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Annex B: Methodology and explanatory notes

The ‘Taxation trends’ survey assesses the tax system from a number of angles. The examination of the tax structures by tax type and by level of government illustrates the relative importance of the different tax instruments used in raising revenues and the distribution of autonomous financial resources among the constituent elements of the state apparatus, respectively. The breakdown into taxes on consumption, labour and capital allows an assessment of the manner in which the tax burden is distributed among the different factors. In addition, environmental taxes and property taxes are specifically examined, as they are subject to increased attention/scrutiny/special focus. The implicit tax rates measure in turn the actual or effective average tax burden levied on different types of economic income or activities.

This methodological note explains the methods of, and the reasoning behind, the calculation of the various ratios presented in the survey; approaching them in the order in which they appear in each country table in Part II and in the tables in the Annex A of the report. Given that Parts A and B (Tax structure by tax type and Tax structure by level of government) follow ESA 2010 classifications⁽¹⁾, a simple description of the aggregates and the data sources is provided. Parts C to E (Tax structure by economic function, Environmental and Property Taxes) and Part F (Implicit tax rates) present statistics developed by the European Commission Directorate-General for Taxation and Customs Union specifically for this publication, so the reasoning will be delved into in greater detail, with attention given to both their theoretical and practical limitations. This note concludes with an in-depth discussion of the approaches used in calculating the split of personal income tax according to its sources, a process critical to the creation of meaningful statistics for Parts C and F.

Data sources

The primary cut-off date for most of the data in this report was 7 December 2017. This concerns the National Accounts data and the more disaggregated tax data submitted to Eurostat (the National Tax List or NTL) which were used for the classification of revenue according to economic functions and to determine the level of environmental and property taxes. The data for the denominator of the ITRs on capital and corporate income in Part 1 were downloaded on 23 January 2018. In very few cases, estimates at the detailed level have been used if statistics were not available; in those cases, the estimates were either supplied by Member States administrations or computed using proxies.

Although all Member States authorities have provided disaggregated data on their tax revenue (the National Tax List), their level of detail varies. Information on the

level of disaggregation used for the computation of the indicators for each Member State can be found on the [web pages](#) of the Directorate-General for Taxation and Customs Union as well as on Eurostat’s ‘[Statistics Explained](#)’ page. While the former presents data as it was used in the calculations of the report, the latter is continuously updated along with updated National Accounts transmissions.

Data coverage

This publication presents time series of tax revenue (including taxes levied on behalf of the institutions of the European Union) and tax rates for the twenty-eight Member States, Norway and Iceland. The seven EU outermost regions - Martinique, Guadeloupe, French Guiana and Réunion, Saint-Barthélemy, Saint-Martin, Madeira, the Azores and the Canary Islands – are covered in the tables presenting tax revenue data. However, they are not covered in the tables presenting tax rates.

Data coverage and reliability have generally improved over time. The coverage of the implicit tax rate on capital is, however, patchy as the computation is quite demanding in terms of the required level of detail in national accounts data. For this and other reasons, the comprehensive calculation of the ITR on capital has been temporarily suspended, but work is in progress to update the indicator in the near future. Nevertheless, an indicative analysis of the ITR on capital and the ITR on corporate income can be found in Part 1, along with some notes regarding the limitations of the indicators.

Ranking

In all the tables of Annex A, a ranking is given whereby the Member State with the highest ratio is listed with number 1, the second with number 2 and so on. The ranking refers to the order of the Member States for each specific ratio and only includes those Member States for which 2016 data are available in the respective table. The rankings are also shown in the country tables in Part II of the report. No ranking is given if more than 10 % of data points are missing.

Averages

This report computes weighted averages for two groups of countries: the EU as a whole (EU-28) and the euro area (EA-19). The average computed for the taxes received by the State Government refers to the *Länder* in Austria and Germany, the *gewesten en gemeenschappen / régions et communautés* in Belgium and *comunidades autónomas* in Spain. The EU aggregates for state government and social security funds are calculated over all Member States.

⁽¹⁾ European Commission (2013)

Ratios to GDP

Throughout the report many revenue indicators are presented as a percentage of GDP. The GDP data used for the report were downloaded from Eurostat's database on 7 December 2017. It should be noted that for Ireland there was a very significant growth in GDP in 2015 primarily due to the relocation to Ireland of a limited number of big economic operators. This also had slight upwards effect on EU and euro area GDP aggregates. The ratio for Iceland was exceptionally high in 2016 (51.6 %) due to a one-off a stability contribution levied on financial corporations.

Totals, shares and “amounts assessed but unlikely to be collected”

For some countries the sum of the taxes in percentage of GDP in each of the Parts A and C of the country chapters data table and in the corresponding Annex A tables adds up to more than the total – equivalently the sum of taxes in percentage of total taxation adds up to more than 100 % for those countries. This is the case whenever the table contains the item ‘Capital transfers (representing taxes assessed but unlikely to be collected)’ (ESA code D.995). For the countries that (partially) use the assessment method of accrual recording (see below), a capital transfer can be recorded from general government to other sectors of the economy. This represents taxes and social contributions assessed but unlikely to be collected (D.995), which have to be deducted from tax revenue in order to produce consistent data with countries that use the time-adjusted cash method or that combine a method based on assessments and declarations with coefficients.

Table 27 of Annex A lists the countries for which this is the case (and the magnitude of this item as a share of GDP). Less than 100 % may also be reported for countries reporting taxes on labour in the sector “EU institutions” (Belgium and Portugal).

According to ESA, taxes and social contributions should be recorded on an accrual basis. Two methods can be used:

a) ‘time-adjusted’ cash – the cash is attributed to when the activity took place to generate the tax liability or when the amount of taxes was determined in the case

of some income taxes. This adjustment may be based on the average time difference between the activity and cash receipt;

b) a method based on declarations and assessments. In this case, an adjustment needs to be made for amounts assessed or declared but unlikely to be collected. These amounts have to be eliminated from government revenue, either by using a tax-specific coefficient based on past experience and future expectations or by recording a capital transfer for the same adjustment (ESA 2010 code D.995) to the relevant sectors.

D.995 should be taken into account when analysing the data for the concerned countries, especially in cross-country comparison as the components of tax revenue are overstated when compared to countries using a time-adjusted cash method or a method based on assessments and declarations but with a coefficient representing taxes unlikely to be collected directly on each tax revenue item. Where it occurs, the proportional bias is on average equal to $(1 + D995)$ expressed as a percentage of total taxation).

Sums by economic function do not add up for Belgium and Portugal due to the non-inclusion of taxes – other than own resources – paid to EU institutions.

Payable Tax Credits

A further issue concerning the measurement of tax revenues relates to the treatment of ‘payable’ tax credits. ‘Payable tax credits’ are credited against a tax liability, and only need to be paid out to beneficiaries if they exceed the tax liability. A payable tax credit can be conceptually split into two components: one component (the ‘tax expenditure component’) is used to decrease the tax liability, and the other (the ‘transfer component’) is the remainder left over if the total tax credit amount exceeds the tax liability, and is paid directly to a recipient as a benefit payment.

A dedicated section on this subject can be found in Part 1. The effects on tax indicators of the two methods of treating payable tax credits – the ‘gross’ approach and the ‘split’ approach - are estimated in this section. The data used in this section come predominantly from Eurostat, but in one or two cases OECD/national finance ministry data may be cited. Payable tax credit data can also be found in section G of the country tables (see Part 2 of the report).

Part A: Tax structure by tax type

Definitions

'Total taxes (including compulsory actual social contributions)' are defined in this report as: taxes on production and imports (D.2), current taxes on income and wealth (D.5), capital taxes (D.91), compulsory actual social contributions (D.611C + D.613C). Indirect taxes, direct taxes and social contributions add up to the total of taxes and compulsory actual social contributions received by the general government and the institutions of the European Union.

'Taxes (excluding social contributions)' are defined as 'total taxes (including compulsory actual social contributions)' minus actual compulsory social contributions.

'Indirect taxes' are defined in this report as taxes linked to production and imports (code D.2 in the ESA2010 system), i.e. as compulsory levies on producer units in respect of the production or importation of goods and services or the use of factors of production. They include VAT, import duties, excise duties and other specific taxes on services (transport, insurance etc.) and on financial and capital transactions. They also include taxes on production (D.29) defined as 'taxes that enterprises incur as a result of engaging in production', such as professional licences, taxes on land and building and payroll taxes.

Indirect taxes are defined as the sum of the following ESA2010 tax categories:

- VAT: value added type taxes (D.211).
- Taxes and duties on imports excluding VAT (D.212).
- Taxes on products, except VAT and import duties (D.214).
- Other taxes on production (D.29).

'Direct taxes' are defined as current taxes on income and wealth (D.5) plus capital taxes including taxes such as inheritance or gift taxes (D.91). Income tax (D.51) is a subcategory, which includes personal income tax (PIT) and corporate income tax (CIT) as well as capital gains taxes.

Direct taxes are defined as the sum of the following ESA categories:

- personal income tax: taxes on individual or households income including holding gains (D.51A + D.51C1);
- corporate income tax: taxes on the income or profits of corporations including holding gains (D.51B + D.51C2);
- other income and capital taxes: other taxes on income corresponding to other taxes on holding gains

(D.51C3), taxes on winnings from lottery or gambling (D.51D) and other taxes on income n.e.c. (D.51E); taxes on capital defined as other current taxes (D.59) and capital taxes (D.91).

'Actual compulsory social contributions' are paid by employers and employees on the basis of a work contract, or by self- and non-employed persons. They can be split into three subcategories:

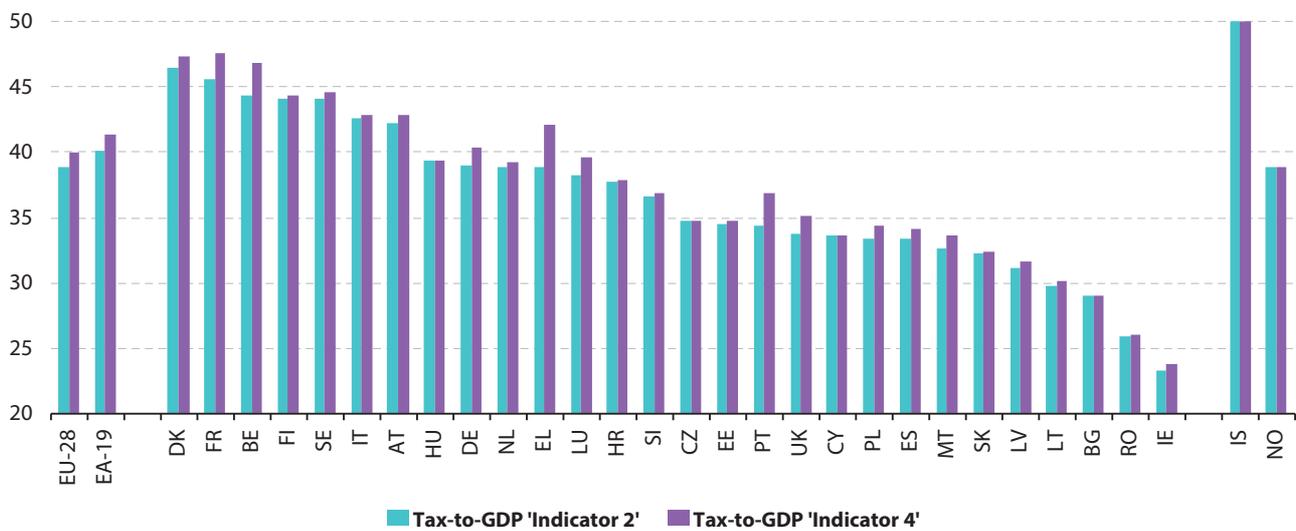
- compulsory employers' actual social contributions (D.611C);
- compulsory employees' social contributions (D.613CE);
- compulsory social contributions by self- and non-employed persons (D.613CS and D.613CN).

Different indicators of tax burden

Some indicators of tax burden take into account all actual social contributions (for example, ESA2010 code D.611), which include both compulsory and voluntary contributions. Voluntary contributions vary in their purpose (e.g. the purchase of 'extra years' for pensions and the wish to complete a gap in the social contributions due to years worked abroad) and may vary in the degree to which they are voluntary in a real economic sense. In addition, employers' 'imputed social contributions' (D.612), which relate to unfunded social security schemes, are excluded from the indicators in this report. Two other items – households' social contribution supplements (D.614) and social insurance scheme service charges (D.61SC) – are also excluded. Households' social contribution supplements (D.614) and social insurance scheme service charges (D.61SC) represent respectively the property income attributable to social insurance policy holders, which is reinvested in the scheme and the output (administrative cost) of operating the social insurance scheme. In both cases, there are counterpart entries in the national accounts. These items are only non-zero when there are defined-benefit or defined-contribution social insurance schemes (funded schemes) classified in general government. A noticeable but small impact of these items is only present for Belgium and Sweden.

The definition employed in this report thus corresponds to Indicator 2 of the four indicators of general government and European Union levies issued by Eurostat (see Box A.1).

Graph A.1: Sensitivity analysis: role of imputed social contributions and voluntary actual social contributions 2016, (% of GDP)



Source: DG Taxation and Customs Union, based on Eurostat data

In practice, imputed social contributions relate to governments, which do not pay actual contributions for their employees but nevertheless guarantee them a pension upon retirement; imputed social contributions represent the contributions the government should pay to a pension fund in order to provide a pension of an equivalent amount to its employees. Imputed social contributions are not therefore based on actual transactions. Including imputed social contributions in the definition of compulsory levies would allow greater comparability over time and across countries, given that some governments make actual contributions for their

employees while others simply pay social benefits to their employees as their entitlement arises. Ultimately, it is found that, while including imputed social contributions (along with households' social contribution supplements and social insurance scheme service charges) in the definition of total taxes would result in a non-negligible level shift, yielding an increase of the tax ratio for the EU-28 average of around 1.23 percentage points (see Graph A.1), the development of the ratios over time remain relatively stable. The inclusion of imputed social contributions does however result in a different ranking of Member States by the size of their tax burden.

Box A.1: Indicators of general government and European Union levies

In 2001, the Eurostat National Accounts Working Group defined four taxation indicators for general government and European Union levies, progressing from a narrower to a broader definition:

- Taxes on production and imports (D.2)
- + Current taxes on income, wealth, etc (D.5)
- + Capital taxes (D.91)
- [- Capital transfers from general government to relevant sectors representing taxes and social contributions assessed but unlikely to be collected (D.995)]
- + Compulsory actual social contributions (D.611C+D613C) payable to the social security funds sub-sector (S.1314)
- = **INDICATOR 1** (Total taxes and compulsory social security contributions)
- + Compulsory actual social contributions (D.611C+D613C) payable to the central government (S.1311), state government (S.1312), and local government (S.1313) sub-sectors as employers
- = **INDICATOR 2** (Total taxes and compulsory actual social contributions payable to general government, including those for government as an employer)
- + Imputed social contributions (D.612) payable to general government as an employer
- + Households' social contribution supplements (D.614)
- Social insurance scheme service charges (D.615C)
- = **INDICATOR 3** (Total taxes and compulsory social contributions payable to general government, including those for government as an employer)
- + Voluntary actual social contributions payable to the general government sector (S.13) (D.611V+D.613V)
- = **INDICATOR 4** (Total taxes and social contributions payable to general government, including voluntary contributions)

Source: Eurostat

For the purposes of this report, voluntary actual social contributions are assumed to be zero, whenever they cannot be distinguished from compulsory contributions.

It should also be noted that in some countries non-tax compulsory payments may be made to private funds or schemes outside general government and that these are not included in the indicators of tax

burden. However, it should be noted that compulsory, unrequited (something-for-nothing) payments can only be received by general government (or EU institutions in some cases), necessitating a rerouting through general government in certain cases, which fulfils the national accounts purpose of bringing out the economic substance of economic transactions.

Part B: Tax structure by level of government

Definitions

'Total taxes received by the general government and the institutions of the EU' (institutional sector S.13_S.212 in ESA2010) are broken down as taxes received by:

- central government (S.1311);
- state (region) government for federal states (S.1312), only applicable for Belgium, Germany, Spain and Austria;
- local government (S.1313);
- social security funds (S.1314), not applicable for Ireland, Malta, the United Kingdom and Norway (please see below);
- EU institutions (S.212).

The amount of first and second own resources recorded in the accounts of the EU institutions for a particular country is influenced by its geographic location and its infrastructure (e.g. large ports). This affects the overall tax burden, the level of indirect taxation and the level of taxes on consumption. In addition, Belgium and Portugal report some revenues for PIT and social contributions for the EU institutions (excluded from taxes by economic function).

It should be understood that data on tax revenues collected should be used with some caution in the context of analysing the issue of government centralisation or decentralisation. In particular, the breakdown by level of government may be different depending on whether one looks at tax receipts data or government expenditure data.

The organisation of the tax system may also have an effect on this breakdown: for example in Estonia the institutional structure dealing with pension contributions is part of central government, which partly explains the comparatively low share of the social security funds sub-sector.

A further issue that should be noted, which affects the classification of revenues to the EU institutions (S.212), concerns banking levies collected by Member States and transferred to the Single Resolution Fund (SRF). It was decided by the Committee of Monetary Financial and Balance of Payments Statistics that this was an

EU tax and that the 2015 contributions raised by the national Resolution authority/National Resolution Fund to be transferred to SRF in 2016 should be recorded as an EU tax in 2015 leading to deductions as tax refunds from the EU taxes to be paid in the period 2016 to 2023. If a Member State had used all or part of the contributions for national resolution measures in 2015, the 2015 contributions were still to be considered as an EU tax for the full amount and the resolution measures are deemed to be carried out on behalf of the EU. However, not all Member States have implemented this provision yet in their reported statistics, and there are therefore differences between countries in the level of government classification of the related revenues.

Country specific information

In **Hungary**, since 2008, total personal income tax (D.51A+D.51C1) for the local government (S.1313) is accounted for by the general government (S.1311) and after transferred under D.7 to S.1313. This method of recording results in a lower estimate of local government tax revenue since 2008 compared with those for the period up to 2007.

For **Belgium**, two alternative allocations of tax revenue by sub-sector are shown: 'ultimately received tax revenues' and tax revenues as transmitted under ESA2010 rules to Eurostat. For the purpose of compiling the EU and euro area aggregates, the National Accounts definition is used. For Belgium use is made of additional data (NBB.Stat: current transfer of fiscal receipts - withheld to fund other sub-sectors (see <https://stat.nbb.be/>) in order to provide "ultimately received taxes" by sub-sectors of general government.

In **Estonia** the figure for local government includes only land tax and other local taxes. However, local governments receive 70% of personal income tax receipts (in addition to the 1.1% share of revenues) as a transfer from central government. Personal income tax is classified under central government as local governments do not set the rate.

Part C: Tax structure by type of tax base

Data sources

The calculation of Part C ratios is done on the basis of specific assumptions and more detailed revenue data than the one published by Eurostat. Eurostat supplements its database supplemented by a so-called National Tax List supplied by Member States to

Eurostat. The allocation of taxes to a tax-base category (consumption, labour, capital), also called the 'economic function code', is applied to each tax contained in the National Tax List.

The detailed revenue data and the economic function code allocation for each country and each tax are

available on the “Economic Analysis” website of the Directorate-General for Taxation and Customs Union.

In addition to the supplementary data, some specific splits/allocations have been assumed:

- A split of the personal income tax to four subgroups is used.
- Compulsory social contributions of the non-employed (considered as part of labour) and the self-employed (considered as part of capital), if not provided separately as D.613CS and D.613CN, are split using estimated shares.

For some countries the split is either directly available in the National Tax List or provided by Member States’ authorities. Where no statistics were available, the share paid by the non-employed was assumed to be negligible.

Methodology and breakdown of taxes by type of tax base

Taxes on consumption, labour and capital add up to the total of taxes received by general government ^(?). The separation of taxes by type of tax base inevitably leads to simplifications and somewhat hybrid categories. A number of borderline cases and approximations had to be taken into account to arrive at a final classification of taxes. Tax data are not always recorded in sufficient detail to identify individual taxes and allocate them to the corresponding tax base categories. In addition, some specific national features required a special treatment. The degree of decomposition provided by national statistical offices makes it sometimes difficult to identify sub-categories. General guidelines for the allocation of the taxes are given in the following Boxes C.1 to C.5. However, exceptions are made if necessary to reflect the true nature of a tax. Borderline cases, which mainly regard the split between taxes on stocks of capital and on consumption, are discussed with Member States.

A key methodological problem when it comes to classifying tax by type of tax base is that some taxes relate to multiple sources of income. This holds most notably for the personal income tax. Therefore, a method was developed to break down personal income tax revenue, in most cases using unpublished data supplied by the national tax administrations. A breakdown of the personal income tax according to four sources of taxable income (labour, capital, self-employment income, and social transfers and pensions) is carried out

^(?) Sums by main economic function may however not add up due to: (a) the non-inclusion of taxes – other than own resources – paid to EU institutions in the case of Belgium and Portugal, and (b) the non-attribution of ‘revenues assessed but unlikely to be collected’ to economic function bases for those countries using D.995.

by Member States’ authorities according to a country specific methodology (the so-called ‘PIT split’). Member States use data sets of individual taxpayers (Belgium, Denmark, Germany, France, Ireland, Luxembourg, Latvia, Malta, Netherlands, Poland, Finland, Sweden, Slovenia and United Kingdom) or income class data based on the data set of individual taxpayers (Cyprus, Greece, Spain, Italy, Lithuania, Bulgaria) or tax receipts from withholding and income tax statistics with certain corrections (Czech Republic, Estonia, Hungary, Austria, Portugal, Romania) ^(?).

Several Member States were not able to provide full time-series coverage for all calendar years. In these cases a trend has been assumed using simple linear interpolations or the fractions were assumed to remain constant, i.e. the 2016 split was considered equal to that of 2015. Tables F.1 to F.4 give all the details of the PIT-split provided by each Member State. In some cases the number of estimates for the PIT split still falls short of the ideal, which to a limited extent affects the accuracy of the distribution of taxes by type of tax base and, therefore, of the implicit tax rates (ITRs). Additional details are given in a later section of this methodological note.

Although, as a rule, taxes are classified under one single category of tax base, in some specific cases a breakdown of revenue has been carried out also for taxes other than the PIT. For example, local business taxes often relate to one or more sources of economic income and are allocated over the different categories of tax base where possible. In those cases, examples of which are mentioned below, estimates from Member States have been used to distribute their revenue across the different groups of tax base.

- The revenue from the French tax on types of accommodation (so-called *Taxe d’habitation*), for example, has been distributed among the categories ‘consumption’ and ‘(stocks of) capital’, using estimates from the national administration. Note that the most appropriate economic function for this tax is currently being investigated by the French National Statistical Office, INSEE.
- The revenue from the Italian Regional tax on Productive Activities (IRAP), for example, has been distributed among the categories ‘labour’ and ‘capital’, using data communicated by the Ministry of Finance. The tax is charged on Public Administrations (state, regions, municipalities, etc.), corporations, partnerships, self-employment and non-commercial bodies. The tax base is the difference between items classified in the production value and items classified in the production cost, as defined in the Civil Code. For the Public Administrations, the tax base is equal to the

^(?) The methodology utilised by Member States to arrive at the PIT split is described in more detail in a separate section of this annex (see ‘Methods used to split the revenue from personal income tax’ in Part F).

total employees' compensation and, therefore, fully attributed to the 'employed labour' component. The part paid by the private bodies is divided between labour and capital by estimating the labour cost from data provided by withholding agents in the tax returns and further calculating the production value net of the estimated labour cost, thus determining the capital share of IRAP.

- The French local business tax (Taxe professionnelle) has been fully allocated to the category 'Stocks of capital', as it is mostly levied on buildings and real estate, and the French government reformed the tax with phasing out the payroll component from the tax base.
- In Italy, the earnings and the compulsory social contributions paid by self-employed persons working under the so called 'co.co.co' regime (coordinated and continuous collaboration, special work regime now abolished and substituted by project collaboration) are transferred from the category 'capital (income of self-employed)' to 'labour' (partly to employers and employees).

Taxes on consumption

Taxes on consumption are defined as taxes levied on transactions between final consumers and producers and on the final consumption goods. In the ESA classification these can be identified as the following categories (see Box C.1).

- Value added-type taxes (D.211).
- Taxes and duties on imports excluding VAT (D.212).

- Taxes on products except VAT and import duties (D.214), which include excise duties. Those taxes paid by companies on products used for production have been excluded from the category of consumption taxes, whenever the level of detail enabled their identification⁽⁴⁾. Some categories have been allocated to capital such as the stamp taxes (D.214B), when they could be identified as related to the stock exchange market or real estate investment. Taxes on financial and capital transactions (D.214C) as well as some export duties and monetary compensatory amounts on exports (D.214K) have also been recorded as capital taxes.
- Other taxes on production (D.29). These are typical borderline cases since this category includes several taxes or professional licences paid by companies 'as a result of engaging in production'. Total wage bill and payroll taxes (D.29C) have been classified as a tax on labour; taxes on land, building and other structures (D.29A) have been classified as taxes on the stock of capital. However, taxes on international transactions (D.29D), taxes on pollution (D.29F) and the under-compensation of VAT (flat-rate system) (D.29G) have been considered as consumption taxes.
- Some taxes defined as current taxes (D.5) in ESA2010 such as poll taxes, expenditure taxes, or payments by households for licences have been attributed to consumption since they are expenditures made by households to obtain specific goods and services.

⁽⁴⁾ A possible breakdown of car registration taxes between those paid by companies and those paid by households would only be available for some countries. Hence, to avoid a different treatment in different Member States, all revenue from car registration taxes has been attributed to consumption.

Box C.1: Definition of taxes on consumption

D.211 Value added type taxes
 D.212 Taxes and duties on imports excluding VAT
 D.214 Taxes on products except VAT and import duties less
 D.214B Stamp taxes
 D.214C Taxes on financial and capital transactions
 D.214K Export duties and monetary compensatory amounts on exports
 From D.29 Other taxes on production:
 D.29D Taxes on international transactions
 D.29F Taxes on pollution
 D.29G Under-compensation of VAT (flat rate system)
 From D.59 Other current taxes:
 D.59B Poll taxes
 D.59C Expenditure taxes
 D.59D Payments by households for licences

Taxes on labour

TAXES ON EMPLOYED LABOUR INCOME

Taxes on employed labour comprise all taxes, directly linked to wages and mostly withheld at source, paid by employers and employees, including actual compulsory social contributions (see Box C.2). They include compulsory actual employers' social contributions (D.611C) and payroll taxes (D.29C), compulsory social contributions paid by employees (D.613CE) and the part of personal income tax (D.51A) that is related to earned income. The personal income tax is typically levied on different sources of income: labour income, but also social benefits, including pensions, dividend and interest income and self-employment income. The notes in Part F explain how taxpayers' data have been used to allocate the personal income tax revenue across different sources of income.

Under the definition of taxes on employed labour income adopted in this report, the categories 'personal income tax' and 'social contributions' are used in a wide sense including all other taxes that are susceptible of increasing the cost of labour. Therefore, the recorded amount of 'personal income tax' in the Nordic countries not only consists of central government income tax, but also includes the state income tax, or municipality income tax and sometimes also church tax. In France, the generalised social contribution (CSG) and the contribution for the reduction in the debt of the social

security institutions (CRDS) are partially booked as income tax on labour income. In Austria, the 'contributions to chambers' and the 'promotion residential building' are also partially booked as tax on labour income. In Hungary, the communal tax on enterprises is allocated to labour as 'employers' social contributions and payroll tax'. In Italy, part of the revenue from the IRAP tax, which is levied on a measure of value added by enterprises, has been allocated to labour and 'employers' social contributions' in particular (and also included in the denominator of the tax ratio). In Belgium and Portugal, personal income taxes and social contributions paid by EU civil servants to the EU Institutions were excluded from the calculations of labour taxes although they are included in total tax revenues.

TAXES ON NON-EMPLOYED LABOUR INCOME

The category labour — non-employed comprises all taxes and compulsory social contributions raised on transfer income of non-employed persons, where these could be identified. This transfer income includes social transfers that are paid by the state (e.g. unemployment, invalidity and health care benefits) and benefits from old-age pension schemes (both state and occupational pension schemes). In this report, taxes on pension benefits are allocated to non-employed labour income and in certain cases to capital income. Part F gives more detail on how Member States use various estimation methods based on tax return data in order to split tax revenue across different sources of income.

Box C.2: Definition of taxes on labour

Employed labour

- From D.51 Taxes on income:
D.51A+D.51C1 Taxes on individual or household income including holding gains (part raised on labour income)
- From D.29 Other current taxes:
D.29C Total wage bill and payroll taxes
- From D.611 Employers' actual social contributions:
D.611C Compulsory employers' actual social contributions
- From D.613 Households' actual social contributions:
D.613CE Compulsory employees' actual social contributions

Non-employed labour

- From D.51 Taxes on income:
D.51A+D.51C1 Taxes on individual or household income including holding gains (part raised on social transfers and pensions)
- From D.613 Households' actual social contributions:
D.613CS+D.613CN Compulsory actual social contributions by self- and non-employed persons (part paid by social transfer recipients)

TAXES ON INCOME OF THE SELF-EMPLOYED

The question arose whether part of the self-employed income should be treated as a remuneration of labour and whether the related taxes should be included in taxes on labour. The best compromise between economic rationale and data availability was to consider self-employment income as income from capital: self-employed income is genuinely an entrepreneurial income and self-employed take the risk of incurring losses when exercising their activity. Personal income taxes as well as social contributions of self-employed are, therefore, allocated to the capital income subcategory for self-employed. This assumption includes the part of self-employment income equivalent to the remuneration of self-employment own labour. For some Member States, this assumption does not reflect the situation of some self-employed, whose economic status or income does not significantly differ from those of wage earners. In Italy, for example, the National Statistical Office (ISTAT) provides official estimates of the percentages of 'mixed income' that can be attributed to labour and capital.

Taxes on capital

Capital is defined broadly, including physical capital, intangibles and financial investment and savings (see Box C.3). Capital taxes include taxes on business income in a broad sense: not only taxes on profits but also taxes and levies that could be regarded as a prerequisite for entering into production/earning profit, such as the real estate tax, as long as owners rather than tenants are taxed, or the recurrent motor vehicle tax paid by enterprises. In their empirical study Desai and Hines (2001) confirmed that these indirect taxes also influence investment decisions of American multinational firms. They also include taxes on capital stocks of households or their transaction (e.g. on real estate). A distinction is drawn between taxes on capital and business income and taxes on capital stock.

Box C.3: Definition of taxes on capital

Capital and business income taxes:

From D.51- Taxes on income:

- D.51A+D.51C1 Taxes on individual or household income including holding gains (part paid on capital and self-employed income)
- D.51B+D.51C2 Taxes on the income or profits of corporations including holding gains
- D.51C3 Other taxes on holding gains
- D.51D Taxes on winnings from lottery and gambling
- D.51E Other taxes on income n.e.c.

From D.613- Households actual social contributions:

- D.613CS Compulsory actual social contributions by self-employed

Taxes on stocks (wealth):

From D.214- Taxes on products, except VAT and import taxes:

- D.214B Stamp taxes
- D.214C Taxes on financial and capital transactions
- D.214K Export duties and monetary compensatory amounts on exports

From D.29- Other taxes on production:

- D.29A Taxes on land, buildings or other structures
- D.29B Taxes on the use of fixed assets
- D.29E Business and professional licences
- D.29H Other taxes on production n.e.c.

From D.59- Other current taxes:

- D.59A Current taxes on capital
- D.59F Other current taxes on capital n.e.c.

D.91 Capital taxes

'Taxes on capital and business income' that economic agents earn or receive from domestic resources or from abroad includes taxes on income or profits of corporations (Box C.4), taxes on income and social contributions of the self-employed, plus personal income tax raised on the capital income of households (rents, dividends and other property income) (Box C.5). In practice this is mainly the personal income tax paid on dividend and interest income and entrepreneurial

activity (part of D.51A + D.51C1) and corporate income tax (D.51B + D.51C2) as well as other taxes on holding gains (D.51C3). This category is further subdivided into 'Taxes on the income of corporations' (using the 'Taxes on the income or profits of corporations including holding gains') and 'Taxes on the income of households', which comprises the remaining sub-headings of 'Capital and business income taxes'.

Box C.4: Definition of taxes on the income of corporations

Taxes on the income of corporations

From D.51-Taxes on income:

D.51B+D.51C2 Taxes on the income or profits of corporations including holding gains

'Taxes on capital stock' include the wealth tax (D.59A), capital taxes (D.91) including the inheritance tax (D.91A), the real estate tax (D.29Aa) or taxes on the use of fixed assets (D.29B), Professional and business licences (D.29E), and some taxes on products (from the category D.214)

and possible other taxes and levies that could be regarded as a prerequisite for entering into production if not allocated elsewhere would fit in this category even if the tax base is not the stock of wealth.

Box C.5: Definition of taxes on the capital and business income of households

Taxes on capital and business income of households:

From D.51 Taxes on income:

D.51A+D.51C1 Taxes on individual or household income including holding gains (part paid on capital and self-employed income)

D.51C3 Other taxes on holding gains

D.51D Taxes on winnings from lottery and gambling

D.51E Other taxes on income n.e.c.

From D.613 Households' actual social contributions:

D.613CS Compulsory actual social contributions by self-employed persons

Part D: Environmental Taxes

The definition of an environmental tax in "Environmental taxes – a statistical guideline" (European Commission 2013) refers to a tax 'whose tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific negative impact on the environment, and which is identified in ESA as a tax'.⁽⁵⁾ Details on the classification of environmental taxes can be found in 'Environmental taxes – a statistical guide'. While

the motivation for introducing the taxes – fiscal or environmental – is not decisive for the classification, its impact on costs and prices is. As the statistical guideline states: 'The definition puts emphasis on the effect of a given tax in terms of its impact on the cost of activities and the prices of products that have a negative effect on the environment. The environmental effect of a tax comes primarily through the impact it has on the relative prices of products and on the level of activities, in combination with the relevant price elasticities.'

⁽⁵⁾ See also Regulation (EU) No 691/2011 on European environmental economic accounts, which uses the same definition.

Environmental taxes comprise taxes on energy, transport, pollution and resources, but value-added type taxes are excluded because they are levied on all products. Environmental taxes represent a sub-category of indirect taxes, in general consumption taxes, but may sometimes also represent taxes on the capital stock.

In line with the definition of the statistical guideline, in this publication environmental taxes are divided in three groups: energy taxes, transport taxes (excl. fuel) and a category combining pollution and resource taxes. For the purposes of this report, the following should be noted:

- **Energy taxes** include taxes on energy products used for both transport and stationary purposes (denoted 'E' in the National Tax List (NTL)). The most important energy products for transport purposes are petrol and diesel. Energy products for stationary use include fuel oils, natural gas, coal and electricity. Note that **CO₂ taxes** are included under energy taxes (rather than under pollution taxes), as it is often not possible to identify them separately in tax statistics. A further disaggregation is provided for energy taxes, namely a category giving the **tax revenues stemming from the transport use of fuels**. Transport fuel taxes include only those taxes which are levied on the transport use of fuels/energy products (including CO₂ taxes) and hence form a subgroup of energy taxes. The derivation of these data is explained under the heading "Transport fuel taxes" below.
- **Transport taxes (excl. fuel)** mainly include taxes related to the ownership and use of motor vehicles (denoted 'T' in the NTL). Taxes on other transport equipment (e.g. planes), and related transport services (e.g. duties on charter or schedule flights or air passenger tax) are also included here, when they conform to the general definition of environmental taxes. The transport taxes may be 'one-off' taxes related to imports or sales of the equipment or recurrent taxes such as an annual road tax. As indicated by the title, taxes on petrol, diesel and other transport fuels, are not included here but are included under energy taxes.
- The last group of **pollution/resource taxes** includes two groups of taxes (denoted 'P' and 'RS' respectively in the NTL). Pollution taxes are taxes on measured or

estimated emissions to air and water, management of solid waste and noise – with the exception of CO₂ taxes, which, as discussed above, are included under energy taxes. The second group – resource taxes – includes any tax linked to extraction or use of a natural resource. This means that licences paid for hunting, fishing and the like are classified as resource taxes, because these activities deplete natural resources. Note that as of the 2013 edition of this publication, taxes on the extraction of oil or gas are not anymore booked as resource taxes, in line with the statistical guideline.

The taxes included as environmental taxes and their respective categories are listed in the NTL for each Member State on the [webpage](#) of the Taxation and Customs Union Directorate General and on the Eurostat [website](#).

Estimation of revenues from transport fuel taxes

Transport fuel taxes are defined as taxes on energy products used for transport purposes only. This category aims at representing the tax burden falling on transport energy products, i.e. transport fuels.

However, National Tax Lists alone are generally not detailed enough to enable this breakdown of tax revenues between transport and non-transport uses of fuel and energy taxes, and auxiliary sources detailing revenues by fuel type and energy uses by fuel types have to be used.

The first estimation strategy is to rely on national sources: all countries have been asked to provide data on tax revenues from mineral oils used in transport only (such as tax revenues from diesel or LPG used for transport purposes only - or just the aggregate of overall mineral oil taxes from transport use) and indicate whether the data are recorded on accrual or cash basis. When necessary, use is made of existing Eurostat and DG "Taxation and Customs Union" data bases to complement the information provided or substitute for the missing information (see box D1).

Box D.1: Auxiliary sources to attribute fuel taxes revenues to transport and stationary uses**The following data sources are available:**

- The National Tax Lists (NTL) which provide overall fuel tax revenues
- The European Commission [Excise duty rates](#) which collect information on (1) revenue and (2) rates from “taxes on consumption (excise duties and similar charges) other than VAT on energy products and electricity”. This information is supplied by the EU member states, but not necessarily following ESA2010 methodology. Revenue data are classified according to eight different product categories and two summary categories. Excise rates are given following the same classification, further broken down according to sector and uses.
 - I) Leaded petrol/Lead substitute petrol
 - II) Unleaded petrol
 - III) Diesel
 - IV) LPG and Methane
 - V) Heavy fuel oil
 - VI) Sum of I)-IV): Total revenues from all mineral oils
 - VII) Natural gas
 - VIII) Coal and Coke
 - IX) Electricity
 - X) Overall sum: Total revenues from all energy products & electricity
- Eurostat public database: The Eurostat public database provides data on environment and energy, and in particular the energy balances from supply through transformation to final energy consumption and uses of energy products, including various oil products ([nrg_102a](#)). Among the final energy uses, the final energy consumption for transport covers all transport sectors (rail, air and water) for all transport use (business, private).

Revenues from transport fuel taxes are estimated using the following principles and sources. Excise duty data (ED) collected by the European Commission are used as a source of data on tax revenues from mineral oil duties. EUROSTAT energy balances provide transport and non-transport uses in final energy consumption. Combining consumption uses with excise rates (also available from the ED database), revenues from transport and non-transport uses can be estimated. This proportion is then applied to the relevant taxes in NTLs.

Additional assumptions are needed for the calculations:

Data on final energy consumption uses tonnes (or toe or TJ) as a measure of the volume of liquid components, whereas excise duties for Petrol and Diesel are defined as Euro/litre. For diesel/gas oil the ‘typical’ conversion factor suggested by Eurostat of 1185l/1000kg is used.

- Moreover, usually more than one tax rate is in place for a product category used for transport purposes. Tax rates on transport diesel are often differentiated according to the diesel’s sulphur or bio diesel content; LPG used for public transport is often taxed at reduced rates or tax exempt altogether. In case multiple tax rates do not permit the application of the general formula ‘tax rate x amount of transport fuel in litres’, a different approach is used. Transport tax revenues are derived as the difference between total tax revenues

according to the product category given by the ED data, namely III) Diesel or IV) LPG and Methane, and the non-transport tax revenues. Calculating non-transport tax revenues by applying the general formula proved feasible as non-transport tax rates are usually less differentiated.

As the ED data does not necessarily follow the ESA2010 methodology used in the NTL further adjustments have to be made to derive the amount of transport fuel taxes according to ESA2010 methodology. First, the shares of transport fuel taxes in mineral oil taxes and in overall energy taxes in ED data are calculated. This is achieved by the division of the estimated transport fuel taxes by VI) Total revenues from all mineral oils and by X) Total revenues from all energy products & electricity, respectively. The resulting shares are then applied to the respective categories in the NTL. Preferably, the ED share of transport fuel taxes to mineral oil taxes is applied to the NTL category of mineral oil tax revenues, as usually the concepts for mineral oil taxes as given in the NTL and in the ED data are linked closely. The application of this share gives hence a proxy of ‘tax revenues stemming from the transport use of fuels’ according to the ESA2010 methodology, which is the one published in the report. In case of unavailability of the category mineral oil taxes in the NTL, the share of transport fuel taxes to energy taxes resulting from the ED data is applied to energy taxes in the NTL.

In some cases it was necessary to apply the split between transport fuel tax revenues and other tax revenues as provided by the Member States – mostly in cash data – to the respective category in the NTL, to give an approximation following the ESA2010 methodology.

While the estimation principles are comparable across countries, the extent to which the different sources have been used varies a lot across countries and time. The full estimation method described above has been used when the only information available is fuel tax revenues from the NTL. On the other hand, as the breakdown of transport and other fuel excises is already recorded in the National Tax List of Poland, no further calculations were necessary for that country. For other countries, total revenues attributed to transport fuel taxes were directly

provided by the Ministry of Finance. Others (Belgium, Italy) provided the directly usable share of the fuel tax revenues that are to be attributed to transport fuel taxes. When data are provided on a cash basis (Czech Republic, Denmark, Germany, Estonia, Croatia, Italy, Cyprus, Lithuania, Luxembourg, Netherlands, Austria, Portugal, Romania), the share of total fuel taxes on a cash base is calculated and applied to ESA2010 accrual data available in the NTLs.⁶ In other cases as well a breakdown of excise revenues was provided by type of fuel. Each fuel was then attributed to transport or stationary uses (possibly broken down with the help of energy balances)

⁽⁶⁾ Although the difference is likely to be small for excise and consumption taxes.

Part E: Property taxes

The classification of taxes on property applied in this report follows, with some adjustments, the approach employed in the OECD Classification of Taxes (2017), which distinguishes six categories of property taxes: 1) recurrent taxes on immovable property; 2) recurrent taxes on net wealth; 3) estate, inheritance and gift taxes; 4) taxes on financial and capital transactions; 5) other non-recurrent taxes on property and 6) other recurrent taxes on property.

The following comparative table (Box E.1) between System of National Accounts (2008 SNA) and European System of Accounts (ESA2010) was used, with the current report distinguishing only between “Recurrent taxes on immovable properties” – category 1) in the above OECD classification – and “Other property taxes” for all the other five categories of property taxes distinguished by the OECD.

Box E.1: Taxes on property – classification

OECD classification	2008 SNA	2010 ESA	ESA2010 classification	Taxation Trends report Taxes on property
4000 Taxes on property				
4100 Recurrent taxes on immovable property				} Recurrent taxes on immovable property
4110 Households	D.59-8.63(a)	D.59A	Current taxes on capital	
4120 Other	D.29-7.97(b)	D.29A	Taxes on land, buildings or other structures	
4200 Recurrent net wealth taxes				} Other property taxes
4210 Individual	D.59-8.63b	D.59A	Current taxes on capital	
4220 Corporations	D.59-8.63b	D.59A	Current taxes on capital	
4300 Estate, inheritance and gift taxes				
4310 Estate and inheritance taxes	D.91-10.207b	D.91A	Taxes on capital transfers	
4320 Gift taxes	D.91-10.207b	D.91A	Taxes on capital transfers	
4400 Taxes on financial and capital transactions	D.59-7.95d; D.29-7.96e	D.214B, C	Stamp taxes Taxes on financial and capital transactions	
4500 Other non-recurrent taxes on property	D.91-10.207a	D.91B	Capital levies	
4600 Other recurrent taxes on property	D.59-8.63c	D.59A	Current taxes on capital	

In this publication the overall level of property taxes is thus obtained by aggregating the relevant revenue of the following ESA categories: D.214B, D.214C, D.29A, D.59A, D.91A, D.91B. The total is split between recurrent taxes (D.29A+D.59A (excl. wealth taxes)) on immovable property and other property taxes (D.214B, C + D.59A + D.91A, B). D.59A appears in the two groups of property taxes; wealth related taxes are excluded from recurrent property taxes and included only in the second group "Other property Taxes". Given the broad definition of the statistical categories some additional adjustments were made by National Statistical Offices: exclusion of recurrent taxes on motor vehicles, roads, boats, farm

contributions, stamp taxes on alcohol, tobacco (from D.214B, C) and other exclusions from D.29A and D.59A in a number of countries (Belgium, Czech Republic, France, Croatia, Italy, Cyprus, Latvia, Netherlands, Austria, Portugal, Romania, Slovenia, Slovakia and United Kingdom). The detailed list of taxes included in the computation of property taxes for every country is available in the National Tax List published [online](#).

Possible discrepancies between results published by OECD and those presented in this report could stem from different allocation of tax payments in the two classifications – OECD and National Tax List (ESA2010) – as well as from different time-points of data reporting.

Part F: Implicit tax rates, split of personal income tax revenues and average effective tax rate

In this last section of the methodological annex, information is given on the methodology followed for calculating implicit tax rates, for splitting personal income tax revenues and for estimating average effective tax rates.

The implicit tax rates are defined for each tax base category defined in part C. They are computed as the ratio of total tax revenues of the category (consumption, labour, and capital) to a proxy of the potential tax base defined using the production and income accounts of the national accounts.

Data sources

National accounts data used in the construction of the denominator are extracted from the Eurostat public database with further national accounts data acquired for calculating the bases of the implicit tax rates on capital and capital income. The numerators are taken from the ratios calculated in Part C. In some cases, limitations in data availability may affect or prevent the calculation of the ITR. The ITR on capital is the most complex of the ITRs and suffers from problems related to patchy data availability. As a result, comprehensive figures for the ITR on capital have not been published in this edition, but the indicator is now under review and will appear again once it has been re-designed. Nevertheless, an indicative analysis of the ITR on capital and the ITR on corporate income can be found in Part 1, along with some notes regarding the limitations of the indicators. A description of the existing methodology for the capital ITRs is reproduced later in this section.

Methodology

The tax revenue relative to GDP statistics presented in this survey can be described as macro backward-looking tax burden indicators. In Annex A tables 39 to 62 the taxes raised on different types of tax base are shown as percentages of total GDP and of total taxation. However, the consideration of tax revenue as a proportion of GDP provides limited information as no insight is given as to whether, for example, a high share of capital taxes in GDP is a result of high tax rates or a large capital tax base. These issues are tackled through the presentation of ITRs which do not suffer from this shortcoming.

ITRs measure the actual or effective average tax burden directly or indirectly levied on different types of tax base or activities that could potentially be taxed by Member States. Note, however, that the final economic incidence of the burden of taxation can often be shifted from one taxpayer to another through the interplay of demand and supply: a typical example is when firms increase sales prices in response to a hike in corporate income taxation; to a certain extent the firms' customers end up bearing part of the increased tax burden. The ITRs cannot take these effects into account, as this can only be done within a general equilibrium framework. Despite this limitation, ITRs allow the monitoring of tax burden levels over time (enabling the identification of shifts between the taxation of different types of tax base e.g. from capital to labour) and across countries. Alternative measures of effective tax rates exist, which, using tax legislation, simulate the tax burden generated by a given tax, and can be linked to individual behaviour. However, these 'forward-looking' effective tax rates do not allow the comparison of the tax burden implied by different taxes; nor do they facilitate the identification of shifts in the taxation of different economic income and activities.

The comparability of these indicators has been enhanced by the improved consistency and harmonised computation of ESA national accounts data. However, this improvement can only be fully exploited by using the same denominator for all countries and not accounting for country-specific peculiarities in national tax legislation. For capital, an average tax rate is estimated by dividing all taxes on capital by a broad approximation of the total capital and business income both for households and corporations. For labour, an average tax rate is estimated by dividing direct and indirect taxes on labour paid by employers and employees by the total compensation of employees. The attractiveness of the approach lies in the fact that all elements of taxation are implicitly taken into account, such as the combined effects of statutory rates, tax deductions and tax credits. They also include the effects due to the composition

of income, or companies' profit distribution policies. Further, the effects of tax planning, as well as the tax relief available (e.g. tax bases which are exempted below a certain threshold, non-deductible interest expenses), are also taken implicitly into account. The advantage of the ITRs in capturing a wide set of influences on taxation is accompanied by difficulties in interpreting the trends when a complete and precise separation of the different forces of influence is not possible (?). In addition, any timing differences that arise because of lags in tax payments and business-cycle effects may give rise to significant volatility in these measures. In short, they represent a reduced model of all variables influencing taxation, tax rates and bases.

(?) OECD (2000, 2002).

Box F.1: Definition of the implicit tax rate on consumption

Implicit tax rate on consumption (ESA2010)

Taxes on consumption / (P.31_S.14dom)

Numerator: see Box C.1 – taxes on consumption

Denominator: P.31_S.14dom: Final consumption expenditure of households on the economic territory (domestic concept)

Implicit tax rate on consumption

The ITR on consumption is defined as all consumption taxes divided by the final consumption expenditure of private households on the economic territory (domestic concept) (see Box F.1)

In the analytical section of the report (Part 1), the ITR on consumption is split into four categories (only the numerator is broken down; the denominator remains the same for each sub-category). The identification of the revenue is done on the basis of the National Tax List. The four categories are as follows:

- VAT: the share of the ITR on consumption relating to VAT (D.211-type taxes).
- Energy: this sub-category includes all consumption taxes on energy listed in the National Tax List; these cover mainly excise duties on mineral oils, duties on electricity or similar taxes; the definition may differ slightly from the one used for Tables 65 and 66 in Annex A, as the latter may also include energy taxes levied on capital or labour.
- Tobacco and alcohol: these include all excise duties on alcohol and tobacco products listed in the National Tax List. For Italy the revenues from stamp duties are included.
- Residual: all remaining consumption taxes are booked in this sub-category; they are obtained as a difference from the total.

Implicit tax rate on labour

The ITR on employed labour is a summary measure that approximates an average effective tax burden on labour income in the economy, and is defined as the sum of all direct and indirect taxes and employees' and employers' social contributions levied on employed labour income divided by the total compensation of employees working in the economic territory (see Box F.2). The ITR on labour is calculated for employed labour only (so excluding the tax burden falling on social transfers, including pensions). Direct taxes are defined as the revenue from personal income tax that can be allocated to labour income. Indirect taxes on labour income, currently applied in some Member States, are taxes such as payroll taxes paid by the employer. The compensation of employees is defined as total remuneration, in cash or in kind, payable by an employer to an employee in return for work done. It consists of gross wages (in cash or in kind) and thus also the amount paid as social insurance contributions and wage withholding tax. In addition, employers' social contributions (including imputed social contributions) as well as to private pensions and related schemes are included. Personal income taxes and social contributions paid by EU civil servants to the EU Institutions are not included. Compensation of employees is thus a broad measure of the gross economic income from employment before any charges are withheld.

Box F.2: Definition of the implicit tax rate on labour

Implicit tax rate on employed labour (ESA2010)

Direct taxes, indirect taxes and compulsory actual social contributions paid by employers and employees, on employed labour income/ (D.1 + D.29C)

Numerator: see Box C.2 – Taxes on Labour: Employed labour*Denominator:* D.1 Compensation of employees, D.29C Wage bill and payroll taxes

A fundamental methodological problem in calculating the ITR on labour and capital is that the personal income tax is typically broad-based and relates to multiple sources of income (i.e. employed labour, self-employed labour, income from capital and income in the form of social benefits and pensions received). The note later in this section on the PIT split explains the calculations for estimating the part of the revenue from personal income tax that can be attributed to labour income and other income sources.

In this report the ITR on labour is one of two indicators used to analyse effective tax rates on labour income, the second being the so-called ‘tax wedge’. These two indicators are based on different methodological approaches, and each has its own advantages and disadvantages.

As explained above, the calculation of the ITR on labour involves relating realised tax revenues to macro-economic variables in the national accounts. It gives a global picture of the taxation of all workers, and is useful for analysing the allocation of the tax base between labour, capital and consumption. It is based on real data that reflect all of the factors that determine the amount of tax paid, including the overall effects of deduction, exemptions, credits and taxpayers’ behaviour, along with the effects of non-compliance. However, because it is a broad indicator, it does not allow the exploration of important differences in effective tax rates due to the personal circumstances of taxpayers, such as their income level or their household composition ⁽⁹⁾. Moreover, the ITR on labour does not disentangle cyclical, structural and policy elements, which implies that the observed changes may only partially reflect discretionary tax policy measures. For example, strong economic growth may decrease the importance of allowances and tax credits and, therefore increase the average tax rate or move taxpayers into higher personal income tax brackets resulting in higher real tax payments (bracket creep).

The second indicator used in the report to analyse effective tax rates on labour income is the ‘tax wedge’. This is defined as the sum of personal income taxes and employee and employer social security contributions net of family allowances expressed as a percentage of total labour costs (the sum of gross wage and social security contributions paid by the employer). The approach is

⁽⁹⁾ See also Clark (2002).

to choose a number of typical taxpayer scenarios, in terms of household composition and income levels, and in each case to apply the tax rules of the country concerned to calculate the effective tax rate. Thus, unlike the ITR on labour, it does not measure the overall effective rate across all workers, but produces a set of different rates for each particular taxpayer scenario. This helps, for example, when assessing the impact of tax reforms targeted at low-wage earners, or when analysing the effects of taxation on supply and demand in labour markets. Because it is based on a ‘theoretical’ calculation, the tax wedge indicator can also provide data on the effects of tax reforms before macro-data are available. In addition, focussing on specific taxpayer situations eliminates differences between countries that are due to income distribution or demographics.

From the above, it is clear that the two indicators are rather different in terms of their scope. The ITR on labour measures the burden from employed labour taxes and social security contribution, net of tax credits, allowances, exemptions and deductions, but excludes social benefits. It also integrates the effects of taxpayer behaviour, including non-compliance. The tax wedge, however, covers tax, SSC and (universal) social benefits, but does not cover all tax reliefs or all types of benefits, or the behavioural impacts of tax reforms. An advantage of the tax wedge is that it allows comparisons between those countries that help families through benefits and those that use the tax system to do so.

For both indicators there is a problem when comparing countries where certain types of benefits are paid in cash with those where there is an in-kind provision of such services subsidized by the state. In addition, neither of the two indicators takes into account non-wage income, notably income on capital which can be a significant component of the overall income position of high earners.

A further issue that arises relates to the adjustment of the ITR on labour for payable tax credits. The new national accounts system, ESA 2010, adopted the ‘gross method’ of reporting with the whole amount of payable tax credits recorded as government expenditure. To keep the accounting of government budget balance right, the full amount of the payable tax credits is also recorded on the other side of the government budget, as tax revenues. This is explained in the dedicated

section in Part 1. A case can be made for adjusting the numerator of the ITR on labour by deducting that part of payable tax credits that is used to reduce the tax liability (but including the part of the payable tax credits that is actually transferred to the tax payer as a component of government expenditure). Indicative figures showing the effects of such an adjustment are given in Part 1 for those countries where data were available to do so. It should be noted, however, that the tax wedge indicator deducts the total value of payable tax credits – i.e. both the expenditure component which reduces the tax liability, and the transfer component.

Implicit tax rates on capital

The implicit tax rate on capital and its sub-components are the most complex of the ITRs both to construct and to interpret. The ITR on capital has not been published comprehensively in this edition, but is under review. Nevertheless, for completeness, a full description of the existing methodology for the capital ITR is reproduced in this section. An indicative analysis of the ITR on capital and the ITR on corporate income can be found in Part 1, along with some notes regarding the limitations of the indicators.

PROPERTIES OF THE IMPLICIT TAX RATE ON CAPITAL

The overall implicit tax rate on capital is computed as the ratio between revenue from all capital taxes, and all (in principle) potentially taxable capital and business income in the economy. It aims at representing the average tax burden falling on capital income.

Our definition of taxes on capital does not stop at taxes levied on capital income streams, such as the corporate income tax, but includes taxes on stocks of wealth or capital assets, stemming from savings and private sector investments in previous periods; as well as taxes on asset transactions. In other words not only taxes on profits are included but also, for instance, taxes and levies that could be regarded as a prerequisite to earn them, like the real estate tax or the motor vehicle tax paid by enterprises; this kind of taxes have to be paid also by non-profitable entities, and, therefore, cannot properly be treated as taxes on income streams. Given that national accounts do not provide any indicator for the tax base of taxes levied on capital stocks or their transactions (e.g. a harmonised measure of the stock of capital or of asset transactions), the overall ITR on capital simply uses as a denominator potential capital and business income; however, this publication also includes a more narrowly defined ITR on capital and business income which excludes taxes on wealth or the capital stock but simply measures the average effective tax burden on private sector investment and saving, as a ratio between taxes paid on capital income streams and the aggregate of capital and business income.

Of the various implicit tax rates, the ITR on capital is the most complex⁽⁹⁾. Its trend can reflect a very wide range of factors, which can also vary for different Member States. In particular, three main factors may distort the ITR on capital and business income in the short and medium run.

- Time lags: theoretical considerations as well as empirical evidence suggest that the ITR on capital income is sensitive to the business cycle. Unlike other taxes the corporate income tax is characterised by long and variable lags between the emergence of income and its taxation, due notably to the possibilities to defer taxation because of previously incurred losses or group taxation.
- Capital gains: expansionary phases, for example in the late 1990s, are accompanied by booming stock markets all over the EU. As a result, capital gains and the corresponding tax revenues may rise substantially. However, given that capital gains are not included in the denominator of any ITR on capital, this development clearly leads to an overestimation of the average effective tax burden on capital and business income, and partly explains the rise in the ITR for some Member States.
- Structural changes in the financing of companies: for example, national accounts data show that from 1995 to 2002, in most Member States a relative shift in financing from debt to equity occurred such that capital income consists less of interest and more of dividend payments. This happened against the background of falling interest rates. Most tax systems in the EU are not neutral concerning financing and allow interest payments to be deducted from the tax base. The shift towards higher dividend distributions results in an increase in the measured average tax burden⁽¹⁰⁾ at unchanged legislation.

Furthermore it is important to note that a cut in the statutory rate that is offset by an equivalent widening of the tax base will leave the ITR on capital unchanged. This is not a limitation of the indicator, but rather an advantage given that the ITR aims at measuring the effective tax burden. This property of the indicator may contribute to explain the relatively limited fall in the ITR on capital in the last years despite significant EU wide reductions in statutory corporate tax rates.

Interpreting the ITRs on capital one should bear in mind that the bases used for the computation are, particularly in the new Member States, not only narrower but also more volatile than GDP as a whole, and thus subject to wide swings. Hence, the overall volatility of this ratio is significantly higher than that of the other ITRs. A degree of caution is, therefore, advisable when making cross-country

⁽⁹⁾ The construction of this indicator and its possible sources of bias in measuring the effective tax burden on capital are explained in detail in European Commission (2004a).

⁽¹⁰⁾ European Commission (2001a).

Box F.3: Definition of the implicit tax rate on capital (income)

Implicit tax rate on capital (income)	Capital (income) taxes /
	(1) + (2) + (3) + (4) - (5) + (6) - (7) + (8) - (9) + (10) - (11) + (12) + (13) + (14) - (15) + (16) - (17) + (18) + (19)
<i>Numerator:</i>	see Box C.3 – taxes on capital
<i>Denominator:</i>	
(1) B.2n_S.11-12	Net operating surplus of non-financial and financial corporations (incl. quasi-corporations)
(2) B.2n_S.14-15	Imputed rents of private households and net operating surplus of non-profit institutions
(3) B.3n_S.14	Net mixed income of self-employed
(4) D.41_S.11-12rec	Interest received by non-financial and financial corporations
(5) D.41_S.11-12pay	Interest paid by non-financial and financial corporations
(6) D.44_S.11-12rec	Insurance property income attributed to policy holders received by non-financial and financial corporations
(7) D.44_S.11-12pay	Insurance property income attributed to policy holders paid by non-financial and financial corporations
(8) D.45_S.11-12rec	Rents on land received by non-financial and financial corporations
(9) D.45_S.11-12pay	Rents on land paid by non-financial and financial corporations
(10) D.42_S.11-12rec	Dividends received by non-financial and financial corporations
(11) D.42_S.11-12pay	Dividends paid by non-financial and financial corporations
(12) D.42_S.13rec	Dividends received by general government
(13) D.42_S.2rec	Dividends received by rest of the world
(14) D.41_S.14-S15rec	Interest received by households, self-employed and non-profit organisations
(15) D.41_S.14-S15pay	Interest paid by households, self employed and non-profit organisations
(16) D.45_S.14-S15rec	Rents on land received by households, self employed and non-profit organisations
(17) D.45_S.14-S15pay	Rents on land paid by households, self employed and non-profit organisations
(18) D.42_S.14-15rec	Dividends received by private households, self-employed and non-profit organisations
(19) D.44_S.14-15rec	Insurance property income attributed to policyholders received by private households, self-employed and non-profit organisations

comparisons or comparisons of one Member State with the EU averages.

Large changes in backward-looking measures of the tax rate on capital are not unusual and not limited to macro indicators. Tests on Belgium and Sweden ⁽¹⁾ report annual changes of several percentage points for effective tax rates derived both from national accounts data or tax statistics using micro data for companies. The calculations presented here have similar features.

Moreover, statistical issues related to the sector data used to compute the denominator of the ITRs might also influence the results. National accounting data are in fact regularly revised. In 2006, complying with the EU legislation ⁽²⁾, the Member States were required

to introduce a number of important methodological revisions in their national accounts in order to improve the measurement of GDP. In particular, the main change, as for the sector accounts, was the allocation of the Financial Intermediation Services Indirectly Measured (FISIM ⁽³⁾) to user sectors/industries, instead of intermediate consumption. Imports of FISIM have also been recorded. At certain moments several Member States did not entirely conform to the methodological regulations. It is, therefore, possible that statistical artefacts influence the time series, particularly in those points where data compiled according to a new methodology are joined with old-series data.

⁽¹⁾ Valenduc (2001), Clark (2002).

⁽²⁾ The legal reference for the definition, calculation and allocation of FISIM are Council Regulation (EC) No 448/98 of 16 February 1998 completing and amending Regulation (EC) No 2223/96 with respect to the allocation of Financial Intermediation Services Indirectly Measured (FISIM) within the European system of national and regional accounts (ESA) and Commission Regulation (EC) No 1889/2002 of 23 October 2002 on the implementation of Council Regulation (EC) No 448/98 completing and

amending Regulation (EC) No 2223/96 with respect to the allocation of Financial Intermediation Services Indirectly Measured (FISIM) within the European System of national and regional Accounts (ESA).

⁽³⁾ Financial intermediaries provide services for which no explicit charges are made. The estimate of this latter is known in national accounts as the Financial Intermediation Services Indirectly Measured (FISIM) and it is fixed by convention. Up to now FISIM has been recorded as intermediate consumption of a notional industry, for want of relative observable variables. (See http://europa.eu.int/estatref/info/sdds/en/na/na_changes2005.pdf for details).

THE IMPLICIT TAX RATE ON CAPITAL AND THE IMPLICIT TAX RATE ON CAPITAL AND BUSINESS INCOME

The implicit tax rate is calculated for total capital taxes and for the subcategory of taxes on capital income (which differs from capital taxes overall because it excludes taxes on the stock of capital) ⁽¹⁴⁾. Both indicators have the same denominator, i.e. total profit and property income from both corporations and households. In the case of taxes on capital income, the denominator does not correspond to the actual tax base; it is in some ways narrower (omitting capital gains) and in other ways broader (excluding some deductions from the tax base). As for 'capital taxes on stocks and wealth', the denominator does not take into account any asset or wealth on which the tax is levied. In addition, two additional disaggregated ITRs, on corporate income and on capital and business income of households are computed. These do not add up to the ITR on capital and business income.

The computation of the ITRs for the whole 1995–2011 period was not possible for four (Bulgaria, Luxembourg, Malta and Romania) out of the 27 Member States and only partly possible for another four Member States (Denmark, Estonia, Ireland, Greece and Spain), mainly because of lack of data availability in the sector accounts. In order to obtain EU averages as accurate as possible, the missing values for the latter group of countries were replaced with the latest available figures and the average was labelled 'adjusted'. Likewise, if the data for the beginning of the series are missing, for the purpose of calculating EU averages only the value for the country is proxied by the first available data point. In the case of **Luxembourg**, following the methodological changes in national accounts regarding the FISIM and given the sizeable weight of the financial sector in this country, it no longer seems appropriate to employ a simplified methodology to compute the ITRs on capital as done until the 2007 publication of the report. The ITRs will be published when a complete set of sector accounts is available. Until the 2008 edition of the report, the ITR was computed with reference to a simplified set of data for **Ireland**. As of the 2009 edition, a full sector accounts dataset is available and the use of it resulted in a downward revision of the ITR.

Of the various implicit tax rates, the ITRs on capital are by far the most complex and given their limitations should be interpreted very carefully. A first problem is that as indicated below, the ITR on capital is broadly based and, therefore, reflects a wide range of factors. In particular, the definitions of the ITR denominators can only roughly approximate the worldwide capital income of a country's residents for domestic tax purposes. This does not mean

that on the side of companies profits of foreign affiliates are consolidated within the (domestic) parent company. National accounts disregard the foreign ownership of subsidiaries located on the economic territory when the generation of profits is recorded. They are simply treated as domestic companies ⁽¹⁵⁾. However, the base of the ITR does not measure the actual base of tax legislation, which drives tax revenues. So in practice it is not easy to link developments in the overall ITR on capital and business income to the various statutory tax rates and other policy changes.

Capital and business income according to national accounts is defined as profits and property income. Profits are defined as net operating surplus (B.2n) of the private sector including corporations (and quasi-corporations), private households, and non-profit institutions and mixed income (B.3n) of the self-employed. The net operating surplus of the government sector is excluded, because losses or profits of the government are not subject to taxation.

There is no simple way of approximating the tax base for property income (mainly interest and dividends) for the whole private sector. A specifically defined balance of property income of the private sector (received minus paid) is used. The objective for the definition of this balance was to approximate the potentially taxable profit of a company and the taxable capital income of private households.

Taxable profits of companies consist of net operating profit and property income received (financial income) less certain deductible elements of property income paid. The property income deductible from the tax base includes interest (D.41), property income attributed to insurance policyholders (D.44) and rents on land (D.45). Dividends (part of distributed income of corporations — D.42) are part of the financial income but they cannot be deducted to calculate the taxable base in national tax legislation ⁽¹⁶⁾. For private households, the taxable capital income consists almost completely of interest and dividend payments received and of property income attributed to policyholders received from insurance companies and pension funds.

⁽¹⁵⁾ The profits of foreign affiliates are recorded in the distribution of income as 'reinvested earnings on foreign direct investment' (D.43) between the parent and subsidiary company. The flow D.43 paid in national accounts means that subsidiaries in the host country have retained profits and this is attributed to the parents abroad in national accounts. The flow D.43 received consists of retained profits of subsidiaries abroad attributed to the parent companies in the investigated country. Both flows can have a negative sign in the case of losses of the subsidiaries. The solution for the ITR tax base is not taking reinvested earnings on foreign direct investments into account. On the one hand the profit (or loss) of a parent earned abroad is not counted. On the other hand the retained profits (or losses) of foreign subsidiaries in the home country is not deducted from the ITR tax base.

⁽¹⁶⁾ The ITRs for the whole private sector avoid double counting of dividends that are distributed by domestic companies out of their operating profits by deducting dividends paid to domestic private households or other domestic companies from the capital ITR tax base. For more details on this issue see European Commission (2004a).

⁽¹⁴⁾ The methodology is described in: European Commission (2004a).

The balance of D.44 received minus paid usually nets off for the whole private sector. The definition takes into account the received property income from abroad and improves the measurement of profits from banks and insurance companies. However, for the ITR on capital several sources of bias compared to taxable profits remain.

- Since the calculation of depreciation of fixed capital in national accounts uses prices of the current period, it differs a lot from methods used in profit and loss accounts. Additionally, the calculation of consumption of fixed capital is not comparable across countries. This could lead to additional biases in measuring the effective tax burden on capital.
- Capital gains are not part of profits in national accounts because they are not related to the production process. This important part of taxable profits of (financial) companies is disregarded in calculating the denominator and leads to an overestimation of the ITR on capital and business income as far as capital gains are taxed. The same is true as regards the capital gains of private households, which are often taxed under the personal income tax. All this is likely to affect international comparability, as some countries have a greater share of financial company profits including gains.
- Central banks are part of the financial corporations sector in national accounts. The inclusion of their (non-taxable) profits in the denominator leads to an underestimation of the ITR on capital and business income.
- For taxable third-pillar private pension benefits, treated as income from capital in the split of the personal income tax (PIT), no corresponding income flow is recorded in national accounts. Ignoring these benefits in the potentially taxable capital and business income in the denominator leads to an overestimation of the ITR.
- In the Eurostat data on national accounts for the EU Member States, interest payments by households and self-employed are not available separately. Taking the total net interest as part of the denominator accounts for tax deductible interest payments of self-employed but leads to an overestimation of the ITR on capital because interest payments for mortgage and consumer loans are not tax deductible in most Member States.
- Unlike net operating surplus, taxable profits and tax revenues are reduced by losses carried forward, causing a cyclical mismatch with the base and cyclical fluctuation in the ITR, which sometimes makes the trend difficult to interpret. This may also distort international comparisons. In addition, the difference in the measurement of imputed rents on owner-occupied dwellings between national accounts and tax legislation is another source of bias.
- The overall ITR on capital and business income for corporations and households is influenced through various channels. Therefore, developments of this indicator are sometimes difficult to explain.

THE ITR ON CAPITAL INCOME OF CORPORATIONS AND THE ITR ON CAPITAL INCOME OF HOUSEHOLDS AND SELF-EMPLOYED

The interpretation of the overall ITR on capital and business income of corporations and households is complicated by the overlapping effects of the various channels previously described. Although difficulties of interpretation stemming from the backward-looking character of the indicator remain, the reading of the ratios is in fact simplified when splitting the ITR between an ITR for the corporate sector and another ITR for the households sector. However the breakdown is not perfect as the denominators of the two indicators are partly overlapping.

The numerator of the overall ITR can be split using the allocation of taxes to the category 'income corporations', '(capital) income households' and 'income self-employed' ⁽¹⁷⁾. In most countries, tax revenues raised on corporate income equal the aggregate D.51b + D.51c2 'Taxes on the income or profits of corporations including holding gains' (Box F.4). For Germany, Italy and Austria revenues from local or regional business taxes are added. In general, the other tax categories of the overall ITR numerator are allocated to the households sector (Box F.5). The other two categories ('(capital) income households' and 'income self-employed') are taken as numerator of the ITR on capital and business income for households. This includes mainly taxes on holding gains of households, the share of personal income tax on capital and on the self-employed and the social contributions paid by the latter.

The denominator includes the mixed income of the self-employed, the net operating surplus of households, dividends and attributed insurance property income received and the difference between received and paid interest and rents ⁽¹⁸⁾. The denominator for corporations consists of their net operating surplus, the difference between received and paid interest and rents and a specific definition of dividends minus property income from insurance companies and pension funds attributed to policyholders ⁽¹⁹⁾.

In calculating the potential taxable base of the corporate sector, interest income received by collective investment funds is included, even though such income is generally exempt from taxation in most EU countries (taxation occurs at the level of the individual investor rather than at

⁽¹⁷⁾ A detailed classification of taxes to the different categories for each Member State is available on the [webpage](#) of the Directorate-General for Taxation and Customs Union.

⁽¹⁸⁾ Note that as far as rent income is concerned, the definition adopted here departs from the customary tax treatment of property income, which in most cases is based on gross property income (possibly with some deduction of interest expenses).

⁽¹⁹⁾ Strictly speaking, it is the balance of attributed property income (D.44) paid mainly to private households and received property income attributed to insurance policyholders because also corporations and quasi-corporations can be insurance policyholders too.

the level of the fund). The impact of this on the calculation of implicit rates differs according to the relative size of the funds industry as compared to the overall economy in each Member State. In Ireland, which has a large international investment funds industry, the inclusion of this tax-exempt income has a disproportionate impact on the calculation of implicit rates of corporate income for Ireland, as compared to other Member States, with the resulting estimates being significantly reduced.

When splitting the ITR on capital income for (non-financial and financial) corporations and households, the flows of property income between these two sectors are of particular importance. A clear split can be made for the national accounts categories interest payments (D.41) and rents (D.45).

In principle, dividends are part of the taxable financial income of a company. They are subject to double taxation because corporate taxes have been levied on the profit at the level of the distributing company. In order to limit or offset the double taxation at the level of the shareholder (corporation or individual) Member States apply different taxation schemes. However, most countries do not offset fully the double taxation. If the dividends received are part of the potentially taxable base, the ITR on corporate income will be lower in those countries which give greater relief for the double taxation of dividends compared to a country that fully applies the classical system.

However, it would be deceptive to count only the dividends received by financial and non-financial corporations. Because the net operating surplus out of

which dividends are distributed is already part of the denominator the dividends would be partly counted twice. Dividends distributed by a company belonging to the sector for financial or non-financial corporations should not be counted. Only dividends received from abroad should be taken into account when constructing the ITR for all corporations.

Unfortunately, information on dividends distributed from the rest of the world to domestic corporations is not available in the Eurostat database of national accounts. For dividends (and nearly all other flows in national accounts) we only know what a specific sector receives from all other sectors and what it pays to all other sectors. However, this information can be used to approximate the dividends received by corporations from abroad. From the total sum of dividends received by corporations (D.42rec_S11-12) we deduct the dividends distributed by domestic corporations (D.42pay_S11-S12) in order to avoid double counting. However, this deduction is too large, as only the dividends distributed to domestic corporations should be subtracted. Therefore, dividends received by the government (D.42rec_S13), the rest of the world (D.42rec_S2) and households (D.42rec_S14-15) are added to the denominator. This approximation is only fully correct under the assumption that government and households do not receive dividends directly from abroad but through domestic banks and insurance companies. For households it can be expected that they receive a certain part of dividends from abroad, meaning that the dividends included in the denominator are overestimated.

Box F.4: Definition of the implicit tax rate on corporate income

Implicit tax rate on corporate income	$(1) + (2) - (3) + (4) - (5) + (6) - (7) + (8) + (9) + (10) + (11) - (12)$	Taxes on corporate income/
<i>Numerator:</i>		
D.51b+D.51c2		Taxes on the income or profits of corporations including holding gains
<i>Denominator:</i>		
(1) B.2n_S11-12		Net operating surplus of non-financial and financial corporations (incl. quasi-corporations)
(2) D.41_S11-12rec		Interest received by non-financial and financial corporations
(3) D.41_S11-12pay		Interest paid by non-financial and financial corporations
(4) D.45_S11-12rec		Rents on land received by non-financial and financial corporations
(5) D.45_S11-12pay		Rents on land paid by non-financial and financial corporations
(6) D.42_S11-12rec		Dividends received by non-financial and financial corporations
(7) D.42_S11-12pay		Dividends paid by non-financial and financial corporations
(8) D.42_S13rec		Dividends received by general government
(9) D.42_S2rec		Dividends received by rest of the world
(10) D.42_S14-15rec		Dividends received by households, self-employed and non-profit institutions
(11) D.44_S11-12rec		Insurance property income attributed to policyholders received by non-financial and financial corporations
(12) D.44_S11-12pay		Insurance property income attributed to policyholders paid by non-financial and financial corporations

Box F.5: Definition of the implicit tax rate on capital and business income of households and self-employed

Implicit tax rate on capital and business income of households (incl. self-employed)	Taxes on capital and business income of households / (1) + (2) + (3) – (4) + (5) – (6) + (7) + (8)
<i>Numerator:</i>	see Box C.5 - taxes on the capital and business income of households
<i>Denominator:</i>	
(1) B.2n_S14-15	Imputed rents of private households and net operating surplus of non-profit institutions
(2) B.3n_S14	Net mixed income of self-employed
(3) D.41_S14-S15rec	Interest received by households, self employed and non-profit organisations
(4) D.41_S14-S15pay	Interest paid by households, self employed and non-profit organisations
(5) D.45_S14-S15rec	Rents on land received by households, self employed and non-profit organisations
(6) D.45_S14-S15pay	Rents on land paid by households, self employed and non-profit organisations
(7) D.42_S14-15rec	Dividends received by private households, self-employed and non-profit organisations
(8) D.44_S14-15rec	Insurance property income attributed to policyholders received by private households, self-employed and non-profit organisations

Due to the double taxation of dividends at the company level and at the shareholder level these payments (or the underlying profits) need to be included in both indicators, for corporations and for households. With these definitions the ITRs on capital and business income for households and on corporate income do not sum up to the overall ITR. For the overall implicit tax rate on business and capital income the dividend payments between the corporations and the households' sector need to be consolidated.

However, with the 'property income attributed to insurance policyholders (D.44)' there exists another income flow for distributing profits from financial corporations to private households ⁽²⁰⁾. Insurance companies and pension funds collect contributions from their insurance policies or schemes, and after deducting their operating costs they invest them in the capital market or in other assets. From this (financial) investment they receive property income in the form of interest, dividends or rents as well as capital gains through trading stocks, bonds etc. This return on investment constitutes partly the profit of the insurance companies and partly belongs to the insurance policyholder as laid down in the insurance contract. It is that part attributed to the policyholders (excluding capital gains) ⁽²¹⁾, which,

⁽²⁰⁾ For the private sector as a whole, including or excluding D.44 (received minus paid) from the tax base has no major empirical impact on the ITR on capital income since the net D.44 is close to zero and represents nearly exclusively a flow from financial corporations to households.

⁽²¹⁾ The capital gains are not recorded in the generation and distribution of income accounts. Some information can be found in the revaluation accounts. Up to now we have not tested whether these data could be used for our purposes.

in national accounts, is transferred via the D.44 mainly to private households in the period when this property income accrued.

In principle, most EU Member States provide a tax exemption of this income in the hands of the financial institution. Several methods are used. In some cases, the institution is tax exempt (certain pension funds); in other cases income is exempt or neutralised in the profit calculation by deducting an insurance technical reserve. However, some Member States levy a withholding/capital yield tax on this income which is not always neutralised on the level of the company.

The preliminary split of the ITR on capital income for corporations and households presented in the 2003 edition did not take the flow D.44 into account. This means that the return on investment was fully allocated to financial corporations. It was based on the fact that there is no actual flow of income in the period in which insurance companies earn income on behalf of policyholders. In national accounts, income received by insurance companies or pension funds by investing their technical reserves in financial assets or buildings is only 'attributed' to insurance policyholders. It is 're-collected' afterwards through imputed higher insurance contributions. Because these flows are purely imputed within national accounts, no taxes — at this stage — are raised on the level of the insurance policyholder.

However, it seems that the tax exemption of such earnings is the dominant regime for the taxation of pension funds and insurance companies in Europe. It means that D.44 paid by financial corporations has to be deducted from the ITR tax base for corporate income.

In the countries where capital yield taxes are levied on these earnings and the tax revenues are allocated to corporations, the ITR on corporations would be overestimated.

In turn, D.44 is added to the ITR tax base for the capital income of the households sector. In most countries, private households are taxed on the benefits or distributions by pension funds or insurance companies when the payoff period starts. This can be an amount of capital or an annuity. For the definition of an ITR on capital income for households this means that we encounter a problem of periodicity. With the property income earned on behalf of the policyholder period by period, insurance companies build up reserves (liabilities) in order to pay the benefits in later periods. However, D.44 could be regarded as proxy for the taxable part of pension benefits and insurance payoffs, which would not include the initial contributions or premiums.

The corporations sector in national accounts also comprises partly unincorporated enterprises, the so-called quasi-corporations. In many countries, these quasi-corporations also have to pay corporate income tax. However, there are some important exceptions. In **Germany**, partnerships (*Personengesellschaften*) constitute a large number of the country's companies and these are treated as quasi-corporations. Their production and profits etc. are recorded in the corporations sector in national accounts. Because they do not have an independent legal status, their owners are taxed under the PIT scheme. The related tax payments are recorded within the households sector in national accounts⁽²⁾. In the classification adopted in this publication, they are reported within 'taxes on self-employed'. This means that tax revenues are booked in a different sector than the underlying business income. Ignoring this booking principle by calculating ITRs on capital income for corporations or households (including self-employed), using the sector information of national accounts without corrections would lead to biased ITRs. Similar problems exist for Luxembourg, Austria, Finland and Portugal. According to information from Statistics **Finland**, the bias in Finland's ITRs is of minor importance.

The ITR on corporate income is generally lower than the statutory corporate tax rate. This can be explained by the fact that the ITR incorporates the effect of reduced rates (e.g. for certain assets, sectors or small profits), tax deductions affecting the base and the effects of tax planning by corporations in order to minimise their tax payments. It should furthermore be noted that the financial corporations described in national accounts include central banks and pension funds, while their profits, which are included in the denominator of the

ITR, are not always subject to taxation. This is another element that explains the relatively low level of the ITRs. Making a comparison with an ITR using micro data from tax statistics, Valenduc (2001) finds that the ITR based on macro data tends to underestimate the effective taxation on company profits.

It is, however, possible that the ITR on corporate income exceeds the statutory corporate tax rate. This may depend, for instance, on the payment by corporation of taxes referring to profits earned earlier, or on taxes paid on capital gains (which are not included in our ITR denominator owing to a lack of statistics). A less straightforward but probably important effect is due to the impact of loss-making companies which not only individually display a zero ITR but curiously drive up the ITR for all profit-making companies; their own negative net operating surplus in fact offsets an equivalent but positive net operating surplus realised by other businesses which turn a profit and pay taxes on it.

The sensitivity to the business cycle is a general feature of backward-looking indicators that measure the average effective tax burden on economic activities. In principle, *ceteris paribus*, three different factors affect the ITR on capital income in an economic recovery.

- In countries with a progressive personal income tax, the ITR should rise in an upswing. If taxable income from capital and self-employment increases, the taxes raised on this income increase faster.
- Corporate tax schedules are generally not progressive and, therefore, the economic cycle should not affect the ITR via that channel of influence. However, some Member States do apply lower rates for small and medium-sized enterprises. In an on-going upswing some of these companies will exceed the tax legislative thresholds resulting in a higher tax burden.
- Rules on carry forward of company losses will generally result in asymmetric effects on the ITR. First, there is an asymmetry with regards to the timing of tax payments: when relying on aggregate data from national accounts, corporate income tax revenues appearing in the numerator of the ITR are reduced by losses incurred in prior years, while the denominator is reduced by losses in current years. The numerator effect is caused by so-called loss 'carry forward' provisions in the tax legislation. The denominator effect results from the inclusion of loss-making firms, with current losses from loss-making firms offsetting profits of profitable firms in the aggregation. Losses are therefore incorporated in both the numerator and the denominator, but the losses are transmitted in the ITR asymmetrically in the sense that they refer to different periods. At the beginning of an economic upswing, more firms will make profits. Initially that the ITR on capital is reduced, because the resulting increase in profits is immediately reflected (in the

⁽²⁾ PIT revenues are also recorded in the government sector which receives the payments.

denominator) but not fully in the tax payments (in the numerator) as losses from previous years are carried forward. However, one could expect that the latter effect diminishes over time, as loss-carry forward provisions are often restricted in time and more and more companies make profits as the upswing persists. This diminishing effect of loss carry-over provisions should therefore lead to a gradual increase in the ITR on capital due to progressive increases in tax payments. Second, a recessionary phase will generally exert an asymmetric impact on the numerator and the denominator of the ITR: the denominator will show the full amount of the decrease in aggregate corporate profits whereas the numerator will not reflect the full extent of the deterioration as a portion of taxpaying companies would have shown zero profits already in the preceding year and further deterioration is not taken into account (hence a greater effect on the denominator than on the numerator resulting in a slight anti-cyclical bias).

All in all, these effects are likely to offset each other to a certain extent in the initial phases of the cycle. However, in a long-lasting economic upturn these channels of influence will point most likely to an increase in the implicit tax rate on capital with a certain time lag.

STRUCTURAL FACTORS AFFECTING THE DEVELOPMENT OF THE CAPITAL IMPLICIT TAX RATE

Beyond the effects of the business cycle, the changes in the ITRs might also reflect more structural changes, in particular in the composition of income. For example, given the increase in stock market capitalisation in the years 1995–2000, it is likely that significant capital gains were achieved by both companies and households, resulting in an increase in financial income. This change in the composition of income is not clearly discernible from national accounts income data, nor is it included in the tax base of the ITR. The additional tax revenues related to this kind of income could therefore have induced a rise in the ITRs on capital income, leading to an overestimation of the effective tax burden on capital income of the private sector. Following the same line of reasoning, the subsequent downturn in stock markets could be an important element in explaining the reduction in the ITR on capital income in 2001.

Moreover, different tax provisions for different sources of income offer an additional explanation for the increase in the ITR on corporate income. Specific tax rates or special types of tax relief apply to different sources of income or expenditure. A common feature of corporate tax systems, for instance, is to favour debt finance relative to the financing of new investments by issuing new equity. For the ITR, dividend and interest payments are aggregated within the tax base. If financial markets

induced a shift from interest to dividend payments, the taxable base would increase. In this case, companies will pay more taxes on capital since the deduction of interest expenditure for determining taxable profits is phased out. At the same time, however, the aggregate and consolidated tax base of the ITR will net off all flows of dividend distributions or interest payments between different companies (for instance between non-financial companies as borrower and banks or insurance companies as creditor) and private households. If a shift occurs from interest to dividend payments, it will not show up in the denominators, and hence the capital ITR will remain constant. The overall result of the higher tax revenues would be an increase in the ITR reflecting a higher effective tax burden that is caused by the effects of the tax legislation ⁽²³⁾.

Implicit tax rate on energy

The nominal ITR on energy is calculated as the ratio between total energy tax revenues and final energy consumption, as calculated by Eurostat aggregating different energy sources on the basis of each source's net calorific value. Although out of analogy with the ITRs on labour, consumption, and capital the name ITR is employed, it should be noted that the former three are pure ratios expressed in percentage terms (or 'dimensionless numbers') while the ITR on energy is expressed in euro per tonne of oil equivalent.

The real ITR on energy differs from the nominal ITR in the sense that the nominal euro amount in the numerator of the ratio is deflated using the final demand deflator (base year 2010). Unfortunately no specific deflator for energy prices is available.

Methods used to split the revenue from personal income tax

THE SOURCES OF PERSONAL INCOME TAX

Apart from the aggregate data in national accounts, additional data made available by Member States have been used to split recorded tax revenues into more detailed categories. This is of particular importance for the recorded personal income tax, which is typically

⁽²³⁾ However, the tendency for the ITR to increase can be offset to some extent by the fact that interest is often more highly taxed than dividends in the hands of personal investors. Only countries with classical tax systems tax interest as much as dividends at the personal level. Others have some form of relief for double taxation of dividends. So there could be more personal income tax on interest than on dividends, offsetting some of the effect mentioned.

broad-based, and relates to multiple sources of income. A method had to be developed to break down revenue from personal income tax by economic function (i.e. labour, capital and consumption). This section describes

the methods used by the Member States to generate estimates of this split of the personal income tax from tax return data. The methods attribute personal income tax to four main taxable income sources (see Box F.6).

Box F.6: Broad definition of the selected income sources

Income source	Type of taxable income components included
Employed labour	<ul style="list-style-type: none"> Wages and salaries Fringe benefits in kind Directors' remuneration Foreign source earned income Financial participation schemes (e.g. stock options) Deemed income from private uses of company cars
Self-employed labour	<ul style="list-style-type: none"> Income from unincorporated businesses Profits from trade or business and proceeds from independent professional services (e.g. dividend distributions from closely held companies)
Capital	<ul style="list-style-type: none"> Income from movable property (e.g. dividends, interest, distributions, royalties) Income from immovable property (rents earned on letting a private dwelling, etc.) Periodic transfers and private pensions Taxable capital gains for some Member States Other (e.g. rental value owner-occupied housing)
Transfers and pensions	<ul style="list-style-type: none"> Taxable social benefits (e.g. unemployment, health care and social assistance benefits) State pension benefits Occupational pension benefits

The resulting estimates of the personal income tax revenue that could be attributed to these taxable income sources are used in the numerators for the implicit tax rates on labour and capital (using relevant aggregate economic incomes as denominators) and in the breakdown of taxes across the economic functions (i.e. taxes on consumption, labour and capital, as a percentage of GDP).

THE FLAWS OF AGGREGATE DATA AND ADVANTAGES OF MICRO DATA

Under an approach using only aggregate data, total personal income tax raised in respect of labour (capital) income is often estimated as the proportion of aggregate labour (capital) income in the aggregate taxpayer income. Another approach is to estimate a single average effective income tax rate on the basis of aggregate data. The total personal income tax revenue data is divided by the aggregate approximation of

labour and capital income in the economy to get the overall effective personal income tax rate, which can subsequently be applied to the labour (capital) income in order to estimate the income tax levied from labour (capital) income⁽²⁴⁾. This ignores the fact that effective rates on personal income tax vary across different taxable income components and groups of taxpayers. Even where, for example, labour and capital income are pooled together for tax purposes at the individual level, such an approach may be criticised where aggregate labour income is believed to be subject, on average across taxpayers, to a significantly different average effective tax burden than capital income⁽²⁵⁾. A main concern associated with average effective (implicit)

⁽²⁴⁾ This approach has been introduced by Mendoza, Razin and Tesar (1994) and was used in internal studies by the Economics and Financial Affairs Departments of both the European Commission and the OECD. See Martinez-Mongay (2000) and Carey and Rabesona (2002) for more details.

⁽²⁵⁾ See also OECD (2000, 2002), Clark (2002) and De Haan, Sturm and Volkerink (2002).

tax rate analysis is the manner in which estimates are derived for the aggregate amount of personal income tax revenue raised from different types of income included in a given country's personal income tax base. Under an approach using only aggregate data from national accounts, for example, total personal income tax raised in respect of labour (or capital or other forms of personal taxable income, for example social transfer or pension income) is often estimated as the proportion of aggregate labour (or capital) income in the aggregate taxpayer personal income. This approach implicitly assumes that labour and capital income (or other forms of taxable income) is subject to one (common) average effective tax rate ⁽²⁶⁾. This assumption is generally unrealistic, and could be expected to lead to imprecise estimates of notional tax revenues raised in respect of different taxable income types and, therefore, imprecise estimates of average effective tax rates by economic income source ⁽²⁷⁾.

Relying on micro-level data — that is, confidential tax data at the individual taxpayer level — Member States are able to generate more accurate estimates of personal income tax revenues raised on separate sources of income. Generally, capital income will tend to be concentrated at the right side of the Lorenz curve and therefore, be subject to higher marginal and average tax rates as compared to income from labour. On the other hand, special tax concessions may apply to income from capital, so that the average tax rate for capital income might not be significantly different from that for income from labour. For example, some Member States apply a so-called 'dual' income tax system, in which capital income is usually taxed at a relatively lower (fixed) rate as compared to other earned taxable income. Forcing the latter assumption (of special tax concessions) on the data would however be a shortcoming to the analysis. Also, most Member States tend to tax pension benefits or social benefits more favourably than earned income from labour, either by way of increased tax allowances or tax credits that are age-based, or by partial exemptions from the tax base. Using micro-data sets that include separate reported figures at the taxpayer level for the items of income on which the personal income tax is raised, it is possible to account for such effects ⁽²⁸⁾.

⁽²⁶⁾ This approach has been introduced by Mendoza, Razin and Tesar (1994) and was used in internal studies by Economics and Financial Affairs departments of both the European Commission and the OECD. See Martinez-Mongay (2000) and Carey and Rabesona (2002) for more details.

⁽²⁷⁾ See also OECD (2000, 2002b) and De Haan, Sturm and Volkerink (2002).

⁽²⁸⁾ In order to illustrate the degree of precision that can be reached with using micro data rather than aggregate tax return data, the Ministries of Finance and Taxation in the Netherlands, Finland, Denmark and Italy performed additional calculations on the basis of only aggregate tax return data for some years. It appeared that the differences for the estimated amounts of income tax raised on income from employed labour were rather small. The reason is that employed labour income is by far the most dominant income source, which means that the overall effective income tax rate (measured on the aggregate taxable income and across all taxpayers) is strongly influenced by the average effective tax rate on labour income. The differences were however significant for

THE METHODOLOGICAL APPROACHES

Most Member States basically multiply individual income tax payments by proportions of the selected income sources in the total taxpayer's income (Belgium, Denmark, Germany, France, the Netherlands, Ireland, Luxembourg, Finland and Sweden). This is done both by way of micro-simulation models relying on samples from the total taxpayer population and by way of use of exhaustive tax return data sets (e.g. Belgium and Ireland). The corresponding estimates obtained at the taxpayer level are consequently aggregated to obtain estimates of the personal income tax raised in respect of the selected sources of income. For example, the total amount of personal income tax raised in respect of labour income, *PIT (labour)* could be estimated as follows:

$$PIT(labour) = \sum_j (W_j / Y_j) * PIT_j = \sum_j w_j * PIT_j$$

where W_j measures the labour income of the j -th taxpayer in a sample of individuals ($j = 1, \dots, n$) and where PIT_j measures the personal income tax payment of the j -th taxpayer on his total taxable income Y_j . The above equation therefore measures the total personal income tax raised on labour income as a weighted average of each individual taxpayer's payment *PIT*, with the weights $w_j = (W_j / Y_j)$ attached to these individual payments reflecting the distribution of total wages and salaries across taxpayers.

Some Member States (Spain, Italy and Greece) instead use tax return data that is aggregated at the level of a number of income classes or income tax brackets ($j = 1, \dots, n$), but essentially make the same calculations. The latter approach is likely to capture broadly comparable effects of the differences in tax treatment and the distribution of income sources across different groups of taxpayers.

Some Member States (Austria, Portugal) choose another approach and use tax receipts data from the wage (withholding) tax and (final) income tax statistics and apply a number of adjustments. Wage (withholding) tax is by its very nature designed to approximate the final income tax liability for wage earners as closely as possible, but in some cases there are certain adjustments for income tax assessments, because the wage tax withheld is not correct (e.g. because of different jobs or pensions during a single year). As this correction concerns only wage earners, in some cases the net amount of the correction is deducted from the total amount of recorded wage tax and, the amount of personal income

the other selected income sources. If only aggregate tax return data were used, generally higher fractions would be computed for capital income and income in the form of social transfers and pensions, and generally lower fractions would be computed for income from self-employed labour.

tax is adjusted accordingly. Since wage tax can also be levied on social benefits (e.g. unemployment benefits, widower's benefits and invalidity benefits) or old-age pensions, the recorded wage tax is adjusted accordingly. The (adjusted) personal income tax is further split between income from self-employed businesses and capital income, either using aggregate proportions or information aggregated at the level of income classes (Austria). The latter approach is also likely to capture broadly comparable effects of the differences in tax treatment and the distribution of income sources across different groups of taxpayers as outlined above.

Finally, Hungary (from 2009 onwards) uses a combination of micro simulation and a correction on the aggregate figures from the micro simulation model.

While in most Member States the personal income tax system is comprehensive in the sense that all subcategories of taxable income are pooled at the individual level, and the result is taxed at ascending statutory tax rates. However, some Member States apply

a given statutory rate on a specific income category, as can occur under a 'dual income tax' system. In the Netherlands, Finland and Sweden, for example, capital income is currently taxed at a relatively lower statutory rate as compared to other earned income. In most cases, however, the tax receipts data are used to isolate the amount of tax collected on that particular income category. In Slovenia, capital income is taxed according to a flat rate while active income is taxed according to a progressive rate. In the United Kingdom, the personal income tax law actually prioritises the order of different types of income. For example, labour income is treated as the bottom of the taxable income and dividend income is treated as the top slice of taxable income. Unlike the method used in other Member States, the United Kingdom calculation therefore does not assume that the individual taxpayer has the same average effective income tax rate over all income sources (see also above). Instead, income source specific income tax rates are multiplied by the selected income sources at the taxpayer level.

Box F.7: Overview of methods to estimate the allocation of the personal income tax

Countries	Data	Basic method
BE, DK, DE, IE, FR, LV, LU, HU (from 2009), MT, NL, PL, SI, FI, SE, NO	Data set of individual taxpayers	Personal income tax payments multiplied by fractions of net taxable income sources (as percentage of the total tax base) at the level of the individual taxpayer
UK	Data set of individual taxpayers	Income source specific income tax rates multiplied by net taxable income sources at the level of the individual taxpayer
BG, CY, ES, EL, IT, LT	Income class data based on data set of individual taxpayers	Personal income tax payments multiplied by fractions of net taxable income sources (as percentage of the total tax base) at the level of income classes/tax brackets
CZ, EE, HU (before 2009), AT, PT, RO	Tax receipts data from withholding and income tax statistics	Approach using aggregate withholding tax and final assessment income tax data with certain adjustments.

CREDITS AND DEDUCTIONS

Income sources are, insofar as it is possible, measured net of tax base deductions or allowances that are exclusively earned on these income sources (e.g. allowance for savings, expenses incurred in maintaining labour income). This is important, as tax breaks and concessions given in respect of the tax on capital income can be quite substantial, with the result that the estimated fraction for personal income tax raised on capital income can be rather low, and in some cases even negative (e.g. in the Netherlands and in Denmark). It is generally attempted to allocate income-specific tax credits (e.g. an additional tax credit that is earned exclusively on income from labour) to the base for splitting purposes to which it relates.

Against this, the revenue effects of general tax base deductions and credits are proportionately allocated across all income sources. Further complications in calculating the bases for splitting arise due to the fact that certain income tax receipts are collected at source and certain tax breaks are granted at source, whilst others are collected and granted in the framework of the individual taxpayer's tax return. This is particularly an issue with certain components of capital income (interest, dividends, pensions, etc.). There are further conceptual and practical issues with pensions and the self-employed to which there are no easy answers.

As a result of data set limitations and a degree of inconsistency between the approaches adopted by

the Member States (which affects most notably the allocation of income tax to capital and social transfers and pensions), the accuracy and comparability of the estimates of the ITRs on labour and capital have been somewhat compromised. The sources of these inconsistencies are various. In some Member States, for example, tax return data are only available at income-class level rather than at the taxpayer level. For some countries not all the taxable benefits from social security or old-age pension schemes could be separately identified from the tax return data. Some Member States could not incorporate the revenue effects of tax base deductions or tax credits specifically related to the main income sources. Inconsistency may also arise where Member States permit a joint assessment of the taxable income of the household (e.g. in France before 2001). To give an example, the principal earner of the household may earn labour income whereas the spouse is actually a social benefit recipient with a relatively lower income. In these cases, however, the same effective tax rate was applied to the taxpayers jointly assessed. There are further conceptual and practical problems with the treatment of pensions for which there are no straightforward solutions.

Some Member States were not able to provide full time-series coverage for all calendar years. In these cases, a trend has been assumed using simple linear interpolations, or the fractions were assumed to remain constant. Where the latest available year was not available, the previous year's split was used. In reality changes in the fractions would reflect changes either in the distribution of income or in the tax parameters. Applying linear interpolation seems a valid method only in the absence of major tax reforms.

Apart from certain simplifying assumptions and estimates of the share of personal income tax limited to specific years this new treatment of the personal income tax is a major improvement on the methodology used prior to the 2003 edition. It is found to be vastly better than an approach based on aggregate data in estimating the tax burden on non-wage income sources (in particular for social transfers and pensions and self-employment income).

INDIVIDUAL COUNTRY APPROACHES BY TYPE OF APPROACH:

(A) Approach using micro-tax receipts data

- **Belgium:** The split of the personal income tax was estimated by the Ministry of Finance using detailed revenue statistics from the national tax administration based on individual tax returns. The data set covers any assessed income, and is exhaustive. In fact, the national tax administration already splits and allocates

the aggregate personal income tax revenue raised on the so-called 'global income' to the different income sources on a case-by-case basis, in order to derive entitlements of individual taxpayers to certain tax credits that are related to specific income sources. For example, the tax credits for pensions, sickness or unemployment are limited to the income tax that relates proportionally to the corresponding net income. This allocation of the tax revenue raised on the 'global income' is calculated by multiplying individual tax payments by proportions of the income types in the total taxpayer's 'global income', as outlined above. The income types are measured net of tax base deductions that are exclusively earned on these income types. Subsequently, the estimated fractions of the aggregate personal tax revenue that is raised on the selected income types depend on a proportional division of the personal income tax that is due on the 'global income' and the income tax due on 'distinct income' sources that are taxed separately. The resulting fractions are consequently applied to the sum of revenues from advance payments on earnings, advance payments of tax on self-employed persons and the amount of the final income tax assessment. The revenue from withholding tax on income from movable capital and real estate tax is not included in the above calculations; they are directly assigned to the capital income.

- **Denmark:** The split of the personal income tax was estimated by the Ministry of Taxation using a micro-simulation model that is based on a sample of micro (taxpayer-level) data. The model incorporates the information of withholdings/prepayments and final income tax returns. The model is updated annually, and used in planning the national tax policies and estimating policy alterations on tax revenues and on the income tax liabilities of taxpayers on different income levels. The model also covers other legislative areas, such as unemployment benefits, housing subsidies, social assistance and so on. The method basically multiplies individual tax payments by proportions of the income types in the total taxpayer's income, as outlined above. The income types are measured net of tax base deductions that are exclusively earned on these income types. By including net interest payments in the tax base of capital, for example, the Ministry of Taxation has taken into account the way the tax relief for mortgage interest payments and other interest payments on loans reduces the tax base of capital. This explains why the estimated part of capital income may be lower than zero. The method takes into account that from 2001 onwards negative capital income can only be deducted in the local income taxes (and from 2007 the so-called health care contribution as a consequence of the municipal reform) and that from 1998 to 2001 the after tax value of the deduction for negative capital income was gradually eroded. The so-called share income (which

is taxed separately) is allocated directly to the part on capital income. As regards employed labour income, it should be recognised that in 1995 and 1999 wage income was taxed as follows: on the one hand the tax base for the municipal income tax and the lower limit central government tax was wage income less transport expenses and unemployment insurance contributions; on the other hand the tax base for the so-called middle bracket and top bracket income tax was the part of the wage income —without any reduction for expenses — that exceeded a certain amount. If one reduces the tax base with deductible ‘wage expenses’, then the part of the mean limit and an upper limit income tax that is attributed to wage income is too small. Whereas if it is not taken into account the part of the municipal income tax and lower limit central government tax that is attributed to wage income is too big. The Ministry of Taxation has chosen the latter approach as it is believed that the bias will be the smallest in this case.

- Germany:** The split of the personal income tax was estimated by the Federal Ministry of Finance using a micro-simulation model. This model is based on a representative sample of micro (taxpayer-level) tax return data that is used for tax forecasting purposes and pre-assessing the consequences of changes in income tax legislation. In addition, the model allows the assessment of the solidarity tax, child benefits, the church tax and social contributions. The simulation model incorporates the information on withholdings/prepayments and final income tax returns (in Germany, nearly every private household liable to income tax must file an income tax return, employees only paying wage withholding tax are also included in the sample). The calculations do not take into account child benefits and tax-free cash grants for acquiring or constructing new occupational dwellings, which are credited against the income tax liability. These transfers are deemed as separate transfers in the context of social policy programmes. Basically, personal income tax payments were multiplied by the selected income sources at the micro level, as outlined above. The income sources are measured net of tax base deductions that are exclusively earned on these income sources. Germany employs a comprehensive income tax base. There are no income-specific rates such as lower flat-rates on income from capital investment as in countries with dual income tax systems, nor does Germany grant lower tax rates or tax credits on low wages. However, the tax base may be largely offset by income-specific allowances (such as the saving allowance), tax incentives or arrangements in computing income, but these effects are captured within the calculations, because the average effective tax rate is multiplied by the net taxable income sources.
- Ireland:** The split of the personal income tax was estimated by the Inland Revenue using an exhaustive data set with micro (taxpayer-level) tax return data. The data set covers all taxpayers for which a return was received. The method basically multiplies individual tax payments by proportions of the income types in the total taxpayer’s income, as outlined above. However, because there are some taxable personal income components that are taxed at a flat rate only, there is no actual split of tax revenues raised on these particular income components. The tax raised on such components is directly calculated from the tax return data. At this stage, the income types are not yet measured net of tax base deductions that are exclusively earned on these income types. This could be done in future updates of the split of the personal income tax.
- France:** The decomposition of the PIT was based on a sample of around 500 000 tax declarations (2 % of the total). The method basically multiplies individual tax payments by proportions of the income types in the total taxpayer’s income. The income types are measured net of tax base deductions that are exclusively earned on these income types. In addition, corrections were made for the revenue effects of tax credits that are exclusively earned on the selected income types (e.g. the payable tax credit, the prime pour l’emploi, to encourage low-paid and low-skilled workers to resume active employment). It is worth noting that France employs a joint assessment of the taxable income in the household. For example, the principal earner in the household may earn labour income whereas the spouse receives social benefits, but the total amount of personal income is jointly assessed. In the calculations for the split of the personal income tax, however, in this case the same effective tax rate has been applied to the partners jointly assessed. For the period 2001–2004 data provided by French authorities also include taxes paid on transfers. For the period 1999–2000 this was only possible if the household income included salary or self-employed labour revenues. In order to maintain comparability and consistency in the time series the split for 1999 and 2000 has been adjusted. Assuming that the changes in the shares from 2000 to 2001 are only due to the introduction of the category ‘transfers’, the absolute changes for the other three categories have been calculated accordingly and deducted from the original values provided. For the period since 2012 the PIT split computation has been further refined. The split is now computed according to the breakdown of net taxable income (and not the reported income). For example, for salaries and wages it is the amount once the deduction for business expenses is taken into account. The new ESA 2010 is applied to the split calculation, with refundable tax credits now included in public expenditure instead of lowering the PIT amount. Real estate capital gains

and the mandatory standard deduction (PFO) are also taken into account and are directly assigned to KIH. Finally, in order to have a precise breakdown of d51A by economic function, a different split is computed for each tax concerned by the split (D51AA-other taxes, D51AC-CRDS, D51AD-CSG, D51AF-other social levies, D51AG-personal income tax). These corrections introduce a break in the PIT series for France, notably for the shares of capital income of households and self-employed although the total share of capital remains almost unchanged.

- Latvia:** The split of the personal income tax was estimated by the Ministry of Finance. Latvia's calculations are greatly simplified by the existence of one single rate of personal income tax. The calculations were based on data from personal income tax returns, in accordance with the individual taxpayers' data. The summary of salary declarations was used to calculate personal income tax revenue from employed labour income. Information on the personal income tax paid by the self-employed was derived from the Declaration of annual income and from the advance payment tax return. Information on tax on pension payments was obtained from the State Social Insurance Agency. The lack of any records of personal income capital taxation means that this amount was taken as the residual. A part of allowances (the non-taxable minimum and allowances for dependants) is applied at the moment of the tax calculation. The tax is collected, taking into account applicable allowances. Information on the applicable allowances is obtained from the tax returns. The other allowances are obtained only after submission of declarations of annual income to the State Revenue Service. The total PIT revenue is already shown in net form i.e. the PIT repayments made by the State Revenue Service are already taken away.
- Luxembourg:** The split of the personal income tax was estimated by the National Statistical Office using detailed revenue statistics from the national tax administration (ACD) based on exhaustive household tax returns (in Luxembourg PIT is based on family taxation) and on withholding revenues on employed labour and transfers. For the part on tax returns, the method basically multiplies individual tax payments by proportions of the income types in the total taxpayer's income, as outlined above. Then the withholding revenues were considered, because it is not mandatory to compile tax return if there is only employed labour or pension income. Since the distinction between withheld amounts raised on labour employed and pension income is not available, data from the social security organisations were used. When only the total amount withheld was available from a social security organisation, the average rate of contribution was used as a proxy.
- Hungary (from 2009):** The split of the personal income tax is based on a combination of a micro simulation
- using all individual tax returns and a correction on the aggregate figures from the micro simulation model. First, the distribution of the PIT revenue attributed to the four income types is derived for each individual, then it is aggregated across all taxpayers. Finally, PIT on incomes taxed at source (they include fringe benefits and most of the taxed interest income, and are not reported in the annual tax returns and were not included before 2009) is added to the relevant categories and the final PIT split is calculated from these revenue figures.
- Malta:** The split of the personal income tax is based on the actual data available at the local tax authorities through the individual returns. When returning their annual declarations, all taxpayers are obliged to correctly indicate the exact source of their income on their individual tax form. This information is then captured at micro level, and is used to compile the figures submitted in the national PIT questionnaire. There is no further extrapolation on the data, except for the case of the withholding taxes on capital. Since the withholding tax is a flat percentage, this figure has been obtained based on the revenue generated from this particular source.
- The Netherlands:** The split of personal income tax is estimated by the Ministry of Finance using a updated micro-simulation model that is based on a sample with micro (taxpayer-level) data. For the 2016 edition, some methodological changes were made, most notably regarding compulsory payments for the Cure Insurance Act which are now included in the split of the social contributions. In order to ensure a consistent series over time, the split of the personal income tax has been recalculated for all years since 2002. The micro-simulation model used covers the combined tax burden of wage withholding tax, personal income tax, social contributions and wealth tax. The method multiplies individual tax payments by proportions of the income types in the total taxpayer's income, as outlined above. In the Netherlands, the lowest two income tax rates consist of personal income tax and social contributions; the highest two rates consist solely of personal income tax. The split has therefore been computed for both personal income tax and social contributions (which are in principle levied on all taxable personal income types). The income types are measured net of tax base deductions that are exclusively earned on these income types. The compulsory net payments to the healthcare fund are split based on the number of people with employed labour, self-employed labour and transfers and are attributed to the social contributions. A special provision applies to the capital income of owner-occupied property. This is taxed at a notional rental value, which represents the balance of revenue and expenses connected with the use of the dwelling, and is assessed using statutory tables. As normal expenses are included in the notional rental value, no expenses

other than mortgage interest and ground rent may be deducted. The deduction for mortgage interest payments explains why the estimated part of capital income is negative.

- Poland:** The split of the personal income tax was estimated by the Ministry of Finance. Poland has a progressive tax system, hence the estimate is obtained with a bottom-up methodology, starting from taxpayer-level data and the aggregating the results. For taxes levied as lump sums, the method used simply multiplies the individual tax due by proportions of the income types in total taxpayer's income. The income types are measured net of estimated social contributions. Adjustments were made for married couples' tax returns (their joint income was used in the calculations). Owing to an important reform in 1999, which introduced tax-deductible health insurance contributions, there are two different methodologies for the years 1995–1998 and 1999–2004. For the years after 1999, the Ministry of Finance arrives at the PIT due by subtracting the amounts due as health insurance contributions from the total revenue and the residual then represents the amount due for the PIT. The amounts due for the health insurance contributions are then split across economic functions and re-introduced in the PIT split so that the final PIT split given is homogeneous across the entire time period.
- Slovenia:** The split of the personal income tax was estimated by the Ministry of Finance. The calculations were based on data sets for individual taxpayers, except in the case of pensions. As most of the PIT from pensions is only accounted for but not collected the PIT from pensions is subtracted. Actual PIT collected from pensions is very close to prepayment of PIT from pensions during the year. Therefore, these prepayments are added to PIT from the transfer and pensions category. The method multiplies PIT payments by fractions of net taxable income sources (as a percentage of the total tax base) at the level of individual taxpayers. The allowances were deducted at the individual level (except in the case of pensions). In 2006, major changes in the PIT system were introduced — schedular system for capital income was introduced and tax prepayments became final payments. This reform resulted into two different sets of data for 2006: accrual individual data for employed labour income, self-employed income and social transfers and pensions; and cash cumulative data for capital income.
- Finland:** The split of the personal income tax was estimated by the Ministry of Finance using a micro-simulation model that is based on a sample of micro (taxpayer-level) data. The information is collected by Statistics Finland. The model is updated annually, and used in planning the national tax policies and estimating policy alterations on tax revenues and on the

income tax liabilities of taxpayers on different income levels. The method basically multiplies individual tax payments by proportions of the income types in the total taxpayer's income, as outlined above. However, because of the dual income tax system, there is no actual split of tax revenues raised on capital income. The tax raised on capital income is directly calculated from the tax return data. The income types are measured net of tax base deductions that are exclusively earned on these income types. The statistical information on dividend income in the model contains both dividend income of the self-employed that is treated as the capital part of the income, and the dividend income from investors, that is not income from self-employed labour but capital income from for example owning shares in a listed company. The statistical information is split into dividend income from self-employment and dividend income from saving and investments using an estimate. From year 2002 the method of splitting dividend income between dividends from listed companies and the dividends of the self-employed owners has been improved. Mortgage interest payments are not deducted from the capital income, since no rental value taxation of income from home-ownership is applied.

- Sweden:** The split of the personal income tax was estimated by the Ministry of Finance using micro-simulation models that are mainly based on administrative sample data. The models are updated annually, and mainly used in planning the national tax policies and estimating policy alterations on tax revenues and on the income tax liabilities of taxpayers at different income levels. The method basically multiplies individual tax payments by proportions of the income types in the total taxpayer's income, as outlined above. However, because of the dual income tax system, there is no actual split of tax revenues raised on capital income. The tax raised on capital income is directly calculated from the tax return data. The income types are measured net of tax base deductions that are exclusively earned on these income types. An alternative way to describe the method is to say that the individual specific average effective income tax rate is calculated to split the personal income tax across different taxable income sources. Note, however, that these average effective tax rates are computed while incorporating the revenue effects of tax credits that are exclusively earned on the selected income sources. The revenue effects of general tax credits for all taxpayers are proportionally allocated across all selected income sources.
- Norway:** The split of the personal income tax was estimated by the Ministry of Finance using a micro-simulation model called LOTTE. The model is based on a sample from the household income statistics of Statistics Norway. The personal income tax system has two tax bases: personal income, from which

no deduction may be made, and ordinary income. Ordinary income includes all types of taxable income from labour, transfers, business and capital. Certain costs and expenses, including interest paid on debt, are deductible in the computation of ordinary income. Dividends are regarded solely as capital income in the calculations. With the exception of the standard allowance, the basic allowance and the allowance for gifts to voluntary organisations, all allowances are entirely allocated to one income source. The basic allowance is calculated as a certain percentage of wage and pension income with a lower and upper limit. In the calculations, the basic allowance is divided according to the size of wage and pension income, respectively, for each individual. Some basic allowance is reported separately for spouse supplementary pensions, child alimonies and pensions. These are allocated to transfer income. The allowance for gifts to voluntary organisations is a general allowance and is as such divided on all income sources. The SC and the central government income surtax are separated between the relevant income sources (labour, self-employed and transfer). The labour and transfer component in gross income is identified by the LOTTE model. Self-employed income is more difficult to identify because of some special limitation rules for this category of income included in the personal income tax base. Actual self-employed income might therefore be higher than the taxable self-employed income included in the gross personal income tax base. However, by hooking the LOTTE model to total gross personal income reported in the tax statistics, it is possible to identify the self-employed income in the tax base (by subtracting labour and transfer income from total gross personal income).

(B) Approach using both micro and aggregate tax receipts data

The method employed in the United Kingdom is based on combining micro and aggregate tax record data. Also, unlike the methods outlined above, the method does not assume that the individual taxpayer has the same average effective income tax rate over all income sources. Instead, income source specific tax rates are multiplied by the selected income sources at the taxpayer level.

- The **United Kingdom**: The split of the personal income tax was estimated by Her Majesty's Revenue & Customs using a micro-simulation model and aggregate tax receipt data. The micro-simulation model incorporates the information of withholding taxes (PAYE), self-assessment tax returns and claims by non-taxpayers for overpaid tax deducted at sources. The method does not assume that the individual taxpayer has the same average income tax rate over all selected income sources. Instead, income-source specific tax rates are computed, because the personal

income tax law prioritises the order of different types of income. For example, labour income is at the bottom of the taxable income and dividend income is treated as the top slice of the taxable income. The total tax liability that results from the micro-simulation model, grossed up to the total taxpayer population for sampling, does not exactly correspond to the total recorded tax receipts from macro-tax receipt data, due to differences in definition and sampling error. The main differences between the micro and macro-tax receipt data occur because some components (i.e. company income tax and unallocated tax receipts) are not modelled. Also, there are various repayments of personal income tax which are made directly at source and are not captured in the model data, including payments to pension funds, charities, special savings schemes, life insurance relief, mortgage interest relief at source, child tax credits, working tax credits and vocational training relief. These elements of the macro-tax receipt data have also been allocated across the selected income types, whenever this was possible.

(C) Approach using tax return data aggregated at the level of income classes or tax brackets

In some Member States tax return data is used that is aggregated at the level of a number of income classes or tax brackets. Basically, the recorded personal income tax payments are multiplied by the selected income types over the sum of the taxable personal income sources at the level of income classes or tax brackets. This approach thus implicitly assumes that a (common) average effective tax rate applies to all selected income types at the level of the income class. The corresponding estimates are consequently aggregated to obtain the estimate of the split of the personal income tax. Calculations by Italy have shown that differences from using either macro-tax return data or micro data aggregated by income classes turn out to be significant for the taxable personal income types that are less important from a quantitative point of view. Although the method cannot provide the degree of accuracy of micro (taxpayer-level) data, it is believed that is likely to capture the effects of progression of the personal income tax system and the distribution of income sources across different groups of taxpayers.

- **Bulgaria**: The split of the personal income tax was calculated by the Ministry of Finance using information from the tax returns filed in the National Revenue Agency, representing aggregated micro data per tax return. The tax base of the different types of income besides labour income is divided over the total tax base and the ratio serves as weight to measure the share of the relevant income in the total tax due. The sum of the weighted tax revenues shall be the tax due for all income except labour income. For employees receiving only labour income, the PIT is withheld by the employer. The share of every type of non-labour

income mentioned before is applied to the cash revenues from all types of income besides labour income. The revenues from labour income and from non-labour income form the total revenues. The share of the labour income revenues in total PIT revenues is known, the share of the total non-labour income revenues in total PIT revenues is also known, as well as the share of each type of non-labour income within the total non-labour income revenues. The relevant shares serve as the PIT split.

- Greece:** The split of the personal income tax was estimated by the Ministry of Finance in cooperation with EL.STAT and Professor Geogakopoulos from the Athens University of Economics. The calculations were based on data from personal income tax returns, which were grouped by category of income and tax bracket. Basically, the method multiplies tax payments by proportions of the income types in the total taxpayer's income, as outlined above, but aggregated at the level of income classes. The income types are measured as net taxable personal incomes. In order to split between income from employed labour and transfers data from the General Secretariat of Information Systems were used. The final percentages are comprehensive of tax on savings, which is included in category D.51a in addition to tax revenue from personal income tax; the total amount of this category constitutes tax on capital and, given that this tax is not calculated on the total income of households, it was added to income tax from capital in the calculations.
- Spain:** The split of the personal income tax was estimated by the Ministry of Finance and the methodology was revised as of 2010. The estimates are covering not only PIT taxpayers' population – those who submit a PIT return – but even those PIT taxpayers not directly obliged to do so but whose contribution to the tax is made only through monthly withholding taxes and advance tax payments. The allocation of tax liabilities arising from earned income – wages and social benefits – is made directly through observed advance tax payments data files rather than calculating the weights based on the values of such income in accordance with the Spanish National Accounts (CNE), as it had been done until 2010. This latter change appreciably affects the final estimates and now reflects much more accurately the allocation of each of those income sources, since, as noted repeatedly in previous years, CNE data overstates the tax burden of pensions and other social benefits in the PIT. This is because it is not possible to deduct those pensions exempt from the tax, and furthermore under the former methodology it was not possible to take into account the different effective tax rates applied to both salaries and pensions, given that pensions usually pile up in lower income levels and therefore its taxation is substantially lower when applying a progressive tax schedule. Therefore, as of 2010 only tax data provided by the Spanish Tax Administration is used.
- The methodology is divided into three basic stages: (1) the final tax liability (by income sources) from PIT filers is directly obtained from tax data records broken down into 47 income brackets; (2) for non-PIT filers the final PIT tax liability distribution is obtained as the difference between the total amount of periodic withholding tax payments (filers and non-filers) and the advance payments of the latter obtained through annual tax returns submitted by third-parties; (3) the allocation of final tax liabilities arising from earned income among wages/salaries and social benefits is directly obtained through the annual observed tax statistics covering the whole tax population (filers and non-tax filers) related to periodic withholding and advance tax payments, and according to their own weight.
- Italy:** The split of the personal income tax was estimated by the Ministry of Finance using a micro-data set containing IRPEF tax return data for all taxpayers. Instead of computing an average tax rate for each individual taxpayer, the information was allocated to 35 classes of gross income. Basically, the recorded personal income tax payments were multiplied by the selected net taxable income sources over the sum of the net taxable income sources at the income class level. The income types are measured net of tax base deductions that are exclusively earned on these income types. In addition, corrections were made for the revenue effects of tax credits that are exclusively earned on the selected income types. In addition to the recorded IRPEF tax revenues, IRPEF payments received by the treasury on denominations other than IRPEF were incorporated in the calculations. These include tax on dividend distributions and dividend withholdings, which were directly allocated to the capital income category. As from 2015, the labour cost concerning permanent contract workers is not included in IRAP Tax Base. The IRAP split is estimated on the basis of tax returns so taking into account the labour cost deduction. On the other hand, 2015 IRAP revenue data might not fully reflect the legislative change because of the tax advance payment system. IRAP revenues will probably decline substantially in 2016. So, the capital component amount of IRAP will be overestimated in 2015 and underestimated in 2016.
- Cyprus:** The split of the personal income tax was estimated by the Ministry of Finance. The calculations were based on tax assessment data, which were grouped by category of income and by tax bracket into 26 income classes. The recorded personal income tax payments are multiplied by the taxable income sources for each class and then divided by the aggregate taxable income of the class. The income types are measured as net taxable personal incomes. All deductions have been allocated to the correct base class and category for the purposes of the split. The personal allowances have been allocated in proportion to the income sources.

- Lithuania:** The split of the personal income tax was estimated by the Ministry of Finance utilising data from the State Tax Inspectorate. Data coverage is very high (99.9 % to 100 % of actual payments by the different revenue group of personal income tax). Lithuania's calculations are simplified by the existence of a dual rate system for earned and unearned income. The categorisation of income taxes allowed most elements to be allocated to their economic functions without need for further individual or income class breakdowns. The split of personal income tax calculation breaks down the total amount of the tax refund across the various revenue groups. Payments from non-employment related or n.e.c. income were attributed to the payments from capital and income from individual activities, in proportion to the interrelation between respective incomes calculated according to tax return data. Adaptations to the methodology were done from 2002 to 2003 as a result of changes in the legislation which allowed deductions for life insurance and pension contributions and for certain interest payments. Note for the year 1999 data limitations required a special estimate which was based on a different methodology.

Taxes and social contributions paid by the self-employed are allocated to the capital and business income category ⁽²⁹⁾. Italy proposed to split tax revenues from income of self-employed in 80 % and 20 %, because most of the self-employed in Italy are more comparable to dependent employed workers. The 80 % are related to labour and the 20 % are linked to capital income of self-employed. The mixed income of self-employed should be split accordingly. Social contributions of self-employed are attributed to labour in the Italian method.

(D) Approach using aggregate withholding tax and final assessment income tax data with certain adjustments

In some Member States the estimates of the split of the personal income tax were computed on the basis of aggregate statistics of withholding tax and the final personal income tax by assessment.

- Czech Republic:** The split of the personal income tax was estimated by the Ministry of Finance. Three PIT accounts exist; the first, wage tax withheld by the employer is purely labour, the second, withholding tax, is presumed to be purely capital, and the tax paid per tax return was split. The calculations were based on data from personal income tax returns, which were grouped by category of income and by tax bracket into 20 classes. The method multiplies tax

payments by proportions of the income types in the total taxpayer's income, aggregated at the level of income classes. The income types are measured as net taxable personal incomes. In calculating the split between income from employed labour and transfers, it was found that almost all the transfers were tax exempt (0.001 % of the total PIT revenue) so all were allocated to employed labour. All deductions have been allocated to the correct base class and category for the purposes of the split.

- Estonia:** The split of the personal income tax was estimated by the Ministry of Finance using micro-level data from the income tax returns and withholding tax statistics. Different approaches were used for determining the PIT splits depending on data availability. Thanks to the very good quality and detail of the data for 2004, the split for this year is the most thorough. Firstly, withholding tax returns were used to derive the split in the case of resident natural persons who didn't submit the 2004 income tax return. As in the case of withholding tax returns the income is already divided between 19 different income categories, the data was grouped between income from labour, capital and transfers. Secondly withholding tax returns, where payments to non-resident natural persons are declared and divided into 11 different income sources, were used and the PIT split obtained. In both cases the allowed deductions are taken into account finding the PIT split. In the third step, based on the income tax returns, firstly PIT from self-employed labour was estimated. As from 2004, the increased basic exemption in event of pension is declared on the income tax return; it was assumed that only resident natural persons who are entitled to pension declare it and would be able to use this deduction. In the case of other income sources, i.e. income from Estonia, gains from transfer of property, other income and income from abroad, all the deductions (including basic tax allowance) were allocated proportionally over the income sources, except the special deduction for self-employed persons in agriculture, which was allocated to their income. The split for the years 2001–2003 was made based on withholding tax returns of non-resident natural persons and on income tax returns. The estimates concerning 1996–2000 were made based solely on the income tax returns data.
- Hungary (before 2009):** The split of the personal income tax was estimated by the Ministry of Finance using aggregate statistical information from individual personal income tax returns and the declarations of enterprises on withholding tax. The share of the personal income tax on labour is related to the total revenue from the personal income tax by deduction of shares pertaining to capital and to self-employed income together with a weighted proportion of the tax credits from the latter.

⁽²⁹⁾ Except the income and taxes of 'continuous and coordinated collaborations' that are allocated to the labour category. The income of these self-employed workers is treated, for tax purposes, as income of employed workers.

- Austria:** The split of the personal income tax was estimated by the Ministry of Finance using statistical information from the wage withholding tax and the final income tax by assessment. Taxes raised on income from employed labour are withheld by the employer at source, and the wage tax system is designed to approximate the final personal income tax as closely as possible, but in some cases certain repayments have to be made by the tax administration. This can for example occur if the taxpayer receives income from several jobs or pensions during one year, or if there are different payments per month or deductions for special expenses etc. As these repayments concern only wage taxpayers, the total net amount of the repayments was deducted from the total recorded wage tax, and the recorded income tax was adjusted accordingly. Also, the income from employment includes income in the form of social transfers and pension benefits received. The recorded revenue of the wage tax was also corrected for the relevant amount to arrive at the fraction of income tax levied on labour income. The revenue of the personal income tax by assessment largely reflects entrepreneurial income and income from capital. The (corrected) recorded revenue from the personal income was split between the two sources, using tax return data aggregated at the level of a number of income classes as outlined above.
- Portugal:** The split of the personal income tax was estimated by the Ministry of Finance using information from personal income tax returns except for the amount of tax raised on capital income, which was estimated using information of both withholding taxes and personal income tax returns. The estimates are based on three data sets: (1) aggregate net taxable incomes by category of income; (2) tax liabilities by category of income or groups of categories, depending on the type of tax returns. Some households only earn income from one category of income (e.g. income from labour), and so the tax liability is directly imputable to that category but other households simultaneously earn income from more than one category (e.g. income from labour and income from self-employed labour); (3) aggregate data from withholding tax returns relating to incomes subject to a final withholding tax, which, in general, are not reported in tax returns (e.g. interest on bank deposits). The split of the personal income tax was estimated according to the following procedure. As the first step, the tax liability of households with one source of taxable personal income was directly allocated. As the second step, from the aggregates of the net taxable incomes by category of income the net taxable incomes of households with one source

of income were subtracted. Third, the aggregate tax liability of households which earn more than income was split. This split was made in proportion to the aggregate taxable incomes for each category that resulted from the second step. In this step it was thus assumed that all categories of income are subject to a common average effective tax rate. Finally, the revenue from the final withholding tax was added to the relevant categories. It should be noted that this assumes that none of the incomes subject to a final withholding tax is reported in the tax return and so could result in double counting. However, in practice, it is believed that the amounts concerned are not of great magnitude.

- Romania:** The split of personal income tax was estimated by the Ministry of Finance in collaboration with the National statistical office using aggregate statistical information of the general personal income tax revenues, and the afferent taxable base, divided on the relevant categories.

ESTIMATES OF THE SPLIT OF PERSONAL INCOME TAX

The following tables present the resulting estimates for the split of the personal income tax. Looking at the estimates, there are some noticeable differences, in particular for the income tax allocated to capital and social transfer and pension benefits. By including net interest payments in the tax base of capital, for example, some Member States (e.g. Denmark and the Netherlands) have taken into account the way the tax relief for mortgage interest payments and other interest payments on loans effectively reduces the tax base of capital. This explains why the estimated fraction for personal income tax raised on capital income is sometimes relatively low (or even negative) for a number of Member States. In some Member States such deductions are less significant or non-existent, while others were unable to take the revenue effects of such specific tax base deductions yet into account. Also, some Member States were unable to estimate the amount of personal income tax on (taxable) social transfers, while others could not distinguish between different types of pension benefits. Inevitably this may have had some consequences for the implicit tax rates on labour and capital. The estimates for the amount of personal income tax allocated to capital income and social transfers and pensions would benefit from future work. What is also noteworthy from the table is the fact that the personal income tax revenue allocated to (employed) labour income appears to be relatively low in Greece and Poland.

Table F.1: Personal income tax revenue allocated to employed labour income
(% of total revenue of personal income tax)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BE	76.7	76.7	77.0	77.3	77.6	77.9	78.0	78.1	77.3	77.0	76.1	75.3	74.8
BG	87.8	85.6	84.1	84.8	82.5	86.5	87.7	85.7	85.6	86.4	87.4	87.8	88.5
CZ	82.1	86.7	89.0	89.5	93.0	93.1	96.2	95.3	95.4	95.5	97.0	95.8	95.5
DK	73.7	72.6	72.6	72.8	75.9	75.0	71.9	71.6	71.2	69.4	68.0	67.5	68.1
DE	75.0	72.1	71.9	70.3	71.2	73.2	72.7	72.7	72.7	72.3	72.5	72.4	72.2
EE	90.2	86.4	88.6	90.4	90.4	89.3	88.8	89.2	90.7	91.2	91.3	90.7	90.9
IE	80.4	80.4	80.4	80.5	80.5	80.5	80.5	82.9	83.4	83.2	83.7	80.9	80.9
EL	50.7	51.9	51.0	50.7	50.0	50.3	50.5	47.7	50.2	50.2	50.2	50.2	50.2
ES	70.9	69.9	67.2	68.2	70.9	72.4	73.0	72.1	70.7	69.5	68.4	67.6	67.1
FR	59.3	59.4	58.2	58.4	58.1	57.8	54.2	54.2	56.8	55.4	55.4	55.2	55.8
HR	79.3	80.7	82.3	83.5	84.3	85.1	84.7	84.9	83.6	80.4	80.4	76.3	75.0
IT	55.4	55.2	54.4	54.4	55.6	55.1	54.7	54.5	55.0	54.4	53.5	53.9	53.9
CY	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5
LV	97.2	97.5	96.8	96.8	96.9	95.3	92.6	88.7	87.4	87.0	87.3	87.9	88.2
LT	91.3	90.1	89.6	88.0	86.2	84.3	85.9	85.4	85.8	86.3	85.5	84.9	83.3
LU	72.6	72.3	72.8	71.8	74.5	73.3	73.2	72.4	72.1	73.4	73.9	74.2	74.2
HU	86.3	86.2	85.6	79.6	82.8	79.4	82.8	82.8	84.4	84.0	83.9	84.1	83.8
MT	69.4	68.4	69.6	69.3	69.8	69.5	69.9	70.0	70.7	70.6	70.8	69.8	73.1
NL	71.6	70.8	70.3	69.6	68.7	73.2	71.4	72.4	71.7	69.5	64.8	67.7	66.8
AT	60.7	61.1	62.2	62.8	63.1	62.0	61.7	62.5	62.6	62.2	61.7	61.7	59.5
PL	53.1	51.5	50.1	45.0	49.3	48.4	48.9	47.8	48.5	47.7	48.0	47.3	47.9
PT	63.7	63.5	63.6	60.6	58.9	59.1	61.2	59.1	54.8	55.6	55.4	57.3	57.3
RO	63.4	69.0	69.2	68.9	67.1	68.6	74.3	73.0	73.7	74.1	66.9	64.1	58.7
SI	90.0	89.4	87.6	82.2	83.7	87.2	87.8	87.9	86.4	89.8	88.4	87.3	87.3
SK	82.6	84.8	85.4	86.5	88.1	93.9	94.3	93.8	94.4	93.8	93.9	94.3	94.9
FI	68.8	68.2	67.3	66.3	69.1	69.1	67.3	66.7	66.4	65.5	63.5	62.3	61.8
SE	68.4	68.3	66.3	66.3	69.8	68.9	69.1	71.6	71.6	70.9	70.2	68.6	68.6
UK	73.6	73.7	73.1	73.0	72.2	73.2	74.8	75.5	74.7	73.7	73.1	71.9	74.5
NO	75.6	73.6	75.0	73.6	74.9	73.4	72.7	73.6	73.6	73.9	73.6	68.4	68.4

Note: The numbers printed in bold are the actual estimates; the numbers printed in italics represent either linear interpolation or fractions that were assumed to remain constant.
Source: European Commission services

Table F.2: Personal income tax revenue allocated to income of the self-employed
(% of total revenue of personal income tax)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BE	12.3	12.3	12.4	12.2	12.0	11.8	12.1	11.9	12.0	12.2	13.0	13.2	13.6
BG	10.1	11.9	11.8	11.5	11.0	8.4	8.7	10.4	10.8	10.2	9.3	8.8	8.6
CZ	15.1	10.8	8.8	8.2	4.6	4.6	1.9	2.5	2.3	2.1	0.9	1.8	2.2
DK	5.2	5.5	5.5	5.5	4.3	4.0	4.3	4.3	4.0	4.4	4.9	4.8	4.9
DE	18.3	20.8	20.3	21.4	19.7	18.3	20.5	20.5	20.3	20.7	20.4	20.6	20.6
EE	1.8	2.0	2.1	1.5	1.3	1.0	1.1	1.6	1.3	0.9	0.8	0.8	0.7
IE	11.4	11.4	11.4	11.2	11.2	11.2	11.2	9.5	8.6	8.7	8.7	8.5	8.5
EL	23.2	20.3	20.2	19.7	19.5	17.8	16.2	20.7	15.0	15.0	15.0	15.0	15.0
ES	12.5	11.7	10.9	10.9	9.1	7.9	7.9	7.4	7.6	7.7	8.0	8.7	8.9
FR	16.8	16.8	15.7	15.4	14.8	14.2	14.9	14.9	10.5	10.0	9.8	9.9	9.5
HR	6.8	7.8	6.2	5.5	5.1	4.3	4.2	4.3	4.3	5.4	4.8	5.2	5.1
IT	17.7	17.3	18.2	18.4	16.8	15.2	15.2	15.3	15.1	14.6	14.5	14.5	14.5
CY	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
LV	0.3	0.4	0.4	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2
LT	1.4	1.3	3.1	3.2	3.4	4.1	2.6	2.6	3.4	3.3	3.5	3.1	3.4
LU	10.2	9.0	9.6	9.0	6.9	9.5	8.6	9.2	8.6	9.6	9.6	10.5	10.5
HU	3.6	3.4	3.3	3.1	3.1	3.3	3.8	5.5	5.6	5.7	5.5	5.6	5.3
MT	8.1	8.4	8.0	8.6	7.9	7.8	7.6	7.4	7.2	7.1	7.3	7.6	7.0
NL	22.2	23.6	23.0	23.8	26.2	20.6	21.3	19.7	18.7	19.9	23.9	18.4	17.9
AT	18.4	18.4	16.8	16.2	15.5	16.8	16.6	15.7	15.2	15.5	15.9	16.0	18.5
PL	24.6	24.9	25.0	30.4	28.5	27.7	27.1	27.9	26.2	26.3	27.8	29.0	29.4
PT	9.2	9.1	8.9	9.1	8.3	7.6	7.4	6.2	5.8	5.7	5.6	5.6	5.6
RO	3.8	4.1	4.8	5.4	5.8	4.3	4.8	4.6	4.4	4.6	4.2	3.7	2.9
SI	5.3	5.5	5.0	7.0	6.0	4.7	4.2	4.0	3.6	3.7	4.2	4.0	4.0
SK	15.0	13.7	12.8	11.6	10.1	4.6	4.2	5.0	4.3	4.7	4.8	4.6	4.0
FI	7.8	7.6	7.7	7.9	7.2	7.2	6.9	7.5	7.5	7.3	7.8	7.1	7.2
SE	2.8	3.3	2.7	2.7	2.7	2.6	2.6	2.7	2.6	2.4	2.3	2.3	2.3
UK	13.2	12.7	12.7	12.3	12.5	11.5	11.3	11.0	10.7	10.6	10.6	10.2	10.1
NO	8.8	9.9	7.8	7.9	7.1	6.9	6.9	7.0	6.7	6.3	6.2	5.9	5.9

Note: The numbers printed in bold are the actual estimates; the numbers printed in italics represent either linear interpolation or fractions that were assumed to remain constant.
Source: European Commission services

Table F.3: Personal income tax revenue allocated to social transfers and pensions
(% of total revenue of personal income tax)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BE	12.2	12.2	12.3	12.9	13.5	14.1	14.2	14.5	14.6	14.1	15.0	15.4	15.6
BG	0.0												
CZ	0.0												
DK	23.2	22.6	22.2	21.5	22.2	25.0	24.5	25.2	25.5	25.9	26.2	25.5	25.0
DE	2.8	3.2	3.3	3.3	3.3	3.5	3.8	3.8	4.0	4.1	4.2	4.2	4.4
EE	6.0	5.9	5.0	3.9	5.2	8.4	8.2	6.8	6.2	5.9	5.9	5.7	6.0
IE	0.9	<i>0.9</i>	<i>0.9</i>	0.9	<i>0.9</i>	<i>0.9</i>	<i>0.9</i>	1.9	2.0	2.2	2.2	2.0	<i>2.0</i>
EL	14.1	16.0	17.0	18.1	19.1	20.6	22.1	19.7	23.1	<i>23.1</i>	<i>23.1</i>	<i>23.1</i>	<i>23.1</i>
ES	6.3	6.6	6.6	6.2	6.6	7.4	8.9	9.8	10.9	11.9	12.3	12.1	12.5
FR	17.3	16.5	16.7	16.9	<i>17.7</i>	18.5	20.0	<i>20.0</i>	17.0	17.6	18.2	18.5	18.5
HR	2.3	2.1	2.4	2.6	2.8	2.9	3.0	2.5	2.9	3.2	3.1	2.4	2.4
IT	22.4	22.8	22.6	22.0	22.5	24.4	24.9	25.5	26.2	27.0	28.2	28.0	<i>28.0</i>
CY	<i>2.5</i>												
LV	1.7	1.9	1.7	0.9	2.1	3.6	4.7	5.2	5.2	5.3	5.6	5.7	6.0
LT	2.5	2.6	3.0	3.7	5.2	7.7	6.9	6.3	4.1	3.5	3.5	4.5	4.7
LU	11.1	12.3	11.9	11.4	11.3	11.6	11.5	12.2	12.5	11.5	11.2	10.7	<i>10.7</i>
HU	1.6	1.8	1.9	7.4	8.4	3.4	2.6	0.8	1.0	1.0	0.9	0.8	0.9
MT	15.1	15.7	16.5	16.2	16.3	16.8	17.3	17.3	18.0	18.3	18.8	18.8	17.9
NL	18.2	18.8	18.4	17.9	17.0	18.9	18.6	19.4	20.2	20.8	19.7	20.7	20.2
AT	18.6	17.8	18.1	18.0	18.1	18.4	19.0	19.3	19.7	19.8	20.1	20.0	19.3
PL	18.1	16.9	17.3	15.6	15.6	17.3	17.5	17.6	18.2	18.6	18.5	18.0	17.6
PT	13.5	14.2	14.9	15.6	15.7	16.7	18.3	19.7	19.7	23.4	23.8	24.8	<i>24.8</i>
RO	0.5	1.1	1.4	1.9	1.9	4.5	5.7	5.3	5.5	6.3	5.7	5.5	5.3
SI	2.5	2.5	2.3	2.1	2.2	2.3	2.5	2.8	2.7	1.1	1.5	1.5	<i>1.5</i>
SK	0.0												
FI	18.4	18.5	18.3	17.8	17.4	19.0	20.0	20.1	20.7	21.6	22.1	23.1	23.6
SE	26.3	23.9	24.1	22.4	22.9	24.1	22.5	20.9	21.4	21.6	20.5	19.9	19.7
UK	1.7	1.6	1.7	1.7	1.7	1.2	1.9	2.1	2.3	2.4	2.6	2.7	2.7
NO	9.9	9.8	9.9	9.9	9.8	10.5	10.8	9.6	10.0	9.7	10.0	13.4	<i>13.4</i>

Note: The numbers printed in bold are the actual estimates; the numbers printed in italics represent either linear interpolation or fractions that were assumed to remain constant.
Source: European Commission services

Table F.4: Personal income tax revenue allocated to capital income
(% of total revenue of personal income tax)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
BE	-1.1	-1.1	-1.6	-2.3	-3.0	-3.7	-4.4	-4.5	-3.9	-3.3	-4.1	-3.9	-4.0
BG	2.2	2.5	4.1	3.7	6.5	5.0	3.6	3.9	3.6	3.3	3.3	3.3	3.0
CZ	2.8	2.5	2.2	2.2	2.4	2.3	1.9	2.2	2.3	2.4	2.1	2.4	2.3
DK	-2.0	-0.7	-0.3	0.3	-2.3	-3.9	-0.7	-1.1	-0.8	0.3	1.0	2.2	2.1
DE	3.9	3.9	4.5	5.0	5.8	5.0	3.0	3.0	3.0	2.9	2.9	2.8	2.8
EE	2.0	5.7	4.4	4.1	3.1	1.3	1.9	2.3	1.9	1.9	2.0	2.8	2.4
IE	7.2	7.2	7.2	7.5	7.5	7.5	7.5	5.7	6.0	5.9	5.4	8.6	8.6
EL	12.0	11.8	11.8	11.4	11.4	11.3	11.2	11.9	11.7	<i>11.7</i>	<i>11.7</i>	<i>11.7</i>	<i>11.7</i>
ES	10.3	11.8	15.4	14.8	13.4	12.4	10.2	10.7	10.8	10.9	11.3	11.7	11.5
FR	6.6	7.3	9.5	9.3	<i>9.4</i>	9.4	10.9	<i>10.9</i>	15.8	17.1	16.6	16.4	16.2
HR	11.6	9.4	9.1	8.3	7.7	7.6	8.2	8.3	9.2	11.0	11.8	16.1	17.5
IT	4.6	4.7	4.8	5.2	5.1	5.2	5.3	4.7	3.8	4.0	3.9	3.6	3.6
CY	<i>0.9</i>	<i>0.9</i>	<i>0.9</i>	<i>0.9</i>	<i>0.9</i>	<i>0.9</i>							
LV	0.8	0.2	1.1	2.0	0.9	0.8	2.4	5.8	7.1	7.5	6.9	6.2	5.6
LT	4.9	6.0	4.4	5.0	5.2	3.9	4.6	5.7	6.7	7.0	7.6	7.5	8.6
LU	6.0	6.4	5.7	7.8	7.3	5.6	6.7	6.3	6.8	5.5	5.2	4.5	4.5
HU	8.5	8.7	9.1	10.0	5.7	13.9	10.8	10.9	9.0	9.2	9.6	9.5	10.0
MT	7.4	7.5	5.9	5.9	6.0	5.9	5.3	5.2	4.1	4.0	3.1	3.9	1.9
NL	-11.9	-13.2	-11.7	-11.4	-11.9	-12.7	-11.3	-11.6	-10.6	-10.2	-8.4	-6.7	-4.9
AT	2.3	2.7	2.9	3.0	3.3	2.9	2.7	2.5	2.5	2.5	2.3	2.3	2.7
PL	4.2	6.6	7.6	9.0	6.6	6.7	6.5	6.7	7.1	7.4	5.6	5.7	5.1
PT	13.7	13.2	12.6	14.8	17.0	16.6	13.1	14.9	19.7	15.3	15.2	12.3	12.3
RO	32.3	25.8	24.7	23.7	25.1	22.6	15.2	17.1	16.4	14.9	23.1	26.7	33.1
SI	2.2	2.7	5.1	8.7	8.2	5.8	5.6	5.4	7.3	5.3	5.9	7.2	7.2
SK	2.5	1.5	1.8	1.9	1.8	1.5	1.5	1.2	1.3	1.4	1.3	1.1	1.1
FI	5.0	5.8	6.8	8.0	6.3	4.7	5.8	5.7	5.3	5.6	6.6	7.6	7.4
SE	2.5	4.6	7.0	8.6	4.6	4.4	5.7	4.7	4.4	5.1	6.9	9.2	9.4
UK	11.5	12.0	12.5	13.1	13.7	14.1	12.0	11.4	12.4	13.3	13.8	15.3	12.7
NO	5.6	6.7	7.3	8.7	8.2	9.1	9.6	9.8	9.7	10.1	10.2	12.3	12.3

Note: The numbers printed in bold are the actual estimates; the numbers printed in italics represent either linear interpolation or fractions that were assumed to remain constant.
Source: European Commission services

Effective average tax rate

The methodology used for the calculation of the effective tax rates is set out by Devereux and Griffith (1999, 2003), and has also been used in an earlier study by the European Commission in 2001⁽³⁰⁾. The methodology has been applied for the calculation of effective tax rates in the EU and other countries by ZEW on a yearly basis⁽³¹⁾.

The basic approach proposed by Devereux and Griffith (1999, 2003) is to consider a hypothetical incremental investment located in a specific country undertaken by a company resident possibly in the same country, but also possibly in another country. Given a post-tax real rate of return required by the company's shareholder, it is possible to use the tax code to compute the implied required pre-tax real rate of return, known as the cost of capital⁽³²⁾. The proportionate difference between the cost of capital and the required post-tax real rate of return is known as the effective marginal tax rate (EMTR)⁽³³⁾.

This approach is based on the presumption that firms undertake all investment projects which earn at least the required rate of return. For a given required post-tax rate of return, the more severe the tax system, the higher is the cost of capital, and hence the less likely that any specific investment project will be undertaken.

A complementary approach is to consider discrete choices for investment, and in particular the discrete location choice. If two locations are mutually exclusive, then the company must choose between them. In this case, the impact of taxation on the choice is measured by the proportion of total income taken in tax in each location. Devereux and Griffith (1999, 2003) proposed a measure of an effective average tax rate (EATR)⁽³⁴⁾ to identify the effect of taxation on such discrete location choices.

⁽³⁰⁾ European Commission (2001a)

⁽³¹⁾ For the most recent report see ZEW (2017), *Effective Tax Levels using the Devereux/Griffith Methodology*, Mannheim.

⁽³²⁾ In the absence of personal taxes, the company is assumed to be required to earn a post-tax real rate of return of 5%. The cost of capital is the implied required pre-tax real rate of return. The cost of capital is calculated for each of 15 different types of investment (5 assets, each possibly financed from 3 sources).

⁽³³⁾ The EMTR is a straightforward calculation as the proportionate difference between the cost of capital and the post-tax real rate of return of 5%. The EMTR is not represented in the tables, since, in the absence of personal taxes, it does not provide more information than the cost of capital.

⁽³⁴⁾ The effective average tax rate is in principle the relevant rate for analysing discrete investment choices, such as where to locate. The EATR is calculated for each of 15 different types of investment (5 assets, each possibly financed from 3 sources). However, now there is not only a post-tax real rate of return required by the shareholder, but also a fixed pre-tax real rate of 20%, while the minimum required post-tax real rate of return (in the absence of personal taxes) remains at 5%. This generates an investment project with a positive net present value. The EATR is a measure of the present value of taxes paid expressed as a proportion of the net present value of the income stream (excluding the initial cost of the investment).

In both cases, the hypothetical investment takes place in one period and generates a return in the next period. It is assumed throughout that the tax system is expected to remain unchanged over the life of the investment. The impact of taxation depends on a number of features of the tax system, including the statutory tax rate, capital allowances, the treatment of interest deduction, the allowance for corporate equity, the treatment of foreign source income, wealth taxes paid by the company, as well as possibly the treatment at the corporate and personal level of dividends paid by the company, and wealth and capital gains taxes at the personal level.

The forward-looking effective tax rates offer a convenient theoretical framework for summarising at a broad level the interaction of tax rules relating to capital investment. It should be noted that the indicator should be interpreted with caution, taking into account the assumptions related to the hypothetical investment as well as to the modelling detail of the tax systems under consideration. The measures presented here should also be distinguished from backward-looking approaches, as derived from published data on tax payments, either from company accounting records or from tax receipts. The latter offer the advantage that they are based on real-life data, but are subject to a number of limitations when analysing investment decisions: time lags in information and a lack of framework to distinguish between economic effects and tax effects, and the absence of a time perspective.

A) Economic assumptions

Several assumptions need to be made in order to define the hypothetical investment project analysed in this report, and the economic conditions under which it would take place. The following is assumed:

- The investment is made in the manufacturing sector.
- The shareholder is assumed to be able to earn a real rate of return of 5% on an alternative investment. If the alternative investment is not taxed, this is also the post-tax return required by the shareholder on the hypothetical investment analysed. Any tax on the alternative asset reduces the required post-tax rate of return on the hypothetical investment.
- The inflation rate is assumed to be 2% in all countries.
- Separate investments in five different assets are considered. They are as follows, together with the true economic depreciation rate assumed in each case (based on a study from the Ifo Institute in Munich): intangibles (taken for tax purposes here to be the purchase of a patent) (depreciation rate of 15.35%); industrial buildings (3.1%); machinery (17.5%); financial assets (zero); and inventories (zero). In presenting averages over different forms of investment, these assets are weighted equally.

- Three sources of finance for investment in each asset are separately considered: retained earnings, new equity and debt. In presenting averages over different forms of investment, weights used are taken from OECD (1991): retained earnings 55%, new equity 10% and debt 35%.
- The methodology has been also applied to compute effective tax rates at the shareholder level. Three types of shareholders are considered: zero-rate, top-rate non-qualified and top-rate qualified. In this report the shareholder taxation in the personal income tax is assumed to be zero. Only corporate taxation is considered.

B) Description of the tax parameters

Common figures to all countries for the real rate of return, the inflation rate, the true economic depreciation on assets and the weights for investments and sources of finance are used in order to identify differences in effective tax rates due to tax regimes, rather than due to differences in underlying economic conditions.

The types of parameters incorporated into the model are as follows:

- statutory corporation tax rates, including surcharges and typical local tax rates on profit, as well as various special rates which apply to specific forms of income or expenditure;
- corporate real estate taxes, net wealth taxes and other non-profit taxes on assets;
- capital allowances for industrial buildings, machinery, intangibles (the purchase of a patent) and the tax treatment of financial assets and inventories.

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