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Measuring Tax Burdens in Europe

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This article calculates effective macroeconomic tax rates for the 25 EU countries following the methodology developed in MENDOZA, RAZIN, and TESAR (1994). The available Eurostat data allow to compute the tax wedge on consumption, labor and capital. We show that effective tax rates in the 10 new member states of the EU are on average 10 percentage points lower on labor, and 5 percentage points lower on capital and consumption. There is no tendency of convergence in effective tax burdens on capital. The newly computed tax rates are in line with the effective tax rates of the EU Commission for EU 15. Effective tax rates on capital are only weakly connected to statutory tax rates on corporate income. As they are calculated from macroeconomic data they provide only limited information on the actual tax burdens of individual corporations or households.

Keywords: Effecitve Tax Rates, Europe
JEL-Codes: H20, E62, H24, H25

1 Introduction

The appropriate measurement of tax burdens has recently attracted considerable attention of policy makers and academics alike. Different measures exist. The most prominent are (i) tax rates, (ii) tax to GDP ratios, (iii) implicit/effective tax rates on consumption, labor and capital according to MENDOZA et al. (1994), and (iv) effective ex-ante tax rates according to DEVEREUX and GRIFFITH (2003).

Especially in the area of corporate taxation, the debate is vigorous. High tax rates are claimed to be a sign of high tax burdens, while others argue that the relevant measure is the effective tax rate on capital, while again others argue that the effective (forward-looking) average tax rates are relevant for investment decisions. According to the first and last measure, Germany is a high tax country, while the second measure shows that Germany is European average. After EU enlargement, the debate has gained additional momentum, as the 10 new member states have considerably lower tax rates. However, only few studies compare the different measures of tax burden in the enlarged EU. This is mostly due to the fact that comprehensive data for the 25 EU countries are missing.

* The opinions expressed in this article are the author's personal.

The first two measures (tax rates and tax to GDP ratios) are widely used in cross country empirical research, e.g., EASTERLY and REBELO (1993) and KNELLER et al. (1999). The main advantage of these measures is that they are readily available and easy to compute. Tax rates, however, give no information on tax exemptions and therefore only partially reflect distortions in decision making. Empirical studies nevertheless find, that they influence investment decisions (BUETTNER and RUF 2004). Tax to GDP ratios are difficult to interpret, as taxes are not levied on GDP and therefore the logical connection of the tax and the tax base, reflecting economic decision making, is absent. This measure nevertheless approximates the overall tax burden in the economy.

The basic idea of the approach by MENDOZA et al. (1994) is to relate pre- and post-tax prices of goods and thereby to measure the distortion for economic decision making. Since pre-tax prices are not observable, the tax wedge has to be approximated by using spending data (i.e. prices times quantities p^*q). In this approach, the tax payment is set in relation to the gross expenditure less the tax payment. For example, the tax wedge on tobacco products would be measured as aggregate tax revenue from tobacco taxes in relation to aggregate spending on tobacco products less the tax revenue.

DEVEREUX and GRIFFITH (2003) further extend the concept of effective average tax rates for discrete, forward-looking, and mutually exclusive location choices of multinationals. These choices are shown to depend on effective average tax rates, which can be measured as a weighted average of the effective marginal tax rate and an adjusted statutory tax rate. The main advantage of this measure is that it precisely captures the distortion of the location decision resulting from taxes. It is forward looking by comparing the post- and pre-tax present value of an investment product. The computation of this measure is rather complex. Besides detailed information on tax rates levied on different investment assets and sources of finance, further information on tax exemption in the home and host country have to be gathered. In addition, one has to make an estimate of future changes of tax systems. This represents the main strength and at the same time the main weakness of the measure. It includes a lot of information, which makes it difficult to compute. In fact, this measure is not publicly available for all EU 25 countries.[1]

1 JACOBS et al. (2004) present some of these data for the 10 new member states and Germany. DEVEREUX et al. (2002) present data for most of the EU 15 countries. The definitions of the two measures differ however, so that they are not comparable.

The present article contributes to the literature by computing effective tax rates on capital, labor and consumption for the EU 25 countries following the methodology of MENDOZA et al. (1994). These measures have not been calculated previously for the 25 EU countries based on one consistent data set.[2] We then compare the newly calculated measure with the commissions' effective tax rates for the jointly available 15 EU countries and show that the measures are similar. The new measure is also compared to other measures of tax burden.

The remainder of the article is structured as follows: The next section discusses the concept of effective tax rates. Section 3 discusses the computation of effective tax rates with Eurostat data and presents the tax rates and some summary information. Section 4 compares the newly computed data to other available tax measures. The last section concludes.

2 Effective Tax Rates in Macroeconomics

The measurement of tax burdens at the macroeconomic level faces several problems. The complexity and variety of tax deductions and exemptions make it difficult to conclude from tax rates to actual tax burdens. Most aggregate revenue data do not themselves correspond to the theoretical concepts of tax burdens on consumption, labor and capital. Different taxes refer to the same tax base, e.g., social security payments and income taxes affect labor income. Finally, tax payments can be shifted inter-temporally, possibly distorting the actual tax burden.

In a seminal paper, MENDOZA et al. (1994) develop a method to compute effective ex-post macroeconomic tax rates with national account data. Their method yields estimates of effective tax rates on factor incomes and consumption consistent with the tax distortions faced by a representative agent. The method has subsequently been applied in several publications, e.g., MENDOZA et al. (1997) and MENDOZA and TESAR (2005).

In particular, MENDOZA et al. (1994) (MRT) assume that the economy consists of three goods, labor, capital and a consumption good, for which pre- and post-tax prices exist. The *ad valorem* tax rate is the difference in the post- and pre-tax price of the good, normalized by the pre-tax price of the good.

2 EUROPEAN COMMISSION – DG Taxation and Custom's Union (2004) present effective tax rates for the old EU countries based on a slightly different definition, however not for the 10 new member states.

$$(1)\quad \tau_i = \frac{p_i - q_i}{q_i}$$

Since data on these prices are not directly available, the *ad valorem* tax rate can be approximated by the product of prices and quantities, using revenue statistics and data on the tax bases:

$$(2)\quad \tau_i = \frac{p_i x_i - q_i x_i}{q_i x_i}$$

The tax wedge on consumption can be calculated as:

$$(3)\quad \tau_c = \frac{T_c}{C + G - GW - T_c}$$

where Tc is the payment of taxes on goods and services and excise taxes, as given by national revenue statistics. $C+G$ is private and government final consumption expenditure, GW is the compensation of government employees.[3] MENDOZA et al. (1994) provide the corresponding keys to the variables in the OECD statistics.

The tax wedge on labor income is calculated with one intermediate step. It is assumed that all household income is taxed with the same rate. This household's average tax rate is computed as:

$$(4)\quad \tau_h = \frac{T_h}{W + OSP}$$

where T_h is the tax payment by households on income, profits, and capital gains, W are wages and salaries, OSP are operating surpluses of private unincorporated enterprises and entrepreneurial income. This average tax rate of households is used in the computation of the effective labor tax rate:

$$(5)\quad \tau_l = \frac{T_h W + SSC^l + T_{pw}}{W + SSC^e}$$

where SSC^l are total social security contributions, SSC^e are employer's contribution to social security and T_{pw} are taxes on payroll and workforce.

The tax wedge on capital income is defined by:

$$(6)\quad \tau_k = \frac{\tau_h OSP + T^{corp} + T_{improp}}{OS}$$

3 GW needs to be deducted, as the government sector only pays indirect taxes on the purchase of goods and nonfactor services.

where T^{corp} are taxes on income, profits, and capital gains of corporations, T^{improp} are taxes on immovable property and taxes on financial and capital transactions.

MENDOZA et al. (1994) employ OECD data and codes to compute these tax wedges. Since the OECD does not provide data for all EU countries, in the next section we approximate the OECD data with data provided by Eurostat.

3 Effective Tax Rates in the EU 25

3.1 Calculation of effective tax rates

To compute the effective average tax rate on consumption, we divide value added type taxes by private and government final consumption expenditure corrected for the payment of value added type taxes. More precisely, the effective tax rate on consumption is calculated as:[4]

$$(7)\quad \tau_c = \frac{D211 + D212 + D214 + D29}{P31\_S14 + P3\_S13 - D1\_S13 - (D211 + D212 + D214 + D29)}$$

The thus calculated effective tax rates on consumption are given in the following Table (1).

4 The codes for the variables are detailed in Table 6 in the appendix.

Table 1 Implicit tax rate on consumption, according to Equation 7

	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1990													
1991	0.32	0.22			0.20					0.29			
1992	0.32	0.23			0.20					0.28			
1993	0.32	0.24			0.21					0.29			
1994	0.32	0.25			0.22					0.30			
1995	0.28	0.24		0.24	0.21	0.42*	0.25	0.18	0.31	0.31	0.21	0.38	0.31
1996	0.29	0.25		0.23	0.21	0.43*	0.24	0.18	0.31	0.32	0.22	0.38	0.32
1997	0.30	0.26		0.21	0.21	0.44*	0.27	0.19	0.34	0.33	0.23	0.35	0.33
1998	0.31	0.26	0.20	0.21	0.21	0.47*	0.23	0.21	0.34	0.33	0.24	0.35	0.33
1999	0.31	0.27	0.20	0.22	0.22	0.47*	0.23	0.22	0.34	0.33	0.26	0.36	0.34
2000	0.30	0.26	0.23	0.21	0.22	0.46*	0.25	0.22	0.33	0.32	0.26	0.37	0.35
2001	0.29	0.25	0.24	0.20	0.21	0.47*	0.25	0.21	0.32	0.31	0.25	0.34	0.31
2002	0.31	0.26	0.25	0.20	0.21	0.47*	0.25	0.22	0.33	0.31	0.25	0.32	0.33
2003	0.31	0.25	0.33	0.21	0.21	0.46*	0.26	0.23	0.32	0.30	0.25	0.35	0.34
2004													

	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
1990														
1991	0.21		0.25											0.23
1992	0.20		0.28											0.22
1993	0.22		0.31								0.38		0.25	0.22
1994	0.22		0.32								0.37		0.35	0.23
1995	0.23	0.19	0.29	0.22		0.21	0.43	0.31	0.26		0.37		0.33	0.23
1996	0.22	0.18	0.29	0.19		0.22	0.44	0.30	0.26		0.38		0.31	0.22
1997	0.24	0.25	0.32	0.20		0.23	0.45	0.29	0.26		0.39		0.28	0.23
1998	0.30	0.24	0.33	0.22		0.23	0.43	0.28	0.28		0.41		0.25	0.23
1999	0.29	0.23	0.38	0.21		0.24	0.43	0.29	0.29		0.45	0.30	0.24	0.23
2000	0.28	0.20	0.44	0.19	0.23	0.24	0.42	0.27	0.28		0.39	0.35	0.24	0.23
2001	0.27	0.20	0.38	0.18	0.25	0.26	0.40	0.26	0.28	0.18	0.39	0.34	0.21	0.22
2002	0.28	0.21	0.36	0.17	0.27	0.25	0.37	0.26	0.30	0.19	0.41	0.37	0.22	0.22
2003	0.27	0.20	0.38	0.18	0.27		0.35	0.28	0.31		0.42	0.38	0.21	0.22

Source: Author's calculation, Eurostat data, * indicates that data are taken from Equation (12).

It can be debated whether "other taxes on production (d29)" should be included in the calculation of this effective tax rate. We include these taxes, since they contribute to the price wedge between producer and consumer prices. Alternatively, some of these taxes could be classified as lump-sum taxes on capital. However, since we aim to calculate the tax wedge on capital income, we add d29 to the indirect taxes.[5]

To compute the effective tax rates on capital and labor income, we first have to compute an intermediate tax rate: the household's average tax rate.

$$(8)\quad \tau_h = \frac{D51A + D51C1}{PITB}$$

5 Omitting d29 altogether gives significantly lower effective tax rates. The country ordering changes only little with a Spearman rank correlation coefficient of around 0.9 in most years.

where the personal income tax base *PITB* (pre-tax household income) is calculated as the total compensation of employees and the net operating surplus in the economy less actual social security contributions and taxes on income, profits, and capital gains of corporations.

(9) $PITB = D1 + B2n - D611 - D51B - D51C2 - D29$

The resulting tax rate is given in Table (2).

Table 2 Household's average tax rate, according to Equation 8

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1990													
1991													
1992													
1993	0.18	0.24			0.18*					0.13*			
1994	0.16	0.24			0.18*					0.14*			
1995	0.17	0.25		0.09	0.18*	0.44*	0.16	0.12	0.27	0.11	0.06		0.15
1996	0.18	0.25		0.09	0.19*	0.44*	0.14	0.13	0.29	0.12	0.06		0.15
1997	0.20	0.25		0.09	0.18*	0.44*	0.14	0.12	0.27	0.13	0.07		0.15
1998	0.20	0.26	0.06	0.09	0.19*	0.43*	0.14	0.12	0.26	0.17	0.09		0.13
1999	0.20	0.25	0.07	0.08	0.19*	0.45*	0.14	0.11	0.26	0.17	0.09		0.13
2000	0.19	0.25	0.06	0.09	0.20*	0.41	0.12	0.12	0.28	0.18	0.09		0.12
2001	0.20	0.26	0.07	0.09	0.19*	0.42	0.12	0.12	0.27	0.17	0.08		0.12
2002	0.20	0.26	0.07	0.09	0.18*	0.41	0.11	0.12	0.26	0.16	0.08		0.10
2003	0.19	0.25		0.09	0.18*	0.41	0.12	0.12	0.25		0.08		0.10
2004													

year	IT	LT	LU	LV	MT	NL	NO	PL	PT	SE	SI	SK	UK
1990													
1991													
1992													
1993	0.22*									0.30	0.15	0.06*	0.19*
1994	0.20*									0.30	0.13	0.06	0.19*
1995	0.19*	0.13		0.12		0.14	0.20		0.11	0.29	0.12	0.07	0.17
1996	0.20*	0.13		0.10		0.14	0.19		0.12	0.33	0.12	0.08	0.15
1997	0.21*	0.10		0.11		0.12	0.20		0.11	0.34	0.12	0.09	0.15
1998	0.22*	0.15		0.12		0.12	0.21		0.11	0.35	0.12	0.09	0.16
1999	0.22	0.17		0.11		0.12	0.21			0.37	0.12	0.09	0.17
2000	0.21	0.16		0.10		0.12	0.18			0.36	0.12	0.07	0.18
2001	0.21	0.14		0.10		0.12	0.18			0.33	0.12	0.08	0.18
2002	0.20	0.13		0.10		0.13	0.19			0.31	0.12	0.07	0.17
2003	0.20	0.13		0.10			0.19			0.32	0.12	0.07	0.16
2004													

Source: Author's calculation, Eurostat data, * indicates that rates are computed from Equation (14).

The effective average tax rate on labor income can then be calculated as:

$$(10)\ \tau_l = \frac{\tau_h D11 + D611 + D29C}{D11 + D6111}$$

The labor income tax rate is the ratio of the average tax rate applied to wages and salaries plus the actual social contributions divided by the tax base, which are the wages and salaries plus the employers' social contribution. In this definition, we also include taxes on the total wage bill and payroll taxes.[6]

Table 3 Implicit tax rate on labor, according to Equation 10

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1990													
1991													
1992													
1993	0.48	0.65			0.48*					0.48*			
1994	0.48	0.64			0.49*					0.49*			
1995	0.49	0.65		0.40	0.49*	0.46*	0.36*	0.35	0.51	0.49	0.40		
1996	0.51	0.64		0.39	0.51*	0.47*	0.35*	0.36	0.52	0.50	0.41		
1997	0.53	0.65		0.39	0.52*	0.46*	0.35*	0.35	0.49	0.50	0.42		
1998	0.53	0.66	0.24	0.39	0.52*	0.46*	0.35*	0.35	0.48	0.49	0.44		
1999	0.52	0.65		0.39	0.52*	0.49*	0.35*	0.35	0.48	0.49	0.44		
2000	0.51	0.65		0.40	0.52*	0.46	0.34*	0.35	0.49	0.49	0.45		
2001	0.53	0.66		0.40	0.50*	0.48	0.33*	0.36	0.48	0.48	0.45		
2002	0.53	0.66		0.41	0.50*	0.45	0.34*	0.36	0.47	0.48	0.46		
2003	0.52			0.41	0.50*	0.45	0.35*		0.45		0.48		
2004													

year	IT	LT	LU	LV	MT	NL	NO	PL	PT	SE	SI	SK	UK
1990													
1991													
1992													
1993	0.50*									0.48		0.33*	0.30*
1994	0.48*									0.49		0.34*	0.31*
1995	0.49*	0.29*		0.36*		0.49	0.39		0.34	0.52		0.41*	0.29
1996	0.52*	0.30*		0.34*		0.47	0.39		0.34	0.56		0.42*	0.28
1997	0.53*	0.30*		0.33*		0.46	0.39		0.35	0.58		0.40*	0.27
1998	0.50*	0.34*		0.35*		0.44	0.40		0.35	0.61		0.42*	0.29
1999	0.49	0.35*		0.35*		0.46	0.40			0.64		0.41*	0.29
2000	0.49	0.36*		0.33*		0.46	0.38			0.61	0.42	0.39*	0.30
2001	0.48	0.35*		0.31*		0.42	0.38			0.59	0.43	0.40*	0.30
2002	0.48	0.33				0.42	0.39			0.57	0.43		0.28
2003	0.48	0.32								0.58			0.29
2004													

Source: Author's calculation, Eurostat data, * indicates that rates are computed from Equation (15).

Finally, the effective capital income tax can be computed from

$$(11)\ \tau_k = \frac{\tau_h(B2n - D611 - D51B - D51C2 - D29) + D51B + D51C + D6113}{B2n}$$

This equation directly follows MRT in assuming that the whole income of self employed is capital income. Therefore, we also added the social contributions of self employed (D6113) in the denominator. Also, this definition

6 This last category could be omitted, since these taxes are not directly linked to the individual labor tax wedge. This does not change the results significantly.

takes as a basis the net operating surplus, since consumption of fixed capital is not taxed *B2n=B2g+B3G-K1*. The results for this measure are presented in Table (4).

Table 4 Implicit tax rate on capital income, according to Equation 11

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1990													
1991													
1992													
1993	0.15	0.18			0.21*					0.13*			
1994	0.14	0.19			0.20*					0.14*			
1995	0.15	0.20		0.21*	0.20*			0.19	0.24*	0.13	0.13		0.20
1996	0.17	0.21		0.17*	0.23*			0.19	0.25*	0.14	0.12		0.21
1997	0.18	0.22		0.19*	0.22*			0.21	0.28*	0.15	0.13		0.21
1998	0.19	0.24	0.13	0.17*	0.22*			0.21	0.30*	0.14	0.16		0.20
1999	0.18	0.23		0.19*	0.23*			0.22	0.30*	0.16	0.18		0.21
2000	0.19	0.23		0.18*	0.23*			0.23	0.35*	0.17	0.20		0.20
2001	0.23	0.23		0.20*	0.19*		0.09*	0.22	0.30*	0.18	0.17		0.19
2002	0.20	0.22		0.21*	0.19*		0.11*	0.24*	0.29*	0.16	0.17		0.18
2003	0.20	0.22*		0.23*	0.20*		0.12*		0.26*		0.16		0.19
2004													

year	IT	LT	LU	LV	MT	NL	NO	PT	SE	SI	SK	UK
1990												
1991												
1992												
1993	0.26*								0.16	-0.05	0.24*	0.20*
1994	0.25*								0.19	0.02	0.16	0.21*
1995	0.20*	0.13		0.12		0.31		0.18	0.19	0.04	0.24	0.22
1996	0.21*	0.13		0.13		0.34		0.20	0.15	0.08	0.20	0.23
1997	0.21*	0.12		0.14		0.35		0.21	0.15	0.11	0.20	0.25
1998	0.20*	0.14		0.16		0.33		0.21	0.11	0.12	0.19	0.26
1999	0.22	0.12		0.14		0.36			0.11	0.12	0.17	0.26
2000	0.21	0.11		0.12		0.35			0.13	0.12	0.17	0.26
2001	0.23	0.11		0.12		0.35			0.04	0.14	0.14	0.26
2002	0.21	0.11		0.12		0.33			0.02	0.15	0.15	0.23
2003	0.20	0.13		0.11			0.46		0.02	0.18	0.16	0.22
2004												

Source: Author's calculation, Eurostat data, * indicates that rates are computed from Equation (17).

3.2 Discussion of the effective tax rates

The general pattern of taxation is broadly consistent with the literature. The effective tax burden on all three goods, consumption, labor and capital is higher in the EU 15 than the 10 NMS. In particular, the tax wedge on labor differs by 10 percentage points, while for consumption and capital the difference is roughly 5 percentage points.

Table 5 Comparing the tax burdon on consumption, labor and capital in the EU15 and 10 NMS

		10 NMS		EU15	
	tax on...	Obs	Mean	Obs	Mean
1998	consumption	8	0.248	15	0.298
	labor	6	0.348	13	0.469
	capital	6	0.151	13	0.214
2000	consumption	10	0.255	15	0.306
	labor	6	0.374	12	0.481
	capital	5	0.138	12	0.230
2002	consumption	10	0.252	15	0.300
	labor	4	0.375	12	0.472
	capital	6	0.143	12	0.204

Source: Author's calculations based on Eurostat data.

The average effective tax burdens do not change much in the period 1998 to 2002. We observe a slight increase in the effective tax on capital from 1998 to 2000 which decreases again in 2002 in the old EU countries. Taxes on capital slightly decrease in the 10 NMS.

The cross country standard deviation of effective tax burdens on capital has slightly increased from 6.6 to 7.1, while the standard deviation of top statutory tax rates taken from European Commission (2004) has fallen from 8.4 to 6.6 together with a reduction in the mean of the top corporate tax rate. We take this as evidence, that tax competition has exercised a downward pressure on tax rate on corporate income together with a harmonization of rates. For the effective tax burden, this effect is not visible. This implies that the tax bases have probably widened.

4 Comparing Different Tax Measures

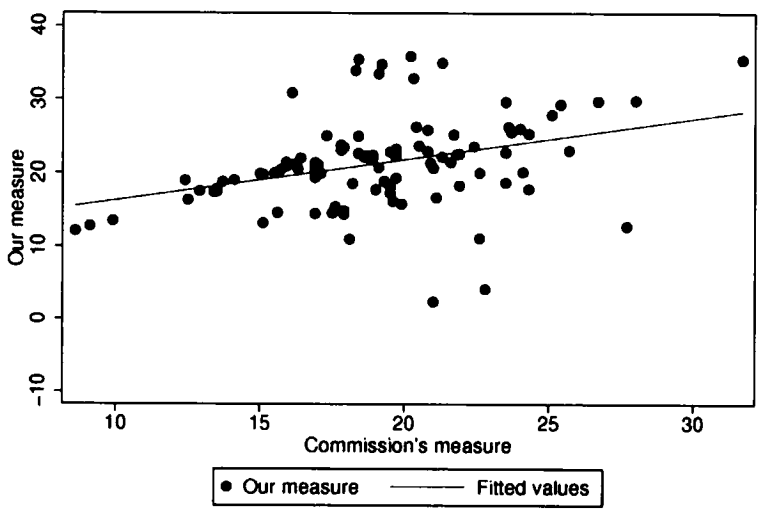
In this section, we compare our newly computed effective measures on capital, labor and consumption with different measures available in the literature. In a first step, we take other effective tax measures. We then compare our measure of the capital income tax wedge with the corporate tax rates.

4.1 The effective tax measures by the EU commission and our measure

To assess the general validity of the MRT approach in the calculation of the effective average tax rate, we compare our results with the effective average tax rate of the EU commission for those countries, for which both data are available. The effective tax rate on capital income computed with the MRT approach is highly correlated with the effective tax rates computed by the European Commission (European Commission 2004). We compute a country correlation coefficient above *0.7* for all EU 15 countries except BE, IE, NL, SE; for many countries the correlation is above *0.98*. This results directly from the fact that similar definitions are used in the computation of this measure.[7]

Figure (1) plots the Commission's and our estimate of the tax wedge on capital income. While a positive linear relationship between the two measures can be observed, there is some variation between the two measures due to differences in definition.

Figure 1 Effective tax on capital

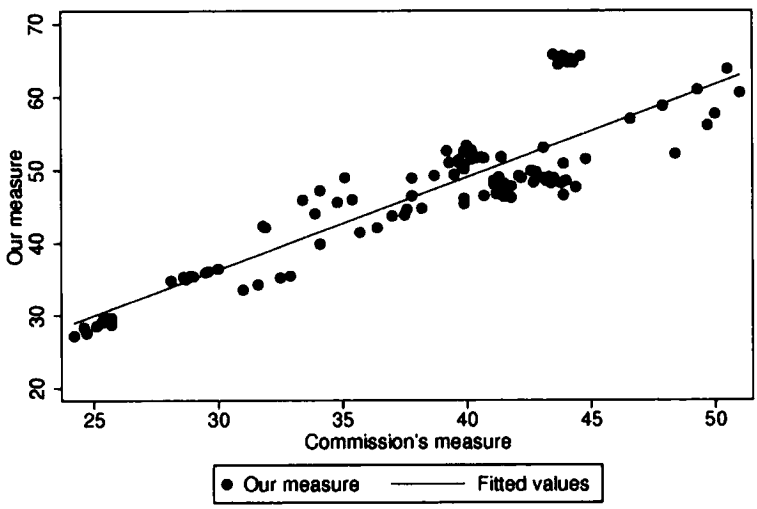


Note: Comparison of the effective tax rate on capital as computed by the EU Commission with our measure according to MRT for the EU 15 countries.

7 We define the denominator differently from the Commission and in line with MRT. The nominator is quite close to the Commission's definition.

Concerning the effective tax on labor, the commission's measure and our measure closely co-move, as can be seen in Figure (2). A linear regression of our measure on the official measure yields an R^2=*0.69* and a coefficient of *1* for the fixed effects regression. The two slightly different ways of computing effective average tax rates are thus very similar. We are therefore confident, that our measure for the enlarged EU is a reasonable measure of effective average tax rates.

Figure 2 Effective tax on labor

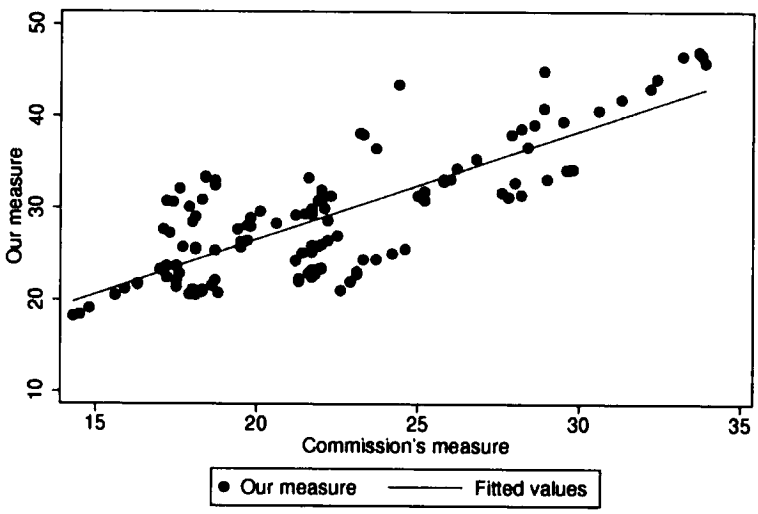


Note: Comparison of the effective tax rate on labor as computed by the Commission with our measure according to MRT for the EU 15 countries.

Similarly, the comparison of our measure and the Commission's measure of the effective tax on consumption reveals a high similarity (Figure 3). The R^2=*0.64* is also high.

Overall, our measures are thus comparable to the effective tax burden computed by the European Commission.

Figure 3 Implicit tax on consumption

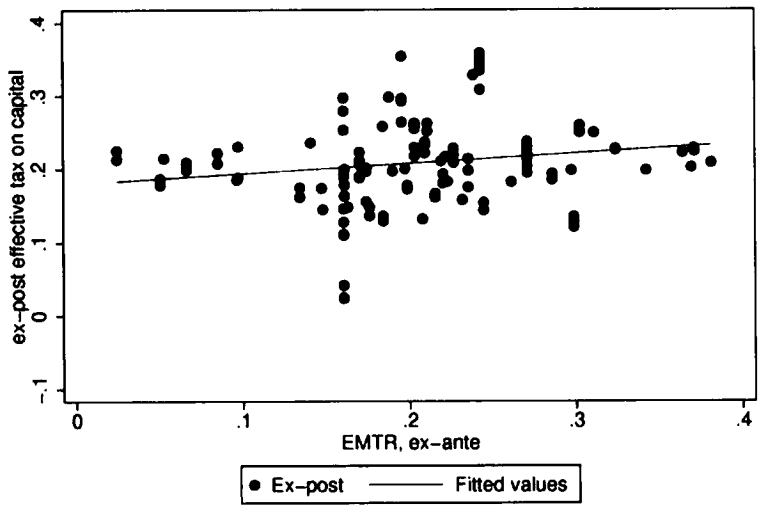


Note: Comparison of the effective tax rate on consumption as computed by the Commission with our measure according to MRT for the EU 15 countries.

4.2 Effective tax wedge on capital income and the effective ex-ante measures by Devereux et al.

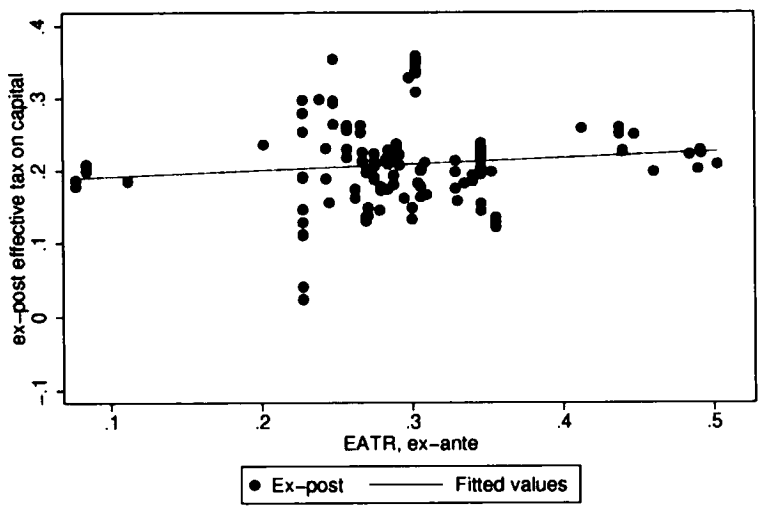
Comparing our ex-post effective average measure of the tax wedge on capital with the effective marginal tax rate as computed by DEVEREUX et al. (2002) gives the Figure (4). The relationship between the effective average ex-ante tax rate and our measure is given in Figure (5). For both measures, the effective marginal and the effective average ex-ante tax levied on income from investment (computed by DEVEREUX et al. 2002), no significant correlation can be found to a broad measure of the tax wedge as proposed by MRT.

Figure 4 Effective ex-ante marginal and ex-post tax on capital



Note: Comparison of the effective tax rate on capital with the DEVEREUX et al. (2002) effective marginal measure for the EU 15 countries.

Figure 5 Effective ex-ante average and ex-post tax on capital

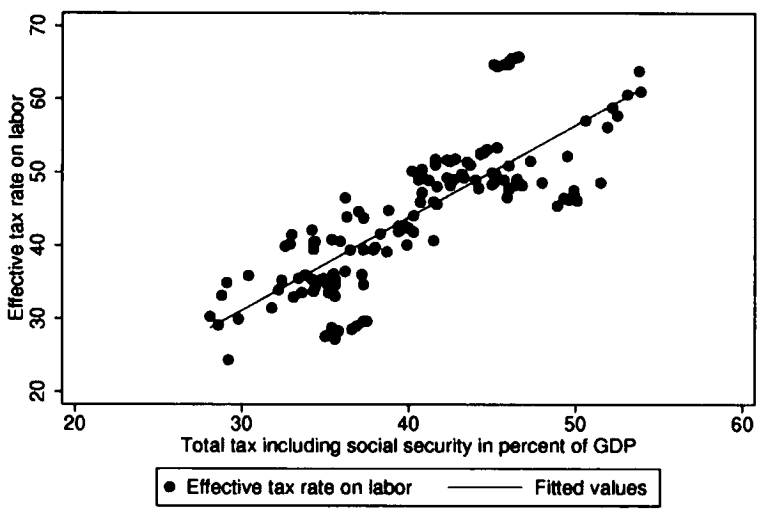


Note: Comparison of the effective tax rate on capital with the DEVEREUX et al. (2002) effective average measure for the EU 15 countries.

4.3 Effective tax measures and other tax measures

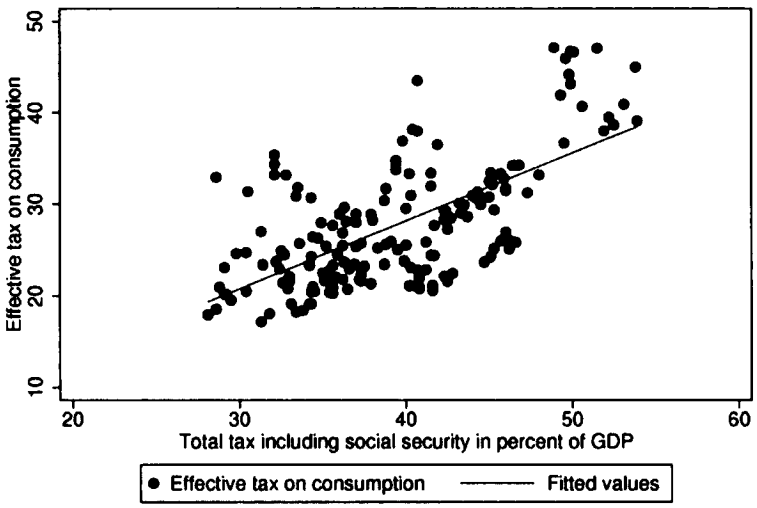
The literature on the effects of fiscal policy on economic growth employs as a prominent measure the total government intervention in the economy. This is measured by the total tax burden inclusive of social security in percent of GDP. As Figure (6) shows this measure is highly correlated with the effective tax burden on labor. Similarly, effective taxes on consumption are strongly connected to the total tax burden measured in percent of GDP (Figure 7). Implicit taxes on capital, on the other hand, have little in common with the total tax burden in percent of GDP as Figure (8) shows. This probably indicates that the major sources of government revenue in the discussed EU countries come from taxing labor and consumption. The variation in the implicit tax burden on capital has on the other hand little in common with the overall tax burden on the economy.

Figure 6 Labor and total tax burden



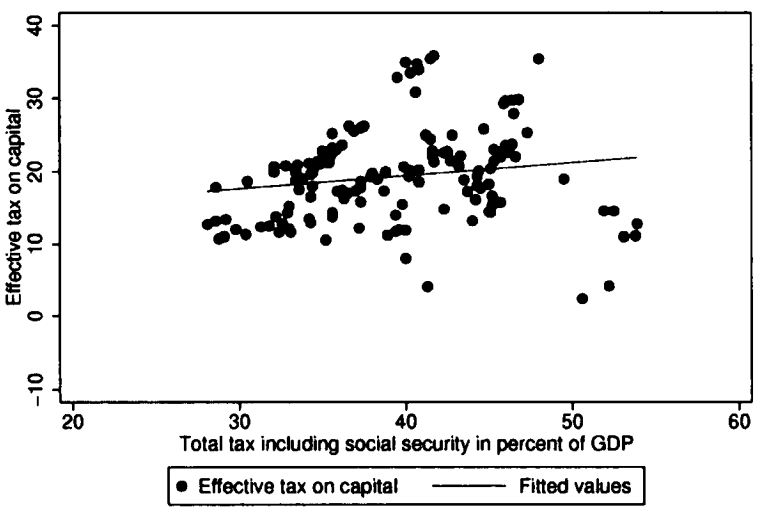
Note: Comparison of the effective tax rate on labor according to the measure computed according to the methodology of MRT with the total tax burden in percent of GDP for the EU 25 countries.

Figure 7 Consumption and total tax burden



Note: Comparison of the effective tax rate on consumption according to the measure computed according to the methodology of MRT with the total tax burden in percent of GDP for the EU 25 countries.

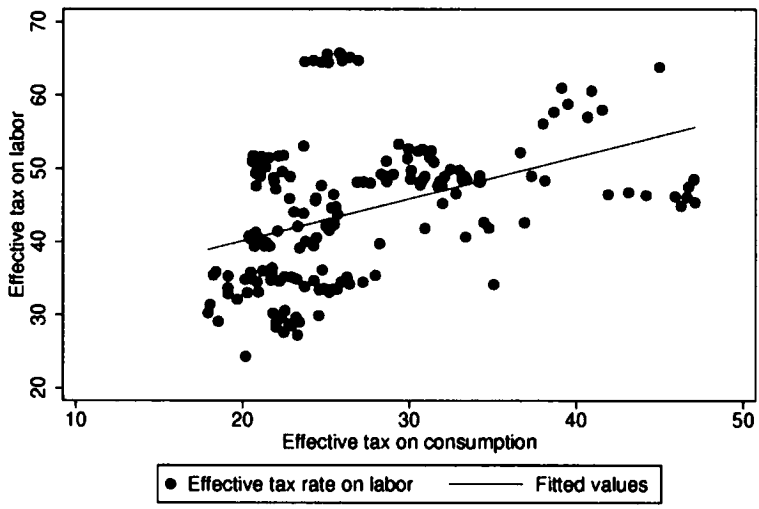
Figure 8 Capital and total tax burden



Note: Comparison of the effective tax rate on capital according to the MRT measure computed by the author with the total tax burden in percent of GDP for the EU 25 countries.

This raises the question, whether labor and consumption taxes are used as supplementary revenue sources or substitutes. Figure (9) shows the relationship between the two measures, which is positive. This means that high labor tax countries have a tendency to also heavily tax consumption. This result is confirmed by a linear regression with a statistically significant coefficient of 0.4. However, there is a lot of unexplained variation as shown by an R2 of 0.18, which implies that some countries might impose a heavy tax burden on labor while leaving consumption tax wedges low and vice versa.

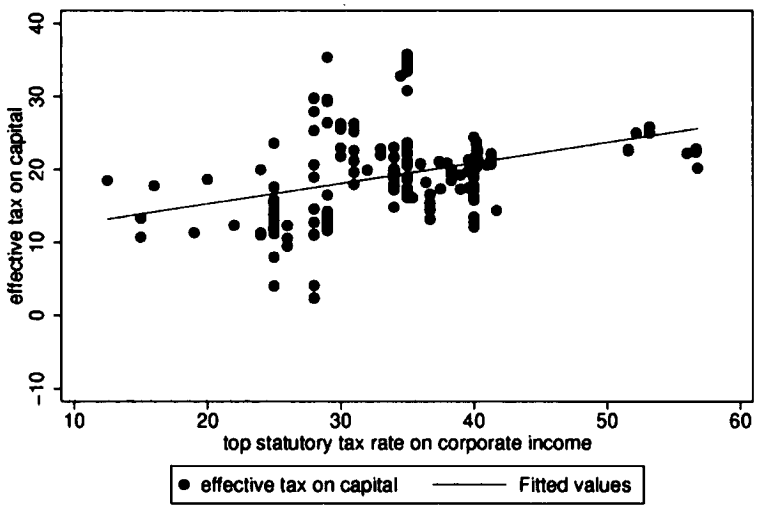
Figure 9 Effective tax on labor and on consumption



Note: Comparison of the effective tax rate on labor with the effective tax rate on consumption for the EU 25 countries.

Finally, we would like to address the question, whether high effective tax rates on capital are found in countries with high corporate tax rates. Figure (10) reveals that while the effective tax rate on capital income is not well explained by the top statutory tax rate on corporate income, a positive relationship is clearly observable. The low degree of explained variance might result from the possibility of significant tax exemptions. It also reflects the fact, that capital income is only partly generated in corporations, unincorporated partnerships are not taxed with the corporate income tax. Nevertheless, there appears to be a connection between the two measures.

Figure 10 Effective tax on capital and the top statutory tax



Note: Comparison of the effective tax rate on capital according to the MRT measure computed by the author with the top statutory tax rate on corporate income.

5 Conclusions

This article computes effective tax rates on consumption, labor, and capital for 25 EU countries based on Eurostat data. These effective tax rates on factor income and consumption are consistent with the tax distortion faced by a representative agent in a general equilibrium framework (MENDOZA et al. 1994). They are well suited for macroeconomic models and broad cross-country comparisons. In particular, they are based on coherent national accounts definitions and take into account all existing exemption, tax credits and deductions. However, as they are calculated from macroeconomic data, they provide only limited information on the actual tax burdens of individual corporations or households.

Our newly computed effective tax rates are in line with the Commission's figures for the EU 15 taken from European Commission (2004). We show that effective tax rates in the 10 new member states of the EU are on average 10 percentage points lower on labor, and 5 percentage points lower on capital and consumption. There is no tendency of convergence in effective tax burdens on capital, a result in line with MENDOZA and TESAR (2005).

However, top statutory tax rates on corporate income converge. Countries with large tax wedges on labor and consumption have large overall tax to GDP burdens, while the tax wedge on capital is only weakly related to the total tax burden. There is a tendency of using taxes on labor and consumption together in the EU and not one instead of the other.

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Appendix

Definitions

Table 6 ESA codes for variables used

B2g+B3G	gross operating surplus and gross mixed income, total economy
B2n	net operating surplus in the economy, not available online
K1	capital consumption at current prices, total economy, UKCT = UKCT from AMECO database
D1	compensation of employees, total economy
D1_S13	compensation of employees, general government
D11	wages and salaries
D2	taxes on production and imports
D211	value added type taxes
D212	taxes and duties on imports excluding VAT
D214	taxes on products, except VAT and import taxes
D214C	taxes on financial and capital transactions, payable on the purchase or sale of non-financial and financial assets
D29	other taxes on production
D29A	other taxes on production, taxes on the ownership or use of land, buildings, or other structures utilized by enterprises in production
D29B	other taxes on production, taxes on the use of fixed assets (vehicles, machinery, equipment) for production
D29C'	other taxes on production, taxes on the total wage bill and payroll taxes
D51A+D51C1	taxes on income, profits, and capital gains of individuals
D51B+D51C2	taxes on income, profits, and capital gains of corporations
D611	actual social contributions received, general government
D611	social contributions by self- and non-employed persons
D6111	employers' actual social contribution
P3_S13	government final consumption expenditure
P31_S14	private final consumption expenditure

Source: ESA (1995)

Implicit tax rate on consumption

The effective tax rate on consumption according to Equation 7 was presented above. Since for some countries, data availability was limited, we propose a broader measure.
This measure of the effective tax rate on consumption is:

$$(12)\tau_c = \frac{D2}{P31\_S14 + P3\_S13 - D1\_S13 - D2}$$

It differs only slightly from the first measure, the results are reported below in Table (8). The mean absolute deviation between the two measures is 0.011 for the common observations. The Spearman rank correlation is above 0.95 in all years.

Table 7 Implicit tax rate on consumption, according to Equation 7

year	AT	BE	CY	CZ	DE	DK	EE	ES	EU15	EU25	EUROZONE	FI	FR	GR	HU
1991	0.32	0.22			0.20								0.29		
1992	0.32	0.23			0.20								0.28		
1993	0.32	0.24			0.21								0.29		
1994	0.32	0.25			0.22								0.30		
1995	0.28	0.24		0.24	0.21		0.25	0.18	0.24		0.24	0.31	0.31	0.21	0.38
1996	0.29	0.25		0.23	0.21		0.24	0.18	0.24		0.24	0.31	0.32	0.22	0.38
1997	0.30	0.26		0.21	0.21		0.27	0.19	0.25		0.25	0.34	0.33	0.23	0.35
1998	0.31	0.26	0.20	0.21	0.21		0.23	0.21	0.26		0.26	0.34	0.33	0.24	0.35
1999	0.31	0.27	0.20	0.22	0.22		0.23	0.22	0.27		0.27	0.34	0.33	0.26	0.36
2000	0.30	0.26	0.23	0.21	0.22		0.25	0.22	0.26	0.26	0.26	0.33	0.32	0.26	0.37
2001	0.29	0.25	0.24	0.20	0.21		0.25	0.21	0.25	0.25	0.25	0.32	0.31	0.25	0.34
2002	0.31	0.26	0.25	0.20	0.21		0.25	0.22	0.26	0.26	0.26		0.31	0.25	0.32
2003	0.31	0.25	0.33	0.21	0.21		0.26	0.23				0.32	0.30	0.25	0.35
2004															

year	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
1991		0.21		0.25											0.23
1992		0.20		0.28											0.22
1993		0.22		0.31								0.38		0.25	0.22
1994		0.22		0.32								0.37		0.35	0.23
1995	0.31	0.23	0.19	0.29	0.22		0.21	0.43	0.31	0.26		0.37		0.33	0.23
1996	0.32	0.22	0.18	0.29	0.19		0.22	0.44	0.30	0.26		0.38		0.31	0.22
1997	0.33	0.24	0.25	0.32	0.20		0.23	0.45	0.29	0.26		0.39		0.28	0.23
1998	0.33	0.30	0.24	0.33	0.22		0.23	0.43	0.28	0.28		0.41		0.25	0.23
1999	0.34	0.29	0.23	0.38	0.21		0.24	0.43	0.29	0.29		0.45	0.30	0.24	0.23
2000	0.35	0.28	0.20	0.44	0.19	0.23	0.24	0.42	0.27	0.28		0.39	0.35	0.24	0.23
2001	0.31	0.27	0.20	0.38	0.18	0.25	0.26	0.40	0.26	0.28	0.18	0.39	0.34	0.21	0.22
2002	0.33	0.28	0.21	0.36	0.17	0.27	0.25	0.37	0.26	0.30	0.19	0.41	0.37	0.22	0.22
2003	0.34	0.27	0.20	0.38	0.18	0.27		0.35	0.28	0.31		0.42	0.38	0.21	0.22
2004															

Source: Author's calculation, Eurostat data.

Table 8 Implicit tax rate on consumption, according to Equation 12

year	AT	BE	CY	CZ	DE	DK	EE	ES	EU15	EU25	EUROZONE	FI	FR	GR	HU
1991															
1992															
1993	0.32	0.27			0.23								0.31		
1994	0.32	0.28			0.24								0.32		
1995	0.31	0.27		0.24	0.23	0.42	0.25	0.20	0.26		0.26	0.34	0.33	0.23	0.38
1996	0.31	0.28		0.23	0.22	0.43	0.24	0.20	0.26		0.26	0.33	0.34	0.24	0.38
1997	0.32	0.29		0.21	0.22	0.44	0.27	0.21	0.27		0.26	0.36	0.35	0.25	0.35
1998	0.33	0.28	0.20	0.21	0.23	0.47	0.23	0.22	0.28		0.28	0.36	0.35	0.25	0.35
1999	0.33	0.29	0.20	0.22	0.23	0.47	0.23	0.23	0.28		0.28	0.36	0.35	0.27	0.36
2000	0.32	0.29	0.23	0.21	0.23	0.46	0.25	0.23	0.28	0.28	0.28	0.35	0.34	0.27	0.37
2001	0.31	0.28	0.24	0.20	0.22	0.47	0.25	0.23	0.27	0.27	0.27	0.33	0.32	0.27	0.34
2002	0.32	0.28	0.25	0.20	0.22	0.47	0.25	0.23	0.27	0.27	0.27	0.33	0.32	0.26	0.32
2003	0.32	0.28	0.33	0.21	0.22	0.46	0.26	0.24				0.33	0.31	0.25	0.35
2004															

year	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
1991															
1992															
1993		0.24		0.35								0.38		0.25	0.24
1994		0.24		0.35								0.37		0.35	0.24
1995	0.34	0.24	0.19	0.32	0.22		0.24	0.43	0.31	0.28		0.39		0.33	0.25
1996	0.35	0.24	0.18	0.32	0.19		0.24	0.44	0.30	0.28		0.40		0.31	0.24
1997	0.36	0.25	0.25	0.35	0.20		0.25	0.45	0.29	0.28		0.41		0.28	0.25
1998	0.36	0.32	0.24	0.36	0.22		0.26	0.43	0.28	0.30		0.43		0.25	0.25
1999	0.37	0.30	0.23	0.40	0.21		0.27	0.43	0.29	0.30		0.47	0.30	0.24	0.25
2000	0.38	0.30	0.20	0.46	0.19	0.23	0.27	0.42	0.27	0.30		0.41	0.35	0.24	0.25
2001	0.34	0.29	0.20	0.40	0.18	0.25	0.28	0.40	0.26	0.29	0.18	0.41	0.34	0.21	0.23
2002	0.34	0.29	0.21	0.38	0.17	0.27	0.27	0.37	0.26	0.31	0.19	0.42	0.37	0.22	0.23
2003	0.35	0.28	0.20	0.39	0.18	0.27		0.35	0.28	0.31		0.43	0.38	0.21	0.23
2004															

Source: Author's calculation, Eurostat data.

Household's average income tax

Table 9 Household's average tax rate, according to Equation 8

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	IE
1992												
1993	0.18	0.24										
1994	0.16	0.24										
1995	0.17	0.25		0.09			0.16	0.12	0.27	0.11	0.06	0.15
1996	0.18	0.25		0.09			0.14	0.13	0.29	0.12	0.06	0.15
1997	0.20	0.25		0.09			0.14	0.12	0.27	0.13	0.07	0.15
1998	0.20	0.26	0.06	0.09			0.14	0.12	0.26	0.17	0.09	0.13
1999	0.20	0.25	0.07	0.08			0.14	0.11	0.26	0.17	0.09	0.13
2000	0.19	0.25	0.06	0.09		0.41	0.12	0.12	0.28	0.18	0.09	0.12
2001	0.20	0.26	0.07	0.09		0.42	0.12	0.12	0.27	0.17	0.08	0.12
2002	0.20	0.26	0.07	0.09		0.41	0.11	0.12	0.26	0.16	0.08	0.10
2003	0.19	0.25		0.09		0.41	0.12	0.12	0.25		0.08	0.10
2004												

year	IT	LT	LU	LV	NL	NO	PL	PT	SE	SI	SK	UK
1992												
1993									0.30	0.15		
1994									0.30	0.13	0.06	
1995		0.13		0.12	0.14	0.20		0.11	0.29	0.12	0.07	0.17
1996		0.13		0.10	0.14	0.19		0.12	0.33	0.12	0.08	0.15
1997		0.10		0.11	0.12	0.20		0.11	0.34	0.12	0.09	0.15
1998		0.15		0.12	0.12	0.21		0.11	0.35	0.12	0.09	0.16
1999	0.22	0.17		0.11	0.12	0.21			0.37	0.12	0.09	0.17
2000	0.21	0.16		0.10	0.12	0.18			0.36	0.12	0.07	0.18
2001	0.21	0.14		0.10	0.12	0.18			0.33	0.12	0.08	0.18
2002	0.20	0.13		0.10	0.13	0.19			0.31	0.12	0.07	0.17
2003	0.20	0.13		0.10		0.19			0.32	0.12	0.07	0.16
2004												

Source: Author's calculation, Eurostat data.

Since the measure for the household average income has quite a lot of missing values, we calculate an approximate measure. Instead of $D51A + D51C1$, we only take $D51A$ from the AMECO database. $D51B + D51C2$ is approximated with D51B from the AMECO database, where A indicates AMECO as a data source. For those countries, for which both data are available, we compared the difference in magnitude, which is minor.

$$(13)\ PITB^A = D1 + B2n - D611 - D51B^A - D29$$

$$(14)\ t_h^A = D51A^A / PITBA^A$$

The correlation of the two measures of household's average tax rates is very high at around 0.9 for those countries, for which both measures are available.

Table 10 Household's average tax rate, according to Equation 14

year	AT	BE	CZ	DE	DK	EE	ES	FI	FR	GR
1991										
1992										
1993		0.25		0.18					0.13	
1994		0.25		0.18					0.14	
1995	0.18	0.26	0.09	0.18	0.44	0.16	0.13	0.28	0.13	0.06
1996	0.20	0.26	0.09	0.19	0.44	0.14	0.13	0.30	0.15	0.06
1997	0.21	0.26	0.09	0.18	0.44	0.14	0.12	0.28	0.15	0.07
1998	0.21	0.27	0.09	0.19	0.43	0.14	0.12	0.27	0.19	0.09
1999	0.21	0.26	0.08	0.19	0.45	0.15	0.12	0.27	0.19	0.10
2000	0.20	0.26	0.09	0.20	0.43	0.12	0.12	0.29	0.19	0.11
2001	0.22	0.27	0.09	0.19	0.43	0.11	0.12	0.28	0.19	0.10
2002	0.21	0.27	0.09	0.18	0.42	0.11	0.13	0.27	0.18	0.10
2003	0.20	0.26	0.10	0.18	0.42	0.13	0.12	0.26		0.09
2004										

year	IE	IT	LT	LV	NL	NO	PT	SK	UK
1991									
1992									
1993		0.22						0.06	0.19
1994		0.20						0.05	0.19
1995		0.19	0.12	0.11	0.17	0.21	0.11	0.10	0.19
1996		0.20	0.12	0.09	0.16	0.21	0.12	0.10	0.18
1997		0.21	0.10	0.11	0.15	0.21	0.12	0.11	0.17
1998		0.22	0.15	0.12	0.14	0.22	0.12	0.10	0.19
1999		0.22	0.17	0.12	0.14	0.22		0.10	0.20
2000		0.22	0.16	0.10	0.15	0.20		0.08	0.21
2001		0.22	0.14	0.10	0.14	0.20		0.08	0.21
2002		0.21	0.13		0.15	0.21			0.20
2003		0.21	0.12			0.21			0.19
2004									

Source: Author's calculation, Eurostat data.

Implicit tax rate on labor

Table 11 Implicit tax rate on labor, according to Equation 10

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1991													
1992													
1993	0.48	0.65											
1994	0.48	0.64											
1995	0.49	0.65		0.40				0.35	0.51	0.49	0.40		
1996	0.51	0.64		0.39				0.36	0.52	0.50	0.41		
1997	0.53	0.65		0.39				0.35	0.49	0.50	0.42		
1998	0.53	0.66	0.24	0.39				0.35	0.48	0.49	0.44		
1999	0.52	0.65		0.39				0.35	0.48	0.49	0.44		
2000	0.51	0.65		0.40		0.46		0.35	0.49	0.49	0.45		
2001	0.53	0.66		0.40		0.48		0.36	0.48	0.48	0.45		
2002	0.53	0.66		0.41		0.45		0.36	0.47	0.48	0.46		
2003	0.52			0.41		0.45			0.45		0.48		
2004													

year	IT	LT	LU	LV	MT	NL	NO	PL	PT	SE	SI	SK	UK
1991													
1992													
1993										0.48			
1994										0.49			
1995	0.34					0.49	0.39		0.34	0.52			0.29
1996	0.37					0.47	0.39		0.34	0.56			0.28
1997	0.37					0.46	0.39		0.35	0.58			0.27
1998	0.33					0.44	0.40		0.35	0.61			0.29
1999	0.49					0.46	0.40			0.64			0.29
2000	0.49					0.46	0.38			0.61	0.42		0.30
2001	0.48					0.42	0.38			0.59	0.43		0.30
2002	0.48	0.33				0.42	0.39			0.57	0.43		0.28
2003	0.48	0.32								0.58			0.29
2004													

Source: Author's calculation, Eurostat data.

Since the effective tax rate on labor could not be computed for several countries because of missing observation, we compute an approximate effective tax rate according to Equation (15).

$$(15)\quad t_l^A = \frac{t_h^A * D11 + D611}{D11 + D6111}$$

The correlation between this measure and the measure calculated from Equation 10 is *0.98* for those countries for which both observations are available. Spearman rank correlation gives a ρ greater *0.9* for most years. The mean absolute deviation between the two measures of effective tax on labor is *0.017* for the 106 available joint observations. We are therefore confident,

that the simplified measure captures the effective tax rate on labor accurately.

Table 12 Effective tax rate on labor, according to Equation 15

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1991													
1992													
1993		0.65			0.48					0.48			
1994		0.65			0.49					0.49			
1995	0.46	0.65		0.40	0.49	0.46	0.36	0.36	0.52	0.48	0.40		
1996	0.47	0.65		0.39	0.51	0.47	0.35	0.36	0.52	0.49	0.41		
1997	0.49	0.65		0.39	0.52	0.46	0.35	0.36	0.50	0.49	0.43		
1998	0.49	0.66		0.39	0.52	0.46	0.35	0.35	0.49	0.48	0.44		
1999	0.49	0.65		0.39	0.52	0.49	0.35	0.35	0.49	0.48	0.44		
2000	0.48	0.66		0.41	0.52	0.47	0.34	0.36	0.49	0.48	0.46		
2001	0.50	0.66		0.40	0.50	0.47	0.33	0.37	0.48	0.48	0.46		
2002	0.49	0.67		0.41	0.50	0.45	0.34	0.37	0.47	0.47	0.48		
2003	0.48			0.41	0.50	0.45	0.35		0.46		0.49		
2004													

year	IT	LT	LU	LV	MT	NL	NO	PL	PT	SE	SI	SK	UK
1991													
1992													
1993	0.50											0.33	0.30
1994	0.48											0.34	0.31
1995	0.49	0.29		0.36		0.51	0.40		0.34			0.41	0.31
1996	0.52	0.30		0.34		0.50	0.40		0.35			0.42	0.30
1997	0.53	0.30		0.33		0.48	0.40		0.36			0.40	0.30
1998	0.50	0.34		0.35		0.46	0.41		0.36			0.42	0.31
1999	0.50	0.35		0.35		0.48	0.41					0.41	0.32
2000	0.50	0.36		0.33		0.48	0.39					0.39	0.32
2001	0.49	0.35		0.31		0.44	0.40					0.40	0.32
2002	0.49	0.33				0.44	0.40						0.31
2003	0.49	0.32											0.32
2004													

Source: Author's calculation, Eurostat data.

Implicit tax on capital

Table 13 Implicit tax rate on capital income, according to Equation 11

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU
1990												
1991												
1992												
1993	0.15	0.18										
1994	0.14	0.19										
1995	0.15	0.20		0.21				0.19	0.24	0.13	0.13	
1996	0.17	0.21		0.17				0.19	0.25	0.14	0.12	
1997	0.18	0.22		0.19				0.21	0.28	0.15	0.13	
1998	0.19	0.24	0.13	0.17				0.21	0.30	0.14	0.16	
1999	0.18	0.23		0.19				0.22	0.30	0.16	0.18	
2000	0.19	0.23		0.18				0.23	0.35	0.17	0.20	
2001	0.23	0.23		0.20			0.09	0.22	0.30	0.18	0.17	
2002	0.20	0.22		0.21			0.11	0.24	0.29	0.16	0.17	
2003	0.20	0.22		0.23			0.12		0.26		0.16	
2004												

year	IE	IT	LT	LV	NL	NO	PL	PT	SE	SI	SK	UK
1990												
1991												
1992												
1993									0.16	-0.05		
1994									0.19	0.02	0.16	
1995	0.20	0.06	0.13	0.12	0.31			0.18	0.19	0.04	0.24	0.22
1996	0.21	0.05	0.13	0.13	0.34			0.20	0.15	0.08	0.20	0.23
1997	0.21	0.05	0.12	0.14	0.35			0.21	0.15	0.11	0.20	0.25
1998	0.20	0.04	0.14	0.16	0.33			0.21	0.11	0.12	0.19	0.26
1999	0.21	0.22	0.12	0.14	0.36				0.11	0.12	0.17	0.26
2000	0.20	0.21	0.11	0.12	0.35				0.13	0.12	0.17	0.26
2001	0.19	0.23	0.11	0.12	0.35				0.04	0.14	0.14	0.26
2002	0.18	0.21	0.11	0.12	0.33				0.02	0.15	0.15	0.23
2003	0.19	0.20	0.13	0.11		0.46			0.02	0.18	0.16	0.22
2004												

Source: Author's calculation, Eurostat data.

$$(16)\quad t_k = \frac{\tau_n^{*}(PITB - D1) + D51B\_ - D51C + D29A + D29B + D214C}{B2n}$$

Table 14 Implicit tax rate on capital, according to Equation 16

year	AT	BE	CY	CZ	DE	DK	EE	ES	FI	FR	GR
1990											
1991											
1992											
1993	0.11	0.22									
1994	0.10	0.23									
1995	0.11	0.24		0.21				0.17		0.22	0.11
1996	0.13	0.26		0.18				0.18		0.24	0.11
1997	0.13	0.27		0.19				0.20		0.25	0.12
1998	0.14	0.29	0.14	0.17				0.20		0.26	0.14
1999	0.13	0.29	0.15	0.19				0.22		0.27	0.17
2000	0.14	0.29	0.17	0.18		0.47		0.23		0.28	0.19
2001	0.18	0.28	0.17	0.19		0.51		0.22		0.29	0.16
2002	0.15	0.28	0.17	0.21		0.51		0.24		0.26	0.15
2003	0.14	0.28		0.22		0.51		0.25			0.14
2004											

year	IT	LT	LV	NL	NO	PL	PT	RO	SE	SI	SK
1990											
1991											
1992											
1993									0.22	-0.11	
1994									0.24	-0.01	
1995	0.02			0.20	0.25		0.17		0.23	0.02	
1996	0.02			0.24	0.26		0.19		0.21	0.05	
1997	0.03			0.26	0.26		0.21		0.22	0.08	
1998	0.03			0.26	0.24		0.21		0.18	0.09	
1999	0.21			0.27	0.26				0.18	0.09	0.17
2000	0.20			0.27	0.28				0.20	0.09	0.16
2001	0.21			0.28	0.28				0.12	0.09	0.14
2002	0.19			0.26	0.27				0.11	0.11	
2003	0.18				0.26				0.11	0.13	0.15
2004											

Source: Author's calculation, Eurostat data.

To account for missing observations of especially Germany, we compute the following effective tax rate on capital income.

$$(17)\ t_k^A = \frac{t_h^A * (PITB - D1) + D51B^A + D6113}{B2n}$$

This measure is highly correlated with the one according to Equation (11), with a Spearman rank correlation greater *0.9* for most years. The mean absolute deviation is 0.018. We are therefore confident, that the computed tax rate is robust to the particular specification.

Table 15 Implicit tax rate on capital, according to Equation 17

year	AT	BE	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE
1990												
1991												
1992												
1993		0.18		0.21					0.13			
1994		0.20		0.20					0.14			
1995	0.15	0.21	0.21	0.20			0.19	0.25	0.14	0.14		
1996	0.18	0.22	0.18	0.23			0.19	0.26	0.14	0.14		
1997	0.18	0.23	0.20	0.22			0.22	0.28	0.15	0.15		
1998	0.19	0.24	0.17	0.22			0.21	0.30	0.14	0.18		
1999	0.18	0.24	0.19	0.23			0.23	0.30	0.15	0.19		
2000	0.19	0.24	0.18	0.23			0.24	0.36	0.16	0.20		
2001	0.23	0.23	0.20	0.19		0.09	0.23	0.30	0.18	0.18		
2002	0.20	0.22	0.21	0.19		0.10	0.24	0.30	0.16	0.18		
2003	0.20	0.22	0.23	0.20		0.11		0.27		0.17		
2004												

year	IT	LT	LV	MT	NL	NO	PL	PT	SE	SI	SK	UK
1990												
1991												
1992												
1993	0.26										0.24	0.20
1994	0.25										0.18	0.21
1995	0.25	0.15	0.16		0.31			0.19			0.27	0.23
1996	0.25	0.14	0.19		0.34			0.21			0.25	0.24
1997	0.26	0.12	0.19		0.34			0.22			0.24	0.26
1998	0.21	0.14	0.22		0.33			0.22			0.25	0.27
1999	0.22	0.12	0.18		0.35						0.22	0.27
2000	0.22	0.11	0.16		0.35						0.20	0.27
2001	0.23	0.11	0.16		0.34						0.17	0.27
2002	0.21	0.11			0.32							0.24
2003	0.21	0.10				0.59						0.23
2004												

Source: Author's calculation, Eurostat data.