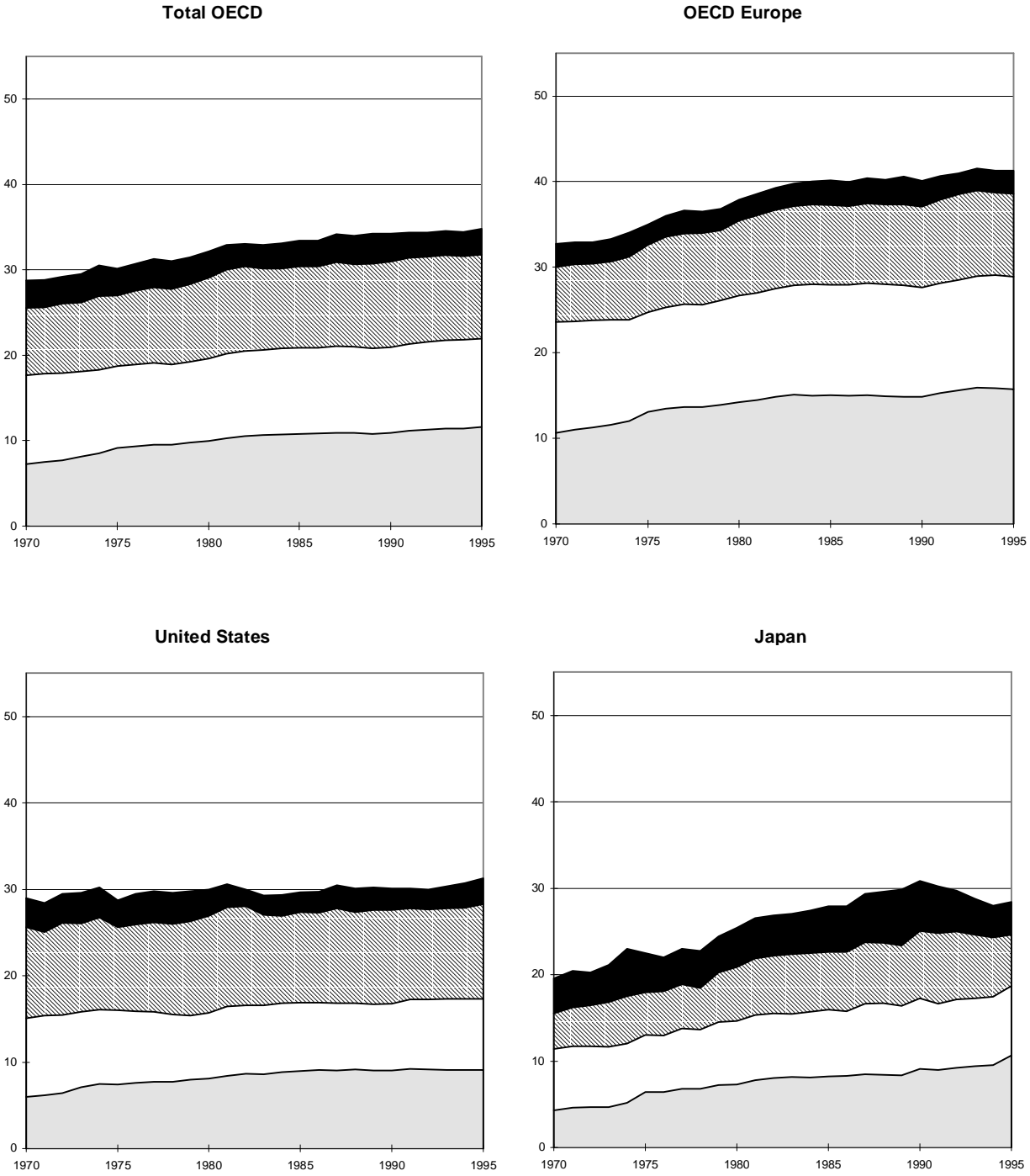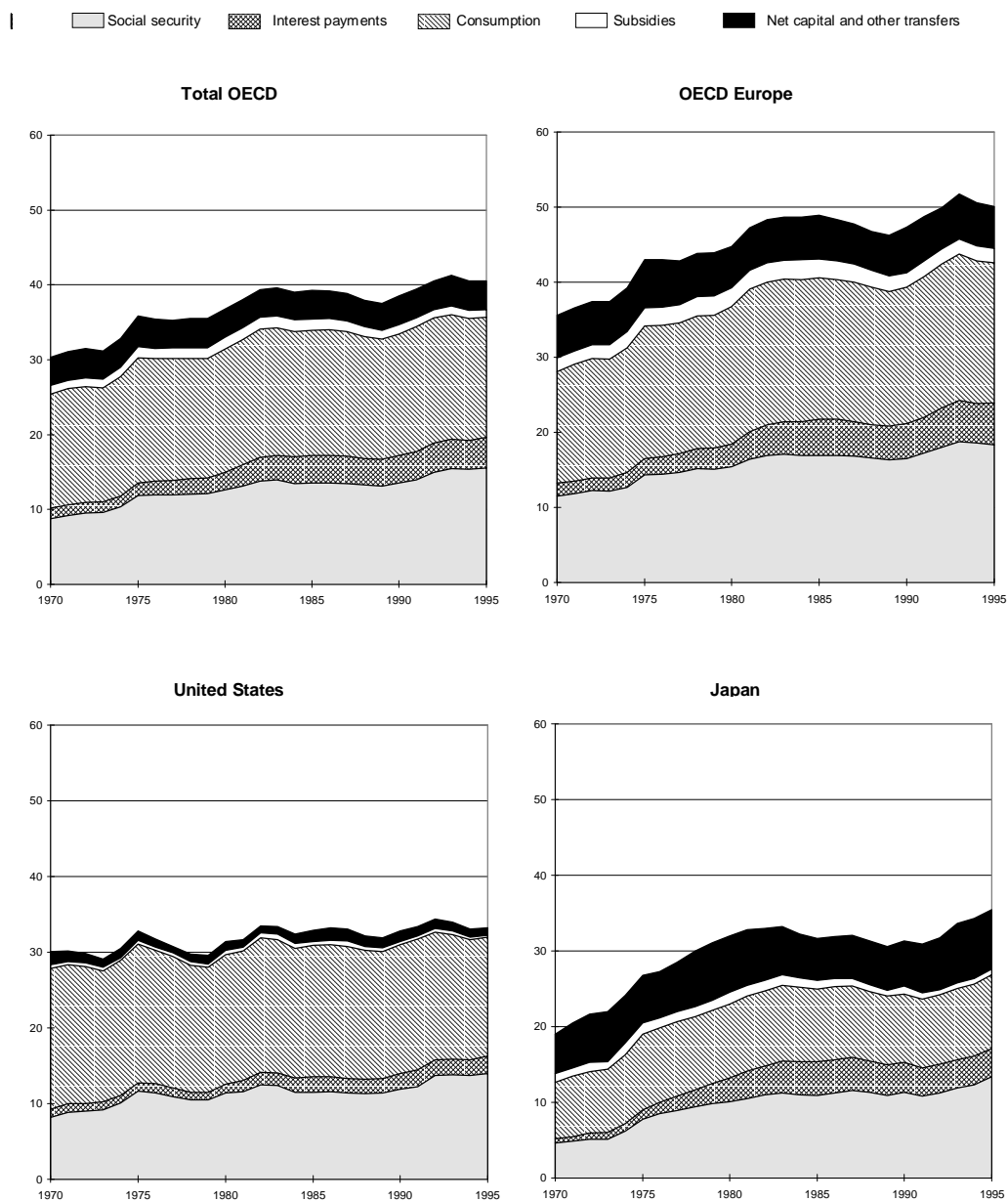| Social security receipts | Indirect taxes | Household direct taxes | Business direct taxes |

**Total OECD**



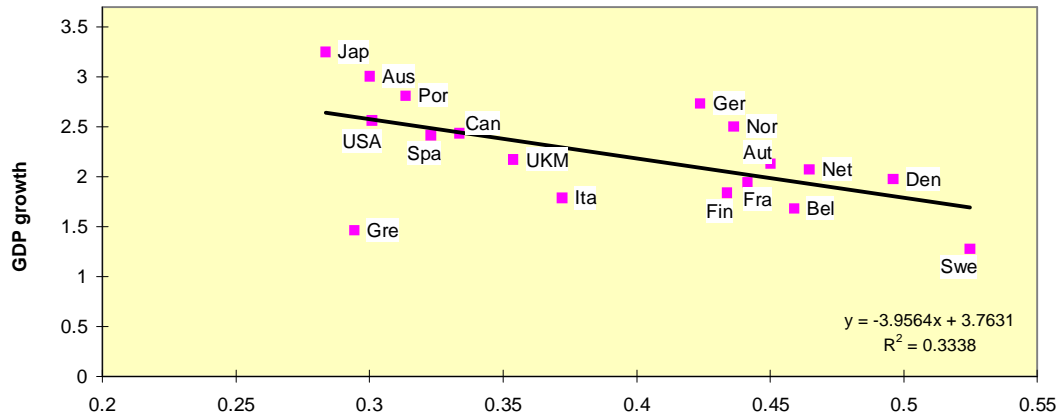**OECD Europe**



**United States**



**Japan**



70

Figure 3   Trends in general government total outlays
as a percentage of nominal GDP

## Figure 4 . Tax rates and growth during the 1980's and early 1990's 1980-1995[1]
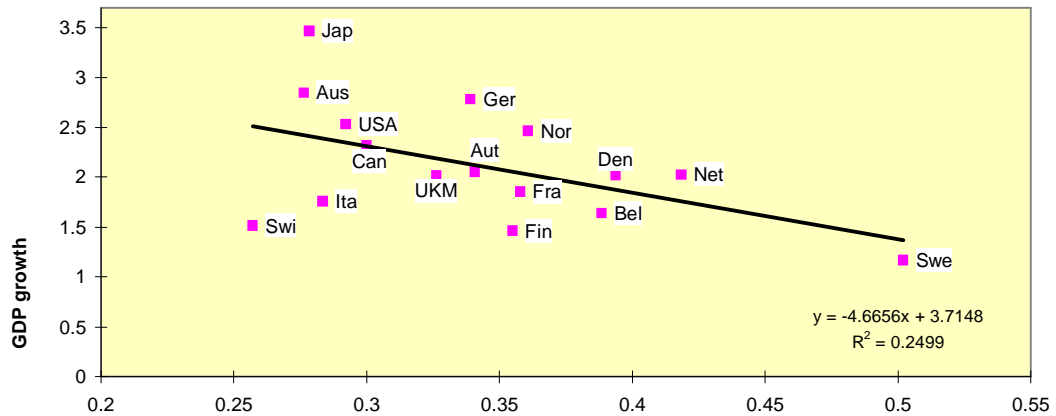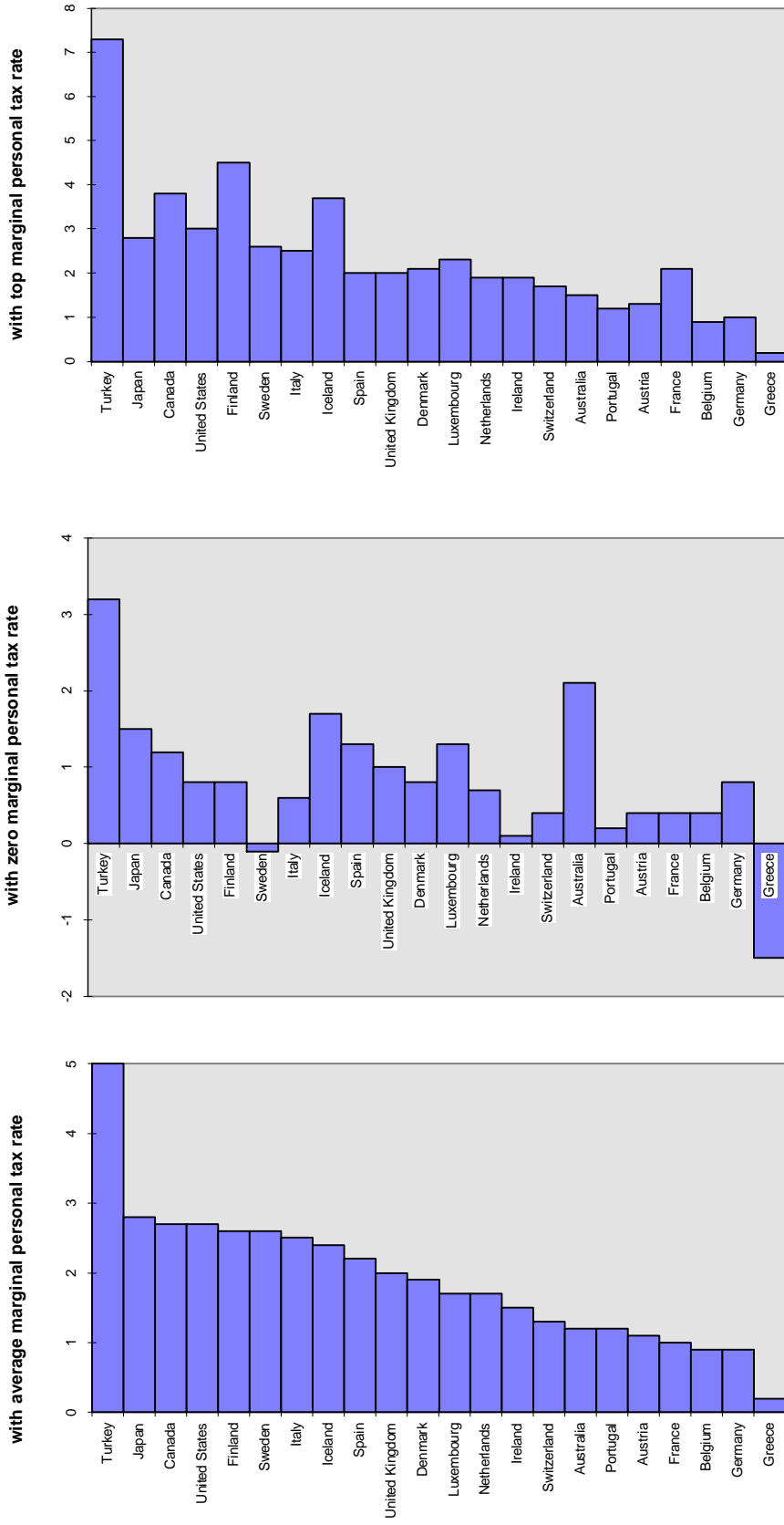
### average tax rate



$$y = -3.9564x + 3.7631$$
$$R^2 = 0.3338$$

### marginal tax rate



$$y = -4.4135x + 3.971$$
$$R^2 = 0.3841$$

### average direct tax rate



$$y = -4.6656x + 3.7148$$
$$R^2 = 0.2499$$
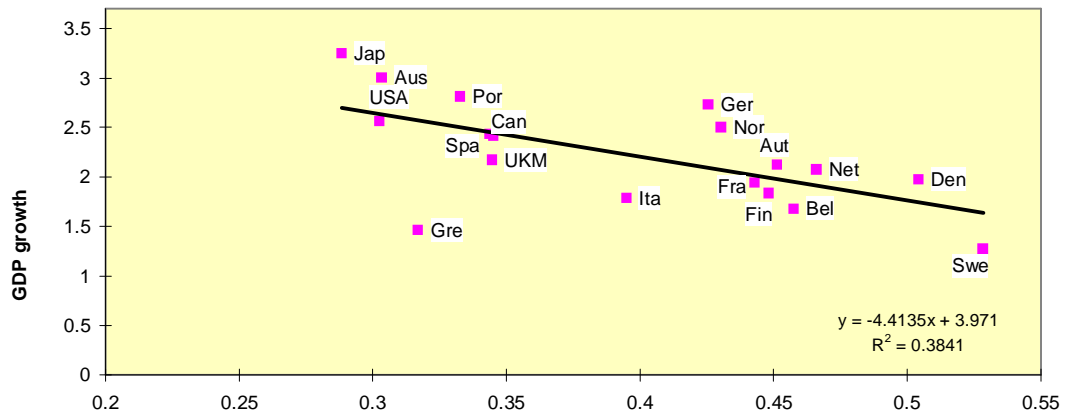
1. For the figure at the bottom, the sample is 1980-1993.

**Figure 5. Capital income tax wedges in 1991[1]**



**with average marginal personal tax rate**

**with zero marginal personal tax rate**

**with top marginal personal tax rate**

1. Country specific inflation. Average weights.
*Source* : OECD 1991. Taxing profits in a global economy. Domestic and International issues.

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**Figure 6. Marginal Effective Tax Rate (METR)**
**on corporate income for various sources of finance (a)**
*in percent*
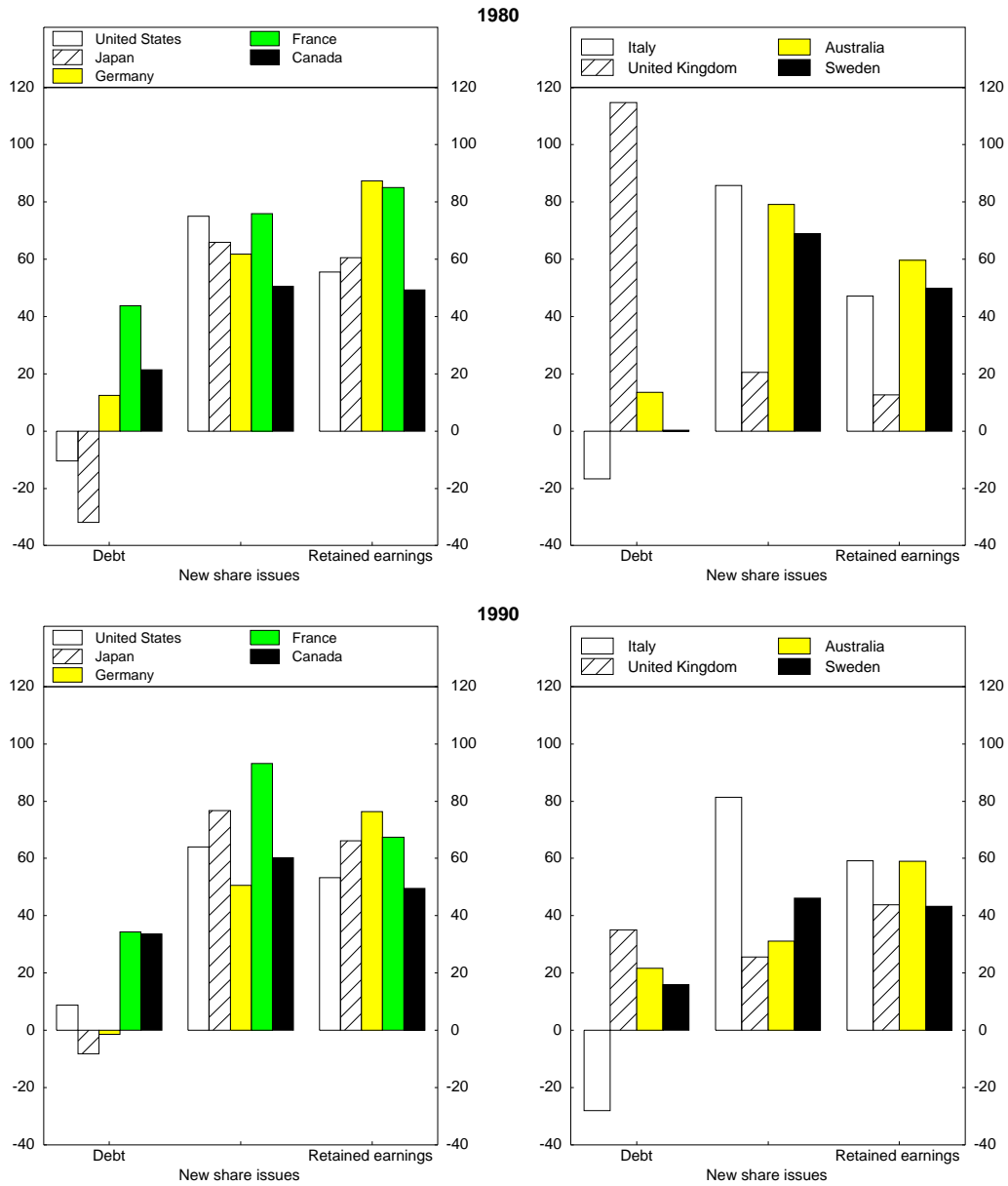


a) Including taxes on investors and savers.
Sources: Tax reform and the cost of capital, an international comparison. Dale W.Jorgenson and Ralph Landau(Ed.).

# Figure 7. Taxation and foreign direct investment

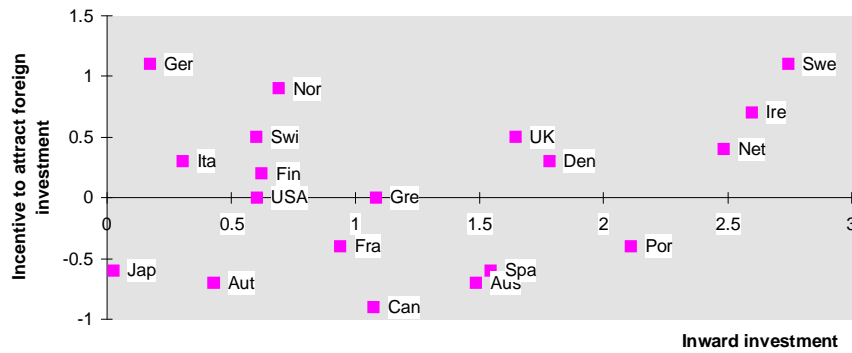## Relationship with inward investment

### Variant A

#### (a) Investment financed from retained earnings of the subsidiary
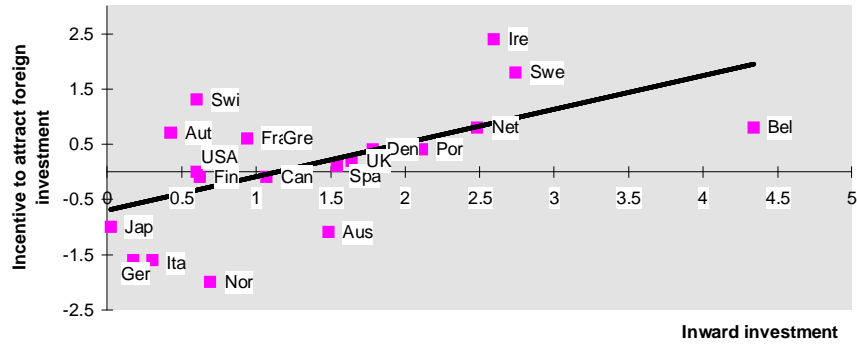


### Variant B

#### (b) Investment financed equally by retained earnings, new equity and loans from parent company



## Relationship with outward investment

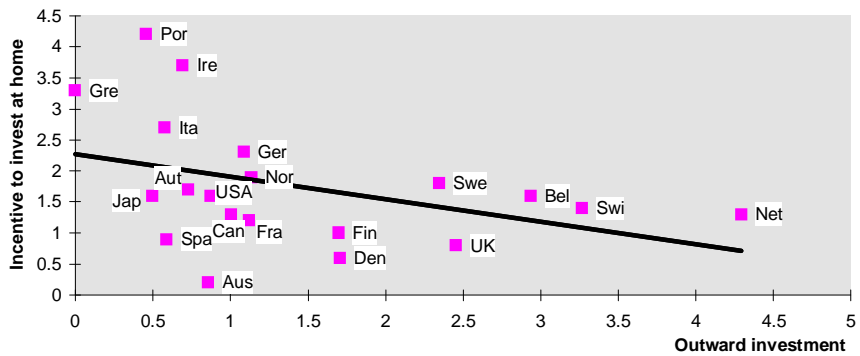### Investment financed equally by various sources of finance

# Figure 8 .**The direct tax wedge on labour costs**[1]



A.Level of the wedge in 1995

- employer's social security contribution rate
- employee's social security contribution rate
- Income tax rate

(Japan, United Kingdom, United States, Canada, Italy, Germany, France)

B. Change in the wedge, 1985-1995

- employer's social security contribution rate
- employee's social security contribution rate
- Income tax rate

(United Kingdom, United States, Japan, France, Germany, Canada, Italy)

1. The wedge is calculated as the sum of income tax paid on wages and employees' and employers'
   social security contributions, divided by gross labour costs ( wages plus employers' contribution
   to social security and private pension plans).

Figure 9. **Labour-market effects of an increase in the labour tax**
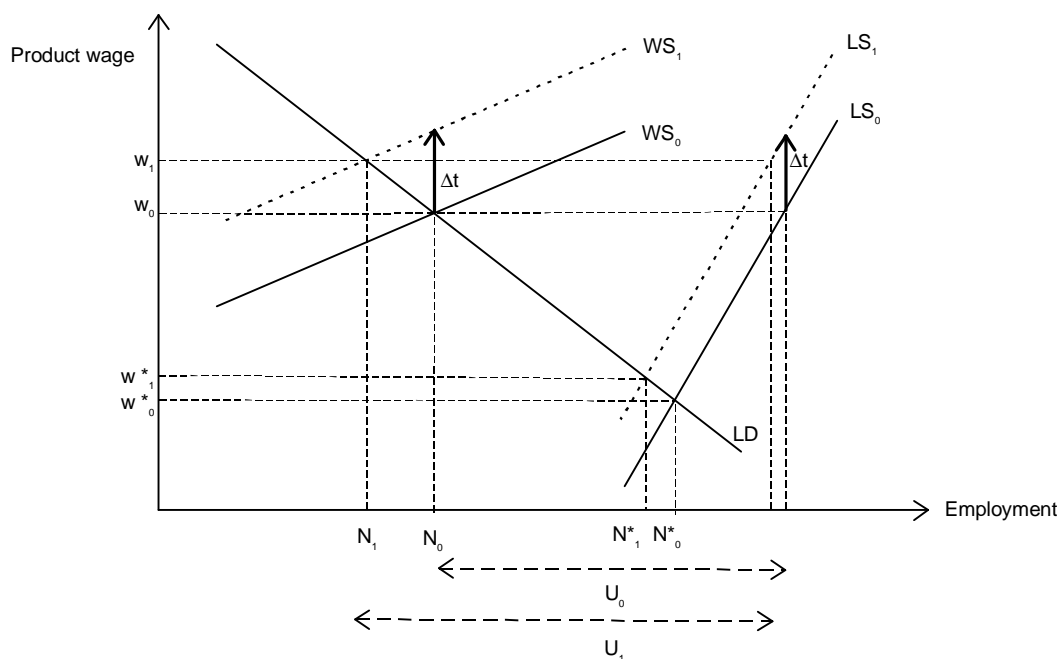


*Definitions :*

w, N, and U    :   denote product wage, employment, and unemployment under non-competitive conditions;

w*, N*       :   denote product wage and employment under competitive conditions;

WS, LS and LD   :   denote wage-setting, labour supply, and labour demand schedules; WS and LS are functions of the consumption wage and LD is a function of the product wage. The consumption and product wages are related as follows : $w = w^c.t.\lambda$ , where $w^c$ is the consumption wage, $t = (1+t_w)(1+t_c)/(1+t_i)$ is the tax wedge (with $t_w$, $t_c$, and $t_i$ denoting employment, consumption, and income taxes respectively), and $\lambda$ is the price wedge (the ratio of consumer to producer prices);

$\Delta t$        :   denotes any increase in labour taxation, whether imposed on employers or employees, which shifts the WS and LS curves vertically by the amount of the tax according to the above relationship between w and $w^c$; for every value of N, higher w is now required both in the wage setting process and in order to supply a given amount of labour.

*Source*: Lindbeck (1993), p.76 (adapted).

Figure 10.  **Employment and the tax wedge (1)**

**A. Tax wedge and hours worked per working-age population, average 1991-1995**
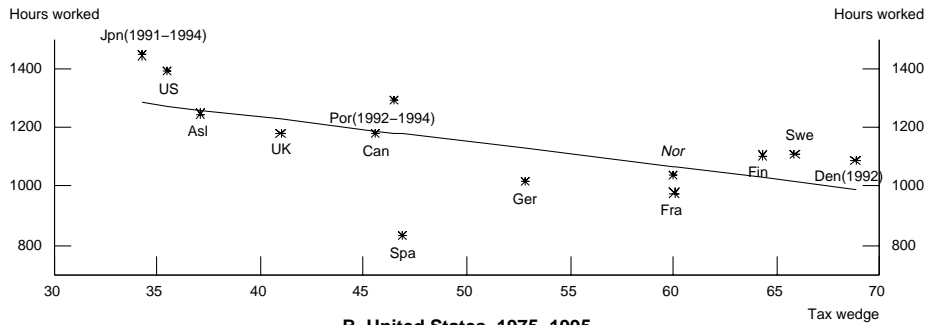


**B. United States, 1975-1995**
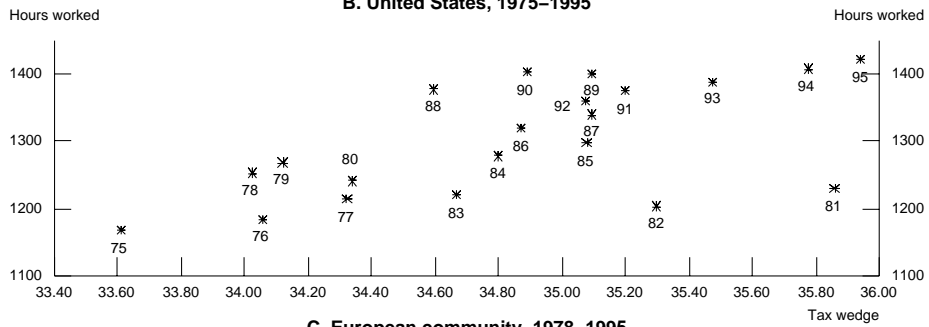


**C. European community, 1978-1995**
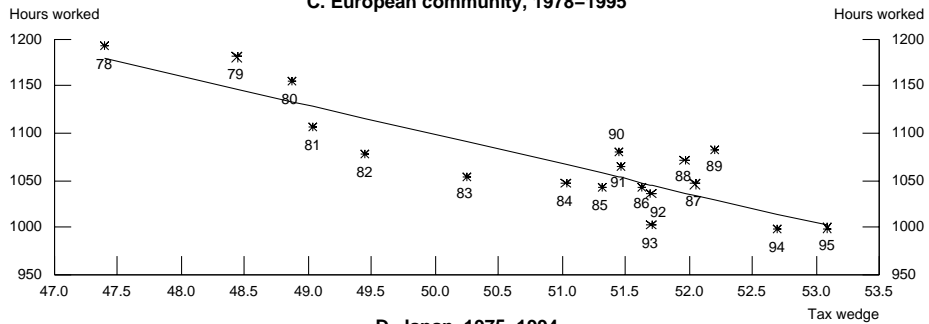


**D. Japan, 1975-1994**
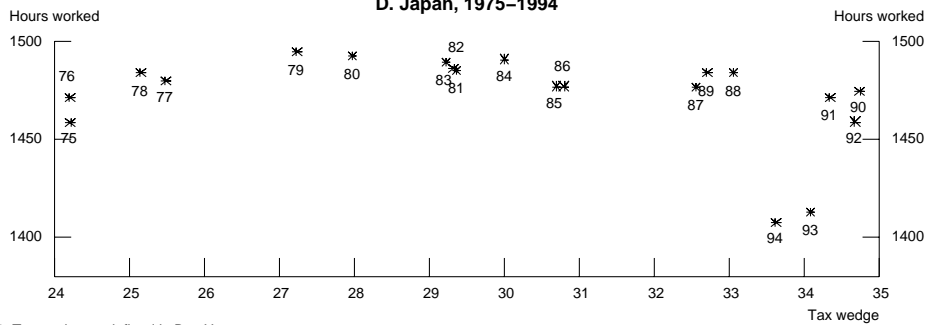


1. Tax wedge as defined in Box H.

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**Figure 11. The tax wedge and female participation rates**
**(average 1990–1994)**
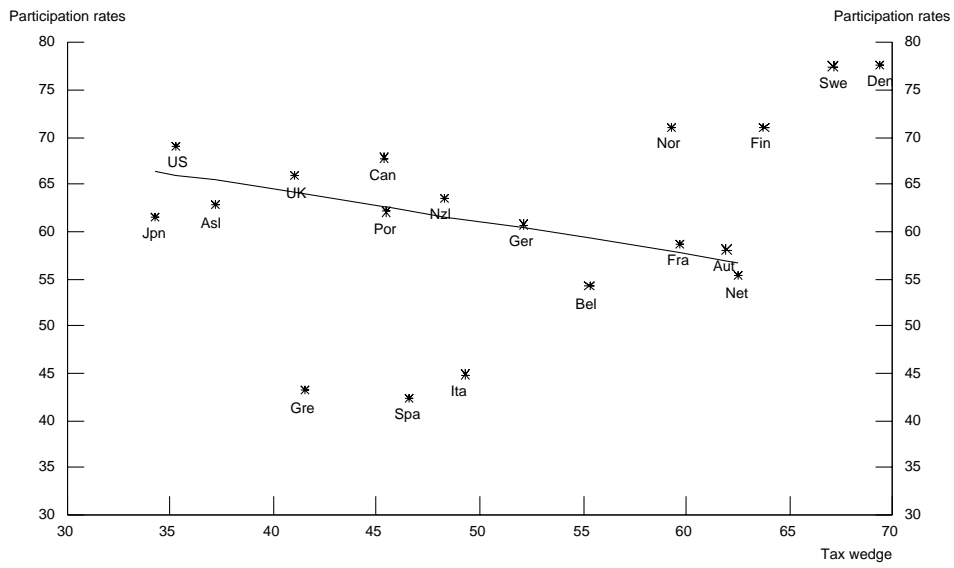


Note : The regression line omits outliers (Denmark, Finland, Greece, Italy, Norway, Spain and Sweden).

**Figure 12. Trends in female and male participation rates**

**A. Female participation rates**
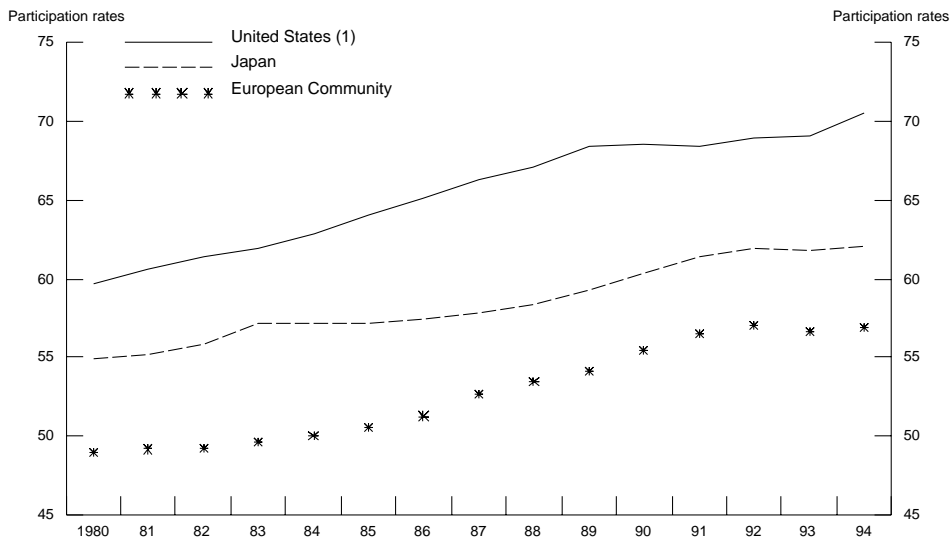


**B. Male participation rates**
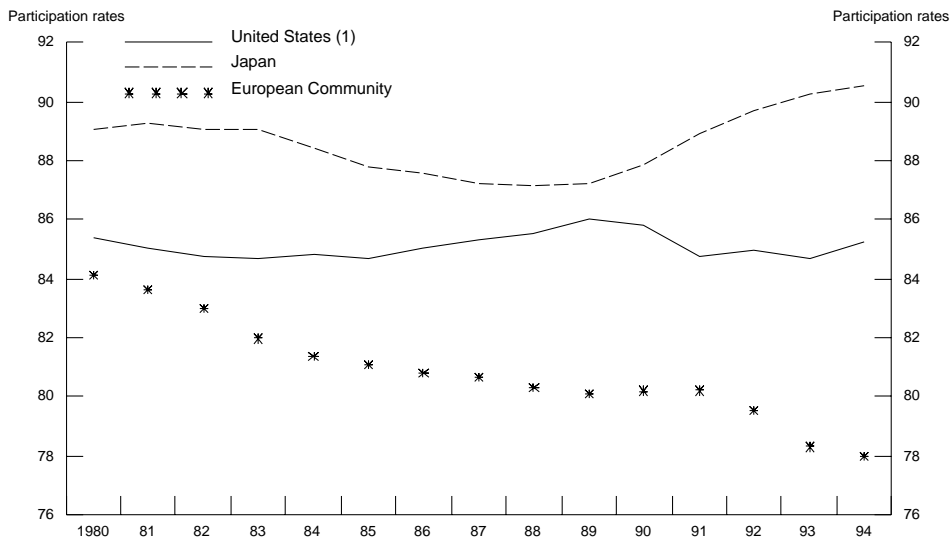


1. Due to a change in the Labour Force Questionnaire there is a break in series for activity rates for the USA between 1993 and 1994.

## ANNEX 1.  BACKGROUND NOTES


## A.  Theories of economic growth and implications for policy

1.        While growth models generally emphasise the role of saving and investment (which are in closed-economy models always equal) they differ on the importance of savings for long-term (or equilibrium) rate of growth and this also has implications for growth policies.  In the *post-Keynesian growth models* (as represented by Harrod and Domar) a higher saving and investment ratio leads to a higher rate of growth (the growth rate is equal to the savings rate divided by the capital/output ratio, and the latter is assumed to be constant).  If the capital stock increases faster than labour, the economy is oversaving;  there will be a labour shortage and the supply of labour will dictate output growth.  If labour supply increases faster than the capital stock, the economy is short of capital (or is undersaving) and labour is unemployed and the supply of capital will dictate output growth.  Thus, in full employment equilibrium growth, labour, capital and output grow at the same rate.

2.        Other post-Keynesian models (such as those by Kaldor or more recently McCombie and Thrilwall) point to the manufacturing sector (or more generally the sector which produces tradable goods) as the "engine of growth".  In these models the ultimate cause of manufacturing output growth lies in autonomous demand and not in factor supply constraints;  in a closed economy, autonomous demand is determined by the growth of the primary sector, but in an open economy by export demand.  Therefore, it is mainly the growth rate of exports that determines growth in advanced economies, to which both consumption and investment adapt via multiplier and accelerator effects.  The growth of demand induced by the growth of exports improves labour productivity and this, by restraining the increase in unit labour costs, favours a further growth of exports and of GDP.  Income changes (rather than price changes) adjust the level of imports to that of exports (*export-led growth model*).

3.        The pace at which a country can grow is limited (in the long term) by the balance-of-payments constraint and the latter is reduced by higher growth in world demand and a higher income elasticity of demand for the country's exports relative to the country's demand for imports.  A country which wishes to grow faster should therefore increase the ratio between these elasticities, for example, by strengthening the manufacturing sector, specialising in more sophisticated goods and improving non-price competitiveness. Improving price competitiveness, for example, by lower wages or a devaluation of the currency makes the selling of the old products easier, but reduces the incentive to innovate and may be inflationary.  In these models, tax and other fiscal policy measures which increase domestic and foreign demand and reduce the balance-of-payments constraint increase growth.

4.        In the *neo-classical growth models* (such as those by Robert Solow and Trevor Swan) output increases in response to larger inputs of capital and labour;  a higher rate of saving (and investment) raises the *level of steady-state income*, and has therefore only a temporary effect on growth (during the period of transition from one steady state to the next). The reason for this outcome is that the economy obeys the law of diminishing returns so that each additional (bit of) capital input -- given a fixed labour supply -- yields a slightly lower return than the one before.  As the growth of capital (or labour) expands, growth

slows and eventually halts. Hence, sustainable growth requires a continued infusion of technical progress -- in terms of improved capital productivity or labour skills -- which arises outside the model. Therefore, the neo-classical model can explain the catching-up of poorer countries -- where capital is relatively scarce so that additional capital yields a higher return than in richer countries -- but cannot explain continued growth in richer countries where technical progress is the main driving force for growth as technical progress is exogenous, i.e. is not explained by the model. In this model, tax measures which raise the savings and investment rate raise the growth of output but only during a transition to a new steady-state level of output, and growth ends after the higher level is reached.

5.        The fact that richer countries still grow, led to the conclusion of the *new growth theory* that the law of diminishing returns may not apply -- so that with additional capital (and a given labour supply) economies may grow forever. In these models (such as those by Romer, Lucas, Krugman and Barro), perpetual growth of output is possible as capital has large positive external effects and/or is defined broadly (i.e. it includes infrastructure and in particular human capital, i.e. the knowledge and the skills embodied in the workforce). Hence, productivity (or innovation) increases as a by-product of capital accumulation, for example as firms learn how to use capital more efficiently, or as they benefit from the existence of other firms or from research and development, so that, in contrast to the neo-classical models, technical progress is sustained (or in terms of this theory is "endogenous"). The new growth theory has implications for the assessment of policies. First, the government should provide an intellectual property law so that innovating firms can reap -- at least temporarily -- abnormal profits which are the engine for innovation. The new growth theory thus drops the neo-classical assumption of perfect competition and allows innovating firms to do better than the others. Second, the size of investment alone is not a sufficient condition for growth as the "quality" of investment also matters; furthermore, if high business investment is accompanied by bad government policies, it is not turned into growth (as was the case in the former communist countries). Third, growth can permanently be raised by good policies such as increasing *human* capital and fostering the right kind of physical capital by an appropriate level and structure of government spending and taxation. Thus, lowering the tax burden without reducing growth-enhancing government programmes such as education and infrastructure would increase the rate of output growth. But given the empirical uncertainties about the external effects of private investment, views differ about how much (and which kind) of government intervention is warranted. Endogenous growth theory therefore does not provide a clear policy prescription, although it emphasises the role of "good policy" for growth and some authors (such as Barro) stress the need to maintain a small government sector. From this perspective, the extension of government sectors in many OECD countries which was mainly driven by social transfers may have been harmful for growth. Furthermore, the fact that OECD countries currently subsidise agriculture six times more than industry ($300 billion per year as compared with about $50 billion with the largest share of industrial subsidies provided to ailing sectors and only around 20 per cent of industrial subsidies to R & D) is clearly not in line with this theory of growth.

6.        Both the neo-classical growth models and new growth models consider the catching-up of poorer countries to leading countries (convergence) as being a major determinant for growth. But while neo-classical models focus on the increase of routine investment, the new growth models stress that human capital formation and bridging idea gaps by assimilating technologies may be more important. The empirical literature on economic growth also found that opening the economy, low inflation and political stability are important determinants for growth and these factors fit equally to the "old" and the "new" growth models. Improving the efficiency in the use of existing resources (such as fixed capital and human capital including entrepreneurial spirits) rather than squandering them, may sometimes be more important than to increase resources. When it comes to explaining growth in certain countries, such as the East Asian countries, views differ. While some (such as Paul Krugman) explain high growth in south-east Asia mainly as a catch-up process consistent with the neo-classical model and driven by high saving and investment and high labour growth (caused by population growth and increasing participation rates),

others think that government policies such as provision of investment tax credits, research and development promotion and human capital formation, play a decisive role. But there is some evidence that, for example in Korea, tax policy was not a major factor and accounted for less than one-tenth of Korean growth between 1962 and 1982 (Trela and Whalley, 1991). Within the OECD area the closing of income gaps to the more advanced countries, i.e. the process of convergence, may explain part of the slowdown growth in the post-war period, but it cannot explain the decline in growth over the past 15 years. In fact, during this latter period, the relationship between growth and the level of initial income weakened significantly (see Figure A1).

**[Figure A1.  Economic growth and initial level of income]**

# Figure A1. Economic growth and initial level of income

**1960-1979**



**1979-1995**
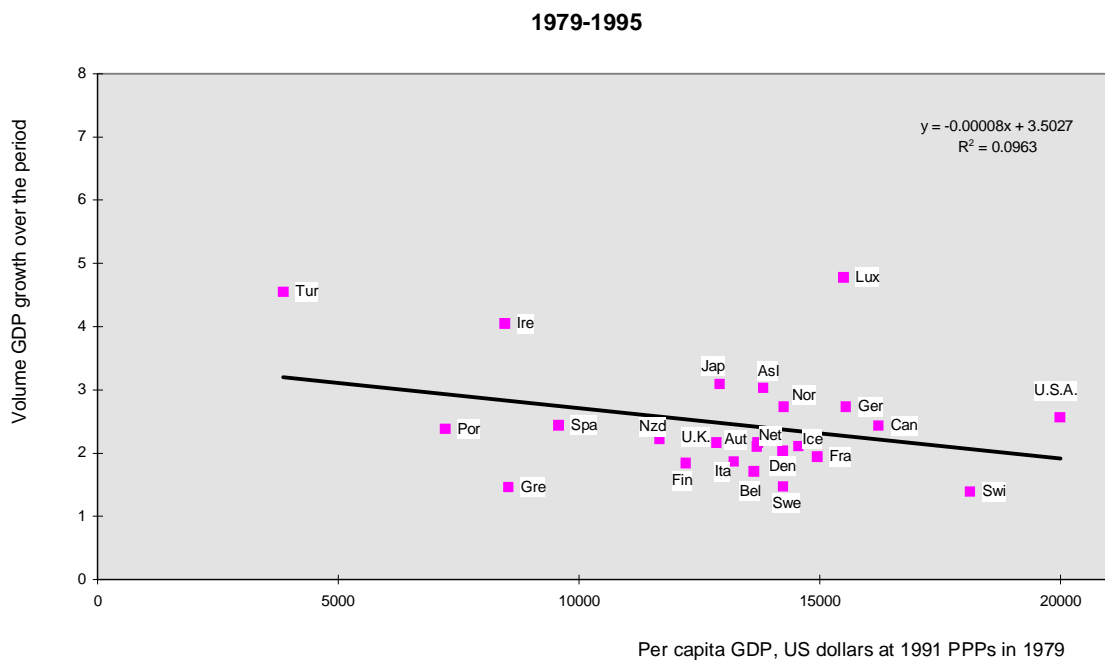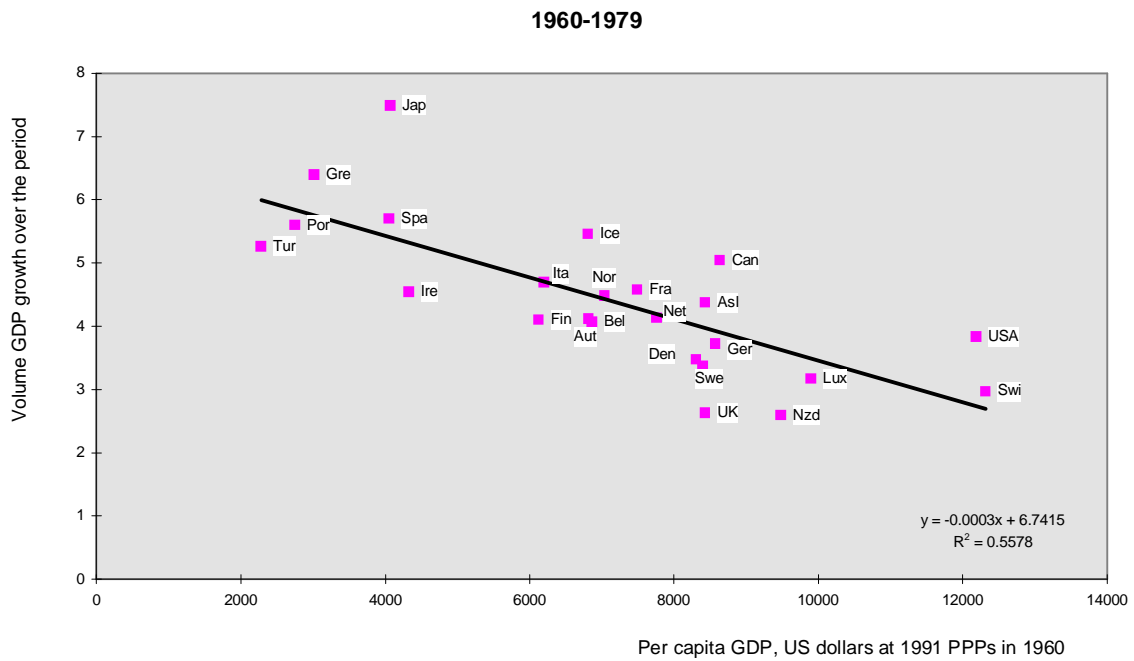
## B. Past trends in tax policies[1]

### 1. Income tax becomes flatter and broader-based

7.          In the 1980s most Member countries cut their top personal income-tax rates by an average of over 10 percentage points (Table A1.1).  Since then, top rates have tended to remain relatively stable, although cuts have been partially reversed in some countries (e.g. the United States and Sweden).  Major differences in top tax rates remain between countries:  for example, they are relatively high in Denmark (63.5 per cent), the Netherlands (60 per cent), France (56.8 per cent), Belgium and Turkey (55 per cent), and relatively low in Norway (13.7 per cent), Switzerland[2] (11.5 per cent) and Canada (31.3 per cent).

**[Table A1.1.  Top marginal rates of personal income tax in OECD countries]**

8.          Cuts in top marginal rates were often accompanied by broadening tax bases.  For example, taxes on fringe benefits were increased in the United Kingdom, Australia, Finland and Ireland, while the 1986 reforms in the United States removed a range of deductions[3].

9.          In addition to cutting top rates of income tax, many countries have restructured the rate schedule so as to reduce the number of tax rates (Table A1.2).  In the 1990s, some countries including France, Greece, Ireland and Luxembourg have simplified their tax schedules, while others such as the United States, the United Kingdom and Iceland reversed previous simplifications.  Overall, the personal income tax became a flatter tax, with fewer tax rates and smaller differences between them.

**[Table A1.2.  Number of positive rates in personal income tax schedule]**

10.         The broadening of tax bases and the overall growth in incomes have kept the share of personal income-tax revenues as a per cent of GDP at roughly similar levels, despite cuts in marginal tax rates.  In 1994, personal income taxes raised an average of 10.7 per cent of GDP across the OECD, ranging from less than 5 per cent in Greece to around 28 per cent in Denmark.

11.         Trends in the corporate income tax have largely followed those observed for the personal income tax:  the tax base has been broadened and rates reduced.  Of the 24 reporting countries only Italy, Austria, Spain and Switzerland did not reduce corporate rates over the 1986-95 period.  Table A1.3 shows that the cuts in corporate income tax at the central government level since the mid-1980s averaged around 10 percentage points.  At the same time, the range of rates across countries fell significantly.  As in the case of personal taxes, the reduction in tax rates was accompanied by a broadening of the base.  These various incentive schemes, including for regional or sectoral development, investment tax credits and property related tax shelters were reduced or abolished in the United States, Germany, Australia, Austria, Finland, Iceland, Portugal and Spain.

**[Table A1.3.  Basic rates of corporate income tax at central government level, 1986-95]**

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1.          This note draws heavily on Owens and Whitehouse (1996).

2.          Taxation of income by cantons, which is not included in this figure, is very important in Switzerland.

3.          Several countries (France, Italy, Australia, Belgium, Finland, Ireland, the Netherlands and Portugal) began producing tax expenditure accounts during the 1980s and such accounts are now produced by 14 OECD countries which enhances the transparency on tax benefits.

12.      Major differences between corporate tax rates and tax bases remain, however, with the highest rates being in Germany and Greece, and the lowest in Finland, Norway, Switzerland and Turkey.


*2. Further moves towards Value Added Tax*

13.      Currently, the United States and Australia are the only OECD countries without VAT-type taxes. Greece, Portugal and Spain introduced VAT in the 1980s on joining the European Union (for which adoption of VAT is a condition of membership).  Japan, Canada, Iceland, New Zealand and Switzerland have also recently introduced a VAT.   The tendency for the rate of VAT to have been increased once the tax is introduced has contributed to the general growth of consumption tax revenues (Table A1.4).  The countries with the largest shares of VAT revenues in GDP in 1993 were Austria, Denmark, Finland, New Zealand, Norway and Sweden.  In all of these countries VAT revenues exceeded 8 per cent of GDP.

**[Table A1.4.  VAT in OECD countries]**

Table A1.1. **Top marginal rates of personal income tax in OECD countries**[1,2]

|  | 1975 | 1985 | 1990 | 1995 |
|---|---|---|---|---|
| United States | 70 | 50 | 28 | 40 |
| Japan | 75 | 70 | 50 | 50 |
| Germany | 56 | 56 | 53 | 53 |
| France | 60 | 65 | 57 | 57 |
| Italy | 72 | 50 | 50 | 51 |
| United Kingdom | 83 | 60 | 40 | 40 |
| Canada | 47 | 34 | 29 | 31 |
| Australia | 65 | 60 | 47 | 47 |
| Austria | 62 | 62 | 50 | 50 |
| Belgium | 60 | 72 | 55 | 55 |
| Denmark | 40 | 40 | 40 | 35 |
| Finland | 51 | 51 | 43 | 39 |
| Greece | 63 | 63 | 50 | 40 |
| Iceland | 40 | 38 | 33 | 38 |
| Ireland | 77 | 60 | 53 | 48 |
| Luxembourg | 57 | 66 | 56 | |
| Netherlands | 71 | 72 | 60 | 60 |
| New Zealand | 57 | 57 | 33 | 33 |
| Norway | 48 | 48 | 20 | 14 |
| Spain | 62 | 66 | 56 | 56 |
| Sweden | 56 | 54 | 20 | 25 |
| Switzerland | 13 | 13 | 13 | 12 |
| Turkey | 68 | 58 | 50 | 55 |

1. Central government rate only.
2. The United States, Canada, Finland, Iceland, Norway, Sweden and Switzerland also have personal income tax levied by sub-central government. This table excludes Portugal for which it is not possible to generate comparable rates.

*Source:* Owens and Whitehouse (1996).

Table A1.2. **Number of positive rates in personal income-tax schedule**

1986, 1990, and 1995

|  | 1986 | 1990 | 1995 |
| --- | --- | --- | --- |
| United States | 14 | 2 | 5 |
| Japan | 15 | 5 | 5 |
| France | 12 | 12 | 6 |
| Italy | 9 | 7 | 7 |
| United Kingdom | 6 | 2 | 3 |
| Canada | 10 | 3 | 4 |
| | | | |
| Australia | 5 | 4 | 4 |
| Austria | 10 | 5 | 5 |
| Belgium | 12 | 7 | 7 |
| Denmark | 3 | 3 | 4 |
| Finland | 11 | 6 | 6 |
| Greece | 18 | 9 | 3 |
| Iceland | 3 | 1 | 2 |
| Ireland | 3 | 3 | 2 |
| Luxembourg | 21 | 24 | 17 |
| Netherlands | 9 | 3 | 3 |
| New Zealand | 6 | 2 | 2 |
| Norway | 8 | 2 | 2 |
| Spain | 34 | 16 | 16 |
| Sweden | 10 | 1 | 1 |
| Switzerland | 6 | 6 | 13 |
| Turkey | 6 | 6 | 7 |

*Source:* Owens and Whitehouse (1996).

Table A1.3. **Basic rates of corporate income tax of central government, 1986-95**

|  | 1986 | 1991 | 1995 |
|---|---|---|---|
| United States | 46 | 34 | 35 |
| Japan | 43 | 38 | 38 |
| Germany | 56 | 50/36 | 45/30 |
| France | 45 | 34/42 | 33 |
| Italy | 36 | 36 | 36 |
| United Kingdom | 35 | 34 | 33 |
| Canada | 36 | 29 | 29 |
|  |  |  |  |
| Australia | 49 | 39 | 33 |
| Austria | 30 | 30 | 34 |
| Belgium | 45 | 39 | 39 |
| Denmark | 50 | 38 | 34 |
| Finland | 33 | 23 | 25 |
| Greece | 49 | 46 | 35/40 |
| Iceland | 51 | 45 | 33 |
| Ireland | 50 | 43 | 40 |
| Luxembourg | 40 | 33 | 33 |
| Netherlands | 42 | 35 | 35 |
| New Zealand | 45 | 33 | 33 |
| Norway | 28 | 27 | 19 |
| Portugal | 42/47 | 36 | 36 |
| Spain | 35 | 35 | 35 |
| Sweden | 52 | 30 | 28 |
| Switzerland | 4-10 | 4-10 | 4-10 |
| Turkey | 46 | 49 | 25 |
|  |  |  |  |
| Average basic rate[1] | 43 | 36 | 33 |

1.  This average excludes Switzerland, takes into account the rates on distributed earnings for Germany (respectively 36 and 30 per cent in 1991 and 1995), 34 per cent for France in 1991 (rate applicable from the second part of the year onwards), 40 per cent for Greece in 1995 (rate applying to non-listed corporate profits), and 42 per cent for Portugal.

*Note:* The United States, Japan, Germany, Italy, Canada, Austria, Finland, Norway, Portugal and Switzerland also have sub-central corporate taxes. Rates rounded to nearest percentage point. Many countries also have special rates for firms with fewer profits and for particular sectors.

*Source:* Owens and Whitehouse (1996).

Table A1.4.  **VAT in OECD countries**

| | Year VAT introduced | Initial standard rate | Current standard rate | VAT revenues 1993 (percentage of GDP) |
|---|---|---|---|---|
| Japan | 1989 | 3.0 | 5.0 | 1.5 |
| Germany | 1968 | 10.0 | 15.0 | 6.8 |
| France | 1964 | 20.0 | 20.6 | 7.5 |
| Italy | 1973 | 12.0 | 19.0 | 5.6 |
| United Kingdom | 1973 | 10.0 | 17.5 | 6.6 |
| Canada | 1991 | 7.0 | 7.0 | 2.6 |
| | | | | |
| Austria | 1973 | 16.0 | 20.0 | 8.3 |
| Belgium | 1971 | 18.0 | 21.0 | 7.0 |
| Denmark | 1967 | 10.0 | 25.0 | 9.8 |
| Finland | 1969 | 11.1 | 22.0 | 8.6 |
| Greece | 1987 | 16.0 | 18.0 | 8.5 |
| Iceland | 1989 | 22.0 | 24.5 | 9.9 |
| Ireland | 1972 | 16.4 | 21.0 | 7.0 |
| Luxembourg | 1970 | 8.0 | 15.0 | 6.7 |
| Mexico | 1960 | 10.0 | 15.0 | .. |
| Netherlands | 1969 | 12.0 | 17.5 | 7.0 |
| New Zealand | 1986 | 10.0 | 12.5 | 8.2 |
| Norway | 1970 | 20.0 | 23.0 | 9.1 |
| Portugal | 1986 | 16.0 | 17.0 | 6.2 |
| Spain | 1986 | 12.0 | 16.0 | 5.1 |
| Sweden | 1969 | 11.1 | 25.0 | 8.5 |
| Switzerland | 1995 | 6.5 | 6.5 | 2.7 |
| Turkey | 1985 | 10.0 | 15.0 | 5.7 |

*Source:*   Owens and Whitehouse (1996).

## C. Problems of measuring tax distortions by tax/GDP ratios ("top-down" approach)

14.     There are various reasons why the relationship between the total tax to GDP ratio and economic growth is often weak in cross-country and time-series regressions. Tax-to-GDP ratios may be affected by statistical distortions; these ratios may be a poor proxy for tax distortions at the micro-level. Furthermore, tax distortions may be outweighed by other factors.

### 1. Comparability of tax/GDP ratios

15.     Tax revenue ratios may not be comparable across countries (or over time) as similar programmes -- e.g. benefits to families with children -- are sometimes classified as spending programmes and sometimes as tax credits (with the latter reducing the tax/GDP ratio). Also, countries which provide similar net transfers may have different total tax and spending ratios if one country taxes transfers while the other doesn't. Furthermore, countries may enact policies that have similar goals and create similar economic incentives or disincentives but have different implications for the size of the government sector as measured by taxes or spending. For example, some governments may provide tax benefits or spending programmes to give incentives to the private sector, while other governments may pursue similar goals through trade policies and regulations. Also, regulating private pension plans as a substitute for public pensions reduces the tax/GDP ratio significantly. Some countries also have large government enterprises which provide specific goods and services at subsidised prices as a substitute for traditional spending and tax programmes.

16.     The question arises therefore if and how in cross-country comparisons the tax/GDP ratios should be adjusted in some countries so that international differences in these ratios better illustrate differences in overall tax distortions. But such an adjustment requires information (or assumptions) about behavioural responses to government regulations. For example, regulated private health insurance -- often employer-sponsored -- is an important means of financing health services in the United States, while many other Member countries use mandatory payroll contributions to finance publicly sponsored insurance. These different ways of drawing the boundary between the private and public sector presumably have various economic effects on the health-care sector and on labour markets. It is clear, though, that this has major implications for measured tax burdens and public expenditure ratios. Aaron (1987) estimates that if the United States had the health financing structure of Germany, France or the United Kingdom, the size of its public sector would increase by 5 or 6 percentage points without significantly changing the government's overall effect on the economy.

### 2. The nature of tax distortions

17.     The difficulties with assessing tax distortions at the macro-level arise from the complex nature of these distortions. Tax distortions must be defined with reference to a neutral tax system, which is generally not observable empirically. In theoretical studies, the lump-sum tax (which is an equal tax amount per person) is used as a reference case for a neutral tax, as this tax provides government revenues without changing relative prices.

18.     Virtually all existing taxes are potentially distortionary in the sense that they change relative prices between factors of production (labour and capital) and/or between current consumption and future consumption (which corresponds to current savings), between different goods and/or services or between labour and leisure. However, the economic implications of these distortions depends on the response of economic agents: a given tax system will have large distortionary effects on the economy (i.e. high

deadweight losses or excess burden) when the elasticities of substitution are high and small distortionary effects when the elasticity of substitution is low.

19.     As the elasticity of substitution generally differs across the economy (for example between labour and capital or between different goods or between demand and supply of similar factors of production or goods), the tax burden may be shifted to those parts of the economy (or to those economic agents) where the elasticity of substitution is low (for example, the tax burden may be shifted from capital to labour);  it may also take some time until all tax effects have worked through the system and are noticeable in the data.  For example, an increase in the tax on labour may induce part-time married women to withdraw from the labour force (if the price elasticity of labour supply is high).  If firms would like to keep these workers they would offer them higher wages (if the price elasticity of labour demand is low) so that employers would finally pay the higher tax;  if the demand for the products which these firms produce is relatively price-inelastic, the tax burden would be shifted further to the buyers of these products so that in the end the tax may be borne by all workers or -- in case these products are exported -- by foreign consumers and workers.  On the other hand, if capital is more price-elastic (or internationally more mobile) than labour, an increase in the capital income tax may cause a fall in the domestic capital stock which would reduce labour productivity and real wages;  thus, the higher capital income tax would finally be borne by workers.  However, higher taxes may not always reduce the supply of labour and capital but may even increase it.  This is so when workers or savers want to preserve their level on income and work more or save more with higher taxes;  such behaviour may, however, not be representative for all workers and savers (see Sections 4 and 5 of the main paper).

20.     These considerations suggest that any analysis on the effects of taxation on growth and employment should focus on the overall effects of taxation including all secondary effects across factor and product markets.  Some of these effects are taken into account in the model simulations as described in Section 6 of the main paper.


### 3.  Why the tax/GDP ratio may understate tax distortions

21.     As the tax /GDP ratio does not include the excess burden arising from behavioural responses, it may significantly understate the total effect of taxation.  For example, when individuals evade a high tax they drive down tax revenue, so that the high tax is not noticeable in the data.  If there are large variations in the degree of tax evasion across countries, this could swamp the difference in the tax revenue-to-GDP ratios.  Therefore, this ratio may not even be a good proxy for the overall *average* tax rate of the economy. But it may be even less meaningful as a proxy for the overall *marginal* tax rate of the economy which has to be considered when assessing tax distortions.  Marginal tax rates vary widely between sectors and individuals. Overall marginal tax rates which individuals face may be even higher than those which result from the tax system alone;  for example, if transfers are means-tested their value declines with income and the combined effect of the marginal tax rate and the transfer-withdrawal rate may imply a large overall marginal tax rate of the fiscal system. Disincentives may also be higher if goods and services are provided by non-governmental organisations at income-tested or wealth-tested prices (as universities do in some countries) or are financed by levies on their member's income tax (as churches do in some countries).


### 4.  Why the tax/GDP ratio may overstate tax distortions

22.     The tax revenue-to-GDP ratio also may overstate the tax costs to the economy as it does not consider that these revenues are spent to supply goods and services to the economy, which may enhance productivity and growth.  There may in fact be feedback effects from the level of GDP (or its growth) to

the desired level of government (demand for government activities). It is generally thought that, at a low size of government, GDP (or its growth) increases with more government involvement. The reason is that the marginal benefits of public goods and services exceed the marginal costs of raising taxes so that the positive effect of government spending on the marginal productivity of capital dominates.

23.     As actual tax/GDP ratios reflect both the costs of government and the demand for government, an identification of the net cost of taxation in cross-country or-time series regression analysis requires the identification and exclusion of income-related and non-income-related demand for government activities. Drawing a simple regression line between tax/GDP ratios and growth may therefore not clarify matters as the regression may be far from an appropriate reduced-form equation for the structural relationship between growth and the net cost of taxation (see Slemrod, 1995).

## 5. *Effect of regulations*

24.     Countries may resort to regulations as a substitute for taxes. If such regulations also have a negative impact on growth, high taxes may go together with high growth as the latter is stimulated by lower regulations than in low-tax countries[4]. There is some evidence for such a negative relationship between the tax/GDP ratio and growth-depressing regulations (Slemrod, 1995). For example, low-tax countries may have trade restrictions which reduce growth and it was found that opening the economies was often accompanied by an increasing size of the government budget.

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4.      If there is a positive relationship between taxes and other growth-depressing government involvement (as regulations), the adverse effect from taxes is overstated as it also includes these other effects.

## D. Does taxation of corporate profits matter for investment?[5]

### 1. View depends on assumed source of finance

25.    There are three views in the literature regarding the distortionary effects of the corporate tax, and much depends on the assumption regarding the source of financing for marginal investment.  The traditional (or "old") view is that corporations finance marginal investment by *new equity* (new share issues):  if the corporate tax leads to double taxation of dividends (as with a "classical" corporate tax system such as that prevailing in the United States, Belgium, Luxembourg, the Netherlands and Switzerland), net capital costs of investment are higher than the market interest rate and this reduces investment in the corporate sector.  It may also lead to some reallocation of capital between the corporate and the non-corporate sectors, which could mitigate the overall effect on aggregate investment.  With this view, reducing or eliminating double taxation of dividends lowers the required rate of return of corporations, thus stimulating corporate investment.

26.    A second view (the neutrality view) is that if *debt* is used to finance marginal fixed investment, the corporate tax would not reduce investment.  This view assumes that:  *i)* without taxes, savers and firms would be indifferent to the structure of investment financing so that the financial structure would not matter to a firm's investment decision (Modigliani-Miller theorem);  *ii)* with taxes, firms should rely on the source of finance which is most favoured by the tax system;  this would be debt in most countries, in particular where the corporate tax rate is higher than the personal tax rate and where there is double taxation of dividends.  If debt is used to finance the marginal investment, investment will be increased until (the risk-adjusted) marginal pre-tax rate of return equals the (tax-deductible) market interest rate before tax.  Investment would then be similar to that in a world without taxes.  Thus, there would be no tax distortion on fixed investment as the tax on its return is similar to the tax on the return from financial investment since both returns are only taxed at the saver's level at the same rate.  The corporate tax then exclusively falls on intra-marginal profits which exceed the market interest rate, but does not fall on marginal investment.  This neutrality hypothesis assumes, however, that depreciation allowances are equal to "true economic depreciation".  If depreciation allowances would exceed economic depreciation (as is often the case), a higher corporate tax rate would actually *stimulate* debt-financed corporate investment, because it increases the value of the tax subsidy implicit in the depreciation allowances.  Hence, those who believe that corporations rely typically on debt at the margin, claim that the corporate tax is either approximately neutral or -- with accelerated depreciation -- is even beneficial to corporate investment.

27.    A third view (the so-called new view) is that the marginal investment of corporations is financed by retained profits rather than by debt or new equity.  The use of retained profits enables investors to accumulate capital at a rate of return that is taxed by capital gains tax rather than by income tax.  If the sum of the corporate tax and the capital gains tax is lower than the personal tax on interest income[6] firms would prefer financing by retained earnings rather than by debt.  The corporate tax would then also be neutral with respect to investment.  The reason is that the retention-financed investment would be carried on until the (risk-adjusted) marginal rate of return becomes equal to the market interest rate and any remaining profits would be invested in the capital market.  Any additional investment could then be financed by reducing this financial investment so that the opportunity cost of investment (and its net

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5.    For the following, see OECD (1991), Sørensen (1995) and Sinn (1991*a*) and the literature which is mentioned therein.

6.    As was the case, for example, in the United States before the 1981 tax reform (Stiglitz, 1973, pp. 1-34).

capital cost) is again the market interest rate; the corporation tax falls here entirely on intra-marginal investment with returns above the market interest rate, but does not reduce investment. In the (second) case, where total taxes on retained earnings are higher than on debt-financed investment, firms may (still) use some form of equity financing. The reason is that they may not wish to rely exclusively on debt and as profit retentions transform dividends into more lightly taxed capital gains on shares, retained earnings financing would be preferable to new equity financing. In that case, the required rate of return on investment (net cost of capital) exceeds the market interest rate so that investment is reduced. In that case, a lower capital gains tax would stimulate corporate investment, whereas reducing dividend taxation would only produce windfall gains to existing stock owners (as double taxation of dividends is capitalised in lower prices) without stimulating investment. But it is argued that with capital gains being taxed only on realisation and not on accrual, the *effective* capital gains tax rate may be relatively low, so that the tax distortion on retention-financed investment should be relatively small.

28.　　　However, not all firms may be in the position to finance marginal investment by retained earnings and those which have to rely on new equity -- in particular, newly established firms with high investments -- may be affected by tax distortions if there is double taxation of dividends (see the first view above). But some argue that these firms will reduce the tax distortion by starting only with small equity and postponing some less urgent investment to a subsequent period when it can be financed by retained profits[7]; during their first period of growth they would then not distribute any dividends, but when firms enter maturity where net investment becomes zero, profits are paid out as dividends. At that later stage, the dividend tax would not raise the cost of capital (i.e. would be neutral) as any new investment would be financed by retained profits which is (according to this view) neutral or close to neutral.

29.　　　This discussion illustrates that some caution is needed when drawing conclusions from corporate tax rates to investment as much depends on the prevailing corporate tax system in relation to the personal income tax and on non-tax factors which may affect the financing of investment. If -- in a closed economy -- the corporate tax reduces the demand for capital, it may be largely borne by shareholders as their net return falls so that the corporate tax is progressive. But in open economies (particularly small ones) the corporate tax cannot affect the after-tax returns by shareholders as (gross) interest rates are determined by international markets. The corporate tax will then be shifted back to the more immobile factors, especially unskilled labour (as their wages fall as a result of a lower capital stock); this implies that the corporate tax could become regressive.

### *2. Measuring tax distortions on investment*

30.　　　The difference between tax distortions of the various sources of investment financing can be described by the following equations:

　　　If $p$ is the real pre-tax rate of return on a marginal investment project, net of depreciation, and $s$ denotes the real post-tax rate of return to the saver, the total tax wedge is[8]:

(1)　　　　　　　　$t = p - s$

The investment tax wedge is then:

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7.　　　Sinn (1991*b*).

8.　　　Sometimes the tax wedge is defined in relative terms as: $t = (p-s)/p.$

$$(2) \qquad\qquad t_c = p - r$$

and the savings tax wedge is:

$$(3) \qquad\qquad t_p = r - s$$

where $r$ is the pre-tax real market interest rate:

$$(4) \qquad\qquad r = i - \pi$$

where $i$ is the nominal market interest rate and $\pi$ is the rate of inflation.

Then:

$$(5) \qquad\qquad s = (1 - m) i - \pi$$

where $m$ is the marginal personal tax rate on capital income. With no inflation $i = r$ and:

$$(5a) \qquad\qquad s = (1 - m)r, \quad \text{so that} \quad t_p = rm$$

The investment tax wedge $t_c$ depends on the way investment is financed.

Consider first investment financing by *debt*. Assuming for simplicity that depreciation for tax purposes corresponds to true economic depreciation and that there is zero inflation. The taxable net profit on an extra unit of investment will be $(p - r)$, since interest payments are deductible. Hence the corporate tax bill ($T$) on income from a unit of additional debt-financed investment is equal to:

$$(6) \qquad\qquad T = \tau\,(p - r)$$

where $\tau$ is the corporate income tax rate.

As long as net profits on additional investment are positive, it will pay the corporation and its owners to increase investment expenditure. Hence the corporation will carry out debt-financed investment to the point where net profits on the marginal investment project are zero:

$$(7) \qquad\qquad p - r - T = 0$$

Insertion of (6) into (7) and rearrangement gives the simple expression for the investment tax wedge under debt finance:

$$(8) \qquad\qquad t_c = p - r = 0$$

It is seen from (8) that when depreciation allowed for tax purposes coincides with true economic depreciation, the investment tax wedge will be zero and the corporate tax system will have no distortionary effect on investment. In practice, many countries allow accelerated depreciation, and in that case the investment tax wedge will be negative because of the tax subsidy implied by the generous depreciation allowances.

In general, a higher rate of depreciation allowance will always reduce the investment tax wedge regardless of the mode of investment finance. However, to simplify the exposition, in the following it is also assumed that depreciation for tax purposes coincides with true economic depreciation.

It is now supposed that the marginal investment is financed by *new issues of shares* ("traditional view"). For shareholders to be willing to inject additional equity into the firm, the subsequent increase in net dividends after payment of corporate and personal taxes must be at least as high as the after tax interest income which shareholders might alternatively have earned by investing their funds in interest-bearing assets. The required rate of return on the marginal corporate investment may therefore be found from the following arbitrage condition:

(9) $$(1-m)\theta p(1-\tau)=r(1-m)$$

where $\theta$ is the dividend received by a shareholder per unit of distributed profits including a possible dividend tax credit. Under a classical corporate tax system no such credit is granted, and $\theta$ is simply unity, but under an imputation system $\theta$ will exceed unity.

The left-hand side of (9) represents the after-tax dividends on the extra share investment, allowing for a possible dividend tax credit, while the right-hand side reflects the after-tax income forgone by investing in shares rather than, say, bonds. Rearranging (9), one finds the investment tax wedge under finance by new share issues:

(10) $$p-r=\frac{r[1-\theta(1-\tau)]}{\theta(1-\tau)}$$

It can be shown from (10) that a higher corporate tax rate $\tau$ will increase the investment tax wedge whereas a higher degree of corporate-personal tax integration (a higher value of $\theta$) will reduce the wedge. Under a classical corporate tax system with no alleviation of the double taxation of dividends, the parameter $\theta$ is simply unity, and (10) simplifies to:

(11) $$t_c=p-r=\frac{\tau r}{(1-\tau)}$$

By contrast, under a system of full imputation with complete relief of the corporate tax underlying the dividend, we have $\theta=1/(1-\tau)$ and it then follows from (10) that the investment tax wedge will be zero.

Finally, considering the case where corporate investment is financed by *retained profits* ("new view"), at the margin where such investment is just barely worthwhile for the shareholder, the after-tax dividend forgone through retentions plus the capital gains tax payable on the resulting increase in share values will just be offset by the capital gain on shares. Hence, if the retention of "I" additional units of net corporate profits induces a capital gain of one unit, this gain will equal the net dividend of $I\theta(1-m)$ forgone by the shareholder plus his additional capital gains liability "$z$", implying:

(12) $$I\theta(1-m)z=1$$

In addition, the shareholder will require that the after-tax dividend of $(1\text{-}m)\,\theta\,pI\,(1\text{-}\tau)$ earned on the extra corporate investment is at least equal to the net return on interest-bearing assets:

$$(13) \qquad\qquad (1-m)\theta\,pl(1-\tau)=r(1-m)$$

Solving (12) for I, substituting into (13) and reorganising, obtains the investment tax wedge when financed by retained profits:

$$(14) \qquad\qquad t_c = p - r = \frac{r\big[\tau + z(1-\tau) - m\big]}{(1-z)(1-\tau)}$$

The term $\tau + z\,(1\text{-}\tau)$ in the square bracket in (14) is the sum of the corporate tax bill and the personal capital gains tax liability resulting from an extra unit of corporate profits which is retained in the corporation. When this combined tax bill exceeds the tax liability "$m$" on a unit of interest income, it is seen from (14) that the investment tax wedge on retentions-financed corporate investment is positive.

When a classical corporate income tax is combined with a comprehensive personal income tax where the effective capital gains tax rate equals the marginal personal income tax rate ($z = m$), it is easy to verify that (14) reduces to (11), implying that the investment tax wedge becomes the same whether equity finance is raised through retentions or through new share issues. A more realistic situation in most countries is that the effective tax rate on accrued capital gains is virtually nil ($z = 0$), in which case (14) simplifies to:

$$(15) \qquad\qquad t_c = p - r = \frac{r(\tau - m)}{(1-m)}$$

A zero capital gains tax thus implies that the investment tax wedge will be positive or negative, depending on whether the corporate tax rate is higher or lower than the marginal personal tax rate on capital income.

## E.  Empirical Evidence on Tax Shifting into Wages

31.      Empirical studies of the responsiveness of wages (and employment) to changes in labour taxes show large cross-country differences.  This is not surprising, as the discussion in Section 5.1.1 of the main paper shows this to depend on the institutional structure of wage bargaining and extent of competition in the product market.  Moreover, given differences in assumptions or estimation methodology, different studies often give very different estimates for the same country.  Most studies include productivity (long-run coefficients often close to 1) and unemployment (negative Phillips-curve-type effects) as determinants of the real wage (real labour costs) in addition to fiscal variables.  Time-series regression techniques, however, may give only weak evidence about how wages respond to tax changes, because wages in most OECD countries have often shown fairly large and erratic short-term movements, while tax rates have changed rather slowly and can only explain a small part of the short-term movements in aggregate wages.  The principal findings are shown in Table A1.5 and can be summarised as follows.

**[Table A1.5  Some estimates of wage responsiveness to taxation]**

32.      Knoester and van der Windt (1987) find, on the basis of single-country estimations, that the shifting forward coefficient ranges from 0.4 for the United States to 1 or more for Japan, Italy, Australia and the Netherlands.  The coefficients on direct taxes and indirect taxes are allowed to differ, and suggest that upward pressure from indirect taxes on real wages is much less than from equivalent direct taxes or social security contributions.  According to these estimates, taxes accounted for 25 to 50 per cent of overall wage growth in OECD countries over the 1970s and 1980s.  Another conclusion is that the "balanced budget multiplier" might be negative where tax shifting is relevant[9], since an increase in taxes will lead to a) an increase in real wages and decline in employment;  and b) a decline in profits thus income distribution shifts, which lowers investment and growth.

33.      Padoa-Schioppa Kostoris (1990) introduces the progressivity dimension and tests her model for Italy, which switched from a proportional to a progressive income tax in 1974.  The paper suggests that when income taxation is proportional, only the tax wedge matters for wage setting, and there is no difference between the impacts of income taxes, employer or employee social security contributions (in line with the so-called "Identity of Incidence Proposition", or IIP[10]);  only progressivity allows different coefficients for tax shifting.  The tests suggest that greater progressivity *raises* the long-run wage elasticity with respect to the income-tax rate to 1, i.e. the introduction of progressivity brought an end to fiscal illusion;  increases in the income-tax rate were now transferred to higher nominal wages and labour costs[11].

34.      Padoa-Schioppa Kostoris (1992) extends estimation of the tax-push hypothesis to nine European countries, and includes changes in fiscal indexation.  In general, for small and open economies such as Austria, Denmark and the Netherlands, her estimates show a zero effect of the tax wedge on labour costs;

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9.      Empirical support for this hypothesis is provided in a later paper by Knoester and Kolodziejak (1992).

10.      See OECD (1990), Chapter 6.

11.      This result is at variance with the theoretical predictions that progressivity should induce wage moderation by making nominal wage gains less desirable than employment gains.  Padoa-Schioppa Kosteris postulates a second progressivity effect which has the opposite influence:  progressivity diminishes the gap between the net real negotiated wage and the net real reservation wage, providing an incentive to increase the nominal wage rate if the union cares about "relativities", i.e. maintaining the real take-home wage relative to the full employment wage that would obtain in the absence of unions. The author argues that the estimates show that the second effect dominates.

steady-state targets are apparently fixed in terms of a real labour cost per unit of value added. Larger and less open economies transfer (in the long-run) increases in both indirect and direct taxes to the real labour costs. The progressivity effect is positive only in Italy and the United Kingdom[12], and negative in Germany, France and Sweden. European countries, however, show a weakening of tax shifting to real labour costs between the end of the 1970s and the beginning of the 1980s. Sweden is an exception to this trend, showing long-run real wage resistance to direct taxes of around a half.

35.     Holmlund and Kolm (1995) focus on the progressivity effect in a model tested for Sweden using micro-data. The results suggest that a rise in progressivity, at constant average tax rates, would reduce wage pressure, confirming the general result of bargaining models. They also suggest that a rise in the average tax rate, holding the marginal rate constant, would increase the pre-tax wage[13].

36.     Alesina and Perotti (1994) test an explicitly open-economy model of distortionary tax effects: higher taxes, to the extent they are not borne fully by workers, increase unit labour costs for tradable goods, generating a loss of competitiveness, which appreciates the relative price of non-tradables (the real exchange rate). The same qualitative effects would arise even if in the event of non-distortionary (lump-sum) taxes if the tax receipts are used to finance transfers to the unemployed, which raises the "reservation wage", in turn boosting wage claims. The effects of labour taxation also depend in a non-linear way on the degree of centralisation of the wage setting process: as the monopoly power of each union increases fiscal policy becomes more distortionary, but after a certain point, large unions can better internalise the negative employment effects of their wage demands and taxes become less distortionary. The model is run for a panel of 14 countries, and the estimates suggest stable coefficients on tax[14]. It is found that when taxes on labour increase by 1 per cent of GDP, labour costs in countries with an intermediate level of centralisation (maximum effect) increase by 3 per cent relative to competitors. Labour taxation also has significant negative effects on profit margins in the open sector and positive effects on the relative price of non-tradables. Another result is that highly centralised labour markets do *not* bring wage competitiveness back to the level of a very decentralised labour market[15].

37.     Tyrväinen (1995), in an analysis of ten countries (OECD *Jobs Study*), finds low long-run average shifting forward of labour taxes into real labour costs in the United States, the United Kingdom and Sweden, high shifting in Canada and full (100 per cent) shifting in Germany. Other countries are in-between with shifting forward coefficients of around ½. Though differing coefficients for income taxes, employers' social security taxes, and indirect taxes are allowed, an identical long-run response to all tax rates (IIP) holds for all except two countries (the United States has 100 per cent shifting of the income tax and zero for the other taxes and Sweden has 100 per cent shifting of the consumption tax and zero for other taxes). However, adjustment speeds differ considerably, with the lag in response reflecting slow response of wages to changes in taxes and in some cases slow response of employment to changes in

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12.     Actually, for these two countries, the positive progressivity effect accounts for virtually all of the tax shifting into wages, as "average" compensation effects are very small.

13.     However, the particular mark-up type form of the real wage equation that the authors employ is not well supported by the empirical results.

14.     Coefficients for different types of taxes are not distinguished, although the tax variable is defined alternatively as *i)* direct household taxes, *ii)* direct household taxes plus employee social security taxes, and *iii)* the latter plus employer social security taxes. Results are rather robust across all three definitions, though the size of the coefficient usually grows in the progression from definitions *i)* to *iii)*.

15.     This asymmetry in the degree of centralisation "hump shape" is confirmed by Scarpetta (1996).

wages. Finally, in Japan, Italy, Canada and Finland steeper progressivity has tended to reduce wage claims.

38.     Applying Tyrväinen's estimated long-run elasticities to actual changes in taxes over the past 20 years:

- taxation is found to have been a primary factor in real wage resistance over the past 20 years in France, Italy and Sweden, due to both high elasticities and big increases in the tax wedge[16];

- in Germany, the real appreciation has "created room" for consumption taxes to rise without any harmful effects due to real wage resistance;

- in the United States, the degree of real wage resistance is low, adjustment is fairly quick, and the rise in the wedge has been fairly small.

39.     Scarpetta (1996) develops a cross-country model for 15 to 17 OECD countries of the determinants of unemployment, where coefficients, including that on the tax wedge, are constrained to be equal for all countries. Thus, this model cannot test for differences in tax shifting across different countries. Instead, it formulates explicit variables representing the differing labour-market institutions across countries, which as seen above are the main determinants of tax shifting. In other words, changes in labour-market institutions cause the labour supply and demand curves to shift, rather than altering the slopes of the curves as in traditional analysis. Estimation of this model finds that the common tax shifting coefficient is not significantly different from zero (as all the explanatory power is absorbed by the institutional variables). However, in the variant of the equation for long-term unemployment, the tax wedge becomes significant. This corroborates that tax wedges "cause" unemployment only if labour-market rigidities are present, preventing wages from falling in order to absorb the tax impacts on labour costs.

40.     Lockwood and Manning (1993) investigate the consequences of non-proportional tax systems for wage bargaining in unionised economies. The empirical evidence presented for the United Kingdom is consistent (though significance of some of the coefficients is low) with the following main theoretical predictions:  *i)* an increase in marginal tax rates reduces wage pressure (measured as the consumer wage for given unemployment and a given level of unemployment benefits);  *ii)* an increase in average tax rates increases wage pressure;  and *iii)* it is the progressivity of the tax system as measured by the coefficient of residual progression (approximated by the difference between marginal and average tax rates) that is important for understanding wage pressure.

41.     Pissarides (1996) simulates a model with plausible *a priori* (though unestimated) coefficients. He finds that although there are forces on the supply side of the labour market that stop wages from fully absorbing employment taxes, once unemployment benefits are indexed to the post-tax wage these forces are too weak to introduce much "real wage resistance".

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16.     In a single country study for France, Cotis *et al.* (1996) find a coefficient of real wage resistance with respect to taxation of around 1.

Table A1.5. **Some estimates of wage responsiveness to taxation**

## 1. Alesina and Perotti (1994)

| Country group according to declining degree of centralisation in labour market | Elasticity of unit labour cost in manufacturing with respect to tax rate[1] |
|---|---|
| Denmark, Finland, Norway, Sweden, | 0.30 (2.62) |
| Germany, France, Australia, Belgium, Netherlands | 0.35 (2.60) |
| United States, Japan, Italy, United Kingdom, Canada | -0.02 (-0.14) |

1. Tax rate defined as direct taxes plus employee social security taxes divided by GDP (average share over sample was 0.121). Elasticities are little changed (0.29, 0.36, -0.01) when it is broadened to include employer social security taxes. Sample period 1960-1990. T-statistics in parentheses.

## 2. Knoester and van der Windt (1987)

| | Elasticity of nominal wage with respect to tax wedge[1] | | Average annual growth in real wages 1974-1981 | Of which due to: | | |
|---|---|---|---|---|---|---|
| | | | | Direct tax wedge | Indirect taxes | Productivity growth |
| United States | 0.43 | (2.91) | 0.08 | 0.29 | -0.04 | 0.16 |
| Japan | 1.19 | (2.22) | 4.31 | 0.88 | -0.01 | 1.85 |
| Germany | 0.72 | (3.94) | 2.47 | 0.32 | -0.00 | 2.42 |
| France | 0.56 | (2.90) | 3.74 | 1.06 | -0.04 | 2.69 |
| Italy | 1.03 | (2.25) | 1.97 | 2.04 | 0.00 | 1.50 |
| United Kingdom | 0.58 | (2.96) | 1.69 | 0.42 | -0.08 | 0.96 |
| Canada | 0.59 | (2.36) | 0.18 | 0.42 | -0.15 | 0.16 |
| Australia | 1.64 | (7.04) | 2.53 | 1.66 | 0.21 | 0.74 |
| Netherlands | 1.15 | (6.46) | 1.62 | 0.75 | -0.02 | 1.24 |
| Sweden | 0.70 | (4.82) | 1.22 | 1.58 | -0.08 | 0.32 |

1. Tax wedge defined as direct taxes plus social security contributions divided by the wage bill. Sample period is 1958-1981 except for Italy 1958-1980) and Australia (1961-1981). Coefficient on consumer prices (inclusive of indirect taxes) is constrained to equal 1.0. T-statistics in parentheses.

### 3. Padoa-Schioppa Kostoris (1992)

| | | Long-run coefficient of wage with respect to: | | Estimated | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | Marginal tax rate | | Progressivity index | |
| | | Tax wedge[1] | Progressivity index[2] | 1965 | 1985 | 1965 | 1985 |
| Germany | 1960-76 | 2.15 | -11.76 | 0.325 | 0.402 | 0.099 | 0.106 |
| | 1977-88 | 0 | 0 | | | | |
| France | 1963-68 | 0 | 0 | 0.213 | 0.328 | 0.065 | 0.075 |
| | 1969-82 | 1.0 | -10.89 | | | | |
| | 1983-88 | 0 | 0 | | | | |
| Italy | 1960-74 | 0 | 0 | 0.148 | 0.271 | 0.058 | 0.067 |
| | 1975-85 | 0 | 1.02 | | | | |
| United Kingdom | 1961-78 | 0 | 2.76 | 0.279 | 0.241 | 0.061 | 0.036 |
| | 1979-88 | 0 | 0 | | | | |
| Austria | 1960-87 | 0 | 0 | 0.208 | 0.238 | 0.080 | 0 |
| Belgium | 1960-78 | 0.95, 2.913 | -6.40 | | | | |
| | 1979-88 | 0.95, 03 | 0 | 0.224 | 0.336 | 0.100 | 0.070 |
| Denmark | 1966-88 | 0 | 0 | 0.509 | 0.702 | 0.395 | 0.518 |
| Netherlands | 1967-88 | 0 | 0 | 0.481 | 0.402 | 0.313 | 0 |
| Sweden | 1961-78 | 0.73 | -0.42 | 0.389 | 0.535 | 0.187 | 0.289 |
| | 1979-87 | 0.73 | -0.52 | | | | |

1. The tax wedge is the sum of the employer social security tax rate (ratio of employers' social security contributions to employees' compensation net of employers' social security contributions), the indirect tax rate, and the direct tax rate which equals the personal income tax (ratio of total income taxes paid by households to the sum of employees' total compensation net of employers' contribution to public and private security programs and self-employed plus property incomes) plus the employees' social security tax rates (ratio of self-employed and employees' social security contributions to the sum of employees' total compensation net of employers' contributions to public and private security programmes plus property incomes plus self-employed incomes).
2. The progressivity index is defined as (marginal average direct tax rate)/(1 - average direct tax rate). The marginal tax rate is derived from econometric estimation.
3. In the case of Belgium, the first coefficient corresponds to the sum of the employer social security and indirect tax rates; the second corresponds to the direct tax rate.

## 4. Tyrväinen (1995)

| | Elasticity of real labour cost with respect to: | | | | Percentage point increase in real labour costs due to resistance to taxes 1975-1991/92 |
|---|---|---|---|---|---|
| | Employers' social security tax rate | Consumption tax rate | Income tax rate[1] | Progressivity index[2] | |
| United States | 0.0 | 0.0 | 1.0 | 0.0 | +2 |
| Japan | 0.5 | 0.5 | 0.5 | 0.5 | +2½ |
| Germany | 1.0 | 1.0 | 1.0 | 0.0 | +4 |
| France | 0.4 | 0.4 | 0.4 | 0.0 | +5½ |
| Italy | 0.4 | 0.4 | 0.4 | 0.6 | +5 |
| United Kingdom | 0.25 | 0.25 | 0.25 | 0.0 | +½ |
| Canada | 0.8 | 0.8 | 0.8 | 0.2 | -½ |
| Australia | 0.5 | 0.5 | 0.5 | 0.0 | +1½ |
| Finland | 0.5 | 0.5 | 0.5 | 0.5 | +3½ |
| Sweden | 0.0 | 1.0 | 0.0 | 0.0 | +6½ |

1. Average tax rate for a married couple with two children with principle earning APW and non-working spouse.
2. Defined as 1- (tm - ta) (1 - ta) where tm and ta denote marginal and average income tax rates respectively. Hence, this is an inverse indicator of progressivity so that a positive coefficient denotes a reduction in wages in response to greater progressivity.

## 5. Padoa-Schioppa Kostoris (1990)

| | Long-run elasticity of nominal wage with respect to: | | | |
|---|---|---|---|---|
| | Employers' social security tax rate | Indirect tax rate | Income tax rate, flat tax (1961-74) | Income tax rate, progressive tax (1975-84) |
| Italy | -0.67 | 0.33 | 0.33 | 1.0 |

## 6. Holmlund and Kolm (1995)

|  | Quintile | Elasticity of real wage with respect to[1]: | | | |
|---|---|---|---|---|---|
|  |  | Progessivity index | | Average tax rate | |
| Sweden | 1/2 | 0.361 | (2.48) | 0.831 | (2.96) |
|  | 3 | -0.050 | (1.68) | 0.552 | (6.01) |
|  | 1 | 0.028 | (1.47) | 0.590 | (6.68) |
|  | 5 | 0.077 | (3.18) | 0.582 | (6.83) |
|  | Average | 0.366 | (3.41) | 0.577 | (3.60) |

1. Progressivity index defined as (1 - marginal tax rate) /(1 - average tax rate) paid by workers;  hence it is an inverse indicator meaning the higher  its level, the less progressive are worker taxes.  Average tax rates equal total state and local taxes divided by income.  Sample period is 1975-92.  T-statistics in parentheses.

## 7. Lockwood and Manning (1993)

|  | Elasticity of real consumption wage with respect to:[1] | | | | |
|---|---|---|---|---|---|
|  | Household marginal tax rate | Household average tax rate | Enterprise marginal tax rate | Enterprise average tax rate | VAT rate |
| United Kingdom | -0.84 | 0.67 | -1.62 | 2.40 | -0.78 |
|  | (1.47) | (0.58) | (1.33) | (1.99) | (0.14) |

1. In the regressions, the real consumption wage is divided by an index of real post-tax benefits to give the dependent variable.  The sample period is 1954-1987, and t-statistics are in parentheses.

ANNEX 2.  COUNTRY CASE STUDIES

**Case Study 1:  the United States**

*Introduction*

1.      The two tax reforms in the United States in the 1980s were introduced amid widespread concern about the slowdown in economic growth.  The reforms sought to raise growth by boosting employment, providing investment incentives at the corporate level and measures to stimulate savings at the personal level.  As such, the reforms involved some substitution of expenditure for income as the basis for taxation and a reduction in the distorting effects on savings and investment that had resulted from marked differences in effective tax rates across investments and savings vehicles.  This case study outlines the main tax measures contained in the Economic Recovery Tax Act of 1981 and the Tax Reform Act of 1986, shows the impact of the measures on effective tax rates, and reviews some of the empirical evidence relating to their effects on private savings, investment and labour supply in the United States.

*The 1981 and 1986 tax reforms*

2.      The 1981 measures focused on increasing after-tax personal incomes and providing additional incentives for private savings and investment.  The main measures were:

  −   *Individual income-tax rate reduction:*  Reduced marginal tax rates by an average of 23 per cent within each tax bracket;  top marginal tax rate reduced to 50 per cent and maximum capital gains rate to 20 per cent;  indexed income-tax brackets, personal exemptions and standard deduction for inflation beginning in 1985;  and provided new earner deduction for two-earner married couples[1].

  −   *Savings incentives:*  Extended eligibility for Investment Retirement Accounts (IRAs) to include active participants in employer pension plans[2].  Maximum annual contribution to a retirement plan by a self-employed individual (the so-called Keogh plan) was doubled to $15 000.

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1.      Married couples with two incomes paying more taxes than two single people with the same total income were allowed a deduction of 5 per cent of the first $30,000 of the earnings of the lower income spouse in 1982, rising to 10 per cent thereafter.

2.      The maximum annual contribution to an IRA established by a working individual for him/herself was increased from $1,500 to $2,000, and from $1,750 to $2,250 for him/herself and a non-working spouse. Individuals who were active participants in an employer-sponsored retirement plan were allowed to deduct up to $1,125 in annual contributions to a spousal IRA.

- *Capital cost recovery provisions:* The Accelerated Cost Recovery System was introduced with faster write-off of capital expenditure under simplified rules. For equipment, the average life is estimated to have fallen from 10.5 to 4.6 years; for structures, the estimated decline is from 40 years to about 15 years. The investment tax credit (ITC) was extended to some short-term assets not previously covered. For equipment, it is estimated that the average tax credit rose from 8.7 to 8.9 per cent.

- *Gifts and estate taxes:* Permitted unlimited marital deduction; increased estate credit to exempt from tax all estates of $600 000 or less; reduced maximum estate tax from 70 per cent to 50 per cent; annual gift-tax exclusion was increased from $3 000 to $10 000.

3.      By allowing contributions to IRA accounts as deductions from income for tax purposes and postponing taxation until funds are withdrawn, the base for the personal income tax was shifted from income toward expenditure. Although the tax reform substantially reduced the burden of taxation on capital income, subsequent analysis of capital income taxation that focused on effective tax rates highlighted the discrepancies among tax burdens borne by different types of capital and gave rise to concerns about the impact of tax-induced distortions on the efficiency of capital allocation[3]. An important objective of the 1986 reform was to equalise the marginal effective tax rates on different forms of capital income. To this end, the reform emphasised a broadening of the tax base and the elimination of special tax preferences in return for a sharp reduction in marginal tax rates. Specifically:

- *Individual income-tax provisions:* Lowered top marginal tax rate to 28 per cent; increased standard deduction to $5 000 for married couples; increased personal exemption to $2 000; increased earned income tax credit[4].

- *Repealed* capital gains exclusion from income tax, state and local sales tax deduction; limited eligibility for a tax reduction on IRA contributions, consumer interest expenses deduction, and exclusion of unemployment benefits, medical expense deductions, deduction for business expenses and miscellaneous expenses.

- *Reduced* corporate marginal tax rate from 46 per cent to 34 per cent; repealed investment tax credit, depreciation allowances scaled back relative to the 1981 reform.

- *Extended* research and experimentation credit; initiated new low-income housing tax credit and deductibility of health insurance costs of self-employed individuals.

*Changes in tax rates*

4.      The effects of the reforms on personal incomes and on the incentives to save and invest are shown in Tables A2.1-A2.4. Table A2.1 shows trends in average and marginal personal income-tax rates for three four-person families at different income levels over the period 1980-88. There are several points to note. First, the decline in average tax rates was limited by increases in social security taxes over the

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3.      Marginal effective tax rates under the 1981 act for all types of assets and all industries are presented in Jorgenson and Sullivan (1981).

4.      The increase in, and indexation of, the personal exemptions and the standard deductions took 480,000 poor people out of the tax net (Pechman, 1987).

period[5]. Second, lower-income families (one-half median income) gained little from the reforms in terms of the effective tax rates: their average combined income tax and social security tax burden was actually higher than at the start of the decade and their marginal combined tax burden only slightly lower. Third, for middle-income families, the increase in social security taxes broadly offset the cut in average income taxes; the average tax rate was slightly higher at the end of the period than the beginning, but the marginal tax declined markedly after both reforms and by about 17 per cent over the period as a whole. Fourth, the largest reduction in tax burden was received by high-income families; for a family on twice the median income the average tax rate fell slightly over the period as a whole and the marginal tax rate declined by about 35 per cent[6].

**[Table A2.1  Average and marginal income tax plus combined social security and Medicare tax rates for four-person families at the same relative positions in the income distribution, 1980-1990]**

5. The effects of the reforms on corporate taxation are presented in Table A2.2. The table shows calculations of marginal effective corporate tax rates for 1980, 1985, and 1990 with respect to different assets and industries, and the different tax treatment of forms of financing and ownership[7]. The effect of the 1981 reform was to broaden the differences with respect to the tax treatment of assets and the sources of finance, while the 1986 reform narrowed these differences substantially, as well as the differences between industries and the different forms of finance. For example:

- Although the statutory corporate tax rate was 46 per cent in 1980, the effective tax rate was 14.4 per cent, mainly reflecting investment incentives included in the provisions for capital recovery under the corporate income tax. The capital cost recovery provisions under the 1981 reform reduced the effective rate further, to 9.2 per cent by 1985, but this rose sharply to 24 per cent by 1990 as a result of the cutback in investment incentives being offset only in part by the reduction in the statutory tax rate.

- The gap in effective tax rates between the assets most favoured (machinery) and those least favoured (inventories) widened from 40.5 percentage points in 1980 to 47.3 percentage points in 1985 and then narrowed to 7.8 per cent in 1990.

- The gap in effective tax rates between the industry most favoured and that least favoured narrowed from 47.5 per cent in 1980 to 44.2 per cent in 1985 and to 22.3 per cent in 1990.

- Debt as a source of finance continued to receive by far the most favourable tax treatment in 1990, although difference with respect to other sources had been reduced substantially.

- The relative advantage of tax-exempt institutions had been reduced substantially by 1990.

**[Table A2.2  Marginal effective corporate tax rates, 1980-90]**

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5. Social security taxes on wage income are estimated to have increased by 2.7 per cent of income for the median-income family (Bosworth and Burtless, 1992).

6. For high-income families the marginal tax rate was not affected by the increase in social security taxes because of the income limit for the payroll tax.

7. As some of the tax reductions associated with the 1981 reform were subsequently undone, the calculations for 1985 represent the net effects of the reforms.

6.        In spite of the two tax reforms, substantial differences in marginal effective corporate tax rates continued to exist in 1990 across assets and industries, and with respect to sources of finance and ownership.  These differences among effective tax rates indicate that there are substantial remaining barriers to the efficient allocation of capital among assets and industries and to the efficient allocation of capital among financial instruments and different forms of ownership.

*Effects on savings and investment*

7.        Some basic trend in private savings and investment over the period 1980-90 are presented in Table A2.3.  Private savings and investment fell markedly over the period, although gross investment fared better than net investment reflecting the much higher rates of depreciation in the 1980s.  Private saving fell almost continuously from 7 per cent of GDP in 1980 to 4.9 per cent at the end of the period; temporary recoveries taking place in 1984 and, to a much lesser extent, in 1988.  Gross private investment rose from 17.6 per cent in 1980 to 19.4 per cent in 1984, but then declined almost continuously to 16 per cent of GDP by 1990;  over the same period, net investment rose from 6.1 per cent to 6.7 per cent of GDP and then declined to 4 per cent of GDP.

**[Table A2.3  Saving and investment]**

*Private savings*

8.        Greater detail on the behaviour of private savings over 1980-90 is shown in Table A2.4.  Private savings comprise the retained earnings of corporations and household savings which are broken down into investment retirement accounts (IRAs) and Keogh accounts, 401(k) account, pension fund savings and other (residual) savings.  Corporate retained earnings fluctuated around relatively low level during the period, mainly reflecting losses of financial corporations, and in relation to GDP ended the period at the level in which they began it.  Total household savings rose from 5 per cent of GDP in 1980 to 6.3 per cent of GDP in 1981 and 1982, but then declined almost continuously to 3.6 per cent of GDP in 1990.  The largest component of household savings comprises pension fund savings.  Pension fund savings were adversely affected by the higher interest rates and the recovery of the stockmarket in the 1980s, which led to many benefit plans becoming over-funded according to United States Internal Revenue Service definitions, and by the revisions to the criteria for what constitutes a fully-funded pension that were contained in the Omnibus Reconciliation Act of 1987.  As a result, employers were unable to deduct further contributions in calculating their tax liability which led to a sharp decline in the net inflow of funds to pension plans[8].  IRAs expanded strongly after the 1981 tax reforms allowed individuals to deduct their contribution from taxable income, accumulate income within the account at a pre-tax rate of return, and pay tax on the full amount of the withdrawal.  The growth of IRAs then contracted sharply when the 1986 reforms reduced the benefits for high-income earners who represented a large proportion of the previous contributors to IRAs[9].  Other (residual) saving turned negative in the middle of the 1980s before recovering somewhat near the end of the decade.

**[Table A2.4  Components of private saving]**

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8.        Pension fund savings includes both defined benefit and defined contribution.  Since the former has a target wealth level, a better investment performance may lead to lower saving, regardless of the tax treatment.

9.        Nonetheless, the tax advantages of IRAs remained substantial, even for those who could no longer deduct the initial investment.

9.     Several studies show that households often shift the composition of their assets and liabilities in response to tax changes;  however, it is not clear whether the response to tax incentives represents a substitution of different forms of saving or a substitution of future or current consumption.  Moreover, even if tax incentives raise private savings, it is not clear that national savings will increase because of the associated losses in tax revenues;  national savings may even fall if tax incentives encourage borrowing to finance participation in savings schemes.  The relevant empirical studies with respect to IRAs have reached conflicting conclusions.  The main studies supporting the effectiveness of IRAs in raising private (and national) savings are the cross-section study using consumers expenditure survey data by Venti and Wise (1990) and the tax return based study by Feenburg and Skinner (1989).  The former authors concluded that raising the IRA limit would cause a pronounced increase in savings with about one-third of the increase coming from tax savings and two-thirds from reduced consumption, with virtually no reduction in other savings, while Feenburg and Skinner concluded that, at least in the aggregate, IRAs are not financed by either borrowing or switching assets.  More recent studies using survey data by, for example, Gale and Scholz (1990) and Engen, Gale and Scholz (1994) suggest that IRAs were not successful in stimulating savings and might actually have decreased national savings[10].

*Private investment*

10.     Assessing the impact of the tax reforms on  private investment in the United States is complicated by two measurement problems that emerged in the 1980s.  First, falling prices of office computing equipment resulted in a substantial reduction in the relative price of capital goods in the 1980s and, because such equipment has a shorter service life than capital equipment in general, a divergence in trends in gross and net investment.  Second, there is a difficulty in measuring the user cost of funds.  Empirical studies typically proxy this by some weighted average of the after-tax real bond rate and the return on corporate equities.  However, bond rates rose sharply in for much of the 1980s, suggesting an increase in the cost of funds, while the stockmarket recovery reduced the cost of equity finance.  In addition, there is the problem of separating temporary and permanent effects of the tax changes on investment;  for example, an investment tax credit is likely to result in investments being postponed or brought forward to take advantage of the credit, with such movements having no long-run effect on the level of investment.

11.     The empirical studies to date suggest that the level and composition of investment was affected by the 1981 and 1986 reforms, but that the tax effects were substantially outweighed by such factors as variations in output, the relative price of capital goods (particularly computers), and the cost of funds.  Corker, Evans and Kenward (1989) found that the level of investment was affected by both the 1981 and 1986 reforms (positively in the former case and negatively in the latter) but that the effects of output growth and the user cost of funds were substantially more important.  Bosworth (1985) found little effect from the 1981 tax reform on the composition of private investment.  Auerbach and Hassett (1990) found a significant impact from the 1986 reform on the level and composition of equipment investment, but not for structures.  Finally, Cummins, Hassett and Hubbard (1994) found that the composition of investment spending changed subsequent to every tax reform since 1962, with the greatest change in investment carried out by firms facing the greatest change in tax incentives; the authors also concluded that tax incentives had significant effects on the level of investment.

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10.     An important estimation problem associated with the empirical work in this area is that IRAs holdings tend to be  disproportionately large for high savers so that the empirical results need to be controlled for selection bias.  Typically, different results are reached by researchers using different methodologies to control for selection bias.

*Effects on labour supply*

12.	In general, the empirical literature suggests that the labour supply elasticity is relatively low, while that for women is quite high, particularly when they are a source of secondary income in a relatively high-income household.  However, Bosworth and Burtless (1992) found some evidence that the 1981 and 1986 tax reforms did cause an increase in total labour supply.  They regressed the change in annual hours worked on the output gap (to adjust for business cycle effects) and two time-trend variables, one that rose over the entire period covered by the regression (1967-89) and a second that began in 1981 rising through 1989, hypothesising that the coefficient on the latter time trend would capture the difference between labour supply trends before and after implementation of the first tax reform in 1981.  Their results suggest that, after falling between 1967-80, annual hours rose slowly after 1981 such that by 1989 average male work was 6 per cent above the level it would have obtained if the trend before 1981 had continued through the 1980s;  the growth of female labour supply also accelerated after 1981, leading to a gain of 5.4 per cent in average hours above the previous trend.  The authors also tested whether supply responses of different income and age groups were proportionate to the tax rate changes they faced.  The results suggested that male labour supply increased within every age group and income class;  however, men in the bottom quintile increased their labour supply by the greatest absolute and percentage amount, even though they typically faced rising average and marginal tax rates over most of the 1980s.  The pattern of response among women showed the largest response occurring in the lowest income category;  although labour supply also increased strongly at higher income levels.   In a similar study, Burtless (1991) found that among men between the ages of 25 and 54 by 1987 average annual hours rose between 2.3 per cent and 4.1 per cent from what it would have been given the trend prior to the 1980s;  among women of the same age group, average annual hours rose about 3.5 per cent.

13.	Lindsay (1988) estimated the effect of the 1981 tax reform using earnings information obtained from tax returns.  He found that higher income earners reported more income than predicted by a simulation based on the assumption that the earned income of each filing unit rose in proportion to the economy-wide growth in average earnings and concluded high-income families raised their earnings disproportionately in response to the incentives provided by sharply lower marginal tax rates.  Between 40-90 per cent of the rise in earnings was due to higher labour supply, the remainder being due to compensation in the form of taxed money wages rather than untaxed fringe benefits.  In a more recent study, Eissa (1995) also found that married women's labour supply was highly sensitive to the tax changes in the 1986 tax reform[11].


*Conclusions*

14.	Assessing the impact of the 1981 and 1986 tax reforms on savings, investment, and labour supply is complicated by the fact that there were many other developments taking place in the United States in the 1980s with potential impacts on these variables -- in particular, the large increases in interest rates, the appreciation of the US dollar and capital gains generated by the recovery of the stockmarket.  In addition, empirical work relevant to the reforms is only recently beginning to emerge.  To date, the balance of this evidence suggests that the tax reforms had little overall impact on private savings, and some evidence to suggest that their impact on national savings may have been negative because of tax revenue losses and an associated decline in public saving. The evidence with regard to private investment is somewhat more favourable.  Although gross and net private investment declined for much of the 1980s the two tax reforms appear to have had significant effects on both the level and composition of investment;

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11.	Women with high-income husbands experienced bigger declines in marginal tax rates than women whose husbands had lower incomes.

however, the effects of the tax reforms were substantially outweighed by factors such as the growth of output and the cost of funds.  The reforms appear to have been most significant in their impact on labour supply, particularly in the case of married women.

Table A2.1. **Average and marginal income tax plus combined social security and Medicare tax rates for four-person families at the same relative positions in the income distribution, 1980-1990**

| | One-half medium income | | | Medium income | | | Twice median income | | |
|---|---|---|---|---|---|---|---|---|---|
| | Income | Average tax rate | Marginal tax rate | Income | Average tax rate | Marginal tax rate | Income | Average tax rate | Marginal tax rate |
| 1980 | 12 166 | 18.3 | 30.3 | 24 332 | 23.7 | 36.3 | 48 664 | 24.8 | 43.0 |
| 1981 | 13 137 | 20.1 | 31.1 | 26 274 | 25.1 | 37.0 | 52 548 | 26.6 | 42.5 |
| 1982 | 13 810 | 19.9 | 29.4 | 27 619 | 24.5 | 38.4 | 55 238 | 25.9 | 39.0 |
| 1983 | 14 591 | 19.9 | 28.4 | 29 181 | 23.8 | 36.4 | 58 362 | 25.0 | 35.0 |
| 1984 | 15 549 | 19.9 | 27.4 | 31 097 | 23.7 | 35.4 | 62 194 | 24.8 | 38.0 |
| 1985 | 16 389 | 20.7 | 28.1 | 32 777 | 24.4 | 36.1 | 65 554 | 25.3 | 38.0 |
| 1986 | 17 358 | 20.9 | 28.3 | 34 716 | 24.8 | 36.3 | 69 432 | 25.7 | 38.0 |
| 1987 | 18 543 | 19.5 | 29.3 | 37 086 | 23.2 | 29.3 | 74 172 | 24.2 | 35.0 |
| 1988 | 19 526 | 20.2 | 30.0 | 39 051 | 24.3 | 30.0 | 78 102 | 23.9 | 28.0 |
| 1989 | 20 382 | 20.3 | 30.0 | 40 763 | 24.4 | 30.0 | 81 526 | 24.1 | 28.0 |
| 1990 | 20 726 | 20.4 | 30.3 | 41 451 | 24.6 | 30.3 | 82 902 | 24.6 | 28.0 |

*Note*: All income is assumed to be earned by one spouse. Itemised deductions are assumed to equal 23 per cent of income through 1986 and 18 per cent thereafter.

*Source*: US Department of the Treasury, Office of Tax Analysis.

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### Table A2.2 **Marginal effective corporate tax rates, 1980-90**

In per cent

|                          | 1980  | 1985  | 1990  |
|--------------------------|-------|-------|-------|
| **Asset**                |       |       |       |
| Machinery                | -12.0 | -18.6 | 18.5  |
| Buildings                | 19.1  | 12.2  | 25.3  |
| Inventories              | 28.5  | 28.7  | 26.3  |
| **Industry**             |       |       |       |
| Manufacturing            | 33.8  | 27.5  | 34.0  |
| Other industry           | 13.7  | -16.7 | 11.0  |
| Commerce                 | 15.5  | 9.2   | 21.8  |
| **Source of finance**    |       |       |       |
| Debt                     | -49.2 | -55.5 | -14.7 |
| New share issues         | 47.1  | 43.0  | 44.1  |
| Retained earnings        | 45.6  | 42.1  | 43.7  |
| **Owner**                |       |       |       |
| Households               | 15.8  | 9.5   | 23.6  |
| Tax-exempt institutions  | 9.1   | 2.4   | 19.3  |
| Insurance companies      | 26.3  | 25.1  | 40.9  |
| **Overall tax rate**     | 14.4  | 9.2   | 24.0  |

*Source*:    Jorgenson and Landau (1993).

Table A2.3. **Saving and investment**

Per cent of GDP

| | Saving | | | Investment | |
|------|---------|--------|-------|-------|------|
| | Private | Public | Total | Gross | Net |
| 1980 | 6.9 | -1.3 | 5.6 | 17.6 | 6.1 |
| 1981 | 7.4 | -1.0 | 6.4 | 18.4 | 6.5 |
| 1982 | 7.1 | -2.6 | 4.6 | 18.6 | 4.5 |
| 1983 | 6.3 | -3.1 | 3.2 | 17.8 | 4.2 |
| 1984 | 8.4 | -1.8 | 6.6 | 19.4 | 6.7 |
| 1985 | 7.2 | -1.7 | 5.4 | 17.9 | 5.5 |
| 1986 | 5.7 | -1.9 | 3.8 | 16.8 | 4.3 |
| 1987 | 5.2 | -1.0 | 4.2 | 16.3 | 3.9 |
| 1988 | 5.8 | -0.7 | 5.1 | 16.4 | 4.1 |
| 1989 | 4.9 | -0.3 | 4.5 | 16.9 | 4.7 |
| 1990 | 5.0 | -1.3 | 3.7 | 16.0 | 4.0 |

*Source*:   OECD *Quarterly National Accounts*.


Table A2.4. **Components of private saving**

Per cent of GDP

| | Corporate retained earnings | Household | | | | | Total private saving |
|------|--------|--------|--------|----------|--------|-------|--------|
| | | Incentive schemes | | | | | |
| | | IRAs and Keogh | 401(k) | Pensions | Other[1] | Total | |
| 1980 | 1.3 | 0.1 | 0.2 | 4.4 | 1.0 | 5.7 | 6.9 |
| 1981 | 1.0 | 0.2 | 0.2 | 3.9 | 2.0 | 6.3 | 7.4 |
| 1982 | 0.8 | 0.9 | 1.0 | 4.5 | 0.1 | 6.3 | 7.1 |
| 1983 | 1.5 | 0.9 | 1.0 | 5.0 | -2.2 | 4.8 | 6.3 |
| 1984 | 2.3 | 0.9 | 1.0 | 3.9 | 0.2 | 6.0 | 8.4 |
| 1985 | 2.2 | 0.9 | 1.0 | 6.0 | -3.0 | 4.9 | 7.2 |
| 1986 | 1.2 | 0.9 | 1.0 | 4.0 | -1.4 | 4.4 | 5.7 |
| 1987 | 1.6 | 0.3 | 0.4 | 3.2 | -0.3 | 3.6 | 5.2 |
| 1988 | 2.0 | 0.2 | 0.4 | 4.2 | -1.0 | 3.7 | 5.8 |
| 1989 | 1.4 | 0.2 | 0.3 | 3.5 | -0.6 | 3.5 | 4.9 |
| 1990 | 1.3 | 0.2 | 0.3 | 4.2 | -1.1 | 3.6 | 5.0 |

1.  Residual.

*Source*:   OECD *Quarterly National Accounts*;  Engen, Gale and Scholtz (1994);  United States Board of Governors of the Federal Reserve System, *Flow of Funds Accounts.*

**Case Study 2: the United Kingdom**

*UK tax reforms during the 1980s*

*Introduction*

15.     The tax system was one of the factors thought to contribute to the disappointing economic performance in the United Kingdom in the 1960s and 1970s (OECD, 1996*f*).  There were a number of problems.  The pre-reform tax system was designed to redistribute income, while it weakened work incentives for many categories of worker, but in fact achieved relatively little redistribution, while weakening work incentives for many people.  The generous treatment accorded to certain types of investment and the capricious treatment of various savings instruments meant that many savings and investment choices were largely tax-driven. Starting in the early 1980s, the United Kingdom embarked on a series of structural reforms that profoundly changed the institutions and the role of government in product, labour and financial markets.  Taxation figured importantly in this reform effort.  In assessing the effects of these tax reforms, it is important to place tax reform in the context of the broader shifts in UK economic policy.

16.     This case study begins with a discussion of the problems encountered with UK tax policies prior to reforms.  It then describes the UK's reform effort.  The third section assesses the impact of tax reform on work incentives, investment and savings.

*Problems of the 1970s*

17.     The UK tax system prior to reform featured a number of problems:

   –   In the 1970s, the UK's tax (and benefit) system appeared to lower unduly the work incentives faced by workers with low earnings potential.  Marginal effective rates of taxation (including both taxation of earnings and removal of benefits) for some workers could exceed 100 per cent.  For workers with high earnings potential, the marginal rate of taxation was also highly dissuasive;  in 1978, the highest marginal tax rate was 98 per cent (Dilnot and Kell, 1988).  Taxes may also have caused part of labour supply and demand to be diverted to the informal labour market.

   –   Although gross fixed investment reached post-war highs during the 1970s, investment flows were heavily influenced by the tax code.  Generous tax treatment was accorded to certain types of fixed investment.  Depreciation allowances were designed to promote physical investment.  Many equipment purchases could be expensed and liberal tax credits and carry-forward provisions were available.  As a result, tax policy tended to favour heavier industry and manufacturing relative to services or light industry.  For manufacturing and "other industry", effective tax rates were low (often negative), while the tax treatment of services was relatively unfavourable (see column one of Table A2.5).   In the favoured sectors, these arrangements often converted investments that were unattractive on the basis of pre-tax cash flows into viable projects on a post-tax basis.  They also meant that revenues from corporate taxation were extremely small:  40 per cent of the firms in the corporate sector were paying no taxes at the end of the 1970s (Keen, 1991).

– The tax treatment of the various saving and investment instruments available to the household sector was highly uneven. Owner-occupied housing was favoured by the non-imputation of implicit rents to taxable income. Also favoured was life insurance (households could deduct half of all premia paid). The tax treatment of capital gains made them a more attractive way to receive income than interest payments or dividends. Interest income was taxable by addition to earned income and subject to an investment income surcharge of up to 15 per cent, while capital gains were taxable at the comparatively low rate of 30 per cent and enjoyed several special exemptions.

*The tax reform*

18.     The reforms undertaken during the 1980s addressed many of these problems. Box 1 describes the changes that took place during the 1980s and early 1990s. As in many other OECD countries (see Annex 1, Section B) the personal tax code was flattened and the base broadened. This significantly lowered statutory and effective tax rates for affluent households. The top corporate rate was also lowered and physical investment incentives were scaled back as part of a series of changes. These changes altered the effective tax rates paid on different assets and sources of finance and by different industries (Table A8.5). Indirect taxation was increased and tax arrangements for local governments were altered. In addition, the benefits system was altered.

**[Table A2.5  Average marginal effective tax rates]**

19.     Recent changes have focused on enhancing the competitiveness in labour markets of people with lower earnings potential and on further fine-tuning of the balance between work incentives and social coverage for certain households. As of 1995, the Family Credit and the Disability Working Allowance offers an additional £10 a week to claimants working for more than 30 hours a week. This has increased the incentives for recipients of Family Credit to work full time rather than the 16 hours necessary to qualify for credit (OECD, 1995*d*). As of April 1996, employers are exempt from National Insurance Contributions for up to a year when hiring someone unemployed for more than two years. This provision has been extended in the current budget to apply to people on training schemes or in temporary work during the two-year qualifying period (OECD, 1996).

*Assessing reform*

*Effects on labour markets and the distribution of income*

20.     In labour markets, the supply responses to the tax changes do not appear to have been large for most workers. This is not necessarily surprising, because, as noted in Section 5 of the main paper, the income and substitution effects of the tax reform on labour supply have opposite signs. Thus, the labour supply response expected on theoretical grounds is ambiguous. Married women (or those earning "secondary" incomes) are generally deemed (in the United Kingdom and elsewhere) to be the most earnings-sensitive segment of the labour force. This means that the largest potential for a positive supply response to tax reform is among married women and higher participation rates and increases in hours worked were observed for this group of women (Blundell, 1992). But, even for them, the response appears to have been weakened by countervailing responses to the reform's effects on the broader household income situation. Thus, the "substitution effects" for female workers were, in some households, offset by family income effects (that is, some households could afford more "leisure" because

of their higher after-tax incomes earned by primary bread-winners and from higher after-tax non-earned incomes).

21.     Another reason the impact on labour supply may be difficult to detect is that the reforms had ambiguous effects on work incentives. While the earlier phases of the reforms to the tax and benefits system did succeed in eliminating 100 per cent effective marginal tax rates for nearly everyone, this was accomplished by doubling the number of people facing marginal rates of 70 per cent or more. Thus, for some workers with lower earnings potential, the overall impact on work incentives may not have pointed strongly toward increased labour supply. As just noted, the more recent changes in labour taxation and benefits policies have focused on improving work incentives for this group of workers.

22.     For higher-income households, however, the reform unquestionably sharpened incentives to supply effort and to report income: top marginal rates were more than halved while the base was broadened. Dilnot and Kell (1988) show that the share of tax revenues paid by high-income households subsequently increased, mainly because of rapid growth in their taxable incomes relative to other tax payers: the lowest decile of earners saw a 3.5 per cent real increase in earnings over the 1978/79 to 1985/86 period, while the top decile experienced a 23.4 per cent real increase. The study does not answer the question of whether these differentials in income growth were due to behavioural responses to the tax reforms or, alternatively, to exogenous forces affecting pre-tax incomes (e.g. factors influencing investment income or changes in the demand for skills[1]).

23.     A related study examines the role that the tax and benefit system may have played in increasing the skewedness of disposable income in the United Kingdom over the 1979 to 1988 period. Johnson and Webb (1993) attribute most of the increased skewedness to changes in the tax and benefit systems. (A secondary role is attributed to "changes in the pattern of economic activity", including the increase in number of households with no-one in full-time employment, the move into self-employment and the increase in the number of elderly). This result needs to be interpreted carefully, though. Real incomes rose on average by 40 per cent between 1979 and 1993-94 and all family types participated in the gains, though to varying degrees. A study released in late 1996 looks at the most recent data on the household income distribution (HMSO Stationery Office, 1996). The study confirms that the richest households continued to gain disportionately from 1991 to 1993. However, in 1994 (the last year for which data is available), the poorest households did better than the richest. The study attributes this to a fall in the unemployment rate and to an increase in income for pensioners. The study also notes that between 42 per cent and 65 per cent of those in the bottom decile in 1992 had moved out of the decile by 1994.

*Effects on savings and investment*

24.     The reforms to business taxation resulted in large increases in the effective marginal rate of corporate taxation (Devereux, 1987) and in increased corporate tax revenues. Because tax subsidies to fixed investment were largely eliminated by the reform, it may be reasonable to conclude that the reforms contributed to the decline in the physical investment rate observed during the post-reform period. However, investment rates fell throughout most of the OECD during the 1980s and not all of the fall can be explained by tax policies (Elmeskov *et al.,* 1991). To date, no empirical study has shown whether the

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12.     The authors themselves favour the conclusion that the UK experience with tax reform for high-income taxpayers does not favour the supply-side hypothesis that lowering marginal rates is to increase tax revenues due to enhanced incentives for earning and reporting income. However, since their empirical study does not explicitly account for behavioural responses to the tax reform itself, it is difficult to separate the tax from the non-tax related shifts in the pattern of incomes.

United Kingdom's increase in the effective marginal tax rates for some kinds of physical investment resulted in better allocation of capital between physical and intangible investments. Although the reforms almost certainly evened out tax rates for physical investment, some analysts (for example, Keen, 1991) question whether the reforms can be viewed as having improved the overall incentive structure for investment. In his view, it is not clear that eliminating the advantageous treatment for certain physical investments improved the uniformity of tax rates for the full set of assets available in the UK economy. For example, the general increase in marginal effective rates on physical assets held by corporations may have tilted the incentive balance toward intangible corporate investments[2]. What does seem clear is that the tax reform lowered the attractiveness of the industrial sector compared with some other sectors (basically, those using relatively intensively such assets as cash, receivables, inventories, financial assets, brand capital and other intangible assets). Because such sectors include many services, it is likely that the reform provided additional impetus for the UK's successful shift into services.

25.     The effective tax rates paid by the household sector on various types of capital income were brought closer together over the 1980s. This was accompanied by a fall (over the 1980s) in the household savings rate relative to disposable income, but not in the savings rate relative to wealth (OECD, 1990*b*). The adjustment of UK households to the liberalised financial system may also account for some of the decline in savings as a proportion of income -- both loans and personal credit increased sharply during the 1980s.

*Conclusions*

26.     The UK tax reforms reduced tax distortions, especially for high-income households and in the business sector. The reforms were also associated with an increase in revenue from these sources, but the increases may have been due to other structural changes. In these respects (lowering distortions with no apparent loss of tax revenues), the reforms can be judged a success. At the same time, the UK experience does not provide evidence for dramatic performance gains from tax reform that some economists might have hoped to find. While the performance of the UK economy -- especially its labour markets -- improved significantly after the reforms, this must be seen against the broader background of reform to labour, product and financial markets. With respect to labour markets, the initial phases of the tax reform had the biggest effects on more affluent households. These households appear to have responded, but incentive effects for less affluent households were more uncertain. In more recent years, tax changes have focused on the problem of finding an appropriate balance between social concerns and work incentives. With respect to two other structural trends -- the shift into services and rising female labour force participation -- the tax reforms appear to have initially lagged existing trends, but then served to reinforce them. The reforms may also have played a role in the widening of the earnings distribution (although here the evidence is mixed).

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13.     Feldstein (1989) makes the same argument in reference to the US tax reform, which resembled the British reform efforts in many respects (see US case study).

**Box 1. Tax Reforms in the United Kingdom during the 1980s and early 1990s**

-- Marginal tax rates were progressively lowered and the number of tax bands was lowered from 12 in 1978 to the current 3. The lowest personal income-tax rate is now 20 per cent and the highest rate 40 per cent (down from 83 per cent in 1978).

-- The tax mix shifted toward indirect taxation. Indirect taxation increased from 34 per cent of revenues in 1978 to about 40 per cent in 1990. The value-added tax assumed greater significance with the reforms (its share of indirect tax revenues rose from about a third to over half during the 1980s).

-- Real capital gains are now taxed as ordinary income. Capital gains were indexed for tax purposes in 1982 and, since 1988, real gains above a threshold level have been taxed at the top band, 40 per cent.

-- Some fiscal privileges were withdrawn. The partial deductibility of life insurance premia was eliminated for new contracts in 1984; deductibility of pension contributions was limited to pensionable earnings of £60 000 in 1989; the value of the ceiling for mortgage interest relief was frozen in nominal terms, so that its real value has declined and the lowest tax rate is applied to the resulting tax relief.

-- New fiscal privileges were introduced. These now include assistance to investment in unquoted companies through the Enterprise Investment Scheme and Venture Capital Trusts. Both permit income tax relief at a rate of 20 per cent. The amount invested in particular companies is subject to a ceiling. Investment in rental housing is promoted under the Business Expansion Scheme. The amount of contributions to all of these schemes is limited.

-- Lower tax rates and a broader base were introduced for corporate taxation. Measures decided in 1984 reduced the statutory rate (in stages) from 52 to 35 per cent (since lowered to 33) and scaled back investment incentives. Full deductibility of expenditure on plant and machinery was replaced by a writing-down allowance of 25 per cent.

-- The investment income surcharge and the composite rates were abolished.

-- Social security benefits were more closely targeted. Support for low-income families was restructured by increasing the generosity of Family Credit, an income-related benefit. At the same time the child benefit (which is not means-tested) was allowed to decline in real terms.

-- Unemployment benefits were made favourable in 1982.

-- Local authority domestic rates were initially replaced by a poll tax. This proved to be an unpopular move and the poll tax was replaced with a property tax with a discount for single adults. In addition, the business rate was replaced by a charge levied at a uniform rate across the country. Revenue is now allocated to local authorities on the basis of adult population.

-- Gifts between the living are no longer taxed and inheritance taxes were reduced.

-- The slab structure of national insurance contributions was somewhat smoothed and the upper earnings limit for employers removed. Independent taxation of husbands and wives was introduced from 1990.

Table A2.5.  **Average marginal effective corporate tax rates, 1980-91**[1]

Per cent

| Item | 1980-81 | 1985-86 | 1990-91 |
|------|---------|---------|---------|
| Asset | | | |
|     Machinery | -67.0 | -5.4 | 8.0 |
|     Buildings | 20.4 | 43.9 | 49.7 |
|     Inventories | -34.2 | 46.8 | 39.8 |
| Industry | | | |
|     Manufacturing | -53.3 | 14.7 | 24.8 |
|     Other industry | -24.2 | 14.5 | 21.2 |
|     Commerce | 12.7 | 38.9 | 37.8 |
| Source of finance | | | |
|     Debt | -157.8 | -36.8 | -15.9 |
|     New share issues | -61.2 | -10.1 | 4.1 |
|     Retained earnings | 2.3 | 38.0 | 40.5 |
| Owner | | | |
|     Households | -45.5 | 14.9 | 23.1 |
|     Tax-exempt institutions | -12.9 | 30.1 | 34.5 |
|     Insurance companies | -29.5 | 22.2 | 28.7 |
| Overall tax rate | -31.4 | 21.4 | 28.0 |

1.    This calculation assumes a 5 per cent inflation rate.  It uses the "fixed up" approach, which determines the post-tax return to savers that would be generated by a fixed pre-tax return on the project.

*Source:* King and Robson (1993).

**Case Study 3:  Sweden**

27.       A major tax reform was introduced in Sweden in 1990-91 aimed at reducing taxation, broadening the tax base, reallocating part of the tax burden away from earned income to consumption, and simplifying the tax code.  An important objective was to arrive at a substantially more proportional tax system, while addressing income distribution concerns through transfers.  The revenue effect of the reform was intended to be broadly neutral.

28.       The main measures were:

− Separate schedules were introduced for earned income and capital income.  The new taxation of earned income implied cuts in marginal income-tax rates ranging from 12 percentage points for low-income employees to 27 percentage points for high-income earners;  the new proportional capital income tax was set at 30 per cent and levied on dividends, interest income, and capital gains.

− A reduction in the statutory corporate tax rate from 52 per cent to 30 per cent.

− Elimination of loopholes and preferential rules for taxing earned income, less favourable treatment for corporate inventories, abolition of corporate "investment funds" (through which firms could reduce the effective tax on corporate profits by setting aside funds for counter-cyclical investment).

− Broadening the VAT (of 23 per cent) to include goods and services previously exempted or granted lower rates (including real estate maintenance, heating and electricity, domestic passenger transport).

− Increased housing and child allowances, designed to cushion the distributional impact of the cuts in marginal tax rates.

29.       The revenue impact of the tax cuts and benefit increases was estimated at equivalent to about 6.7 per cent of GDP.  The broadening of the tax base was estimated to yield revenue equivalent to about 5.8 per cent of GDP, with the remaining revenue loss being made good by supposed "dynamic effects" of the tax reform (Table A2.6).

**[Table A2.6  Estimated tax revenue effect of the 1991 tax reform]**

*Impact of the measures*

30.       Assessing the impact of the tax reform on economic performance is complicated by the fact that there is relatively little empirical literature analysing the reform on which to draw; in addition, the reform coincided with the deepest economic recession in Sweden since the 1930s, with real GDP recording a cumulative decline of 4.7 per cent during 1991-93, before recovering sharply in the following two years.  Nonetheless, the following general conclusions appear from the literature:

*Short-run revenue losses*

31.       As indicated above, the reform was supposed to be self-financing.  However, some recent analysis suggests that the revenue projections associated with the reform relied on an overly optimistic assessment of the development of some of the tax base for the first year following the reform, with the revenue shortfall possibly amounting to around 2 percentage points of GDP a year in 1991-93 (Agell, Englund and Södersten, 1996;  Kristoffersson, 1995).

*Changed patterns of consumption and savings*

32.      Broadening the tax base implied substantial tax increases for some previously favoured consumption categories.  Thus, estimates by Hultkranz (1995) show a strong negative demand response to the tax increases on domestic tourism and hotel and restaurant services.  The lower rates at which capital and earned income were taxed after the reform gave households strong incentives to reduce their financial liabilities and to switch from real to financial savings outlets (Tables A2.7 and A2.8).  Agell, Berg and Edin (1995) estimate that about one-third of the increase in financial assets by households over the period 1992-93 was in response to the tax reform.

**[Table A2.7  Before and after-tax lending interest rates for selected years]**
**[Table A2.8  Household savings, 1976-93]**

*Effect on non-residential investment*

33.      Auerbach, Hassett and Södersten (1995) examine the impact of the tax reform on manufacturing equipment investment.  They show that, although the tax reform raised the user cost of capital for those firms which previously financed their marginal investment from investment funds, for the majority of firms the user cost of capital was unaffected and thus the reform had little overall impact on investment.  Rather, the sharp decline of investment over 1991-93 mainly reflected adverse developments in corporate profitability and in real interest rates.

*Reduced residential investment*

34.      The tax reform does appear to have adversely effected residential investment, mainly reflecting the reduction in the value of mortgage interest deductions that resulted from integrating the tax system for owner-occupied housing and the new capital income tax, and reductions in interest subsidies and income related housing allowances.  Englund, Hendershott and Turner (1995) suggest that the tax reform reduced the demand for owner-occupied homes by about 15 per cent and accounted for about 10 percentage points of the 25 per cent fall in the real price of owner-occupied homes between 1990-93 (the remainder being explained by the severe economic recession).

*Uncertain labour supply effects*

35.      An important motivation for the tax reform was the potential for increasing labour supply.  While there was a substantial reduction in the tax wedge for many income groups, Klevmarken *et al.* (1995) suggest that about a quarter of individual taxpayers may have experienced an *increase* in the tax wedge, thereby discouraging labour supply.  This mainly reflects the fact that a large fraction of Swedish wage-earners work part-time and their marginal tax rates were left largely untouched by the income-tax cuts, while they faced higher consumption taxes because of the VAT rise.  Agell, Englund and Södersten (1996) suggest that the overall impact on labour supply could be calculated to be approximately 3 per cent, mainly reflecting positive effects on married men (the group with the highest wages and salaries and the group with most working hours).  In addition, the long-term impact of the reform on labour supply may be positive in that, by cutting tax rates at higher income levels while leaving tax rates on lower incomes largely unchanged, it greatly increased incentives to undertake investment in education.

## Table A2.6 **Estimated tax revenue effect of the 1991 tax reform**

|  | SEK (billions) | In per cent of GDP |
|---|---|---|
| **Revenue losses** | **97.3** | **6.7** |
| Cuts in income taxes | 89.1 | 6.2 |
| Distributional measures | 8.2 | 0.6 |
|  |  |  |
| **Revenue gains** | **95.1** | **6.6** |
| Broader base of employment income | 12.7 | 0.9 |
| Broader base of capital income and property taxes | 38.6 | 2.7 |
| VAT and other indirect taxes | 28.4 | 2.0 |
| Corporate income taxes | 1.2 | 0.1 |
| Other revenues | 9.2 | 0.6 |
| Attributable to allocative gains | 5.0 | 0.3 |

*Source*:    Adapted from Kristoffersson (1995).


## Table A2.7 **Before and after-tax lending interest rates for selected years**

In per cent

|  | 1980 | 1989 | 1991 |
|---|---|---|---|
| 1.   Interest rate | 14.0 | 14.0 | 14.0 |
| 2.   Tax effect | 8.7 | 6.6 | 4.2 |
| 3.   Interest rate after tax (1-2) | 5.3 | 7.4 | 9.8 |
| 4.   Inflation rate for coming year | 12.3 | 10.2 | 2.6 |
| 5.   Real rate of interest (3-4) | -7.0 | -2.8 | 7.2 |

*Source*: Agell, Berg and Edin (1995).


## Table A2.8 **Household savings, 1976-93**

In per cent of disposable income

|  | 1976-80 | 1981-85 | 1986-89 | 1990-93 |
|---|---|---|---|---|
| 1.   Financial assets | 10.6 | 10.5 | 12.3 | 5.6 |
| 2.   Liabilities | -11.5 | -9.8 | -16.2 | -0.9 |
| 3.   Net lending (1-2) | 22.1 | 20.3 | 28.5 | 6.5 |
| 4.   Net tangible assets | 4.5 | 1.9 | 1.1 | -0.5 |
| 5.   Net saving (3+4) | 26.6 | 22.2 | 29.6 | 6.0 |

*Source*: Agell, Berg and Edin (1995).

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