LABOUR TAXATION IN THE EUROPEAN UNION. CONVERGENCE, COMPETITION, INSURANCE?

Carlos Martinez-Mongay[*]

Introduction

The EU total tax burden, which expresses total tax revenues in terms of GDP, recorded a level above 41 per cent in 2002 (see Figure 1).[1] This is, for instance, 13 percentage points higher than in the US (28 per cent). Moreover, such a figure for the EU at the beginning of the 21st Century sharply contrasts with that observed thirty years ago. In 1970, the total tax burden for the EU as whole was only slightly higher than 33 per cent, while the figure for the US was close to 27 per cent. Therefore, over the last three decades, total tax revenues in the EU have increased by 8 percentage points of GDP,[2] but by only 1 point in the US.

The differences between the EU and the US in terms of labour taxes are also striking. To understand the size of labour taxes in the EU and their evolution compared with our main economic partners, it is useful to follow the common distinction of classifying taxes into taxes on labour, capital and consumption.[3] Tax revenues obtained from labour income (social security contributions plus personal income taxes on labour income) in the EU represent 22 per cent of GDP. In the US they amount to only 14 per cent of GDP (15 per cent in Japan). Moreover, since labour tax revenues in the EU represented 16 per cent of GDP in 1970, ¾ of the 8 percentage points increase in the total tax burden over the last three decades has been financed by labour taxes. As a result, while the tax burden on labour income (labour tax revenues expressed in terms of gross wages – see section 2) in the EU amounted to 26 per cent in 1970, the figure was close 37 per cent in 2002, which contrasts with 23-24 per cent in the US and Japan (see section 2).

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[*] European Commission - BU-1, 04/155 - B-1049 Brussels, Belgium. Telephone: +32 2 29 61 228, Fax: +32 2 29 80 997, E-mail: carlos.martinez@cec.eu.int

This paper very much relies of two previous drafts by the author. The first one is a mimeo paper entitled *"Computing the Average Effective Tax Wedge on Labour"* which, in turn, is an update of Martinez-Mongay (2000). The second one is Huizinga and Martinez-Mongay (2001). I want to thank comments from participants at the Banca d'Italia Workshop. I particularly acknowledge fruitful discussions with and help by Lucio Pench. The findings, interpretation, and conclusions expressed in this paper are entirely those of the author and should not be attributed to the European Commission.

[1] The figures presented in this paper are based on Commission's Economic Forecasts of Spring 2003 (European Commission, 2003).

[2] Comparisons of the EU with Japan are also remarkable. Although the tax burden in the latter country has increased by 8 percentage points, at 19 per cent of GDP in 1970, the starting level was very low by EU standards and still remains low thirty years after (28 per cent in 2001).

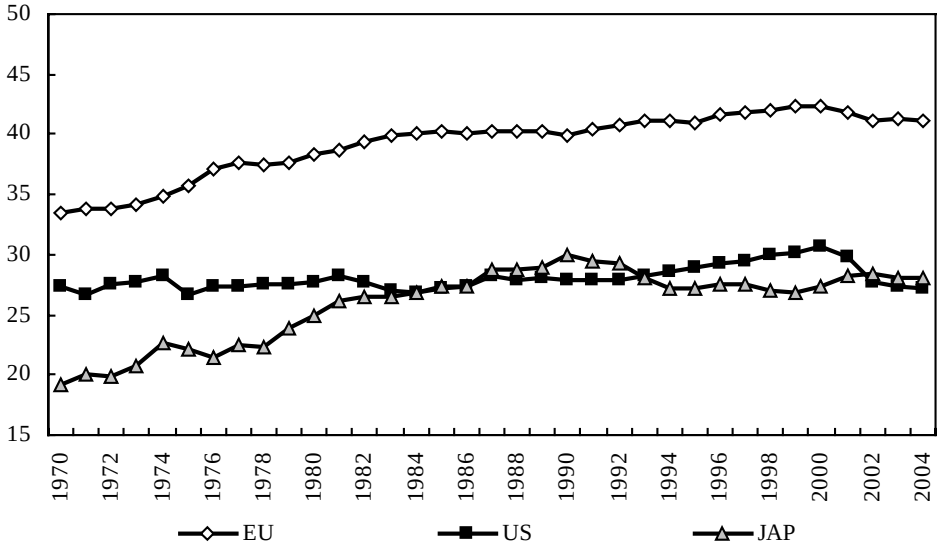
[3] Section 1 below, following Mendoza, Razin and Tesar (1994), Martinez-Mongay (2000) and European Commission (2000a), explains the criteria used to decompose total taxes into labour, capital and consumption taxes.

Figure 1

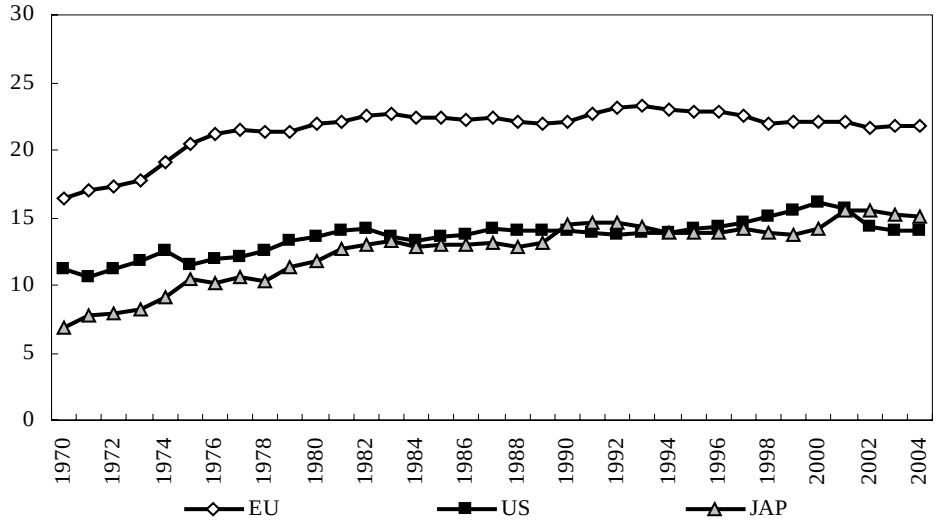
Total Tax Burdens and Labour Tax Revenues in the EU, the US and Japan, 1970-2004

(percent of GDP)

Panel I. Total Tax Burden



Panel II. Labour Tax Revenues



Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

The observed increase in the tax burden on labour sharply compares with the developments observed in capital and consumption taxes. In the EU, the tax burden on capital increased only by 3 percentage points (from 19 per cent to 22 per cent) between 1970 and 2002, while that on consumption remained practically unchanged at 20 per cent. In the other side of the Atlantic, the tax burden on labour also increased (by 6 percentage points – from 17 per cent to 23 per cent), but those on capital (from 27 per cent to 19 per cent) and consumption (from 13 per cent to 10 per cent) fell.

Against this background, the aim of the this paper is twofold: First to provide a dynamic picture of the structure of labour taxes in the EU and, second, to analyse the factors driving such dynamics. Concerning the latter, two apparently opposed factors should be weighed. On the one hand, the increase in labour taxes has coincided with larger public sectors. Empirical research, in turn, has linked larger public sectors to income, demography and trade openness.[4] On the other hand, there are forces of international competition and cooperation that generally shape tax structures and thus also labour taxes. Labour taxes, at least in the short run, are in part borne by capital. Therefore, they are affected by the international competition for capital. At the same time, there are several, though limited, forms of policy coordination in the area of EU labour taxes.

In the remainder of this paper, section 1 gives a complete view of the current labour tax wedge, its structure and long-run trends over the last three decades in the EU Member States, and compares them with those of the US and Japan. Section 2 analyses for comparison purposes the levels and developments in capital and consumption taxes and introduces the concept of effective labour tax rates. This section also presents some initial evidence on how labour tax changes are related to capital tax changes and on the interdependence of labour and other taxes in the EU. Section 3 attempts to work out the extent to which the observed labour tax trends in the EU can be attributed to international trends and to domestic forces. Section 4 concludes.

1. The structure and evolution of labour taxes in the EU

Following Layard, Nickell and Jackman (1991, page 209), the total wage wedge "is the gap between the real labour costs of the firm, on the one hand, and the real, post-tax consumption wage of the worker, on the other". Disregarding the effects of the real price of imports,[5] the tax wedge arises because labour income is first taxed through social security contributions; then, workers have to pay income taxes on the remaining income, which in turn, once direct taxes have been deducted,

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[4] See, for instance, Rodrick (1998), European Commission (2000a) and Martinez-Mongay (2001, 2002).

[5] Layard, Nickell and Jackman (1991) define the wedge as non-wage labour costs plus personal income taxes plus the difference between the consumer and the producer prices. This latter difference depends not only on consumption taxes but also on the real price of imports times the share of imports. We focus here on the tax components of the wedge and exclude external effects.

will be subject to indirect taxes when consumed. In other terms, the tax wedge on labour is the difference between the gross wage deflated by the producer's price (real producer wage $-w_p$) and the gross wage net of social security contributions and personal income taxes on labour income deflated by the consumer's price (the real consumer wage $-w_c$). Therefore, we can express the tax wedge on labour (TWL) as:

$$TWL = (w_p - w_c)/w_p = 1 - (w_c/w_p) \tag{1}$$

If P_p and P_c are respectively the producer price and the consumer price, and W_p and W_c are respectively the nominal gross wage and the nominal consumer wage, the tax wedge on labour can also be written as:

$$TWL = 1 - (W_c/W_p)(P_p/P_c) \tag{2}$$

The relationship between the nominal consumer and producer wages is determined by the ratio between social security contributions paid per unit of labour (*ssc*) and the nominal producer wage, the so-called "non-wage labour costs" ($nwlc=ssc/W_p$), and by the personal income tax rate (t_i) according to the expression:

$$W_c = W_p\,(1 - nwlc)(1 - t_i) \tag{3}$$

because workers first pay social security contributions on the producer wage and then pay personal income taxes on the rest.

The consumption tax rate is usually defined as the difference between the consumer price and the producer price expressed in terms of the latter:

$$T_c = (P_c/P_p) - 1 \tag{4}$$

so that:

$$P_p/P_c = 1/(1 + T_c) = 1 - t_c \tag{5}$$

where t_c would be an equivalent way of measuring the consumption tax rate: the difference between the consumer price and the producer price expressed in terms of the former.

$$t_c = 1 - (P_p/P_c) \tag{6}$$

Plugging (3) and (5) into (1) we obtain an expression of the tax wedge on labour income in function of non-wage labour costs, personal income taxes and consumption taxes:

$$wedge = 1 - (1 - nwlc)(1 - t_I)(1 - t_c) \tag{7}$$

The rates in (7) are unobservable at aggregate level and have to be estimated to obtain a quantitative indicator of the tax wedge in order to assess and compare the impact of tax reforms on the tax burden borne by labour across countries and its developments over time. The well-known work by Mendoza, Razin and Tesar

(1994) – MRT hereafter – proposed an operational solution to the problem of analysing the effects of the changes in tax laws, which consists of constructing synthetic tax indicators, the so-called (average) "effective" tax rates. According to this methodology, the average effective tax rates are defined as the ratio between the tax revenues from particular taxes (viz. indirect taxes) and the corresponding tax bases (viz. value of final consumption) obtained from national accounts.

The rest of this section and part of the next one is devoted to calculate and analyse such rates following Martinez-Mongay (2000), which applies a variant of the MRT method, suited to the information available within the framework of the Commission Spring and Autumn forecasts.

1.1 Non-wage labour costs

Properly speaking, non-wage labour costs include social security contributions (SSC)[6] and taxes on payroll and workforce, with the latter being actually non-existent or negligible in most countries, so that SSC can be considered as a good proxy to non-wage labour costs.[7] The non-wage labour costs effective rate (NWLC) can be calculated as the ratio of non-wage labour costs to total labour costs. This is a measure of the wedge between the nominal wage paid by the producer and the nominal wage received by the worker before paying personal income taxes.

AMECO directly provides the series on total social security contributions as ratios to each country's GDP (NWRV). On the other hand, the series for the total compensation of employees can also be obtained from AMECO in percentage of GDP (COEL).[8]

The problem with NWRV and COEL is that they refer to two different categories of labour. NWRV includes not only SSC paid by the employees and their employers, but also SSC paid by the self-employed, while COEL only reflects the total cost of the employees (including SSC paid by employees and employers). Therefore, in order to obtain an estimate of the tax base of NWRV we need to estimate the gross, or before taxes, labour income of the self-employed. We treat part of the total income of the self-employed as labour income and consider the rest as the income they receive as owners of capital. We estimate such a labour income of the self-employed in a way that is consistent with theoretical models of firm

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6 The appendix gives a detailed account of the statistical sources of the input series.

7 Taxes on payroll and workforce are zero in most Member States, as well as in the US and Japan. This is particularly true since the mid-Eighties, where the figure are only significant in Denmark, Ireland, Austria and Sweden (see OECD, 2002). Moreover, as shown in Martinez-Mongay (2000) disregarding or not TPRWF does not make a real difference in terms of within-country evolutions or across-country comparisons even for those countries (Ireland, Austria and Sweden) where taxes on payroll and workforce are sizeable. In consequence, from our point of view, the way such a tax item is treated to obtain the non-wage labour costs effective rate is not a relevant issue, while being able to calculate NWLC just on the basis of AMECO data is a clear advantage.

8 Note that COEL includes social security contributions paid by both the employers and the employees.

Box 1. Statistical Problems.
From ESA79 to ESA95 and the German Case

The changeover to ESA95 has affected AMECO series on public finances and, indeed, the components of the total tax burden. Where social security contributions are concerned, the ESA95 system considers three different items ("SSC received", "Actual SSC" and "Imputed SSC"), so that a choice has to be made. Analogously, the ESA95 system includes information on capital taxes, which are not available in ESA79. The problem with using ESA95 data is that, although all the series currently stop in 2001, the starting year varies from one country to another and there is no data before the Nineties for most of them. In addition, the ESA79 series, which start in 1970 for all the countries, stop in 1995 in most cases. Consequently, in order to obtain a set of series for all the countries over the period 1970-2001 it has been necessary to link the ESA95 series with their counterparts in the ESA79 system. Since the main purpose of the AMECO databank on effective taxation is to carry out early assessments of tax reforms (from 1999 onwards), we have kept the ESA95 original series for the available years and reconstructed them backwards on the basis of the observed growth rates in the corresponding ESA79 series. In the case of social security contributions, the choice of the ESA95 series, "Social security contributions received; general government" (AMECO code UTSG) has been determined by its unique counterpart in ESA79, "Social security contributions received; general government" (AMECO code UTSGF). The same applies to other series used in the calculations displayed in this paper (see appendix for a detailed description of the series used).

In the case of Germany the need to link ESA79 and ESA95 figures overlaps with the break imposed on the series by German Unification. Series for the unified Germany are only available for 1991 onwards, while those for the former West Germany only run until 1997/98. Unlike in the case of the changeover to ESA95, since the former and the unified Germany may be two very different economic entities, reconstructing the series for Germany backwards on the basis of the growth rates for West Germany may be controversial. Therefore, we have opted to link both types of series directly. As a result, a structural break usually appears in 1991 in the series in levels, which, indeed, does not affect within and across-country assessments in the 90's and 2000's.

behaviour. The opportunity cost of being self-employed is the wage that this category of workers would have earned had they been working as employees. Such an opportunity cost can be approximated by the average wage of employees. This hypothesis is of general use for estimating the labour share on the basis of the compensation of employees in macroeconomic and growth models, and has been adopted to calculate the effective tax rate of labour in, for instance, Gordon and Tchilinguirian (1998) and Carey and Tchilinguirian (2000).[9]

If *OCCP* is the occupied population or, in other words, total employment (National Accounts) and *EMPL* stands for employees (wage and salary earners), both measured in persons and available in AMECO, the labour share including the opportunity cost of the self-employed – *LETB*, which is coincidental with the labour effective tax base in percentage of GDP – can be calculated as:

$$LETB = COEL*OCCP/EMPL \quad (8)$$

Then, the effective average non-wage labour costs for total employment can be obtained as:

$$NWLC = NWRV/LETB \quad (9)$$

In short, the effective rate of non-wage labour costs (*NWLC*) is the ratio of total social security contributions (*NWRV*) to total labour costs (*LETB*). The rate includes the imputed wage of the self employed, as well as the social security contributions paid by this category of labour. At the macroeconomic level, such an imputed wage equals the average gross wage earned by employees (wage and salary earners). Therefore, the total cost of labour can be calculated as the total compensation of employees multiplied by the ratio of occupied population to wage and salary earners.[10]

Table 1 reports the evolution of *NWLC* (in percent) between 1970 and 2004 based on the European Commission Economic Forecasts of Spring 2003 (European Commission, 2003). The long-term trend has been unambiguously positive over the whole period, but it seems to have reversed after the late Nineties. The observed fall is related to efforts to reduce taxation on labour through cuts in SSC.

Despite this, however, the effective *NWLC* rate remains still much higher in the euro area (27 per cent in 2002) and the EU as a whole (24 per cent) than in the US (12 per cent) or Japan (17 per cent). The exceptions to this rule are the UK, Ireland and Denmark. At 11-12 per cent, non-wage labour costs in the two first countries are comparable to the US', while, in Denmark, the figure is below 5 per cent. In this latter case, as will be shown below, there is a clear compensation through very high personal income taxes on labour income. According to European

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[9] This solution had also been suggested in Martinez-Mongay (1998).

[10] Of course, the total operating surplus of the economy should be then reduced by an amount equal to the average gross wage times the number of the self-employed.

Table 1

Average Effective Non-Wage Labour Costs (*NWLC*)

Country	1970	1980	1990	2000	2001	2002	2003	2004	70-80	80-90	90-00	00-04
B	19.3	20.6	25.7	26.0	25.9	25.9	26.0	26.0	1.3	5.1	0.3	0.0
D	19.3	24.9	26.9	30.8	30.6	30.7	31.1	31.0	5.6	2.0	3.9	0.3
GR	11.3	14.8	17.5	24.0	24.3	24.8	24.9	25.4	3.5	2.7	6.5	1.4
E	11.3	18.4	20.6	22.1	22.7	22.8	22.9	23.1	7.1	2.1	1.5	1.0
F	22.6	28.8	33.9	31.7	31.4	31.4	31.8	31.7	6.2	5.1	–2.2	0.0
IRL	4.8	8.8	11.8	11.3	11.5	11.8	11.7	11.9	4.0	3.0	–0.5	0.6
I	18.9	20.7	22.5	22.9	22.7	22.8	22.9	23.0	1.7	1.9	0.4	0.0
L	16.2	19.7	21.0	21.5	21.9	22.0	22.2	22.0	3.5	1.3	0.4	0.5
NL	20.1	25.5	27.1	28.7	25.6	24.2	25.5	25.0	5.4	1.6	1.6	–3.7
A	14.9	19.5	22.6	26.5	26.8	26.7	26.8	26.9	4.6	3.1	3.9	0.3
P	7.8	10.4	15.1	17.6	17.7	18.1	18.2	18.3	2.5	4.7	2.5	0.7
FIN	8.7	17.0	20.3	22.4	22.5	22.2	21.8	21.8	8.3	3.3	2.1	–0.5
EU-12	**18.8**	**23.7**	**26.2**	**27.4**	**27.0**	**27.0**	**27.2**	**27.1**	**4.9**	**2.5**	**1.2**	**–0.2**
DK	3.7	2.8	3.8	5.7	5.5	4.6	4.5	4.4	–1.0	1.0	2.0	–1.3
S	13.6	22.2	24.1	25.5	25.6	25.6	25.2	25.1	8.6	1.9	1.5	–0.4
UK	9.6	11.6	11.4	12.2	11.9	11.9	12.5	12.8	2.0	–0.1	0.7	0.6
EU-15	**16.8**	**21.4**	**23.5**	**24.2**	**23.9**	**23.8**	**24.2**	**24.2**	**4.6**	**2.2**	**0.7**	**0.0**
US	6.9	9.3	11.2	11.5	11.5	11.6	11.4	11.4	2.4	2.0	0.3	0.0
JP	6.7	9.9	13.5	16.1	16.5	16.9	17.1	17.4	3.2	3.6	2.6	1.3

Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003) and own calculations.

Commission (2000b), the evolution of *NWLC* seems to be mainly driven by insurance principles, thus closely linked to the evolution of welfare spending. In the case of Denmark, however, such an insurance principle determines the personal income tax rather than non-wage labour costs.

1.2 The personal income effective tax rate

Once non-wage labour costs have been deducted from gross wages, workers pay personal income taxes on their remaining labour income. Analogously, once capital incomes have been adjusted for corporate income taxes and those on property and wealth, the remaining capital income received by households is also taxed through the same personal income tax. Therefore, to obtain the average effective total tax wedge on labour income it is necessary to split personal income taxes between the two production factors, labour and capital.

Such a distinction is not directly available either in AMECO or in the OECD Revenue Statistics (OECDRS). AMECO only provides the aggregate series on direct taxes on income and wealth (*DTRV*). These series actually include four categories of taxes: taxes on personal income from labour, taxes on personal income from capital, taxes on corporate income, and taxes on property and wealth. Taxes on corporate income are capital taxes, while property taxes could also reasonably be imputed to capital income, since they are taxes on the capital stock of the economy regardless of whether they are paid by individuals or by firms. Consequently, only the first component includes taxes on labour income.

Where the OECDRS databank is concerned, it provides a more detailed, but still insufficient, breakdown of direct taxes. OECDRS distinguishes between "Taxes on income, profits and capital gains of individuals" (item RS1100 – TRII hereafter), "Corporate taxes on income, profits and capital gains" (item RS1200-TRCI), and "Revenues from any kind of property taxes" (RS4000-PROP). *TRCI* and *PROP* are exclusively capital taxes, while *TRII* includes direct taxes on both labour and capital. Based on this breakdown of direct taxes, it is possible to decompose *DTRV* from AMECO into the same three categories of direct taxes. First, we calculate the following ratios from the OECDRS:

$$TRIIR = TRII/(TRII+TRCI+PROP) \tag{10}$$

$$TRCIR = TRCI/(TRII+TRCI+PROP) \tag{11}$$

$$PROPR = PROP/(TRII+TRCI+PROP) \tag{12}$$

Then we decompose *DTRV* from AMECO in the following way:

$$PIRV = DTRV*TRIIR \tag{13}$$

$$CORV = DTRV*TRCIR \tag{14}$$

$$PWRV = DTRV*PROPR \tag{15}$$

Since, at the time of writing, the series in OECDRS only provide coverage up to 2001, the values of the series on *PIRV*, *CIRV* and *PRIRV* for 2002-2004 can be obtained by assuming that the values of *TRIIR*, *TRCIR* and *PROPR* observed in 2001 hold in the 2002-2004 period.

Once *PIRV*, *CORV* and *PWRV* have been singled out, the problem is to split *PIRV* into household tax revenues from labour and capital income. In order to do that, we follow MRT and assume that any unit of a household income pays the same average tax rate regardless of the source of such income, whether labour or capital. Strictly speaking, we apply here a modified version of the MRT approach. As in Carey and Tchilinguirian (2000), we assume that only the net wage (take-home pay) is subject to personal income tax. However, we apply a rather broad definition of personal income from capital. Instead of using *OSPUE* (*less* the imputed wage income of the self-employed) plus *PEI*, we define the household income from capital as the net operating surplus of the economy (*NOS*), which is directly available in AMECO, minus the imputed labour income of the self-employed minus other direct taxes on capital, namely the corporate income tax and taxes on property and wealth. The personal income tax base is:

$$PITB = LETB - NWRV + NOS - (LETB - COEL) - CORV - PWRV \tag{16}$$

where *LETB* is defined in (8) and *CORV* and *PWRV* have been calculated in (14) and (21) respectively. A more condensed expression of (16) is:

$$PITB = COEL + NOS - NWRV - CORV - PWRV \tag{16a}$$

Then, the effective tax rate on personal income is:

$$PITR = PIRV/PITB \tag{17}$$

In sum, the total personal income effective tax rate is calculated as the ratio of tax revenues from income taxes paid by individuals to the total income received by them, a part of which is revenues from capital. Such personal income is the sum of total labour costs, including the imputed wages of the self-employed and excluding social security contributions and the net operating surplus of the economy, adjusted for the imputed wages of the self-employed and excluding taxes on corporate income and on property and wealth. Box 2 compares this proposal to calculate the personal income tax rate with other contributions in the literature.

The effective rate of personal income taxes (*PITR*) in the euro area is about 16 per cent in 2002 (slightly higher than in the EU-15, see Table 2). This is also

Table 2

Average Effective Personal Income Tax Rates (*PITR*)

Country	1970	1980	1990	2000	2001	2002 *	2003 *	2004 *	70-80	80-90	90-00	00-04 *
B	12.6	23.5	22.1	24.1	24.8	24.8	24.3	23.8	10.9	–1.4	1.9	–0.3
D	12.2	17.0	14.7	18.4	17.7	17.2	17.6	17.9	4.8	–2.2	3.6	–0.5
GR	2.0	4.1	4.8	8.3	10.5	10.2	10.1	9.7	2.1	0.7	3.6	1.3
E	1.9	6.4	10.5	10.0	10.5	11.0	10.7	10.7	4.5	4.1	–0.5	0.7
F	5.3	8.0	8.1	14.3	14.4	13.4	13.1	13.1	2.8	0.0	6.3	–1.2
IRL	5.2	12.6	14.5	12.7	11.9	10.8	10.6	10.3	7.4	1.9	–1.8	–2.5
I	3.6	9.9	16.3	18.1	18.7	17.6	16.9	16.7	6.3	6.4	1.8	–1.4
L	8.1	17.3	15.6	11.7	11.9	13.0	12.8	12.1	9.2	–1.6	–4.0	0.4
NL	14.6	19.5	18.8	11.8	11.8	11.8	11.3	11.0	4.9	–0.7	–7.0	–0.8
A	12.5	16.6	16.3	19.5	21.5	21.0	21.5	21.9	4.1	–0.3	3.2	2.4
P	6.0	7.2	7.7	10.5	9.8	9.9	9.9	9.8	1.2	0.5	2.8	–0.7
FIN	15.8	20.5	27.3	27.6	25.5	25.3	24.3	23.7	4.7	6.8	0.3	–3.9
EU-12	**8.1**	**12.8**	**13.8**	**16.2**	**16.2**	**15.6**	**15.5**	**15.4**	**4.7**	**0.9**	**2.5**	**–0.8**
DK	27.8	32.9	38.3	41.1	41.0	40.5	40.1	40.0	5.1	5.4	2.8	–1.1
S	25.8	31.5	35.6	31.6	35.4	31.0	31.7	31.5	5.6	4.2	–4.0	–0.1
UK	15.3	15.2	16.1	15.8	16.1	14.9	14.9	15.0	–0.1	0.9	–0.3	–0.8
EU-15	**10.5**	**14.3**	**15.4**	**17.1**	**17.3**	**16.4**	**16.3**	**16.3**	**3.8**	**1.1**	**1.8**	**–0.8**
US	10.9	12.9	12.3	16.0	15.2	12.9	12.7	12.5	2.0	–0.5	3.6	–3.4
JP	4.3	7.0	10.1	7.0	9.0	8.8	8.6	8.5	2.7	3.1	–3.1	1.5

* Projection on the basis of the OECD Revenue Statistics for the year 2002.

Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

Box 2. Alternatives To Calculate Personal Income Tax Rates

There are two major differences between the definition of the personal income tax rate in (17) and that of MRT (see also Carey and Tchilinguirian, 2002). Expression (17) is based on a rather rough approximation to the personal, taxable income. We include enterprises' (both corporate and incorporate, but especially the former[1]) net savings in the personal income tax base, thus wrongly assuming that profits are fully distributed.[2] This means that the tax base is overestimated if such net savings are positive and underestimated when they are negative. In addition, unlike MRT and Carey and Tchilinguirian (2000), we use a rather broad definition of property taxes, which covers the whole item RS4000 in OECDRS, while MRT only include RS4100 and RS4400.[3] The advantage in approximating personal income in this way is that we can use variables, such as the compensation of employees and the net operating surplus, which are updated and projected twice a year in the framework of Commission's Spring and Autumn Forecast, while the "operating surplus of unincorporated enterprises" and "property and entrepreneurial income" used by MRT are available with a or 4-year lag. Moreover, as a general rule, there is not a big quantitative difference between using RS4000 and RS4100+RS4400, while, in some cases, aggregate items in the OECDRS, such as RS4000, are more updated than their components.

Overall, one could argue that the criteria proposed here may be as good or as bad as any other applied in the relevant literature on effective taxation. The criteria applied by Mendoza, Razin and Tesar (1994) or Carey and Tchilinguirian (2000), as well as those in European Commission (1997b, 1999, 2000a), also lead to more or less rough approximations to the "true" personal income tax revenues from labour income.

Where the MRT method is concerned, one has to conclude that, in the end, the range of alternatives to define the personal income tax base is rather wide. For

instance, Carey and Tchilinguirian (2000) and, more recently, Carey and Rabesona (2002) have proposed a number of modifications to the MRT method. These include correcting the treatment of social security and private employers' contributions to pension funds, avoiding double taxation of dividends, considering the preferential tax treatment for pension funds and life insurance earnings, or assuming that households do not pay taxes on capital income. In most cases, such modifications require using costly information, which is only available with a certain lag and/or is totally absent in National Accounts. In addition, when comparing different alternatives, the conclusion seems to be that such modifications induce more or less large changes in levels and affect some countries more than others. However, their impacts in terms of within-country evolutions and across-country comparisons are fairly small in most cases or even negligible in some of them.

Therefore it seems that, from an empirical point of view, different methods either lead to fairly similar tax indicators or to totally different ones, but there are not clear *ex ante* arguments to make a choice. As shown in Martinez-Mongay (2000) and in de Hann, Suturm and Volkerink (2002) alternative approaches lead to sets of indicators with similar statistical properties. Given this, unless the detailed tables of the national accounts are published in time, and they can be included in the forecasts of the European Commission, the approximation proposed here appears to be, at least, a reasonable solution to compute medium-term forecasts of the personal income tax rates.

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1) Once the imputed wage of the self-employed is deducted from OSPUE, profits (and savings) of unincorporated enterprises are a rather small fraction of GDP.

2) AMECO includes series on net savings for both corporate enterprises and for households (including net savings from incorporated enterprises), which could be used to obtain a better proxy of the personal income tax base. However, the series of net saving of corporations are not available in some countries and they are very short in most of them, while the series of net savings from incorporated enterprises cannot be singled out from total household savings.

3) Carey and Rabesona (2002) also consider this broad definition of property taxes.

higher than in the US (13 per cent). Overall, the way the personal income is taxed varies across Member States. While in some Mediterranean countries, such as Spain, Portugal and Greece, the effective rate is below or close to 10-11 per cent, in the Nordic countries (Denmark, Finland and Sweden) as well as in Belgium, governments take more than 25 per cent of the personal income tax base in the form of taxes on households. High taxation in Denmark (more than 40 per cent) is, at least, partially explained by very low social security contributions, so that, as mentioned above, the welfare state there is mainly financed through general income taxes.

Over the whole period 1970-2000, the personal income effective tax rate increased by almost 100 per cent in the euro area. However, the bulk of the change took place during the Seventies, while in the Eighties and the Nineties such a positive trend slowed down. The reforms applied or planned in most Member States in the recent past seem to be reversing such a long-term path in the 2000s.

1.3 The effective tax rate on consumption

As mentioned in the introduction, the effective tax rate on consumption should be the ratio of tax revenues from consumption taxes to the pre-tax value of consumption. Consumption tax revenues can be accurately proxied by indirect taxes, which are available in AMECO. On the other hand, following MRT, the pre-tax value of consumption can be calculated as private final consumption (*PFC*), plus government final consumption (*GFC*), minus the compensation of employees of general government (*CEGG*), minus consumption tax revenues (*INVR*). *CEGG* is deducted from the tax base since governments pay indirect taxes on the purchases of

Box 3. The Tax Treatment of Government Wage Consumption Expenditures

Although the exclusion of CEGG from the tax base is proposed by many authors, the agreement as regards the treatment of such a series is far from total. For instance, in European Commission (1997b) this variable was not deducted from the base. Recently, Carey and Tchilinguirian (2000) (see also Carey and Rabesona, 2002) have proposed a variant of the MRT method, where they make the tax base more comprehensive by not excluding CEGG. They argue that the fact that government wage consumption expenditures are not subject to indirect tax is not a compelling reason for using a partial consumption tax base. In the end, many other elements of the consumption tax base are equally not subject to indirect taxes but remain in their base. However, they also conclude that the inclusion/exclusion of CEGG only changes the level of the rate without affecting very much comparisons across countries, as well as the major features of its evolution over time.

goods and non-factor services, while they are usually exempted from paying indirect taxes on goods and services provided by the public sector (see Box 3).

Calculated in this way, it can be shown straightforwardly that the effective tax rate on consumption is the difference between the consumer price (a post-tax price) and the producer price (a pre-tax price) expressed as a percentage of the latter. An equivalent definition of the effective tax rate on consumption is applied in European Commission (1997, 1999, 2000a) where the wedge is expressed in terms of consumer prices. As shown at the beginning of the section, this rate has the advantage of being explicitly included in the formulae of the tax wedge on labour. It is called the consumption implicit tax rate and its expression is:

$$t_c = (P_c - P_p)/P_c \tag{18}$$

In macroeconomic terms, the consumption implicit tax rate can be calculated as:

$$CITR = INRV/(PFC + GFC - CEGG) \tag{19}$$

One of the most distinguishing features of tax systems in the EU, as compared with the US or Japan, is the tax burden on consumption (Table 3).

Overall, at 20 per cent, indirect taxes in the EU, expressed in terms of the value of final consumption, are twice that of the US. Indirect taxes represent ¼ or more of the (inclusive of taxes) value of final consumption in France, Ireland, Luxembourg, Finland, Denmark, and Sweden. At the opposite extreme, in Germany, Spain, and the UK, the figure is clearly below the EU average, but always bigger than in the US or Japan.

During the last thirty years, the effective tax rate on consumption has increased by 1 percentage point in the euro area, but has remained almost unchanged in the EU as a whole. The rate fell in most countries during the Seventies, probably due to a generalised fall in tariffs. In the Eighties, average rates in the euro area rose more than 1 percentage point. This is most likely due to the introduction of VAT regime in countries such as, for instance, Spain and Portugal in the Eighties. In addition, VAT harmonisation at the late Eighties, as well as the introduction of energy and environmental taxes could also have played a role. Such a trend continued and accelerated in Nineties, when budgetary consolidation strategies in many Member States consisted, at least in a first phase, of increasing taxation (see European Commission, 2000b).

1.4 The average effective total tax wedge on labour

Given (15), (24) and (26), the macroeconomic counterpart of (7), *i.e.* in terms of average effective tax rates, can be calculated as:

$$WEDGE = 1 - (1 - NWLC)(1 - PITR)(1 - CITR) \tag{20}$$

Table 3

Average Effective Tax Rates on Consumption (CITR)

Country	1970	1980	1990	2000	2001	2002	2003	2004	70-80	80-90	90-00	00-04
B	23.3	17.8	18.3	20.5	19.5	20.1	20.2	20.2	–5.4	0.5	2.2	–0.3
D	18.9	17.4	17.2	17.2	16.9	16.8	17.1	17.2	–1.5	–0.2	0.0	0.0
GR	17.1	14.5	17.8	20.7	20.5	20.3	20.5	20.5	–2.6	3.3	2.9	–0.2
E	11.4	9.0	15.4	17.7	17.4	17.9	18.1	18.3	–2.4	6.4	2.3	0.6
F	23.7	23.3	22.7	24.1	23.3	23.4	23.1	23.3	–0.4	–0.6	1.4	–0.8
IRL	20.9	18.3	22.2	24.6	22.6	23.6	24.0	24.0	–2.6	3.9	2.4	–0.6
I	14.9	13.1	16.4	22.0	21.3	21.4	21.1	21.1	–1.8	3.3	5.6	–0.9
L	11.7	14.1	19.6	29.2	26.9	26.3	25.3	24.8	2.3	5.5	9.6	–4.4
NL	16.0	15.9	16.6	19.4	20.1	19.4	19.8	19.5	–0.1	0.7	2.8	0.2
A	26.8	25.6	25.0	22.5	22.2	21.9	21.7	22.1	–1.2	–0.7	–2.4	–0.4
P	14.1	16.9	19.4	21.5	21.6	22.8	22.8	23.4	2.8	2.5	2.1	1.9
FIN	22.0	22.8	26.7	23.9	23.0	23.1	22.8	22.4	0.8	3.9	–2.9	–1.4
EU-12	**19.0**	**17.7**	**18.6**	**20.4**	**19.9**	**19.9**	**20.0**	**20.1**	**–1.3**	**1.0**	**1.7**	**–0.3**
DK	30.1	28.1	29.3	30.8	30.9	30.8	30.5	30.6	–2.0	1.2	1.5	–0.2
S	23.4	25.1	32.0	27.1	27.4	28.3	28.6	28.9	1.6	7.0	–5.0	1.8
UK	21.4	19.6	17.2	17.8	17.4	17.5	17.5	17.6	–1.8	–2.4	0.6	–0.3
EU-15	**19.9**	**18.5**	**19.2**	**20.4**	**19.9**	**20.0**	**20.1**	**20.2**	**–1.4**	**0.7**	**1.2**	**–0.2**
US	13.1	11.0	10.7	10.4	10.2	10.1	9.9	9.8	–2.1	–0.3	–0.3	–0.6
JP	12.8	11.6	13.2	12.8	12.7	12.4	12.4	12.4	–1.1	1.5	–0.4	–0.4

Source: AMECO (DG ECFIN Economic Forecasts of Spring 2003; see European Commission, 2003) and own calculations.

When a part of the income of the self-employed (the imputed wage) is considered as labour income, total taxes on labour, thus including the incidence of indirect taxes, represent half the gross wage in both the euro area and the EU in 2002 (Table 4). This strongly contrasts with the figures for our main trade partners, where the tax wedge on labour in 2002 was around 30 per cent. In no Member State the total burden on labour income is lower than in the US. In the UK, and, to a lesser extent, in Spain, Ireland, Portugal and Greece, the figure is well below the EU average. However, in Denmark, Finland and Sweden, the tax wedge represents more than 60 per cent of the gross wage bill. Relatively high taxes are also borne by labour in Belgium, Germany, France and Austria.

Indeed, the evolution of the tax wedge in the last three decades summarises that of its components. Overall, consumption taxes have contributed little, while the changes observed in the tax wedge have been driven by changes in non-wage labour costs and in personal income taxes. In the Seventies and the Nineties, both rates contributed by comparable amounts. However, the bulk of the increase recorded by the tax wedge was due to the surge in social security contributions.

2. The average effective tax rates on labour and capital

Section 1 provides the basic elements to calculate the so-called the average effective tax rate on labour income (*LERT*), as defined by MRT.

Basically, the *LERT* is a tax wedge on labour that does not take account of indirect taxes. By analogy and for comparison purposes, one can calculate the average effective tax rates on capital *KETR*, which includes direct taxes on capital plus the part of the personal income tax attributable to capital income.

2.1 The average effective tax rate on labour income

The average effective tax rate on labour income is the ratio of the sum of non-wage labour costs *plus* the personal income tax revenues attributable to labour income to the pre-tax labour income. In accordance with (8), the latter income is total gross wages, including gross wages imputed to the self-employed. The second component of the tax revenues can be estimated by multiplying *PITR* in (17) by the net wage, once non-wage labour costs have been discounted. Then the effective tax rate on labour income is:

$$LETR = (NWRV + PITR*(LETB - NWRV))/LETB \quad (21)$$

In short, the average effective tax rate on labour income (*LETR*) can be computed as the ratio of *NWLC* (*SSC* plus taxes on payroll and workforce) plus personal taxes on labour income to gross wages.

Table 4

Average Effective Total Tax Wedge on Labour (WEDGE)

Country	1970	1980	1990	2000	2001	2002 *	2003 *	2004 *	70-80	80-90	90-00	00-04 *
B	45.9	50.1	52.7	55.3	55.2	55.4	55.3	55.0	4.2	2.6	2.6	–0.3
D	42.5	48.6	48.4	53.2	52.6	52.3	53.0	53.1	6.0	–0.2	4.8	–0.1
GR	28.0	30.1	35.4	44.7	46.2	46.2	46.3	46.4	2.2	5.2	9.4	1.7
E	23.0	30.5	39.8	42.3	42.8	43.6	43.6	43.9	7.5	9.3	2.5	1.6
F	44.1	49.8	53.1	55.6	55.0	54.5	54.5	54.5	5.7	3.3	2.5	–1.1
IRL	28.6	34.9	41.3	41.6	39.7	39.9	40.0	39.9	6.3	6.4	0.3	–1.7
I	33.5	37.9	45.8	50.8	50.5	50.0	49.5	49.4	4.4	8.0	4.9	–1.4
L	32.0	43.0	46.5	50.9	49.7	50.0	49.3	48.4	10.9	3.5	4.5	–2.5
NL	42.7	49.6	50.6	49.3	47.6	46.1	47.0	46.3	6.9	1.0	–1.3	–3.0
A	45.5	50.1	51.4	54.2	55.3	54.8	55.0	55.5	4.6	1.3	2.8	1.4
P	25.6	30.9	36.8	42.1	41.8	43.0	43.1	43.6	5.3	6.0	5.3	1.4
FIN	40.0	49.1	57.5	57.2	55.5	55.3	54.3	53.7	9.0	8.5	–0.3	–3.5
EU-12	**39.4**	**45.1**	**48.2**	**51.5**	**51.0**	**50.6**	**50.7**	**50.7**	**5.6**	**3.1**	**3.3**	**–0.8**
DK	51.4	53.1	58.0	61.6	61.5	60.8	60.2	60.2	1.7	4.9	3.6	–1.3
S	50.9	60.1	66.8	62.9	65.1	63.2	63.6	63.5	9.1	6.7	–3.9	0.7
UK	39.8	39.7	38.5	39.2	39.0	38.1	38.6	38.9	–0.1	–1.3	0.8	–0.3
EU-15	**40.3**	**45.0**	**47.7**	**50.0**	**49.6**	**49.1**	**49.3**	**49.4**	**4.7**	**2.7**	**2.3**	**–0.6**
US	27.8	29.7	30.5	33.4	32.6	30.8	30.2	30.2	1.8	0.8	2.9	–3.2
JP	22.1	25.9	32.5	31.9	33.6	33.6	33.6	33.8	3.8	6.6	–0.6	1.9

* Projection on the basis of the OECD Revenue Statistics for the year 2002.

Source: AMECO (DG ECFIN Economic Forecasts of Spring 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

The effective tax burden on labour in the euro area was close to 40 per cent in 2002 (Table 5). It was 2 percentage points higher than in the EU-15, and 14-15 points higher than in the US and Japan. By comparing Table 5 with Tables 1 and 2, it becomes clear that such large differences between the EU and its two major trade partners are explained by the differentials in non-wage labour costs, rather than by the existing differences in taxes on household income. Where differences across Member States are concerned, the tax burden on labour is above 40 per cent in Belgium, Germany, France, Austria, Finland, Denmark and Sweden. In the latter country, the effective tax burden on labour income (total employment) represents more than 50 per cent of the gross wage bill. At the opposite extreme, the tax burden on labour is relatively low and comparable with that of the US in Ireland, the UK and, to a lesser extent in Portugal.

The effective tax rate of labour has not ceased to increase during the last thirty years both inside and outside the EU. The only clear exception is the UK, where the rate has remained fairly stable since 1970. As with non-wage labour costs and personal taxes, the largest change took place during the Seventies, while the trend slowed down in the Eighties and even more in the Nineties. Such trends are being reversed in most Member States in the 2000s.

2.2 The average effective tax rate on capital income

A proxy to tax revenues obtained by governments from capital income can be calculated in the following way. Total taxes on capital income should include taxes on personal income from capital, taxes on corporate income and property taxes. Property taxes being a tax on the capital (wealth) stock of the economy can be considered as taxes on capital income, regardless of whether they are paid by households or by business. Expressions (14) – *CORV* and (15) – *PWRV* respectively give the tax revenues from corporate and property taxes consistent with AMECO data and calculated on the basis of the OECDRS. The tax revenues from taxes on personal income from capital can be obtained on the basis of (16) by multiplying *PITR* in (17) by the capital income of households, which can be approximated by the net operating surplus of the economy after deducting taxes on corporate and property incomes and excluding the imputed wage income of the self-employed.

A second issue concerning the capital tax base is whether the capital income should include or exclude depreciation or, in other words, whether one should use the net or the gross operating surplus. MRT rightly argue that no capital taxes are levied on depreciation of fixed assets, so that the capital tax base should be calculated in net terms (excluding depreciation). However, Carey and Tchilinguirian (2000)[11] note that capital effective tax rates based on the net operating surplus depend on charges for depreciation, which vary a great deal from one country to

[11] See also Carey and Rabesona (2002).

Table 5

Average Effective Tax Rates on Labour (LETR)

Country	1970	1980	1990	2000	2001	2002 *	2003 *	2004 *	70-80	80-90	90-00	00-04 *
B	29.5	39.3	42.2	43.8	44.3	44.2	44.0	43.6	9.8	2.9	1.6	–0.2
D	29.1	37.7	37.7	43.5	42.9	42.6	43.3	43.4	8.6	0.0	5.8	–0.1
GR	13.1	18.3	21.4	30.3	32.3	32.5	32.5	32.6	5.2	3.1	8.9	2.3
E	13.1	23.6	28.9	29.9	30.8	31.2	31.2	31.4	10.6	5.3	1.0	1.5
F	26.7	34.5	39.3	41.5	41.3	40.6	40.8	40.6	7.9	4.8	2.2	–0.8
IRL	9.7	20.3	24.6	22.6	22.1	21.3	21.0	20.9	10.5	4.3	–2.0	–1.7
I	21.8	28.5	35.2	36.9	37.1	36.4	36.0	35.8	6.7	6.7	1.7	–1.0
L	23.0	33.6	33.4	30.7	31.2	32.1	32.1	31.4	10.6	–0.2	–2.7	0.7
NL	31.8	40.1	40.8	37.1	34.4	33.1	33.9	33.2	8.3	0.7	–3.7	–3.9
A	25.6	32.9	35.2	40.9	42.5	42.1	42.5	42.9	7.3	2.4	5.6	2.1
P	13.4	16.9	21.7	26.3	25.8	26.2	26.2	26.3	3.5	4.8	4.6	0.0
FIN	23.1	34.0	42.0	43.8	42.3	41.8	40.8	40.4	10.9	8.0	1.8	–3.4
EU-12	**25.4**	**33.5**	**36.4**	**39.1**	**38.8**	**38.3**	**38.4**	**38.3**	**8.1**	**3.0**	**2.7**	**–0.8**
DK	30.5	34.7	40.6	44.5	44.3	43.3	42.8	42.7	4.3	5.9	3.9	–1.8
S	35.9	46.7	51.1	49.1	51.9	48.7	48.9	48.7	10.8	4.4	–2.1	–0.4
UK	23.4	25.0	25.7	26.0	26.1	25.0	25.5	25.9	1.6	0.6	0.4	–0.2
EU-15	**25.7**	**32.7**	**35.5**	**37.2**	**37.1**	**36.4**	**36.7**	**36.7**	**7.0**	**2.8**	**1.8**	**–0.6**
US	17.0	21.0	22.2	25.6	24.9	23.1	22.6	22.5	4.0	1.2	3.4	–3.1
JP	10.7	16.2	22.3	21.9	24.0	24.1	24.2	24.4	5.5	6.1	–0.3	2.5

* Projection on the basis of the OECD Revenue Statistics for the year 2002.

Source: AMECO (DG ECFIN Economic Forecasts of Spring 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

another, mainly according to differences in the lives of capital assets assumed for tax purposes. In other words, if the net operating surplus is used, differences in capital taxation across countries may be due to differences in assumed services' lives of fixed assets rather than in any real difference in tax rates. On this basis, the gross operating surplus should be used as the tax base of capital. This seems particularly advisable when the labour income attributable to the self-employed has to be deducted from the operating surplus. If the net operating surplus is used, the resulting tax base becomes too small and the rates unrealistically high in some countries and years. Additionally, one should bear in mind that the net operating surplus exhibits more volatility over the cycle than the gross operating surplus, which may make it difficult to assess short to medium term changes in the rates.[12]

Finally, it is also worth noting that using the gross operating surplus seems to be coherent with the way the labour effective tax base (*LETR*) is defined in (21), where workers' expenditures to maintain, renovate and increase the stock of human capital is not deducted from the tax base. Yet, many (personal) tax laws do not foresee levying taxes on such expenditures. They usually establish (minimum) income thresholds and other deductible spending (viz. education, training), which are not taken into account to obtain the tax rates on labour income.

On this basis, the capital effective tax rate is:

$$KETR = (CORV + PWRV + PITR*(NOSA - CORV - PWRV))/GOSA \qquad (22)$$

where *GOSA* is the gross operating surplus adjusted for the imputed wage income of the self-employed – see (5):

$$GOSA = GOS - (LETB - COEL) \qquad (23)$$

and *NOSA* is the net operating surplus adjusted for the wage income of the self-employed:

$$NOSA = NOS - (LETB - COEL) \qquad (24)$$

At 19 per cent, the tax rate on capital income in the euro area in 2002 is lower than in the EU-15 and comparable to that in the US (18.5 per cent – see Table 6). Although it is still higher than in Japan (18 per cent), it is worth highlighting that the differences between European countries and their main trade partners are much smaller for capital taxes than for labour taxes. Where Member States are concerned, Luxembourg and the UK (31-34 per cent)[13] and, to a lesser extent, Belgium, France, Italy, Denmark and Sweden (22-27 per cent) set the highest tax burden on capital income. At the bottom end of the rate scale, in Germany, Spain, and Portugal, the capital effective tax rate is much lower than in the euro area.

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[12] See Martinez-Mongay (2000) for a detailed comparison of the capital effective tax rates calculated including and excluding depreciation from the tax base.

[13] Note that such a high effective tax rate of capital in Luxembourg does not take account of special fiscal treatment of capital income of non-residents.

Table 6

Average Effective Tax Rates on Capital (KETR)

Country	1970	1980	1990	2000	2001	2002 *	2003 *	2004 *	70-80	80-90	90-00	00-04 *
B	14.8	19.4	20.3	24.3	23.9	23.9	23.6	23.3	4.6	0.9	4.0	–1.0
D	17.1	17.6	15.0	16.6	12.6	12.3	12.7	12.9	0.4	–2.5	1.6	–3.7
GR	9.9	8.6	12.4	24.8	16.8	16.3	16.0	15.3	–1.3	3.8	12.4	–9.5
E	7.8	10.6	19.1	19.6	18.8	19.2	18.5	18.4	2.8	8.5	0.5	–1.2
F	15.9	18.8	18.9	23.5	24.5	23.0	22.7	22.6	2.9	0.2	4.6	–0.9
IRL	27.0	18.5	18.8	20.6	19.6	17.7	17.3	16.7	–8.6	0.4	1.8	–3.9
I	11.7	15.9	22.7	22.7	22.8	21.6	20.9	20.8	4.2	6.7	0.0	–1.9
L	15.6	30.3	31.3	32.4	34.5	37.6	36.3	34.2	14.7	1.0	1.1	1.8
NL	19.9	23.1	21.8	24.2	23.4	24.0	22.9	22.4	3.2	–1.3	2.5	–1.8
A	17.7	15.3	16.0	17.5	21.4	20.8	21.0	21.4	–2.4	0.7	1.5	3.9
P	6.4	4.6	14.3	23.5	22.1	22.4	21.5	20.7	–1.8	9.7	9.2	–2.7
FIN	14.8	13.2	15.2	28.9	26.0	25.9	25.0	24.7	–1.6	2.0	13.7	–4.3
EU-12	**15.0**	**17.0**	**18.4**	**20.8**	**19.6**	**19.0**	**18.7**	**18.7**	**2.0**	**1.4**	**2.3**	**–2.1**
DK	23.6	20.8	23.0	26.0	26.9	26.8	26.9	27.1	–2.9	2.2	3.0	1.1
S	20.1	18.1	22.7	27.9	25.6	22.4	22.7	23.6	–2.0	4.6	5.3	–4.4
UK	34.3	30.6	33.2	33.4	33.2	30.9	30.6	30.8	–3.7	2.5	0.2	–2.6
EU-15	**18.6**	**19.3**	**20.9**	**23.5**	**22.4**	**21.5**	**21.1**	**21.2**	**0.7**	**1.6**	**2.6**	**–2.3**
US	27.1	23.0	20.6	23.1	21.6	18.5	18.4	18.2	–4.1	–2.4	2.5	–4.9
JP	17.4	27.3	27.4	18.0	16.2	15.6	15.2	15.0	9.9	0.1	–9.4	–3.0

* Projection on the basis of the OECD Revenue Statistics for the year 2002.

Source: AMECO (DG ECFIN Economic Forecasts of Spring 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

Compared with the tax rates on labour, those on capital have remained fairly stable during the last thirty years. In the early 2000's, the fall in personal income taxes, as well as fiscal incentives for risk and venture capital, are inducing generalised cuts in capital taxes. Indeed, as mentioned in European Commission (2000b), a part of such reductions might be due to cyclical factors rather than to discretionary reforms. Anyway, on the basis of *KETR*, it is difficult to conclude that potential capital tax competition is lowering the tax burden on capital income. However, on the same grounds, it also seems evident that labour income, and not capital income, has been bearing the bulk of the additional tax burden generated since 1970. The two panels of Figure 2, which show the long-term developments of the average effective tax rates on labour, capital and consumption in the EU and the US between 1970 and 2003, provide a good illustration of this.

3. The shaping of tax systems: convergence, competition and insurance

It is worth noting that the increase in the effective tax rate on labour does not reflect the need for compensating eventual falls in the corresponding tax base, but rather the need for increasing labour tax revenues in order to finance a growing public sector. This is shown in Table 7, which compares the changes in the average effective tax rates and the changes in the labour tax base over the last thirty years, and in Figure 3, which depicts the developments in total revenues, total expenditures and transfer to households.

The effective labour income tax rate rose by 12 percentage points in the 1970-2000 period, while the average labour income tax base – as a share of GDP – fell by 4.9 per cent. It is interesting to look separately at the sub-periods 1970-1985 and 1986-2000. In the first sub-period, the average effective labour tax rate in the EU rose by 9.6 per cent, while the average labour tax base fell by 0.1 per cent. In the second sub-period, small tax rate increases more or less offset small labour tax base declines.

Higher effective labour taxes in the EU appear to have been driven by increased government revenue needs more than by anything else. Government expenditures grew on average by 9 percent of GDP over the last three decades (see Figure 3). The rise in social transfers accounts for more than half of this increase, with other welfare payments such as for health care and higher interest payments representing other major expense increases. Evidence in Martinez-Mongay and Fernandez (2001) suggests that the increased welfare spending has been the major factor behind the rise in labour taxes.

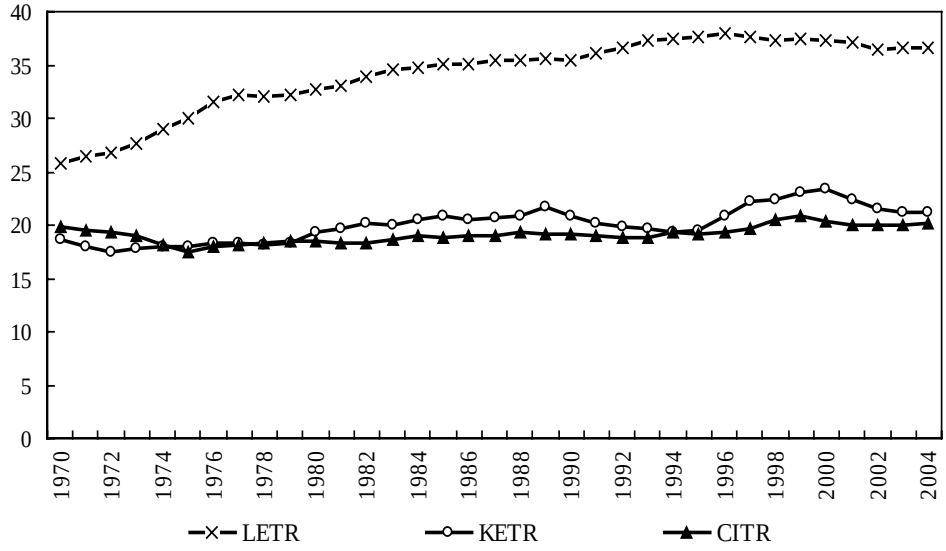
3.1 Tax convergence

Despite a larger tax burden gap between the EU and the US, there is some evidence that effective tax rates have converged somewhat among the EU augmented by the US and Japan. For these 17 countries, the coefficient of variation

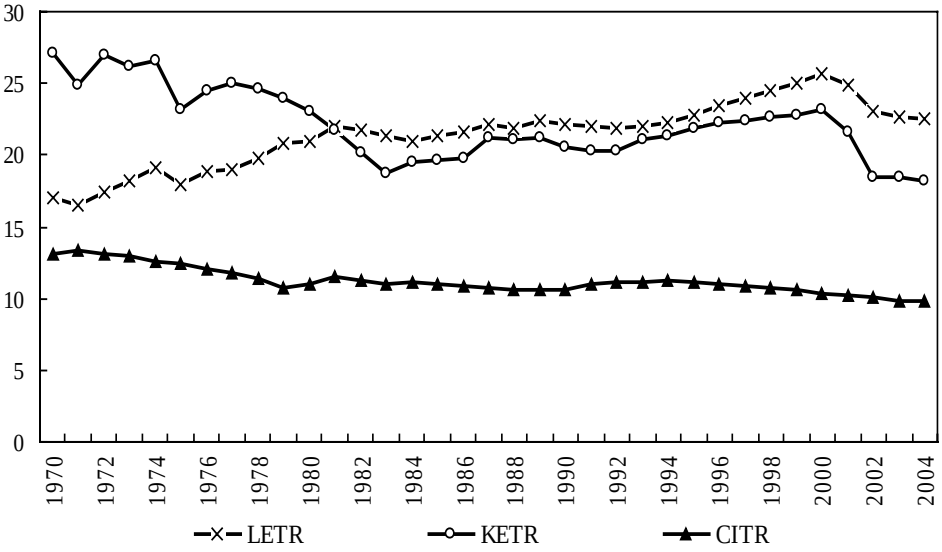
Figure 2

Effective Tax Rates on Labour (LETR), Capital (KETR) and Consumption (CITR) in the EU and the US, 1970-2004
(in percentage points of the corresponding tax bases)

Panel I. EU



Panel II. US



Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

Table 7

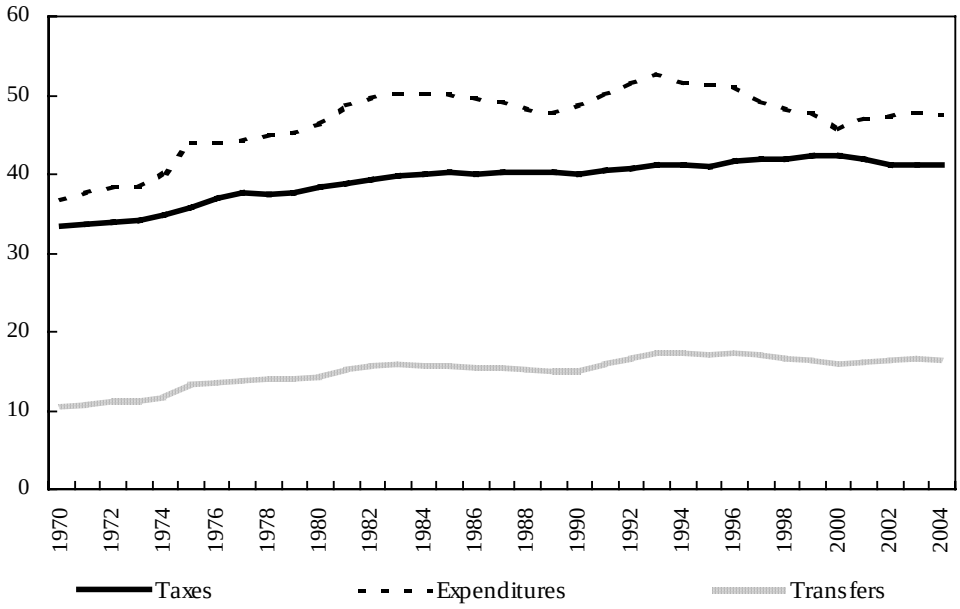
The Effective Labour Tax Rates and Bases over Time, 1970-2000

	Change (in percentage points) of tax rates between			Change (in percentage points) of tax bases between		
	1970 and 2000	1970 and 1985	1986 and 2000	1970 and 2000	1970 and 1985	1986 and 2000
Belgium	15.5	15.6	0.0	1.4	6.0	–4.4
Denmark	11.7	9.5	2.5	–6.8	–3.2	–3.1
Germany	14.6	10.4	4.7	–4.3	–0.6	–3.4
Greece	17.6	7.8	9.3	–9.6	1.0	–6.4
Spain	17.3	14.1	3.6	–6.0	–3.7	–0.5
France	15.0	11.4	3.9	–4.2	2.5	–5.0
Ireland	12.9	15.2	–3.4	–20.1	–4.5	–15.4
Italy	15.9	11.8	3.6	–9.4	1.7	–9.7
Luxembourg	8.5	12.2	–1.9	2.5	8.4	–4.7
Netherlands	7.0	9.8	–2.0	–8.1	–5.5	–3.4
Austria	14.9	10.4	4.6	–4.6	2.6	–7.7
Portugal	16.3	8.7	7.4	–12.1	–0.4	–7.6
Finland	21.3	14.8	5.0	–8.7	2.4	–11.2
Sweden	16.1	9.8	5.6	–2.2	–3.3	1.0
UK	2.7	2.8	–0.3	–1.7	–2.1	0.0
US	8.2	4.3	3.7	–5.2	–3.0	–2.3
Japan	10.5	8.1	2.1	0.2	4.0	–3.2
Euro area	14.3	11.1	3.3	–5.7	0.6	–5.3
EU	12.0	9.6	2.3	–4.9	–0.1	–4.1

Source: Huizinga and Martinez-Mongay (2001).

Figure 3

Total Tax Revenues, Total Public Expenditures and Transfers to Households in the EU, 1970-2004



Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

(the standard deviation divided by the mean expressed in percentage points) of the effective labour tax has declined from 37 to 25 per cent over the last three decades (see Figure 4, Panel A).

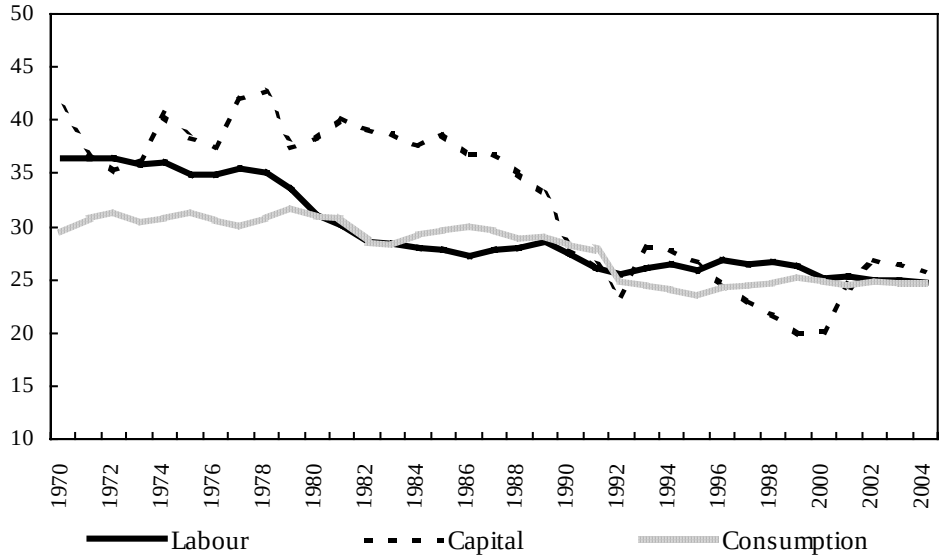
Convergence was particularly noteworthy till 1985 when this coefficient of variation stood at 28-27 per cent. Since then effective labour tax convergence has slowed or even stopped. A similar picture emerges if we look at the time trend of the coefficient of variation of the effective labour tax for the EU only (see Figure 4, Panel B). If anything, the degree of dispersion of the effective labour tax rates is lower in the EU than in samples including other industrial countries, as the coefficient of variation in the EU stands at a relatively low 22 per cent at the end of the sample period. This may reflect, as suggested by Figure 5, that government expenditures in the EU also appear to have lower dispersion than in other countries.

Effective capital income and consumption taxes also appear to have converged, but according to different patterns and speeds. Convergence in consumption taxes appears to be a genuine EU phenomenon. Due to early VAT harmonisation in the EU, there have been no significant changes in the coefficient of variation of the consumption tax rate in the EU since the late Eighties.

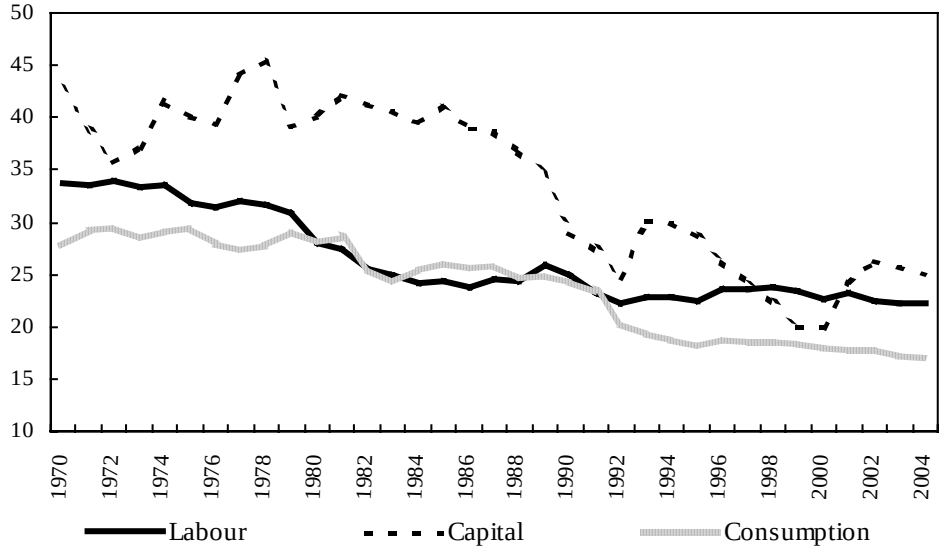
Figure 4

Convergence in Effective Tax Rates Across the OECD, 1970-2004(*)

Panel A. EU Member States, the US and Japan



Panel B. EU Member States

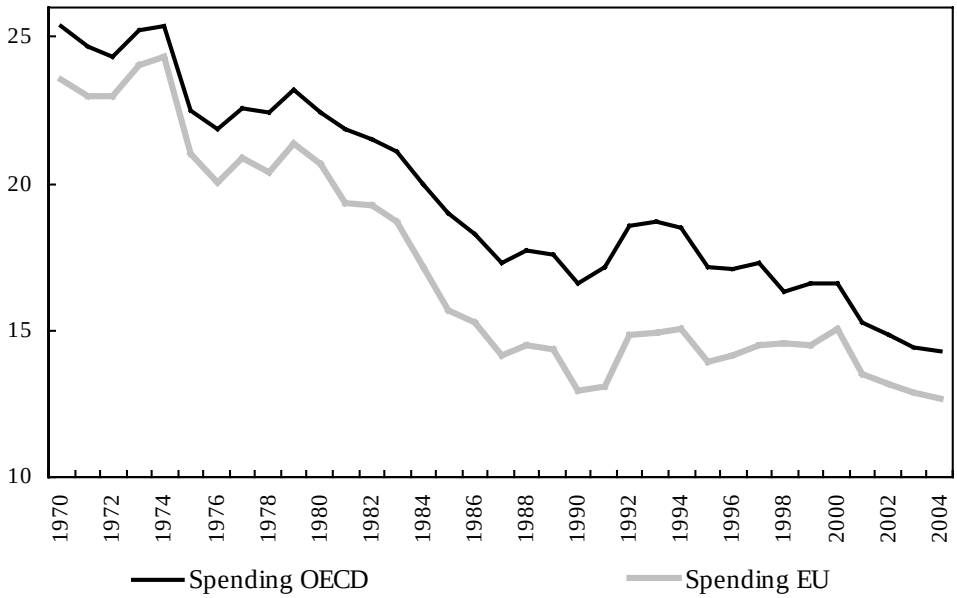


(*) The graphs show the evolution in time of the ratio between the standard deviation and the mean (coefficient of variation) expressed in percentage points.

Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

Figure 5

Convergence in Public Expenditures Across the OECD, 1970-2004(*)



(*) The graph shows the evolution in time of the ratio between the standard deviation and the mean (coefficient of variation) expressed in percentage points.

Source: AMECO (DG ECFIN Economic Forecasts 2003; see European Commission, 2003), OECD (Revenue Statistics) and own calculations.

Convergence of effective capital income taxes, as measured by the coefficient of variation, was somewhat slow and erratic in the early Seventies to accelerate later on. This is the case in the EU and in the larger set of 17 countries. In fact, the time trends of the coefficients of variation for these two groups of countries are very similar, suggesting that convergence in capital rates progressed similarly in the EU and in the larger set of countries including the EU and Japan. Moreover, convergence in capital tax rates has been stronger than in labour or consumption. While the coefficients of variation for labour and consumption tax rates were close to or below 35 per cent in the mid-Seventies, that of capital was higher than 45 per cent (Figure 4, panel A). However, 25 years later, the three coefficients of variation for the whole OECD were quite comparable.

Summing up, convergence in labour taxes has largely taken place in earlier days, and in particular during the first half of the Eighties and, to a lesser extent, during the early Nineties. Interestingly, labour tax rates are somewhat more alike in the EU than in the larger set of countries including the US and Japan. Convergence in consumption taxes is primarily an EU phenomenon as driven by VAT and excise

duties harmonisation in the EU and, to a lesser extent, by the dismantling of tariffs and common trends in environmental taxes. Finally, convergence in capital income taxes, instead, is a more significant phenomenon common to the EU as well as to the US and Japan. It is also worth keeping in mind that, leaving aside apparent cyclical fluctuations, convergence in capital has steadily taken place over the last 25 years, whereas the convergence processes in labour and consumption taxes seem much more irregular. In particular, the latter processes appear to be significant only in the early Eighties and the early Nineties, while in the rest of the period their time-profiles are rather flat.

3.2 Tax competition, tax interdependence and tax coordination

International tax competition – and by extension efforts to undue competition through coordination – are potentially important forces that shape tax burdens and structures. The question is to see the extent to which labour and capital taxation trends correspond to what one expects to result from increased international tax competition.

I will follow (and use results in) Huizinga and Martinez-Mongay (2001) to answer the question by looking at developments of labour taxes compared with that of capital taxes (have labour taxes risen relative to capital taxes?). I will discuss empirical evidence on the statistical relationship between changes in labour taxes and changes in capital taxes. Finally, I will also discuss empirical evidence on the reaction of various domestic tax rates to the corresponding rates and measures abroad.

Models of international tax competition tend to predict that capital income taxes will decline (or even fall to zero in the extreme). Indeed, this prediction has not materialised. In several countries, notably Ireland, the US, Japan and Germany, capital tax rates have fallen since 1970, but in others (Belgium, Greece, Spain, Italy, Luxembourg, Portugal, Finland) they actually have increased very significantly. For the EU as a whole, capital tax rates have in fact increased by almost 4 percentage points over the last three decades.

A second, weaker prediction of tax competition models would be that increases in welfare spending cannot be financed by increased taxes on capital. The evidence in Figures 1 to 3 largely supports this conjecture, as increased social spending was primarily met by increased taxation of labour income. To some extent, this reflects that workers were offered (and accepted) increased income insurance for which they had to pay themselves, but increased capital mobility – in part due to the liberalisation of international capital flows – may well have affected the financing of the expanding welfare state. A way to directly measure the increase, if any, in labour vs. capital taxes is to examine changes in the ratio of the effective labour and capital tax rates. This was done by Huizinga and Martinez-Mongay (2001), the results of which are reproduced in Table 8. It shows that during the last 30 years of the past century, labour tax rates grew at a higher speed than capital tax rates. This was particularly the case in the 1970-85 sub-period, during which welfare states in most

EU member states reached full maturity. In the subsequent 1986-2000 period, the earlier trend was in part reversed. Thus in the more recent period, the effective labour tax rate grew less (declined by more) than the effective capital tax rate.

Additional empirical evidence on co-movements in labour and capital taxes can be obtained by regressions that explain changes in effective labour tax rates on the basis of changes in effective capital income taxes. Regressions of this kind were ran by Huizinga and Martinez-Mongay (2001) and are presented in Table 9 for a number of sub-samples. These sub-samples consider either changes in the medium term (two consecutive five-year periods) or in the very long-run (changes between the late Nineties and the early Seventies. Five-year averages are considered in order to control for cyclical effects. Regression results are reported separately for the sample of EU countries and the larger sample including the US and Japan. In the table, none of the regressions have a significant slope parameter. Huizinga and Martinez-Mongay (2001) reported significant slope regressions for the differences between the period 2002-2000 and the period 1995-1999. Such results have not been included in the table, since new analyses have revealed that the regression results are very sensitive revisions in the late years of AMECO and Revenue Statistics series.

Overall, there thus appears to be little or no evidence at all of significant co-movements between labour and capital tax rates.

To shed additional light on international co-movements in tax rates, it is interesting to consider fiscal reaction functions – explaining changes in a particular tax in a country on the basis of the average change in this tax in other countries. Estimating fiscal reaction functions, Besley, Griffith and Klemm (2001) find evidence to support the idea that countries set their taxes interdependently. Moreover, they appear to do so in ways that are predicted by the theory. Specifically, Besley, Griffith and Klemm (2001) find that tax revenues from mobile tax bases (capital) are more reactive to tax revenues internationally than tax revenues from relatively immobile tax bases (labour and consumption). In addition, tax reactions are larger in countries where tax bases are more mobile.

While Besley, Griffith and Klemm (2001) estimate an annual panel data of tax revenues in percentage of GDP, Huizinga and Martinez-Mongay (2001) controlled for cyclical effects by using five-year averaged data. Moreover, in order to avoid spurious correlation effects, instead of working in levels, they took first differences across subsequent five-year periods. Additionally, since tax revenues are the result of multiplying tax rates and tax bases, they estimated fiscal reaction functions not only for tax revenues, but also for effective tax rates and tax bases. Another difference is that Huizinga and Martinez-Mongay focused on the three categories considered in this paper (labour, capital and consumption), while they also estimated reaction functions for the total tax burden, total expenditures and transfers to households.

Table 10 reproduces such results for the EU sample and the broader sample also including the US and Japan. The results of the tax revenue regression are very similar to those in Besley, Griffith and Klemm (2001). In particular, changes in tax

Table 8

The Relative Tax Burden on Labour over Time, 1970-2000(*)

	Changes between		
	1970 and 2000	1970 and 1985	1986 and 2000
Belgium	–1.9	25.0	–22.1
Denmark	19.9	27.2	8.9
Germany	98.7	55.6	40.2
Greece	–7.7	106.5	–94.6
Spain	–4.5	67.1	–64.2
France	5.8	22.5	–18.0
Ireland	78.8	101.0	–22.3
Italy	–13.2	–8.3	–4.6
Luxembourg	–70.4	–46.2	–30.4
Netherlands	–2.8	51.5	–38.4
Austria	88.4	79.8	2.9
Portugal	–26.6	112.0	–175.2
Finland	5.9	96.4	–96.7
Sweden	11.7	36.9	–6.2
UK	4.7	3.7	–4.2
US	47.7	48.9	–2.2
Japan	75.8	8.4	65.8
Euro area	25.3	35.3	–9.5
EU	21.2	28.1	–11.1

(*) Changes in the ratio between the effective tax rate of labor and that of capital (in percentage points).

Source: Huizinga and Martinez-Mongay (2001).

Table 9

Simple Regressions Between Changes in Labour Tax Rates and Changes in Capital Tax Rates(°)

Regression	Intercept	slope	Adj. R^2	LM Het(1)	T(2)
Within the OECD					
1970-1999(3)	2.19*	0.12	0.01	0.05	85
1990s-1970s(4)	10.3*	0.25	0.06	0.75	17
1974-1979(5)	4.20*	0.22	0.06	0.38	17
1979-1984(6)	3.13*	0.08	–0.0	2.24	17
1984-1989(7)	1.47*	0.30	0.04	0.86	17
1989-1994(8)	1.15*	0.12	–0.0	1.02	17
1994-1999(9)	0.61	0.14	–0.0	0.05	17
Within the EU					
1970-1999(3)	2.28*	0.10	0.00	0.00	75
1990s-1970s(4)	10.9*	0.18	–0.0	0.08	15
1974-1979(5)	4.52*	0.25	0.09	0.73	15
1979-1984(6)	3.21*	0.03	–0.0	1.53	15
1984-1989(7)	1.58*	0.27	–0.0	0.41	15
1989-1994(8)	1.08**	0.15	0.02	0.82	15
1994-1999(9)	0.65	0.11	–0.0	0.39	15

(°) The variables are differences in two consecutive five-year averages over 1970-99 (periods 1970-74, 1975-79, 1980-84, 1985-89, 1990-94, 1995-99). The regressor is changes in the capital effective tax rate.
* significant at 5%, ** significant at 10%.

(1) LM test for hoteroskedasticity. The null is accepted in all the cases.
(2) Sample size.
(3) Full sample.
(4) Differences between year averages for 1994-99 and 1970-74.
(5) Differences between 5-year averages for 1975-79 and 1970-74.
(6) Differences between 5-year averages for 1980-84 and 1975-79.
(7) Differences between 5-year averages for 1985-89 and 1980-84.
(8) Differences between 5-year averages for 1990-94 and 1985-89.
(9) Differences between 5-year averages for 1995-99 and 1990-94.

Source: Huizinga and Martinez-Mongay (2001).

Table 10

Fiscal Reaction Functions, 1970-1999(°)

Fiscal indicator	In the OECD		In the EU	
	Slope	R^2	Slope	R^2
Labour effective tax rate	0.83*	0.19	0.82*	0.21
Labour tax revenues	0.93*	0.40	0.92*	0.42
Labour tax base	0.93*	0.41	0.92*	0.42
Capital effective tax rate	–0.47	–0.0	–0.16	–0.0
Capital tax revenues	0.85*	0.23	0.88*	0.30
Capital tax base	0.17*	0.23	0.83*	0.21
Consumption effective tax rate	0.82*	0.19	0.81*	0.17
Consumption tax revenues	0.64**	0.07	0.61**	0.05
Consumption tax base	0.85*	0.21	0.84*	0.21
Total tax burden	0.76*	0.12	0.76*	0.13
Total expenditures	0.94*	0.47	0.94*	0.50
Transfers to households	0.90*	0.32	0.89*	0.33

(°) Regression results (estimates of the slope and the corresponding R^2) for the fiscal indicator at country level regressed on the arithmetic average for the sample (either the whole sample –1st block or the EU sub-ample –2nd block) excluding the country.
* Significant at 1%.
** Significant at 5%.

Source: Huizinga and Martinez-Mongay (2001).

revenues appear to be associated with similar changes in the "rest of the world". In addition, the estimated coefficients for the capital tax revenues are larger than for much less mobile tax categories such as consumption. Similar results are obtained with the EU sample and the larger sample of 17 countries.

Such co-movements are the results of co-movements in the tax bases and they are associated to co-movements in tax burdens, public expenditures and social transfers. Regressions of this kind fail to establish clear causality, and may suffer from simultaneity bias. Co-movements in tax revenues and tax rates may very well stem from common structural developments that force countries to become more similar in many areas including taxation. This would be consistent with the last two rows in Table 10 which show that total expenditures and transfers to households display international co-movements as well. Martinez-Mongay (2002) showed that these latter two fiscal variables seem to be driven by factors such as income, demography, trade, openness, and politics and by fiscal policy rules and other institutional factors. Commonality in fiscal variables such as these may be driven by common structural trends as well as by tax competition.

Interestingly, co-movements in capital tax rates are statistically insignificant. This is not surprising because, as shown in Figure 4, capital effective tax rates have converged towards an almost time-constant average, which actually implies very different across-country relationships between changes in countries' tax rates and changes in the rest-of-the-world's averages. Since the sample-average is only slightly increasing over time (see Figure 2), convergence implies that tax rates increase in some countries, decrease in others and remain constant in the rest. Therefore, small positive changes in the rest of the world would be associated to a wide range of changes at the country level, which would result in a very low correlation between changes in individual countries' tax rates and changes in the average tax rates for the rest of the world.

4. Conclusion

In the EU, effective labour tax rates have increased over the last three decades in absolute terms as well as relative to effective capital tax rates. Effective tax rates on labour and capital, and to some extent consumption, appear to have converged over this period. Little evidence exists that changes in effective labour tax rates are related to changes in effective capital tax rates, but there is some evidence of significant co-movements of effective tax rates (specifically labour and consumption tax rates) and of tax revenues across countries. All in all, the increased importance of labour taxes, and international co-movements of tax rates and tax revenues, can be explained by the existence of international tax competition, but they can equally result from common structural changes that underlie taxation choices.

APPENDIX

STATISTICAL SOURCES

Series from OECD (Revenue Statistics)[14]

PROP Taxes on property. National currency, current prices. OECD Classification: item 4000.

TRCI Corporate tax revenues from income, profits and capital gains. National currency, current prices. OECD Classification: item 1200.

TRII Tax revenues from income, profits and capital gains of individuals. National currency, current prices. OECD Classification: item 1100.

Input series from AMECO (DG ECFIN, European Commission)[15]

CEGG Compensation of employees; general government. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UWCG-ESA95/1 0 310 0 UWCGF-Old definition.

COEL Compensation of employees; total economy. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UWCD.

DTRV Taxes on income and wealth (Direct taxes); general government. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UTYG-ESA95/1 0 310 0 UTYGF-Old definition.

EMPL Employees, persons; total economy (National accounts). 1000 persons. AMECO Code: 1 0 0 0 NWTD.

GDPN Nominal Gross Domestic Product at market prices. Common currency, Mrd. current euro. AMECO Code: 1 0 92 0 UVGD. These series are used to obtain the weights to calculate the effective tax rates for the euro area (EU-12) and the EU (EU-15) as weighted averages of the tax rates of the corresponding Member States.

GFC Final consumption expenditure of general government at current prices. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UCTG.

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[14] In alphabetical order.

[15] In alphabetical order.

GOS Gross operating surplus; total economy. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UOGD.

INRV Taxes linked to imports and production (Indirect taxes); general government. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UTVG-ESA95/1 0 310 0 UTVGF-Old definition.

NOS Net operating surplus. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UOND.

NWRV Social contributions received; general government. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UTSG-ESA95/1 0 310 0 UTSGF-Old definition.

OCCP Employment, persons; total economy (National accounts). 1000 persons. AMECO Code: 1 0 0 0 NETD.

PFC Private final consumption expenditure at current prices. Percent of GDP (gross domestic product at market prices). AMECO Code: 1 0 310 0 UCPH.

REFERENCES

Besley T., R. Griffith and A. Klemm (2001), *Fiscal reaction functions*, mimeo, London School of Economics.

Carey, D. and H. Tchilinguirian (2000), *Average effective tax rates on capital, labour and consumption*, Paris, OECD.

Carey, D. and J. Rabesona (2002), "Average effective tax rates on capital, labour and consumption", paper presented at the CESifo Summer Institute Workshop on "Measuring the Tax Burden on Capital and Labour", Venice, 15-16 July.

De Haan, J., J.E. Sturm and B. Volkerink (2002), "How to measure the tax burden on labour?", paper presented at the CESifo Summer Institute, workshop on "Measuring the Tax Burden on Capital and Labour", Venice, 15-16 July.

European Commission (1997), *Structures of the Taxation Systems in the European Union. New version 1970-95*, Brussels.

——————— (1999), *Structures of the Taxation Systems in the European Union. 1970-96*, Luxembourg, EUROSTAT.

——————— (2000a), *Structures of the taxation systems in the European Union, 1970-97*, Luxembourg, EUROSTAT.

——————— (2000b), *Public finances in EMU – 2000*, European Economy Reports and Studies, No. 3.

——————— (2003), *Economic Forecasts, Spring 2003*, European Economy, No. 2.

Gordon, K. and H. Tchilinguirian (1998), "Effective average tax rates on capital, labour and consumption goods: Cross country estimates", OECD document DAFFE/CFA/WP2/RD(98)14, Paris, OECD.

Huizinga, H. and C. Martinez-Mongay (2001), "Labour taxation in the European Union", paper presented at the conference on "Tax Policy in the European Union" organised by the OCFEB of Erasmus University in The Hague, 17-19 October.

Layard, R., S. Nickell and R. Jackman (eds.) (1991), *Unemployment. Macroeconomic Performance and the Labour Market*, New York, OUP.

Martinez-Mongay, C. (1998), "On effective taxation", OECD document DAFFE/CFA/WP2/RD(98)17, Paris, OECD.

——————— (2000), "ECFIN's effective tax rates. Properties and comparisons with other tax indicators", Economic Paper No. 146, (October), Brussels, European Commission.

——————— (2001), "The long-run determinants of government receipts", in *Fiscal Sustainability*, (chapter 12), Roma, Banca d'Italia.

——————— (2002), "Fiscal policy and the size of governments", forthcoming in M. Buti, J. von Hagen and C. Martinez-Mongay (eds.), *The behavior of fiscal authorities. Stabilization, growth and institutions*, London, Palgrave.

Martinez-Mongay, C. and R. Fernandez (2001), "Effective taxation, spending and employment performance", in M. Buti, P. Sestito and H. Wijkander (eds.), *Taxation, Welfare and the Crisis of Unemployment in Europe*, Cheltenham (UK), Edward Elgar.

Mendoza, E.G., A. Razin and L. Tesar (1994), "Effective tax rates in macroeconomics. Cross-country estimates of tax rates on factor incomes and consumption", *Journal of Monetary Economics*, 34, pp. 297-33.

OECD (2002), *Revenue Statistics*, Paris, OECD.

Rodrick, D. (1998), "Why do open economies have bigger governments?", *Journal of Political Economy*, No. 106, pp. 997-1032.