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AVERAGE AND MARGINAL EFFECTIVE TAX RATES FACING WORKERS IN THE EU. A MICRO-LEVEL ANALYSIS OF LEVELS, DISTRIBUTIONS AND DRIVING FACTORS

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Abstract

Macro-based effective tax rate (ETR) measures do not provide information on the level or distribution of marginal effective tax rates thought to influence household behaviour. They also do not capture differences in average ETRs facing different population sub-groups. I use EUROMOD, an EU-wide tax-benefit model, to derive distributions of average and marginal ETR measures for fourteen countries. Results for each country show how many and which types of individuals face different ETR levels. I consider effective tax burdens on labour income as well as the marginal tax rates faced by working men and women. Results are broken down to isolate the influence of income taxes, social contributions and various types of social benefits.

Keywords: Effective Tax Rates; European Union; Microsimulation.

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EUROMOD relies on micro-data from 11 different sources for fifteen countries. The datasets used in this paper are the European Community Household Panel (ECHP) made available by Eurostat; the Austrian version of the ECHP made available by the Interdisciplinary Centre for Comparative Research in the Social Sciences; the Living in Ireland Survey made available by the Economic and Social Research Institute; the Panel Survey on Belgian Households (PSBH) made available by the University of Liège and the University of Antwerp; the Income Distribution Survey made available by Statistics Finland; the Enquête sur les Budgets Familiaux (EBF) made available by INSEE; the public use version of the German Socio Economic Panel Study (GSOEP) made available by the German Institute for Economic Research (DIW), Berlin; the Survey of Household Income and Wealth (SHIW95) made available by the Bank of Italy; the Socio-Economic Panel for Luxembourg (PSELL-2) made available by CEPS/INSTEAD; the Socio-Economic Panel Survey (SEP) made available by Statistics Netherlands through the mediation of the Netherlands Organisation for Scientific Research - Scientific Statistical Agency; and the Family Expenditure Survey (FES), made available by the UK Office for National Statistics (ONS) through the Data Archive. Material from the FES is Crown Copyright and is used by permission. Neither the ONS nor the Data Archive bear any responsibility for the analysis or interpretation of the data reported here. An equivalent disclaimer applies for all other data sources and their respective providers cited in this acknowledgement.

EDITORIAL NOTE

This paper is a shortened and revised version of EUROMOD Working Paper No. EM2/02. The numbers reported for France are affected in particular. It is also published as an OECD Working Paper.

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1. INTRODUCTION

The analysis of most tax and transfer policy issues requires knowledge about how much is paid in taxes and received in benefits, by whom and in what circumstances. Moreover, in assessing existing tax-benefit policies and proposing reforms, it is useful to compare levels and structures of taxes and benefits across countries. The complexity of relevant rules governing tax liability and benefit entitlement and a lack of comprehensive and comparable data at the micro-level has recently led to major efforts being directed towards finding methods to construct simple summary indicators such as implicit effective tax rates based on revenue statistics and national accounts data (Carey and Tchilinguirian, 2000; Martinez-Mongay, 2000). Although these indicators can provide important insights regarding aggregate payments they cannot be used to measure marginal effective tax rates. While macro-based average effective tax rates would be good approximations of marginal effective tax rates if net taxes paid per income unit were the same across incomes and across individuals, neither is true for tax-benefit systems: Aggregate calculations do not give correct measures of the marginal tax rate because they do not consider the institutional rules as they apply to each taxpayer and benefit recipient. Obviously, macro-based figures also cannot answer questions about the detailed distribution of tax payments across the population.[1]

Previous studies have calculated distributions of household-sector tax burdens for individual countries, notably the US (Mitrusi and Poterba, 2000). At the European level, no detailed distributions of tax rates are available on a comparable basis. This paper aims to fill this gap by deriving distributions of effective tax rates for fourteen EU countries. A new EU-wide tax-benefit model is used to separately show the contributions of individual policy instruments to effective tax rates. The simulation approach also permits the calculation of marginal effective tax rates, which, by their nature, are not directly observable from micro-data sources.

Effective tax rates capture the net tax burden resulting from the interaction of different types of taxes and, depending on the purpose, benefit payments. Average effective tax rates (AETRs) express the resulting net

[1] Throughout the paper, I use the terms tax and benefit *payments* to refer to the actual amounts paid in tax or received as benefits, i.e., the formal incidence. How this relates to the final ('economic') incidence is discussed in section 3.

payments as a fraction of the income on which they are levied. They are therefore useful in assessing the size of transfers to and from the government *given* the incomes and circumstances observed at a given point in time. Marginal effective tax rates (METRs) measure the degree to which any *additional* income would be 'taxed away'. METRs are therefore useful measures for evaluating the financial incentives to engage in activities meant to generate or increase income.

The accurate measurement of AETRs and METRs is important for a range of policy related questions. Measures of effective tax rates have, for instance, been used as explanatory variables in studies concerning the influence of tax burdens on economic growth (Agell, *et al.*, 1997; , 1999), unemployment (Daveri and Tabellini, 2000; Martinez-Mongay and Fernández-Bayón, 2001) and wage setting behaviour (Sorensen, 1997). Clearly, many of the processes underlying these issues are strictly linked to the behaviour of individuals or households. In comparing and evaluating different tax-benefit systems one would therefore want to characterise them not only in terms of the effective tax burden of a single average ('representative') agent but also in terms of the number and types of households and individuals who are, in fact, facing effective tax rates of the various magnitudes. In fact, from a distributional point of view, detailed knowledge about the incidence of tax and benefit payments is of interest in itself (e.g., Mercader-Prats, 1997).

Although comparable and detailed household micro-data have become more readily available in recent years, the information contained in these data sources is nevertheless insufficient for calculating detailed AETRs and METRs. One reason is simply that variables on income tax (IT) or social insurance contributions (SIC) are often missing. Even if they are recorded, social insurance contributions paid by employers (or benefit paying institutions) on behalf of employees (benefit recipients) will usually not be available (as shown below, employers' contributions represent an important part of the tax burden borne by labour incomes). To overcome this problem simulation methods are frequently used to impute missing information (Immervoll and O'Donoghue, 2001a; Weinberg, 1999). This basically entails combining the information on people's status and incomes with a detailed representation of tax-benefit rules and provides all necessary information for computing AETRs. Importantly, the combination of micro-data with a model of tax and benefit rules in microsimulation models can be used to compute METRs, which are not observed in standard micro-data. By varying each observation's incomes by a certain amount and then re-computing tax liabilities and benefit entitlements, the effective tax burden on any additional income can be captured. Finally, the parameterisation of tax-benefit rules built into microsimulation models permits effective tax rates to be computed under a range of different policy configurations. In the EU, such 'forward-looking' analyses of the likely impact of policy reforms on effective tax burdens are particularly relevant given the identification of 'high' or 'excessive' levels of taxation as a major policy concern.[2]

The plan for this paper is as follows. Section II provides a rationale for evaluating effective tax rates at the micro-level and compares approaches using empirical micro-data with macro-based techniques as well as 'typical household'-based methods. Section III discusses the choices to be made in measuring effective tax rates and explains the scope and approach adopted in the present study. Section IV contains an explanation of the data sources used as well as a brief description of the microsimulation model employed for simulating relevant tax and benefit amounts for each observation. The remainder of the paper presents simulation results for fourteen countries.[3] Section V focuses on the effective taxation of labour incomes and, thus, on those in work. It presents individual-level estimates of the total tax 'wedge', expressed in terms of AETRs, resulting from the combination of IT and SIC. Section VI evaluates relevant financial incentives for the working population by computing METRs separately for men and women. All ETR results are presented in terms of their overall distribution as well the difference across certain individual characteristics such as income level or gender. To understand the impact of existing or proposed policies on ETRs it is essential to isolate the effects of particular tax-benefit instruments on total tax burdens. ETRs are therefore disaggregated in order to show, for each level of ETR, the contributions of individual tax-benefit instruments. In addition, Annex A presents an overview of the features of tax-benefit instruments across countries. Section VII concludes.

2. MEASURING EFFECTIVE TAX RATES – WHY LOOK AT THE MICRO-LEVEL?

International comparisons of tax systems have long relied on information about formal tax rules (such as the rate structure) or they have summarised their aggregate impact by relating total receipts to national income (these indicators are sometimes called 'tax ratios'). One main shortcoming of this latter approach is that it disregards the tax base a tax is levied on. A 'tax ratio' for a certain type of income tax of *x*% may be the result of a combination of (a) a broad tax base and a low tax rate; or (b) a narrow tax base and a high tax rate. The economic consequences are, obviously, very different. To rectify this problem, there has, starting in the 1990s, been a growing interest in methods seeking to derive measures of effective tax rates based on Revenue Statistics and National Accounts (Lucas, 1990, Mendoza, *et al.*, 1994). By relating tax receipts to

[2] In 2000 the European Council has, for instance, committed the European Commission to assess "whether adequate measures are being taken in order to […] alleviate the tax pressure on labour […]" (Martinez-Mongay (2000), p. 6). Carone and Salomäki (2001) supply a recent contribution towards such an assessment.

[3] A working paper version of the present study (Immervoll (2002)) also considers the contribution of tax-benefit systems to household incomes by computing AETRs for the household as a whole taking into account both taxes and all types of cash benefits.

the relevant tax bases they provide a much better indicator of tax burdens. They are also attractive in that deriving comparable figures across countries is facilitated by the availability of internationally comparable sources of revenue statistics, such as those produced by the OECD, and standardised national accounts data. In addition, data on tax revenues as collected by tax authorities, capture any non-compliance, which can be substantial in some countries.

Obviously, macro-based measures cannot be used to investigate the micro-level incidence of tax payments. There are, however, other potential problems. One is related to the institutional characteristics in terms of how taxes and benefits are integrated in different countries and the fact that macro-based effective tax rates tend to focus on taxes and SIC while disregarding benefits. Child related payments may, for instance, be formally administered through the tax system in some countries (e.g. using tax credits) while they are paid as benefits in others. Clearly, excluding benefit payments in the latter cases means that the comparability of effective tax rates across countries will suffer. While, in principle, applying appropriate corrections would be straightforward, data on social transfers tend to be less comparable across countries than revenue statistics and incorporating them in multi-country studies can therefore be problematic.

Technical difficulties also arise due to conceptual differences between revenue statistics and national accounts data. Prior to 2004, OECD Revenue Statistics were, for instance, collected on a cash basis while national accounts measure incomes as they accrue. As a result the timing of the two data sources diverges (Jacobs and Spengel, 1999). Several other issues are also related to differences in definitions and scope between the two data sources and a number of assumptions are required to align them (Carey and Tchilinguirian, 2000). This range of potential problems has prompted a number of 'health warnings' being issued in order to make users of macro-based effective tax rates aware of their shortcomings (OECD, 2000b; c). The Working Party No. 2 on Tax Policy Analysis and Tax Statistics of the OECD Committee on Fiscal Affairs takes the view that "AETR results relying on aggregate tax and national accounts data are potentially highly misleading indicators of relative tax burdens and tax trends" and that "further work relying on micro-data is required to assess the magnitude of potential biases to average tax rate figures derived from aggregate data."[4]

In fact, there is an existing literature documenting various approaches of combining information on statutory tax rules and tax returns with data on income distribution and household surveys (Barro and Sahasakul, 1986; Easterly and Rebelo, 1993). Among researchers interested in the macroeconomic effects of taxation, however, these attempts have been met with some scepticism (although some authors have in fact used them

[4] cited from Carey and Tchilinguirian (2000), p. 5.

as yardsticks for validating macro-based results) as it was considered doubtful whether "marginal tax rates that apply to particular individuals in a household survey, or a specific aggregation of incomes based on tax-bracket weights, are equivalent to the aggregate tax rates that affect macroeconomic variables as measured in national accounts."[5] This limitation certainly holds for tax rate calculations based on 'typical' households (such as OECD, 2000a) as such estimates, while illustrative, fail to take into account the heterogeneity of the population. Although extending these calculations to a wider range of 'synthetic' households can serve to improve our understanding of the mechanics built into tax-benefit systems the point remains that any calculations based on synthetic households cannot capture, in the correct proportions, the tax and benefit payments across the entire range of household types found in the population as a whole (Immervoll, *et al.*, 2001). In contrast, the above criticism is not valid for calculations based on representative household micro-data as they can be used to derive aggregate measures of effective tax rates using *any* desired aggregation rule. At the same time, they are more informative than aggregate measures since they capture the distribution of effective tax rates across the population.

There are cases where computing measures based solely on *observed* past tax receipts and tax bases (sometimes referred to as 'backward-looking' in the literature), whether based on aggregate or micro-level data, cannot be used. First, measuring METRs requires assessing what would happen to tax burdens if incomes were to change. As tax-benefit systems are generally far from proportional, aggregate income changes are meaningless in this context. Instead, it is important *whose* income is changing. In a non-proportional tax-benefit system, METRs can therefore only be computed based on a knowledge of the distributions of incomes and other characteristics that determine tax liabilities and benefit entitlements. This problem is usually acknowledged in studies using macro-based measures of effective tax rates. However, since many of the distortionary effects of taxation that researchers are interested in are related to marginal rather than average tax rates, there is a worrying tendency to equate METRs with AETRs and use the latter as proxies for the former (see Mendoza, *et al.*, 1994 for an example and Padovano and Galli, 2001 for a critique).

A second area where 'forward-looking' methods of computing effective tax rates are particularly useful is in the analysis of policy reforms. There is often a need to evaluate reforms before detailed macro-economic data become available. Since the delays can be sizable, simulation techniques can play an important role in an early evaluation of policy reforms.[6] By changing the parameters of the tax-benefit rules built into such

[5] Mendoza, *et al.* (1994), p. 298

[6] Martinez-Mongay (2000) notes that there is generally a 2-3 year lag in the production of macro-based tax rates.

simulation models, they can also be used to perform analyses of reforms that have not yet been implemented or are purely hypothetical.

Measuring tax burdens by means of simulation methods is, however, also subject to a number of drawbacks that need to be kept in mind when interpreting results, including those reported in this paper. First, the interpretation depends on the particular situations for which tax calculations are made. In the case of simulations based on representative household micro-data, the quality of these data is obviously a decisive factor and a thorough validation of models against relevant reference statistics is therefore essential. A related point concerns the simulation of non-standard tax reliefs such as deductions that depend on people's expenditures. The micro-data used in simulation models are often not sufficiently detailed to determine the size of expenditures that would qualify for such deductions. Finally, simulation models tend to apply tax rules "mechanically" without trying to capture the degree of non-compliance.

3. WHOSE TAXES, WHICH INCOMES, WHAT MARGINS?

Several choices have to be made when measuring effective tax rates. Most of them have important implications for the interpretation of the results and thus require some consideration. In fact, depending on the research questions it will, as done below, often be desirable to compute effective tax rates in several different ways. A method which allows some flexibility is therefore valuable.

Before discussing the various decisions to be made and how microsimulation methods can be used to accommodate them it is useful to clarify the scope of the measurement exercise. AETRs measure some concept of total tax as a fraction of some concept of tax base. Obviously, the distribution of AETRs is therefore connected to the incidence of taxes. In studying questions of incidence one can be interested in the payments *per se*, or in the economic loss suffered by the taxpayer. For a particular taxpayer, this loss will, for two reasons, generally differ from the tax paid. First, taxes may, through influences on supply and demand at the market level, influence the prices of goods and services produced or consumed by the taxpayer. Second, the taxpayer herself may, in response to price changes, adjust the basket of goods and services she produces or consumes and suffer welfare losses in the process. The familiar process of tax 'shifting' is of great interest to economists and results of incidence studies may be very sensitive to the degree of shifting.[7]

Moreover, there are many economic consequences of taxation that cannot be captured by looking at the amounts of taxes alone. To take an extreme example, a tax that, at a given point in time, generates no

[7] Indeed, imperfect competition may lead to over-shifting in the sense that the loss suffered by a taxpayer can be less than 0% or more than 100% of the amount of tax paid. See, for instance, Stern (1987).

revenue at all may be detrimental to economic growth if it has made a certain type of productive activity so financially unattractive as to drive people away from engaging in it altogether. Nevertheless, it is difficult to deny that tax payments are an issue of public interest in themselves and therefore deserve investigation. The central issue then is to "distinguish clearly between tax payments and losses from taxation, and to recognise that the first is an accounting characteristic of a particular equilibrium, while the second requires the evaluation of a comparison between two alternative equilibria."[8]

In this paper, effective tax rates are computed for a given 'equilibrium' as characterised by the information recorded in household micro-data of a particular year. While the resulting AETRs will, for the reasons stated above, not capture total losses associated with the imposition of taxes, any substitution effects caused by them do enter the results: If we assume that we are, in fact, looking at an equilibrium then people will already have adjusted their activities in response to the tax burdens imposed on them.[9] The aim of computing AETRs is to understand the extent and distribution of burdens resulting from tax payments and, to avoid confusion, there should be no claim that the incidence of AETRs can be used as some sort of approximation of the incidence of economic losses. Instead, tax payments are one component of incidence analyses and should be treated as such.[10] For METRs, on the other hand, no qualifications regarding any decisions about the appropriate treatment of tax shifting are required at all. The main reason why we are interested in METRs in the first place is their possible effect on behaviour or, in other words, their role in moving from 'equilibrium 1' to 'equilibrium 2'. Clearly, METRs must therefore be evaluated under 'equilibrium 1'.

While some of the methodological issues to be considered for effective tax rate measurement at the micro-level are similar or can at least be related to those facing researchers concerned with deriving macro-based measures, others only become apparent due to the level of detail which micro-based approaches support. Even though these issues exist, in principle, regardless of the level of aggregation, the data sources used for

[8] Dilnot, *et al.* (1990), p. 213.

[9] It should be emphasised that this implies an important qualification of studies looking at effects of policy *reforms* on the incidence of effective tax rates. If taxes and benefits are computed for a given (pre-reform) population then, conceptually, the assumption of an equilibrium will not be appropriate. To what extent taking into account behavioural responses following the reform would, in fact, noticeably change results is another matter. The usefulness of incorporating behavioural response in microsimulation-based policy evaluations will depend on the precise type and intent of the reform and on the extent to which underlying micro-data permit changes to be detected in a statistically meaningful way. For a discussion of some of these and related issues see Pudney and Sutherland (1994) and Creedy and Duncan (2002).

[10] Dilnot, *et al.* (1990) show how tax payments, income effects due to price changes and welfare loss as a result of substitution processes can be brought together in one unified framework.

macro-based measures simply do not provide the same range of choices. The relevant dimensions are (1) the types of taxes and benefits to take into account and the income (or ‘tax base’) to relate them to and (2) the unit of analysis and, related to it, the sharing of any incomes within the unit. In the case of METRs an additional issue is (3) the nature and size of the income “margin” to be used for computing marginal effects. Each of these will be discussed in turn.

3.1 Tax-benefit instruments and definition of income base

Although effective tax rates are supposed to provide broad measures of tax payments, the choice of tax and benefit instruments to be incorporated in such a measure is not self-evident. Most studies consider taxes and ‘tax-like’ payments. However, it is not at all clear that SIC are, for example, equivalent to income taxes and it is undoubtedly the case that the degree of equivalence differs widely across countries. While, in principle, SIC are payments made in return for insurance coverage the link between income taxes and public services is not as direct. However, cross subsidies between the various ‘pots’ of public finances often make such a distinction less meaningful. In addition, social insurance schemes are, for the most part, compulsory and not characterised by a strict actuarial link between the value of insurance services and SIC paid. The discrepancy can be seen as performing functions (such as raising revenues or redistribution) normally associated with income tax.

Section II has already hinted at comparability problems that can arise due to international differences in the structure of tax-benefit systems when the benefit side is ignored. As the distinction between tax concessions and benefits can be more or less arbitrary, tax-benefit models which allow an integrated view on the tax-benefit system as a whole are useful in this respect. There are, however, limitations nonetheless as these models usually focus on cash instruments. As a result, there are inherent difficulties in comparing effective tax rates of countries where, say, childcare payments or housing benefits are paid in cash and those where these benefits are provided ‘in-kind’ through access to subsidised child-care or housing. A related question is that about the appropriate time-horizon of the calculations. Should some measure of future benefits financed by current SIC be taken into account? [11]

Some of these issues become somewhat clearer once one considers the appropriate definition of income that is to enter the denominator of the AETR calculations (the tax base). If the purpose of studying the incidence of AETRs is assessing the distribution of the relative contribution of tax-benefit systems to current cash

[11] The question here concerns pensions in particular, i.e., the distant future. There is, for instance, less of an issue with means-tested benefits which are sometimes, depending on current income, revised at the end of the current reference period (the ‘near’ future). These should, as far as possible, be taken into account when computing METRs.

incomes (as in Immervoll, 2002, a working paper version of the present study) then any in-kind transfers as well as future incomes such as pension rights will be disregarded.[12] Similarly, if the focus is on evaluating the total tax burden on labour (as in Section V) then any taxes or benefits which are not strictly related to labour income (such as taxes on investment income, family benefits[13]) should be disregarded.

3.2 Unit of analysis and sharing within units

A natural question to ask is whose effective tax rates we are interested in. Depending on the purpose, we may want to look at tax/benefit payments at the individual level, the level of the formal tax unit or some other notion of family or household. For distributional studies concerned with household welfare the household level will be appropriate (Canberra Group, 2001). In measuring the tax wedge on labour, however, one would want to relate the relevant taxes directly to the labour incomes of those supplying labour (and hence choose the individual as the unit of analysis).

Given that one distinguishing feature of households is the sharing of common resources (and given that we do not observe the precise sharing arrangements) studying units of analysis smaller than the household can be problematic. A particular issue arises due to the assessment unit built into statutory tax and benefit rules. These can be quite different for different instruments in a given country (e.g., individual SIC but joint IT) and, obviously, for the same instruments across countries. Although recent decades have, at least in the EU, seen a trend towards individual taxation, joint tax filing is current practice in a considerable number of countries (O'Donoghue and Sutherland, 1999). In addition, even if the tax schedule itself is applied to each individual separately, tax concessions such as tax-free allowances or tax credits are often transferable between family members and therefore represent a 'joint' element. Notions of family or household are even more important in determining the eligibility for benefits and applicable amounts. With the important exception of insurance-based benefits, practically no type of benefit is targeted directly towards individual persons. Instead, the structure of families or households as well as their members' characteristics and

[12] There would still be an issue of what 'current' means. Normally, income distribution studies take the year as their reference period (Canberra Group (2001)). In the context of effective tax rate calculations based on micro-data, this means that annual income data would be ideal. Some data sources, however, measure income over a shorter period (see appendix 1). Although these data can, of course, be annualised, time-period differences in the original data need to be borne in mind in comparative studies as income changes during the year will, for a particular household, imply that annual income is not equal to one particular month's income times 12.

[13] As illustrated by the 'tax concessions versus benefits' example in section 2, the treatment of benefits is not always straightforward. If family related tax concessions in country *A* are allowed to reduce effective tax rates then, for symmetry reasons, the same may need to hold for family benefits in country *B*.

incomes are crucial determinants of benefit payments. Even insurance-based benefits formally paid to the insured person often take into account family circumstances (e.g., minimum or basic pensions, unemployment benefits).

Whenever taxes or benefits are explicitly or implicitly targeted towards more than one person, the question how these payments are shared between members of an assessment unit is crucial if the unit of analysis is smaller than the unit of assessment. Should benefits be shared equally among all members of the household, or just among adults, or should payments be assigned according to some equivalence scale? Similarly, what is the best basis for sharing jointly paid income taxes? Should it be in proportion to the tax base or should those with higher income pay progressively more? Inevitably, these decisions are, to some degree, arbitrary. One attraction of calculations based on micro-data lies in raising the issue in the first place and forcing analysts to be explicit about the decisions they adopt.

3.3 Nature and size of margin used for computing METRs

Additional issues arise in computing the effective tax burden on marginal income changes. They relate to the exact features of the change. While marginal tax rates could in principle be found analytically by taking first differences of the relevant effective tax schedule this is not possible in practice as tax-benefit systems are characterised by discontinuities. While one could use kernel techniques to 'smooth over' any uncomfortable kinks, the most direct approach is to look at each observation separately and ask what would happen to taxes if income were to change by a certain amount. METRs can thus be found numerically by altering income, using a tax-benefit model to re-compute relevant taxes and benefits and comparing the results with the original situation:

$$METR = 1- [\ (y_1 + d)\ (1 - t_2) - y_1\ (1 - t_1)\ ]\ /\ d \qquad (1)$$

where y_1 is the original pre-tax-benefit income, d is the margin and t_1 and t_2 are the AETRs applying, respectively, to y_1 and y_1+d. $y_1(1-t_1)$ and $(y_1+d)(1-t_2)$ are, therefore, the incomes after taxes and benefits (before and after the income change). Similar to Sections III.1 and III.2 above, relevant decisions concern the definition of y_1, the tax-benefit instruments to be taken into account in computing t_1 and t_2, as well as the unit of analysis used for measuring incomes. In addition, the size (and direction) of d is important and leads to different interpretations of resulting METRs. In establishing work incentives, one will often be interested in a small income change, such as a small fixed percentage rise in earnings or the rise in gross earnings due to an additional hour of work. However, the margin can also be earnings as a whole in which case it measures the fraction of in-work income that is 'taxed away' when moving into work and is thus related to the concept of a replacement rate. For such 'large' margins, however, it is often not sufficient to only change income before re-computing taxes and benefits. In addition, several other characteristics which are available in the micro-data and which, in addition to income, are potential determinants of taxes and benefits (variables such as hours of work, employment status, economic sector) will have to be altered as well (see Immervoll and O'Donoghue, 2001b).

For questions related to financial incentives the appropriate choice of unit of analysis is particularly important. If a person's additional earnings reduce the household's entitlement to housing benefits then this is likely to be a consideration she will take into account. Similarly, an important consequence of joint taxation of married couples is that, from the couple's point of view, the lower earning spouse faces, for a lower level of earnings, the same marginal tax rate as her higher earning partner. Clearly, to bring out these facts, METRs would need to be computed for the household as a whole. For multi-person units, however, another decision to be made is who to attribute *d* to. Since for the unit as a whole, METRs will be different depending on *who* earns the additional amount, it will often be appropriate to evaluate METRs by attributing the additional income to each household member in turn (see Section VI).

4. DATA SOURCES AND TAX-BENEFIT MODEL

In computing effective tax rates for a representative sample of each country's population, I utilise person-level information on earnings, taxes and social benefits that is either taken directly from micro-data sources or simulated using EUROMOD, an EU-wide tax-benefit model.[14] A simulation of these income components is necessary in cases where they are not recorded in the micro-data. In addition, simulation is required in order to compute METRs (which entails evaluating changes in taxes and transfers following marginal income changes).

EUROMOD is an integrated microsimulation model of the tax-benefit systems in fifteen EU Member States.[15] The model permits common definitions of income concepts, units of analysis, sharing 'rules', etc. to be used across countries and therefore is a suitable instrument for computing effective tax rates on a comparable basis. EUROMOD captures the full range of institutional features of tax and benefit systems. This includes detailed income definitions (such as taxable income or "means" relevant for computing income-tested benefits), definitions of assessment units (such as who counts as a "child" for the purpose of a

[14] In this paper, simulated tax and benefit amounts are computed under the assumption of no tax evasion and 100% benefit take-up. Arguably, they may thus be seen as indicative of the way tax-benefit systems were formally designed to work. For an overview of country differences in benefit take-up rates see Hernanz, *et* al. (2004).

[15] At the time of writing, the Swedish part of EUROMOD was being finalised.

particular tax or benefit rules), thresholds, floors, ceilings and relevant tax rates as well as specific eligibility rules, withdrawal rates or income disregards used in computing benefit entitlements. The considerable level of detail makes it possible to derive a finely grained picture of tax burdens and benefit entitlements and how these vary with individual and family characteristics. Further information on EUROMOD and the simulated tax-benefit instruments, including simulation details as well validation of model results against other sources, can be found in Immervoll, *et al.* (1999), Sutherland (2001b) and on the Internet at http://www.econ.cam.ac.uk/dae/mu/emod.htm.

The tax and benefit rules underlying all calculations in this paper are those for 1998 as summarised in Annex B. The sources of micro-data used are listed in Annex A. In countries where income information relates to periods before 1998, they are adjusted to 1998 levels (Sutherland, 2001b explains how this is done). Depending on the country, sample sizes range from 2,500 to over 11,000 households. For the current exercise this results in effective sample sizes of between 1,300 and 5,500 per country in the case of computing AETRs and 3,000 to 17,000 per country in the case of the METR calculations (see Tables C2a and C2b).

5. EFFECTIVE TAX BURDENS ON LABOUR INCOME

As briefly discussed above, a focus on the tax burden borne by labour incomes requires that AETRs be evaluated for the individuals supplying the hours worked. While this section aims at measuring tax payments rather than the total 'losses' they give rise to, it should not matter who pays the taxes formally.[16] As a result, employer SIC paid on behalf of the employee are included in the numerator of the AETR ratio along with employees' SIC and income taxes. Since it is the burden on total labour income we are interested in, employer SIC also need to be added to employment income to yield the 'tax base' denominator.[17] As a rule, benefits are not subtracted from the numerator. An exception are employment-conditional benefits in the UK

[16] There is, however, a long-running debate whether SIC paid by employers have a stronger or more immediate effect on labour demand than own SIC. For arguments in support of this link see, for instance, Leibfritz, *et al.* (1997). For recent empirical evidence pointing towards little effect of payroll taxes on labour demand see Bauer and Riphahn (2002).

[17] It should be noted that the calculations do not take into account components of 'non-wage labour costs' that cannot be simulated using household micro-data. These include payroll taxes that depend on firm-specific characteristics. However, employer SIC as simulated by EUROMOD do represent the major part of total payroll taxes. Another area where household micro-data typically do not provide detailed information is the provision of voluntary employer insurance contributions to occupational pension plans, etc. To the extent that these vary between countries, any results based on such data-sources may not adequately capture these differences. This will also be true for the numbers presented in this paper.

(Family Credit in 1998) which constitute a tax concession particularly designed to increase net labour incomes.[18]

An interesting conceptual question concerns the treatment of consumption taxes. Traditionally, it has been argued that, as they also reduce earners' consumption opportunities, they need to be included in calculations of the 'labour tax wedge' by adding them to the AETR numerator.[19] However, a contrasting view is that, since consumption taxes apply to both earners and non-earners, they do not constitute a 'labour tax wedge' and therefore do not matter for studying the relationship of tax burdens and unemployment (Daveri and Tabellini, 2000). In the results presented here, I implicitly adopt the second view as, for technical reasons, it is difficult to include consumption taxes in the fourteen country simulation exercise.[20]

Since AETRs are computed at an individual level rather than for the household as a whole it is necessary to assume sharing arrangements for joint income taxes. In this exercise, it is assumed that any joint income tax burdens of a joint tax unit are shared in proportion to taxable income.[21] Another issue concerns the treatment of self-employment incomes which, by their nature, are part labour income and part income from capital. Carey and Tchilinguirian, 2000 present an approach which attempts to identify these components in the correct proportions at the macro-level. Due to the generally limited quality of self-employment income variables as available in micro-data sources the present paper does not attempt to approximate appropriate shares of labour and capital components and instead restricts its scope to employees only (i.e., individuals whose employment income exceeds income from self-employment). This is important when interpreting results for countries where self-employment incomes are important (e.g., Greece, Portugal) and may frequently represent a 'second-choice' substitute for regular employment.

Because income taxes are levied on the sum of all taxable income it is not entirely straightforward to find the tax paid on labour income alone in cases where individuals have income from more than one source. The

[18] For a discussion of the properties of UK in-work benefits see, for instance, Blundell and Hoynes (forthcoming).

[19] According to Layard, *et al.* (1991), p. 209, for instance, this wedge is "the gap between real labour costs of the firm […] and the real, post-tax consumption wage of the worker".

[20] Most EUROMOD datasets are income surveys containing no information on expenditures. While there are ways to impute the relevant variables from expenditure surveys, using imputed values for studying distributional issues on a disaggregated level can be problematic. See Baldini, *et al.* (forthcoming) and Sutherland (2001a).

[21] After any deductions, i.e., the income to which the tax schedule applies. In some countries, such as Belgium, tax schedules are formally individual based but as considerable amounts of taxable income are transferable from the higher-earning to the lower-earning spouse, a sizable 'joint' element exists nevertheless. In these cases, I treat the transfer as a tax-concession for higher-earning spouses, i.e., they are still assumed to pay the tax due on any transferred taxable income, albeit at the lower rate at which the lower-earnings spouse would be taxed.

approach taken here is to find the average income tax rate which applies to taxable income as a whole and to assume that this rate applies uniformly to all taxable income components. A result of this assumption is that AETRs on labour incomes will tend to be underestimated in countries where other income sources, such as income from capital, are effectively taxed at a lower rate. A similar method is used for computing the average labour 'tax' rate due to SIC. As people can, at a given point in time, have more than one income subject to SIC (e.g., employment and self-employment income) it is assumed that the resulting average 'tax' rate applies uniformly to all components that are part of the SIC base. In a last step, the average income tax and SIC rates are added up to find total AETRs on labour income.

The 'working population' sub-sample is restricted to non-civil servants[22] aged 18-64 who work during the *entire* period to which income information in the micro-data relates. The purpose of excluding people who have been working only for part of that period while being unemployed, retired or 'inactive' during the remainder is to avoid mixing AETRs relating to labour incomes with those that apply to unemployment benefits, pensions and other replacement incomes. Even if replacement incomes are not taxable, progressive income taxes will result in AETRs that, over the year, are lower for people working for only part of the year. For measuring tax burdens on labour, however, this 'averaging effect' is undesirable and would result in an underestimating the burden during the in-work period. By excluding people with out-of-work spells during the year, the results presented here will therefore represent a more focused picture of tax burdens on labour incomes than macro-based approaches which employ annual aggregate data and, in cases where other income components are also subject to tax, are unable to fully match taxes with the relevant in-work periods. On the other hand, excluding those with less stable work patterns may introduce a sample selection bias insofar as those experiencing out-of-work spells face AETRs that are systematically different (lower, most likely) from those for people with uninterrupted employment. This potential problem should be borne in mind when interpreting the results although any associated bias is likely to be considerably smaller than that introduced by not matching taxes with the appropriate in-work periods.

Before examining the density of AETRs it is instructive to compare aggregate effective tax burdens to those resulting from existing macro-based studies. There are, of course, important conceptual differences and one would therefore not expect to find similar numbers. Nevertheless, results from different studies should at least to some degree be reconcilable if they are to be useful for policy analysis purposes. In Table 1

[22] Civil servants are excluded because the details and degree to which their insurance benefits are financed by employers vary widely across countries. Any results including civil servants would therefore be difficult to interpret. While authorities employing civil servants explicitly pay employer SIC in some countries, such contributions can neither be identified nor simulated in others.

EUROMOD results for employees are compared with those reported in Martinez-Mongay, 2000: 27. In both cases, countries are ranked in descending order of AETRs. We see that EUROMOD results are higher in all fourteen countries and this is particularly true for countries where tax evasion may be important as the results in this paper refer to theoretical tax and SIC liabilities in a situation of no tax evasion. In addition, while non-standard tax reliefs can reduce burdens for taxpayers entitled to claim them, a lack of relevant data often precludes EUROMOD from taking this type of tax reductions into account.[23] Perhaps more importantly, however, higher AETRs are also to be expected since the micro-based approach is able to focus exclusively on the income taxes and SIC paid by those working during the entire year and therefore avoids mixing tax burdens of working and non-working persons. There are other data-related issues that can help explain discrepancies between micro- and micro-based AETR (Sutherland, 2001a). With the notable exception of Luxembourg and Portugal as well as Italy the ranking of countries in the first two columns of Table 1 is, nevertheless, remarkably similar for both sets of measures: Belgian, German and Finnish workers are subject to the highest tax burdens while AETRs are lowest in southern countries, in Ireland and the UK.

While this is somewhat reassuring the main point of computing AETRs based on micro-data is to gain an understanding of the distributions of tax payments. Indeed, the results show that the ranking of countries can be very different depending on the group of interest. On the right-hand side of Table 1, we see that, depending on earnings levels, countries' positions vary by between two (Belgium, Italy, UK) and eleven (Germany) ranks, indicating considerable dispersion between different groups. This is confirmed in Figure 1 where countries are ranked in ascending order of mean AETR (it is worth noting that the AETR averaged over individuals is different from the ratio of total taxes divided by total labour income shown in Table 1). The full distributions of tax burdens are shown in Figure 2. Since total tax burdens are here defined as income tax plus SIC without any consideration for benefits, there are very few negative net tax burdens on labour incomes. So-called "non-wastable" or "refundable" tax credits (i.e. tax credits whose size is not limited by pre-credit tax liabilities) can, as in Austria or the UK, nevertheless cause negative AETRs. With the exception of Greece, AETR bands encompassing more than 10% of employees are spread over a range of at least 15 percentage points. We also see a considerable number of earners where gross labour costs equal net earnings (zero AETRs in Greece, Ireland, Germany and the UK). In all fourteen countries, using aggregate or mean AETRs alone would clearly provide a poor representation of the tax burden faced by a major part of the working population.

[23] The scope of model simulations is described in EUROMOD country reports available on the Internet at http://www.econ.cam.ac.uk/dae/mu/emod.htm.

Looking at how tax burdens differ by earnings level (Table 2), we find that the number of negative and zero AETRs in Greece and the UK is sufficiently large to produce zero medians for the lowest gross earnings decile group.[24] Indeed, the UK aggregate AETR (i.e., taxes summed over all earners divided by their total labour income) for this group is negative, indicating substantial non-wastable tax credits for employees with very low earnings. The highest AETRs apply to top earning levels in Belgium with income taxes, employee SIC and employer SIC summing to more than 60% of gross earnings. The lowest effective tax burdens on very high earnings are found in Ireland and the UK. However, top earners are not always subject to the highest AETRs. This is mainly a result of upper contribution limits built into social insurance schemes but can also be a consequence of joint tax systems where low-wage earners can see their income tax rates pushed up by their higher-earning partner (and vice-versa for high-wage earners). As a result of both effects, median AETRs of Germany's 10% top earners differ little from median values in deciles 5 and 6.

Annex B provides an overview of the tax measures giving rise to the observed effective tax rate patterns across countries. In addition, Figure 3 provides a breakdown of AETRs by tax instrument. For each AETR band, it shows which part of the total tax burden is, on average, due to income taxes and social insurance contributions paid by both employee and employer. SIC are a more important determinant of AETR than income taxes in all countries but Denmark, Ireland and the UK. In all countries except Greece, Ireland and the UK, SIC are by far the most important tax component for those facing AETRs below 30% (employees in Belgium all face AETRs in excess of 30%). Employer SIC generally represent a larger component of AETRs than own SIC (particularly in Belgium, Italy and Spain). Employee SIC are more important in Denmark and the Netherlands. In Austria and the UK, negative income taxes, resulting from non-wastable tax credits mentioned earlier, are shown to considerably reduce total AETRs faced by certain groups of employees.

In addition to the composition of different extents of tax burden, it is interesting to compare across countries which earnings levels are associated with particular AETRs. This is indicated by the dashed line showing, against the right-hand axis, the average tax base (i.e., gross earnings including employer contributions) for each AETR band. The line therefore indicates the earnings situation of people that are subject to the different tax burdens. In several countries, we see a considerable degree of "horizontal redistribution", i.e., differential tax treatment of similar earnings levels as indicated by very flat sections of the earnings graph. This is mostly the result of income tax provisions that are conditional on family circumstances. Examples are benefits administered as part of the tax system (e.g., child-related tax credits in Austria or the UK) or tax schedules

[24] Deciles in table 7 are computed in relation to the 'tax base' of the working population, i.e., on the basis of individual gross earnings *plus* employer SIC.

that depend on the family situation (e.g., joint tax systems in France, Germany, Ireland, Luxembourg or Spain).

AETR bands with average earnings close to the population median range from 15-20% in Luxembourg to more than 50% in Belgium. High effective tax burdens for low-wage earners are likely in Belgium and Germany where average earnings of around half the population median are found for those subject to AETRs between 35-45%, the tax burden which, as shown in Figure 2, is faced by around 17% of Belgian and 23% of German employees. Very considerable variations of average earnings are also found for those facing very high AETRs. For instance, employees whose gross earnings are taxed at rates between 55-60% have average earnings of more than four times the median in Denmark and France, while Belgian employees facing this tax rate have average earnings of less than 1.5 times the median.

6. NO PAIN NO GAIN? MARGINAL EFFECTIVE TAX RATES.

Tax-benefit models can be used to numerically compute METRs by altering income variables observed in the micro-data, re-computing taxes and benefits and comparing them with taxes and benefits before the income change. Measuring METRs is useful for a range of purposes each implying a particular set of measurement choices. One frequent use is as indicators of financial work incentives and, in particular, as a measure of the gain in current cash income resulting from an increase in working hours or work effort. This is also the focus in the present paper.

The margin considered here is +3% of gross earnings (excluding employer-paid SIC).[25] The effects of an earnings increase for a particular employee are, for reasons stated in Section II, evaluated for the household as a whole. That is, the resulting METRs capture changing tax burdens or benefit entitlements that result from the earnings change even if they affect household members other than the person whose earnings are being altered. METRs are evaluated taking into account all taxes and benefits affecting the household's current cash disposable income. This is in line with most empirical studies on labour supply, which tend to investigate labour supply responses in relation to budget sets that show the feasible combinations of working

[25] The size of the margin is a rather arbitrary choice. It should be large enough to correspond to a meaningful change in work effort but small enough to capture all relevant kinks and spikes in the employee's budget constraint. One attractive alternative option would be to take as the margin the change in gross earnings resulting from an additional hour worked. However, the micro-data used in this exercise are not taken from labour force surveys and information on working hours is thus rather imprecise. For instance, it is often not clear if the number of hours worked relates to "usual", "actual" or "contractual" working hours. The +3% margin corresponds to slightly above one additional working hour for the typical full-time employee.

hours and take-home pay. Unlike the AETR results in the previous section, calculated METRs are therefore not affected by employer social insurance contributions (except to the extent that employer SICs have an impact on the gross earnings observed in the data).

While changes in net taxes are summed across all members of household they will generally be different depending on *whose* earnings are changing. This is particularly important when evaluating financial incentives of first and second earners to increase earnings. To capture these differences, and since women represent second earners in the majority of two-earner households, METRs are computed separately for men and women. For households with more than one earner, METRs are computed for each of them with the 3% earnings increase going to each earner in turn. As in the previous section, results are presented for the working population aged 18-64. However, since METRs are meaningful regardless of the type and duration of work activities the group is much less restricted than that used for computing effective tax rates on labour in the previous section. It includes civil servants, the self-employed, and those with more than one labour market status during the observation period.

Results for this group as a whole are shown in Figure 4. Median METRs range between under 30% (Greece, Portugal and Spain) and more than 50% (Denmark, Germany). Average tax burden measures such as the AETRs presented earlier smooth over discrete marginal tax rate changes. As a result, the variability of METRs is expected to be larger. This is confirmed in Figure 4 where standard deviations are shown to be particularly sizable for countries with large discrete changes in statutory marginal rates such as the Netherlands. It should be noted that METRs shown here take into account benefit withdrawals (and, since they focus on current cash income, do not consider employer contributions) and are therefore not computed on the same conceptual basis as AETRs in the previous section. The inclusion of benefits, which are often subject to very high withdrawal rates (see Annex B), also increases METR variability considerably.

Density graphs similar to the previous section are presented in Figure 5. By far the largest number of earners facing METRs in excess of 50% is found in Denmark (85%) followed by Germany (60%). In a number of countries, a sizable group of just under five percent of employees and self-employed may benefit little or not at all from a small earnings increase. This affects mainly those in very-low income households where income-tested benefits are withdrawn at very high rates but, as will be shown below, social insurance contributions play a role here too. On the other end of the spectrum, roughly one-fifth of earners in Greece would retain the full amount of a 3% earnings increase.[26] Denmark and the UK have the most concentrated

[26] Negative METRs, while rare, can result from tax concessions or benefits which are contingent upon having income of at least a certain level. Those with income just below that level will see their after-tax-benefit income rise by more than

distributions of METRs with 52% and 49% of the entire working population located in just one single 5 percentage point band (50 to 55% in Denmark; 30 to 35% in the UK).

For the latter two countries, METRs differ, in fact, very little between different (household-) income groups. This is shown in Table 3. METRs between the highest and lowest decile group differ by little more than ten percentage points. In the UK, earners in the bottom two decile groups are subject to considerably *larger* marginal tax burdens than their high-income counterparts – a result of high withdrawal rates applicable to both means tested benefits (Income Support, Job Seekers' Allowance, Housing Benefit, Council Tax Benefit) and in-work benefits (Family Credit) and SIC thresholds below which no contributions are payable. A similar spike in METRs at low levels of household disposable is visible for Irish workers in the third income decile group and, particularly, the lowest income group in Portugal. In the other countries the joint effects of benefit withdrawals and tax/SIC thresholds appear to affect the working population to a lesser extent. In Denmark, the small differences in METRs between high and low income earners is less related to exceptionally high marginal rates at the bottom than to a very flat income tax schedule. In general, METRs are much more directly related to earnings levels than to household disposable income (Table 4).

However, the most interesting dimension in Table 4 is that of gender differentials. While across the working population as a whole, METRs are generally lower for women (see Annex C; Table C2), a more diverse picture emerges once one controls for earnings differentials between men and women. In most couples, working women have lower earnings than their partner. In countries with joint income tax filing, these women therefore tend to face higher METRs than men in the same earnings group (France, Germany, Ireland, Luxembourg, Portugal, Spain). For some decile groups, noticeable gender differences also exist in countries that, while not formally employing a joint tax base, allow sizable parts of unused tax concessions to be transferred from the lower- to the higher-earning spouse (Belgium, Denmark, the Netherlands).

Taking a closer look at which tax-benefit instruments drive METRs, the important role of benefits is clearly visible in Figure 6. The withdrawal of means-tested benefits is the major contributor to very high (>80%) METRs in all countries except in Greece, where the withdrawal of income tax concessions is more

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the 3% earnings increase. In addition, and as mentioned in section 5, certain SIC schemes (e.g., health insurance contributions in the Netherlands) do not cover earners of high incomes. Above a certain earnings limit, people will therefore no longer have to pay *any* SIC. Clearly, this will cause METRs of some high-income earners to be negative. Of course, people no longer covered by the compulsory social insurance scheme will normally continue to pay contributions to public or private insurance schemes on a voluntary basis. This important qualification of all effective tax rate results based exclusively on compulsory taxes and SIC applies also to the results presented in this paper.

important.[27] These are also very relevant in the UK where the tapering of in-work benefits (here included in the income tax category) has a noticeable effect. In several countries social insurance contribution thresholds can cause very high METRs for individuals earning wages just below a limit: once the threshold is exceeded, the entire earnings of Austrian, German, Dutch and British low-wage earners become subject to the contribution rate. The influence of both benefit claw-back rates and contribution thresholds is strongest for low-wage individuals: across all countries, the highest METRs are not faced by the highest-earning individuals but by those earning (often substantially) less than the median earner (dashed lines in Figure 6).

7. CONCLUSION

The aim of this paper was to assess and compare effective tax rates in fourteen EU Member States using micro-data in combination with a tax-benefit model. It was argued that effective tax burdens faced by people can differ substantially depending on the particular labour market and household situation and that these differences matter when assessing the economic consequences of tax-benefit systems.

Results across the countries analysed are very different and these differences should not be blurred by attempting broad policy conclusions at the end of a paper that has focused on measurement issues rather than policy analysis. A few methodological observations can be made, however. First, the distributions of both average and marginal effective tax rates show that summing up the effective tax burden using one single average or macro-based figure can provide very misleading pictures of effective tax burdens for large numbers of people. Micro-based measures of effective tax rates therefore have an important role in enriching and complementing indicators based on macro-data or ‘typical household’ type calculations. In addition, marginal effective tax rates are impossible to derive looking at aggregates alone. The results in this paper indicate that differences between average and marginal effective tax rates in both average level and distribution can be substantial and that using average tax rates as proxies for marginal rates will therefore often be problematic.

One attraction of computing macro-based effective tax rates is that it is relatively straightforward and, given the availability of consistent international data, can easily be implemented across different countries. An assessment of effective tax burdens at the micro-level, on the other hand, is confronted with a large number of conceptual and definitional issues as the discussion in this paper has shown. This is particularly true when comparing rates across a number of countries. This multitude of measurement issues raises two relevant

[27] The extent to which households are in fact exposed to very high METRs depends on whether they are in fact receiving the benefits they are formally entitled to. See footnote 14.

questions. First, are multi-country studies feasible? Given the effort needed to build simulation models, harmonise micro-data and keeping both policy rules and data sources up-to-date, undertaking comprehensive multi-country studies on a regular basis appears to be a daunting task. Microsimulation models, however, are useful for a multitude of purposes. Similar to micro-data they can therefore be considered research infrastructure. If supported as such the effort and amount of resources needed for any particular study will become less prohibitive as synergies between different model applications are exploited.

A second question is whether the considerable number of choices to be made in deriving micro-based tax burden measures and the potential sensitivity of results with respect to these choices make results difficult to interpret. The absence of such detailed choices in the case of macro-based tax burden indicators does, however, not mean that these choices are irrelevant. Rather, estimates based on approaches where questions regarding, for instance, the appropriate unit of analysis, do not arise should be confronted with some degree of caution.

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TABLES AND FIGURES.

Table 1. Individual AETRs on Labour Income: Country Rankings (1998).

Rank	Martinez-Mongay (2000)		EUROMOD		EUROMOD by gross earnings decile group									
		AETR [%]		*aggregate AETR [%]*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	BE	45.1	BE	55.4	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE
2	FI	43.8	GE	49.0	DK	FI	GE	GE	GE	GE	GE	GE	GE	FI
3	GE	43.7	FI	48.6	FI	DK	FI	FI	FI	FI	FI	FI	FI	DK
4	DK	42.7	FR	46.8	IT	IT	DK	IT	DK	IT	AT	AT	AT	IT
5	FR	41.3	IT	46.1	FR	GE	IT	FR	IT	AT	IT	IT	IT	GE
6	AT	41.0	DK	46.0	AT	AT	FR	DK	FR	FR	DK	DK	DK	FR
7	NL	35.9	AT	44.8	PT	FR	AT	AT	AT	DK	FR	FR	FR	AT
8	IT	35.3	NL	40.1	GE	NL	NL	NL	NL	NL	NL	GR	GR	PT
9	LU	31.7	PT	37.7	NL	PT	GR	GR	SP	GR	SP	SP	SP	GR
10	SP	29.6	GR	37.3	SP	SP	SP	SP	GR	SP	GR	NL	NL	NL
11	GR	28.7	SP	36.5	LU	LU	PT	PT	PT	PT	PT	PT	PT	LU
12	UK	25.4	LU	32.5	GR	GR	LU	LU	UK	LU	LU	LU	LU	SP
13	PT	24.8	UK	28.6	IR	UK	UK	UK	LU	UK	UK	UK	IR	IR
14	IR	23.2	IR	27.2	UK	IR	IR	IR	IR	IR	IR	IR	UK	UK

Source: EUROMOD, author's calculations. See text for explanations. Decile groups are derived using population weights supplied in the micro-data. 'Gross earnings' include employer social insurance contributions.

Table 2a. Median Individual AETRs (Labour Income) by Decile Group of Gross Earnings

%	**AT**	**BE**	**DK**	**FI**	**FR**	**GE**	**GR**	**IR**	**IT**	**LU**	**NL**	**PT**	**SP**	**UK**
Decile Group														
1	32.3	39.5	39.1	39.4	32.9	34.8	0.6	4.1	33.5	24.1	23.8	28.1	25.8	0.0
2	34.4	45.7	41.3	42.6	35.2	37.9	36.0	7.9	40.5	24.1	29.7	28.6	28.4	13.2
3	38.2	49.4	43.3	43.7	41.2	44.3	36.0	15.5	42.2	25.3	34.4	30.5	33.3	21.4
4	40.4	51.3	44.2	44.5	43.9	47.3	36.3	19.7	42.6	26.1	38.4	31.6	33.8	24.8
5	42.1	52.1	44.9	46.0	44.0	49.1	36.6	23.6	43.1	27.9	40.4	32.4	35.7	27.1
6	43.0	53.6	44.0	46.6	44.2	50.3	36.6	24.8	44.0	28.3	38.8	32.6	35.2	28.1
7	44.4	55.7	44.1	47.7	44.5	51.0	37.2	26.7	44.8	30.6	39.3	33.9	37.3	28.9
8	45.5	55.6	44.8	49.2	45.5	51.9	38.2	30.1	45.8	30.3	36.7	34.7	37.1	29.5
9	47.7	56.8	46.2	50.9	46.6	52.0	39.2	32.3	46.8	34.0	38.0	37.9	38.4	29.5
10	47.9	59.7	49.4	53.9	49.1	49.9	42.2	33.7	49.5	37.6	39.3	45.5	38.3	32.4

Table 2b. Aggregate Individual AETRs (Labour Income) by Decile Group of Gross Earnings

%	**AT**	**BE**	**DK**	**FI**	**FR**	**GE**	**GR**	**IR**	**IT**	**LU**	**NL**	**PT**	**SP**	**UK**
Decile Group														
1	30.5	43.0	41.1	39.2	32.2	26.6	16.3	7.1	34.6	24.7	26.1	29.2	24.7	-2.0
2	35.5	46.0	41.6	42.4	35.0	39.5	24.9	9.2	40.4	24.9	29.3	29.3	29.2	10.3
3	38.9	49.5	42.8	43.4	40.0	44.0	33.1	15.6	42.1	26.8	34.2	30.5	31.9	20.5
4	41.6	50.5	42.5	44.1	42.8	46.0	35.5	18.2	42.8	26.6	37.7	31.4	33.4	24.7
5	42.8	52.6	43.8	45.5	43.2	47.5	33.7	21.7	43.4	27.3	38.8	32.0	34.8	27.3
6	44.2	53.4	43.3	46.2	43.5	48.6	35.5	24.5	44.2	28.4	39.1	32.5	35.4	28.2
7	45.7	54.6	44.3	47.0	43.6	49.9	36.6	25.9	45.4	30.1	39.9	33.8	37.2	29.2
8	47.2	55.7	45.3	48.8	44.9	51.1	38.6	29.6	46.6	31.9	37.3	35.3	37.5	30.2
9	49.3	58.5	46.5	50.5	46.3	52.0	40.6	32.0	47.8	35.2	38.4	38.2	39.0	30.4
10	49.0	61.4	53.1	55.1	49.9	51.4	42.7	35.3	52.0	39.4	41.7	45.5	39.3	34.2

Source: EUROMOD, author's calculations. See text for explanations. Decile groups are derived using population weights supplied in the micro-data. 'Gross earnings' include employer social insurance contributions.

Table 3. Median METRs by Household Disposable Income

%	AT	BE	DK	FI	FR	GE	GR	IR	IT	LU	NL	PT	SP	UK
Decile Group														
1	38.5	18.3	51.2	34.2	35.1	52.5	0.0	5.0	9.2	13.1	33.9	80.0	0.0	33.4
2	41.0	31.1	51.2	35.9	35.8	51.4	0.0	7.2	33.5	13.1	42.6	15.0	6.4	76.0
3	40.3	42.8	51.2	39.8	34.9	50.3	15.9	44.5	33.7	15.7	39.4	15.5	19.0	33.0
4	40.6	44.8	51.2	41.1	28.7	50.9	15.9	30.8	33.7	23.5	39.4	25.1	20.0	31.4
5	41.1	46.1	51.2	43.8	29.9	51.7	22.8	28.5	35.4	27.2	41.8	26.0	24.1	31.4
6	41.5	49.1	51.2	44.6	33.9	53.0	23.4	30.8	33.7	34.6	42.6	26.0	24.6	31.4
7	41.6	49.9	51.2	45.0	34.9	52.5	28.5	30.8	38.4	38.8	42.6	26.0	27.6	31.4
8	42.2	50.4	51.2	48.8	34.9	53.1	30.0	30.8	39.9	39.7	42.6	26.0	28.0	31.4
9	43.3	50.4	51.2	49.6	35.6	53.0	31.4	48.2	39.9	45.1	42.6	36.0	28.5	31.4
10	43.5	50.4	62.4	50.9	40.0	52.4	36.5	48.2	44.0	47.7	50.0	42.1	31.2	31.4

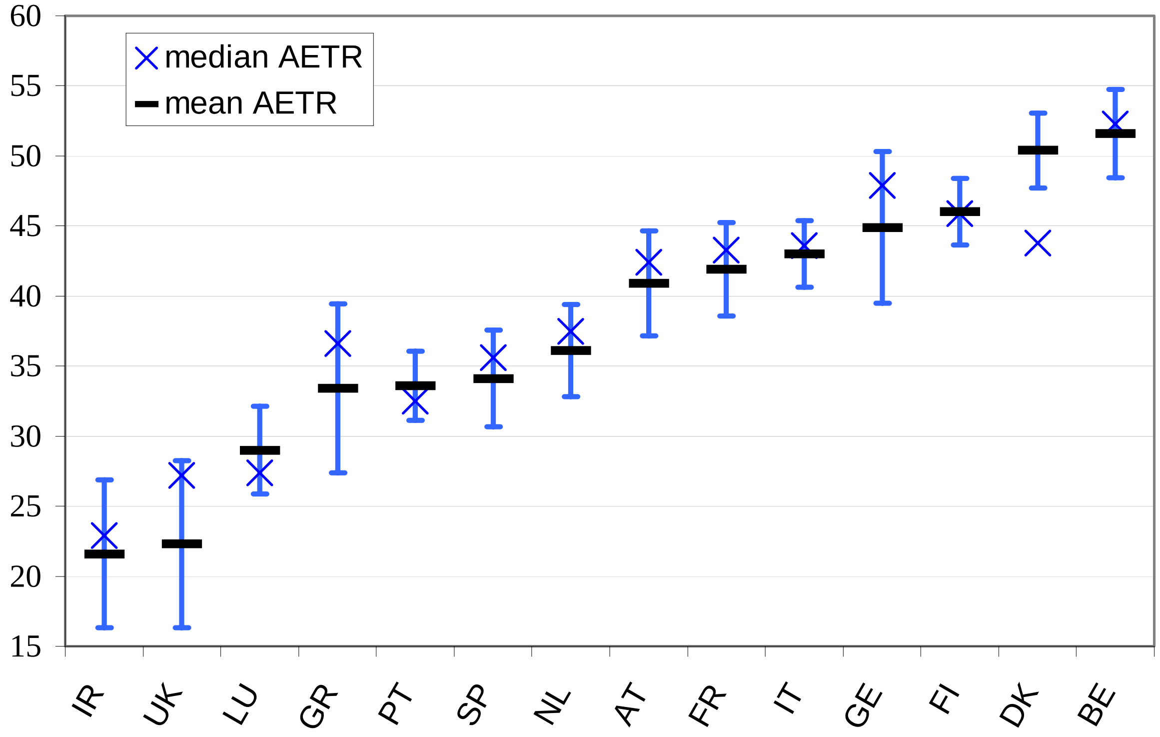
Source: EUROMOD, author's calculations. Household disposable income (HDI) is market income plus cash benefits minus direct taxes minus social insurance contributions paid by employees and benefit recipients. Decile groups are derived using population weights supplied in the micro-data and are based on equivalised HDI using the 'modified OECD' equivalence scale (giving a weight of 1 to the first adult, 0.5 to each further adult and 0.3 to children below 14).

Table 4. Median METRs by Earnings and Gender

%	AT		BE		DK		FI		FR		GE		GR		IR		IT		LU		NL		PT		SP		UK	
Decile Group	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*	*f*	*m*
1	0.0	16.3	11.9	11.9	51.2	45.8	28.5	27.9	33.9	36.2	12.9	0.0	0.0	0.0	24.0	5.0	24.3	24.4	13.1	13.1	33.9	-0.4	15.0	15.5	3.4	0.0	0.0	0.0
2	18.0	20.4	42.6	31.4	51.2	51.2	29.6	29.3	34.5	34.2	52.3	28.6	0.0	0.0	28.5	19.4	26.2	26.2	21.6	13.1	33.9	33.9	15.5	11.0	6.4	0.0	30.0	30.0
3	39.6	42.4	45.4	44.9	51.2	51.2	32.1	31.6	33.6	34.9	51.9	47.4	15.9	13.8	28.5	28.5	33.5	33.5	28.4	27.4	33.9	33.9	26.0	26.0	3.4	6.4	30.0	30.0
4	39.4	41.0	46.2	45.4	51.2	51.2	40.6	40.4	34.9	34.9	54.3	52.2	22.8	19.4	30.8	30.8	33.5	33.5	31.5	29.3	42.6	42.6	26.0	26.0	28.5	26.6	33.0	33.0
5	40.9	41.1	50.4	49.9	51.2	51.2	44.6	44.3	34.9	34.9	52.9	52.4	22.8	19.4	30.8	30.8	33.5	33.7	36.0	32.9	42.6	42.6	26.0	26.0	31.2	24.1	31.4	33.0
6	41.4	41.7	49.9	49.9	51.2	51.2	44.8	44.8	34.9	34.9	53.6	53.0	28.5	28.5	52.8	30.8	39.9	39.9	41.8	32.7	42.6	42.6	26.0	26.0	26.6	24.1	31.4	33.0
7	41.9	42.7	50.4	49.9	51.2	51.2	49.9	49.5	34.9	34.9	54.3	53.4	36.5	31.4	52.8	44.9	39.9	39.9	46.9	37.5	40.3	39.4	36.0	26.0	26.6	26.8	31.4	31.4
8	44.5	44.5	50.0	49.9	58.4	51.2	50.2	50.2	35.7	32.8	55.1	54.5	36.5	30.5	52.8	30.8	39.9	39.9	50.5	37.0	52.4	41.4	36.0	32.8	26.6	28.2	31.4	31.4
9	48.9	48.4	50.5	50.4	62.4	62.4	50.7	50.7	35.7	33.9	57.8	51.8	36.5	36.5	48.3	48.3	42.0	42.2	50.8	44.4	50.7	50.0	40.1	36.0	30.4	30.3	25.4	24.3
10	41.5	43.3	54.2	54.6	62.4	62.4	55.6	55.8	44.4	39.3	54.7	46.1	40.0	43.8	48.3	48.3	45.9	46.1	47.1	45.3	50.0	50.0	42.2	42.2	39.0	39.0	40.0	40.0

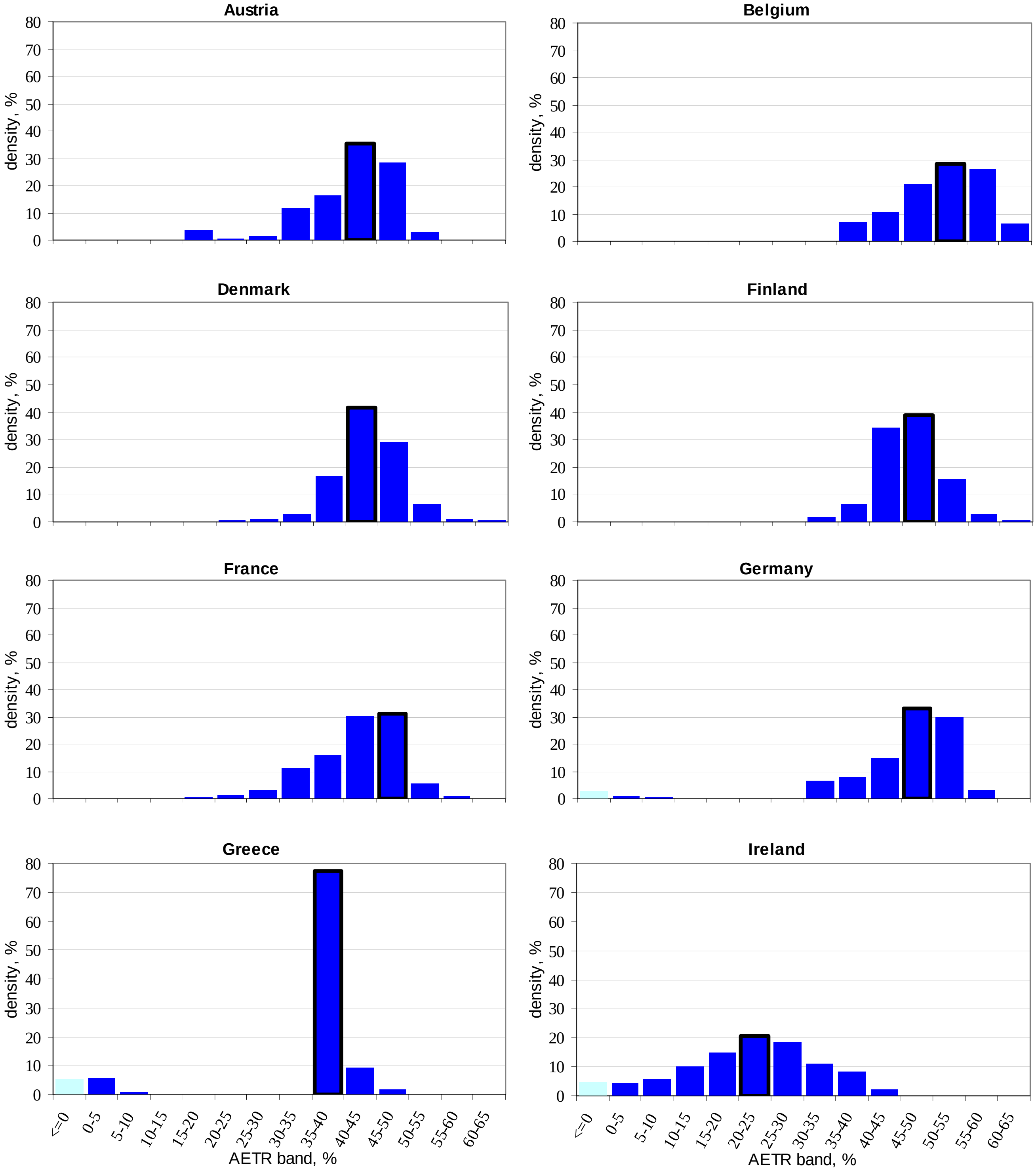
Source: EUROMOD, author's calculations. Decile groups are derived using population weights supplied in the micro-data. 'Gross earnings' **exclude** employer social insurance contributions.

Figure 1. Average effective tax rates (AETR) on labour income (1998): Summary.



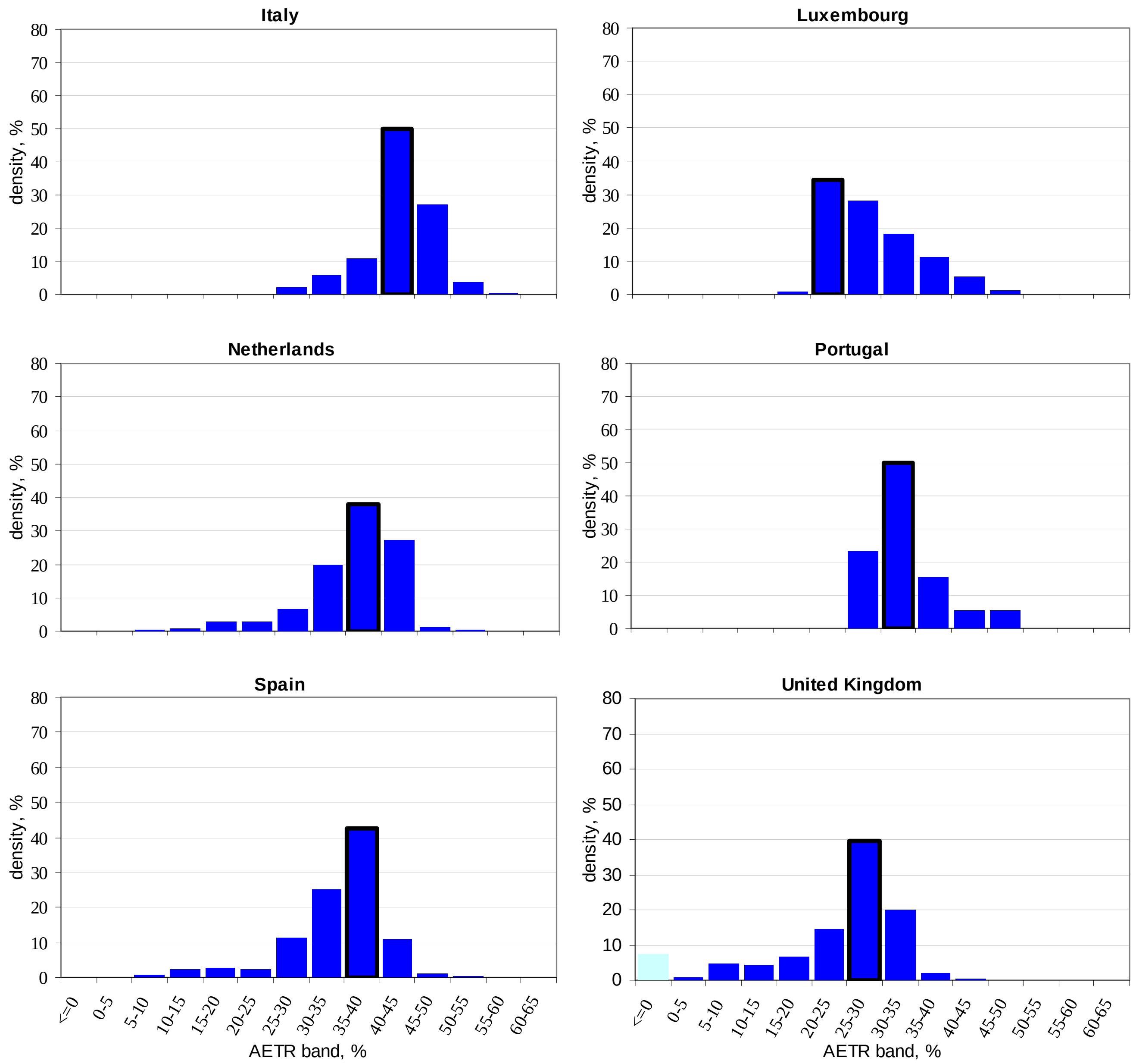
Source: EUROMOD, author's calculations. Error bars show standard deviation.

Figure 2. Average effective tax rates (AETR) on labour income (1998): Distributions.



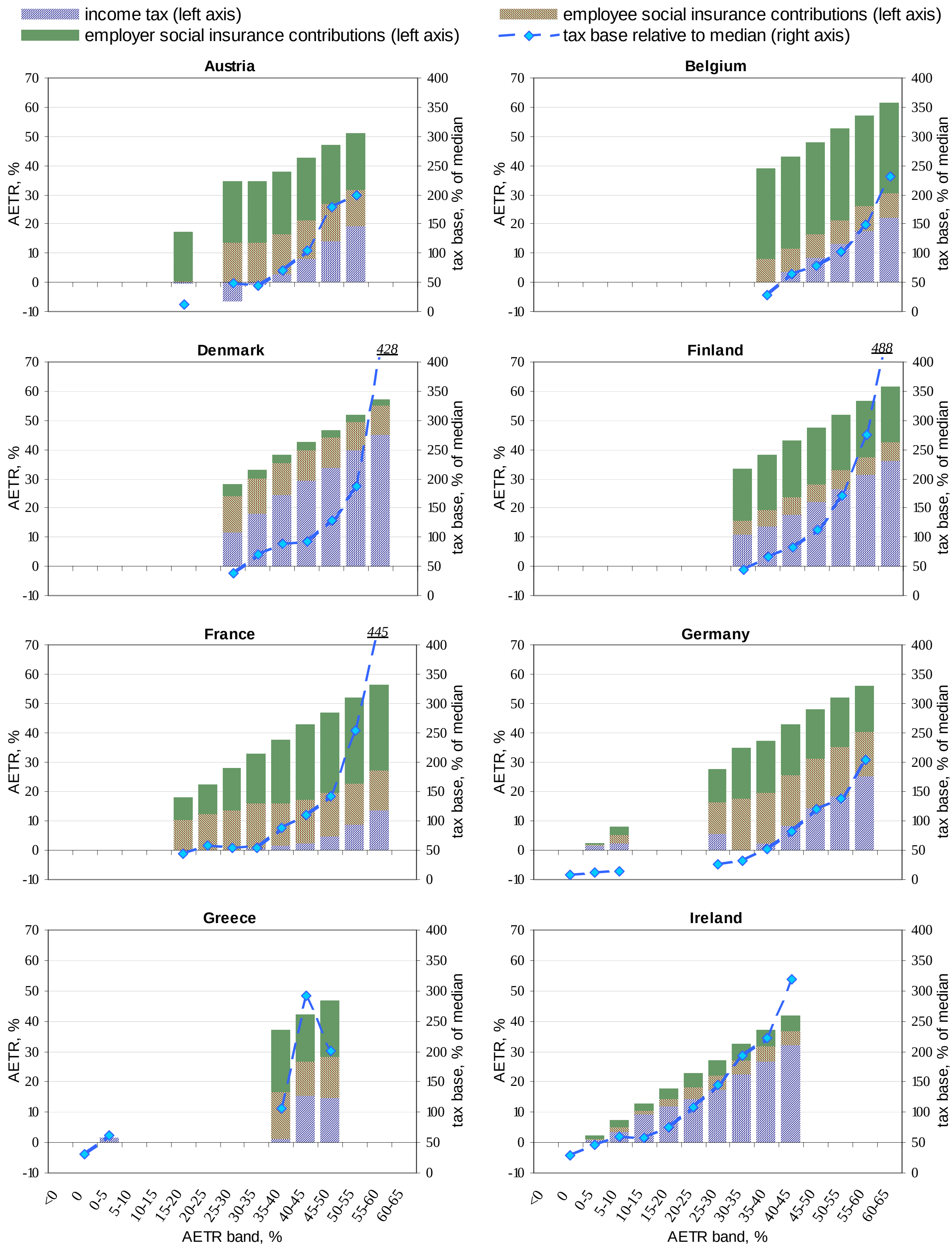
Source: EUROMOD, author's calculations. Framed bars are the modal values. Frequencies are derived using weights supplied in the micro-data. Numerical results, including cell sizes, are provided in Annex C (Table C1).

Figure 2. (continued).



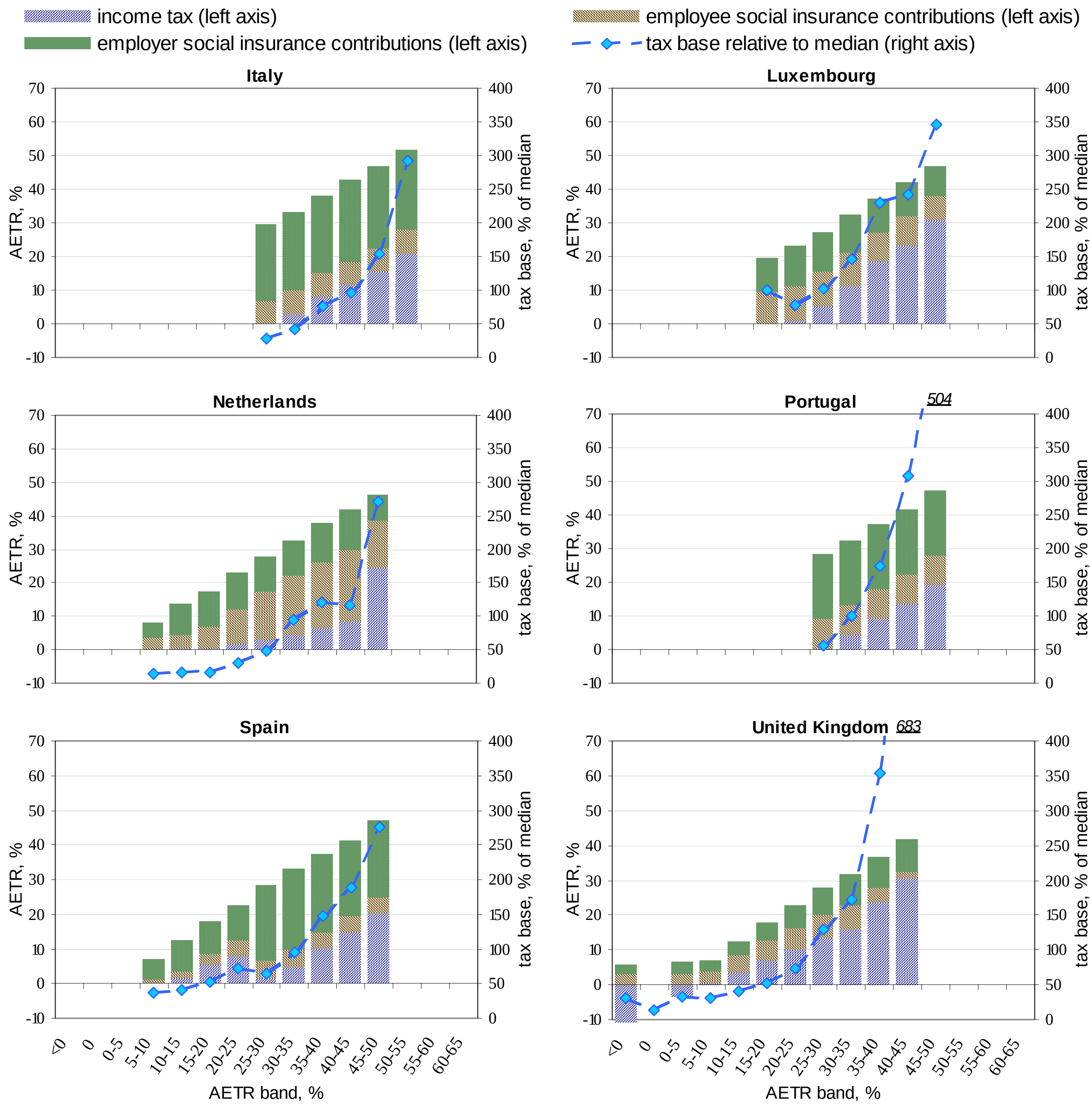
Source: EUROMOD, author's calculations. Framed bars are the modal values. Frequencies are derived using weights supplied in the micro-data. Numerical results, including cell sizes, are provided in Annex C (Table C1).

Figure 3. Average effective tax rates (AETR) on labour income (1998): Decomposition by tax instrument.



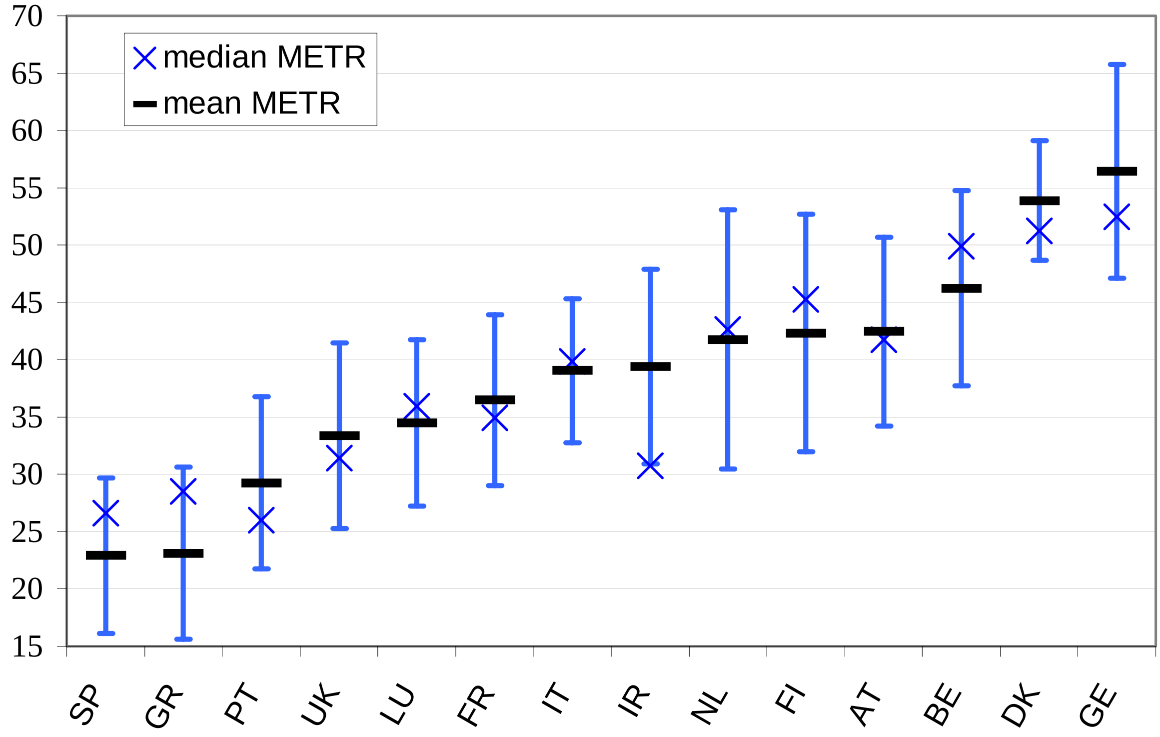
Source: EUROMOD, author's calculations. See text for explanations. No values are shown for AETR bands containing fewer than 10 observations. Graphs should be read in conjunction with densities in Figure 2.

Figure 3. (continued).



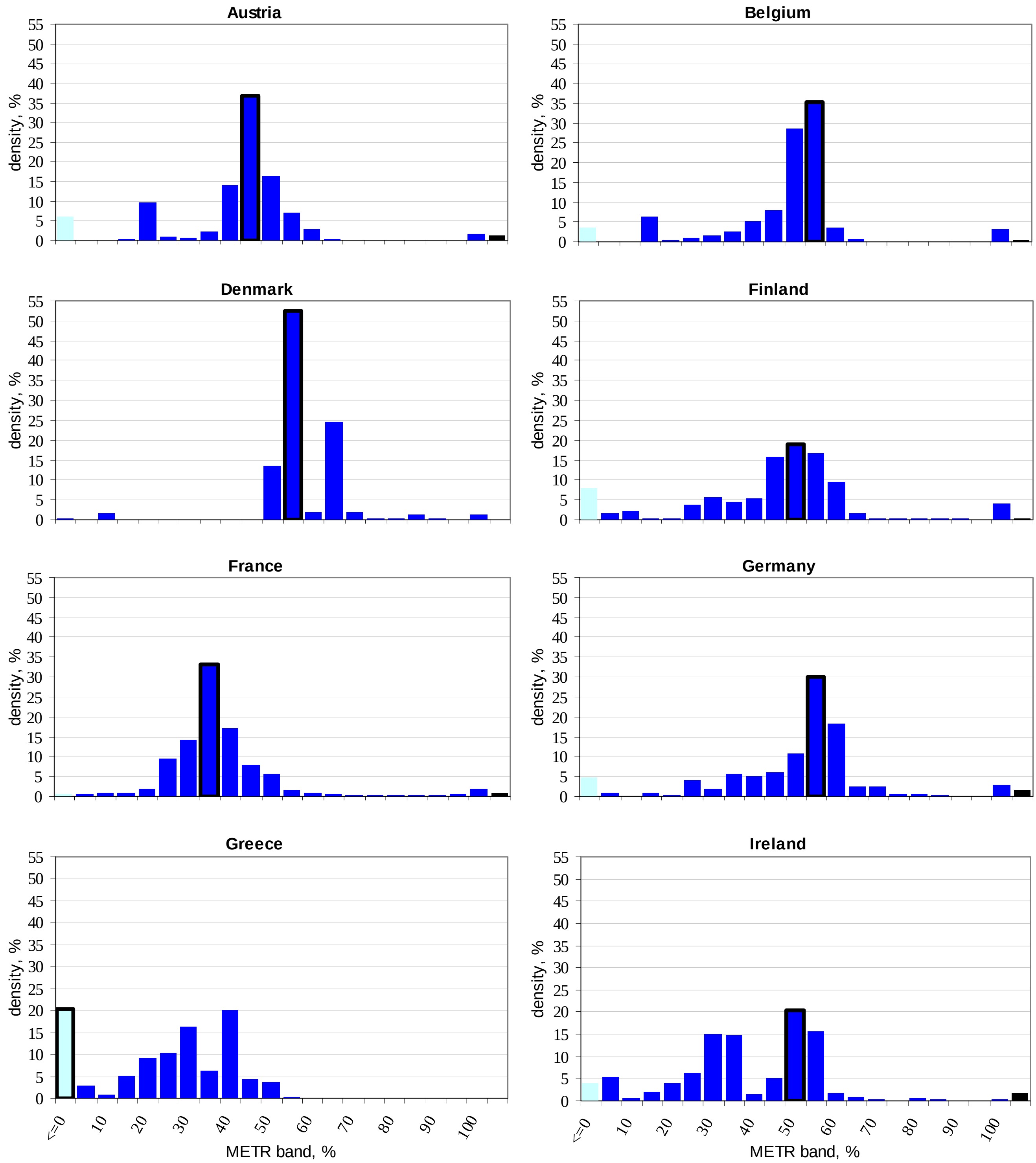
Source: EUROMOD, author's calculations. See text for explanations. No values are shown for AETR bands containing fewer than 10 observations. Graphs should be read in conjunction with densities in Figure 2.

Figure 4. Marginal effective tax rates (METR) faced by working population (1998): Summary.



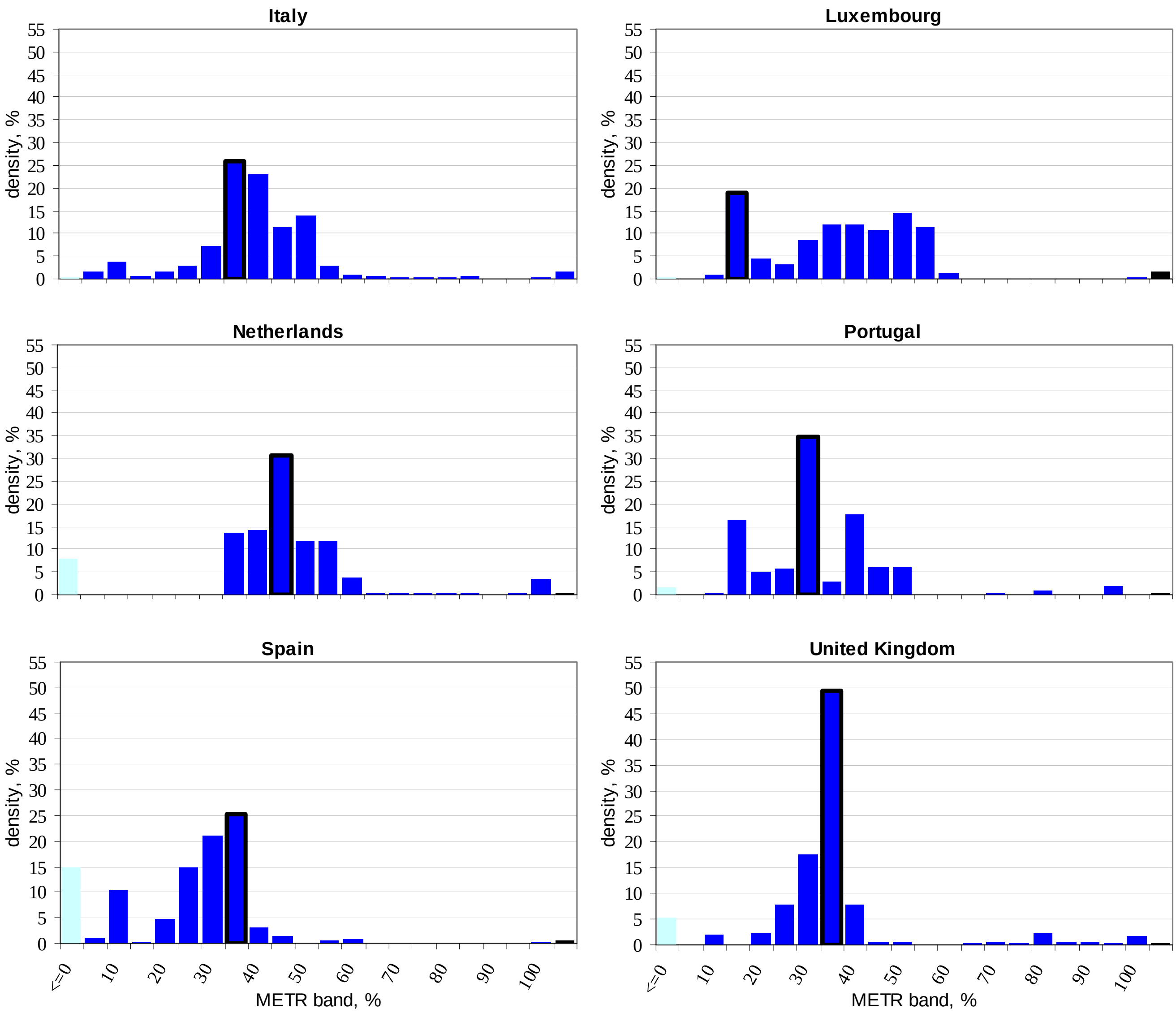
Source: EUROMOD, author’s calculations. Error bars show standard deviation.

Figure 5. Marginal effective tax rates (METR) faced by working population (1998): Distributions.



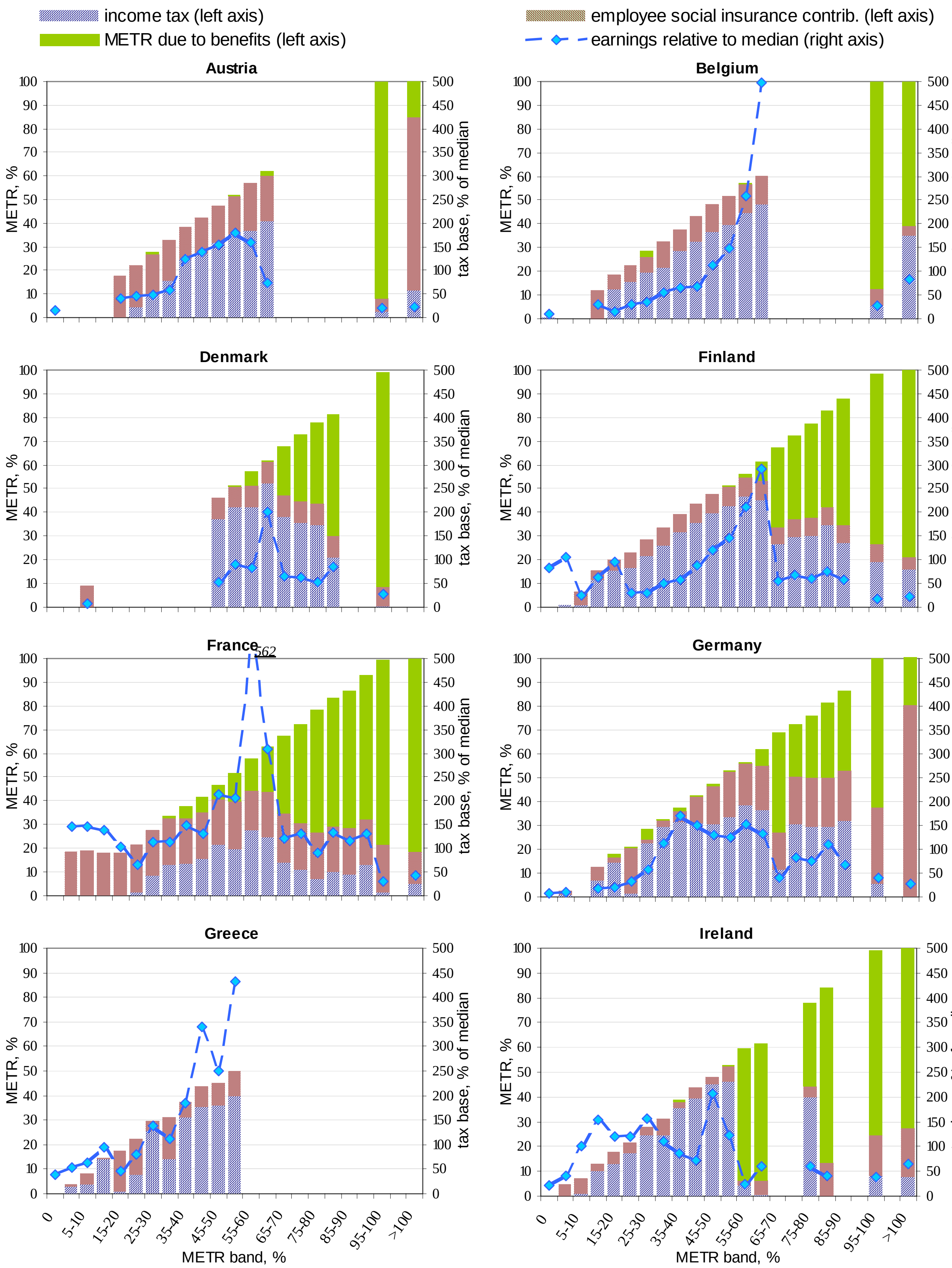
Source: EUROMOD, author's calculations. Framed bars are the modal values; frequencies of METR>100% are indicated in black. Frequencies are derived using weights supplied in the micro-data. Numerical results, including cell sizes, are provided in Annex C (Table C2).

Figure 5. (continued).



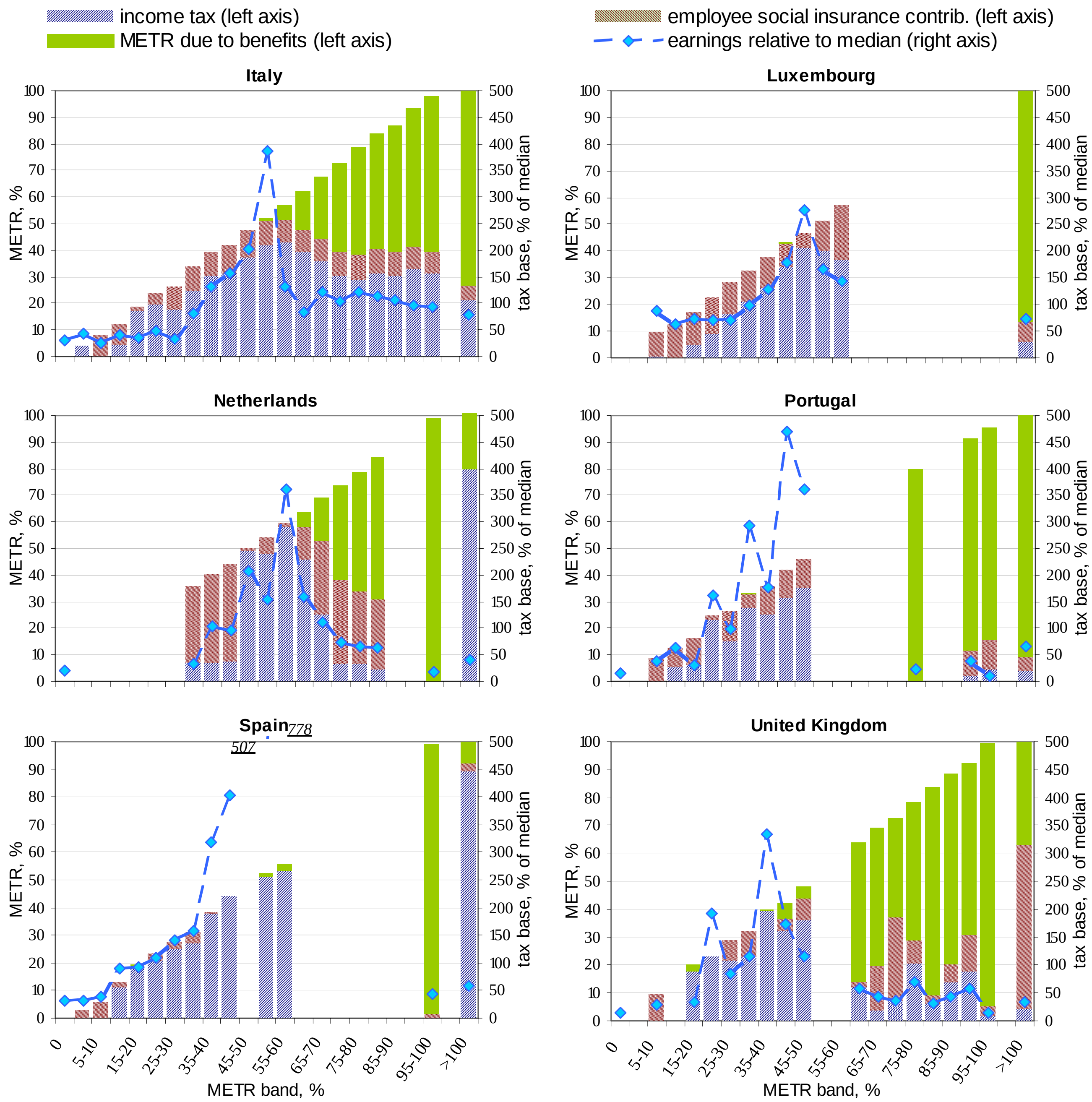
Source: EUROMOD, author's calculations. Framed bars are the modal values; frequencies of METR>100% are indicated in black. Frequencies are derived using weights supplied in the micro-data. Numerical results, including cell sizes, are provided in Annex C (Table C2).

Figure 6. Marginal effective tax rates (METR): Decomposition by instrument.



Source: EUROMOD, author's calculations. See text for explanations. No values are shown for AETR bands containing fewer than 10 observations. Graphs should be read in conjunction with densities in Figure 5.

Figure 6. (continued).



Source: EUROMOD, author's calculations. See text for explanations. No values are shown for AETR bands containing fewer than 10 observations. Graphs should be read in conjunction with densities in Figure 5.

ANNEX A. DATA SOURCES.

Country	Base Dataset for EUROMOD	Sample size (households)	Date of collection	Reference time period for incomes
Austria	European Community Household Panel, Austrian version	2,677	1999	annual 1998
Belgium	Panel Survey on Belgian Households (W6)	2,834	1997	annual 1996
Denmark	European Community Household Panel (W2)	3,215	1995	annual 1994
Finland	Income distribution survey	10,010	1997	annual 1997
France	Budget de Famille	11,291	1994/5	annual 1993/4
Germany	German Socio-Economic Panel (W15)	7,494	1998	annual 1997
Greece	European Community Household Panel (W3)	5,169	1996	annual 1995
Ireland	Living in Ireland Survey (W1)	4,048	1994	month in 1994
Italy	Survey of Households Income and Wealth	8,135	1996	annual 1995
Luxembourg	PSELL-2 (W5)	2,539	1999	annual 1998
Netherlands	Sociaal-economisch panelonderzoek (W3)	4,568	1996	annual 1995
Portugal	European Community Household Panel (W3)	4,806	1996	annual 1995
Spain	European Community Household Panel (W3)	6,119	1996	annual 1995
UK	Family Expenditure Survey	6,797	1995/6	month in 1995/6

ANNEX B. OVERVIEW OF TAX-BENEFIT SYSTEMS.

Table B1: Social benefits potentially available to working individuals and their families, 1998 (rates shown for single benefit recipients)

	Social Assistance				**Housing Benefit**		**Family Benefits**		**Employment-conditional Benefits/Tax Credits**		
	max. amount[1]	disregard[1]	withdrawal rate	taxable	max. amount[1]	withdrawal rate	amount[1]	withdrawal rate	amount[1]	work/income conditions	withdrawal rate
Austria	32	-	100%	IT: no SIC: no	-	-	5-7 per child	-	-	-	-
Belgium	39	9	100%	IT: no SIC: no	-	-	4-13 per child; additional supplements if not working	-	-	-	-
Denmark	34 (+ housing allowance)	up to 9	100%	IT: yes SIC: no	3 (no children); 14 (>3 children)	75%	3-4 per child; higher for one parents; plus day-care subsidy	-	-	-	-
Finland	18 (+reasonable housing cost)	-	100%	IT: no SIC: no	17	80%	5-9 per child; plus 2 per child for lone parents; plus day-care subsidy	-	-	-	-
France	24; (plus lone parent benefit of 31+10 per child)	-	100%	IT: no SIC: no	ca. 15	ca. 34%	main benefit: 7 to 12 for second & further children; special benefits for young children	main benefit: 100% once income > 174-261	-	-	-
Germany	13[2]	4	75-100%	IT: no SIC: no	ca. 25	ca. 40%	5-9 per child; plus 5-7 child raising benefits for very young children	young child raising benefit: 20-40% once income > 62	-	-	-
Greece	-	-	-	-	-	-	0.5-1 per child plus additions for large families	reduced in steps for incomes > 65	-	-	-
Ireland	29 (+housing supplements)	19 for partner's income	100%	IT: no SIC: no	see Social Assistance		3-4 per child	-	60% of difference between family gross earnings and ca. 88 (higher limit for larger families)	couple jointly working at least 20 hours per week	60% (of gross earnings)
Italy	none at the national level				none at the national level		see employment-conditional benefits		ca. 3-17 per family member (also spouses) depending on family type	must work at least 3 days per week; reduced benefits if working less than full-time	reduced in steps for incomes > ca. 73 at rates of ca. 6-10%
Luxembourg	37	7	100%	IT: yes SIC: reduced	6 (must receive Social Assistance)	100%	8-13 per child; plus education allowance for children aged 3-	-	-	-	-
Netherlands	24	-	100%	yes but amount shown is net of tax	6 (for low rents)	ca. 54%	2-7 per child	-	-	-	-
Portugal	20	-	80%	IT: no SIC: no	none at the national level		4 per child	reduced to 3 per child once income > 71	-	-	-
Spain	none at the national level				none at the national level		2 for first child, 0.2 for further children	100% of income > 55	-	-	-
United Kindgom	18	2-4	100%	IT: no SIC: no	100% of recognised rent; 100% of council tax	65% (housing benefit); 20% (council tax benefit)	3-5 per child	-	18 + up to 13 per child + 4 if working > 30 hours per week; only entitled if >= 1 child	at least one person working >= 16 hours per week	70% of income > 29

Notes: SIC = social insurance contributions. [1] in % of median gross employment income (not including employer social security contributions). [2] West Germany.

Source: Adapted from Immervoll, *et al.*, 2004, Table A2.

Table B2: Taxes on labour income, 1998 (where relevant, rates shown for a single full-time blue-collar private sector employee with no other income and no non-standard expenses)

	Income Tax[7]					employee SIC				employer SIC					
	lowest/highest tax band limit[1,2]	lowest/highest rate [%]	main tax credit[1]	tax unit	family-related tax provisions	thres-hold[1]	rate [%]	ceiling[1]	tax deductible	thres-hold[1]	rate [%]	ceiling[1]	taxable	features reducing METR	features increasing METR
Austria	17/231	21/50 4 rates	5	individual	deduction for single earners; tax credits for lone parents	15	18.8	193	yes	15 -	21.3 4.5	49000 -	no		for a 2nd earner: phase-out of single-earner credit
Belgium	24/318	25/55 7 rates	-	individual	parts of taxable income transferrable to spouse; additional tfa for children and lone parents	-	11.9	-	yes	-	45.4	-	no		for a 2nd earner: phase-out of amount transferrable from higher-earning spouse
Denmark	12/100	40/59[4] 3 rates	-	individual	unused deductions transferrable to spouse	-	9 + flat amnt	-	yes	-	2.0 + flat amnt	-	no		
Finland	35/223	24/56[4] 6 rates	-	individual		- 58	7.6 0.5	-	yes	-	24.5	-	no	earned income tax allowance of 20% of taxable earnings above 11	phase out of earned income tax allowance for earnings > 31; and basic allowance for taxable earnings > 76
France	30/336	11/54 6 rates	-	family		- - - 136 -	0.9 9.6 2.8[4] 3.6 7.6	- 136 409 545 -	yes yes yes yes partly	- - - 136	19.8 13.4 4.1 5.3	- 136 409 545	no	reductions of marginal employer contributions rates of up to about 60% for wages < 130% min. wage.	
Germany	30 133 252	27.3 37.2 55.7[5]	-	family	choice of tfa or child benefit	15	7.7 13.4	156 208	yes	15	7.7 13.4	156 208	no		
Greece	56/478	5/45 5 rates	max. 15% of recognised household expenditure	individual	0.9-1.8 non-refundable tax credit per child	-	15.9	200; none for new jobs	yes	-	28.2	200; none for new jobs	no		
Ireland	25/80	24/46 2 rates	-	family (individual optional)	-	41 86	4.5 2.3	193 -	no	- 112 -	8.5 12.0 4.0	12 231 231	no	tax reduced to zero for income below 33 (higher limit if children)	tax reduction phased out above the 33 limit.
Italy	0/118	19/46 5 rates	up to 6	individual	up to 2 tax credit per dependent family members	- 56	9.0[4] 1	-	yes	-	33.0[4]	-	no		for 2nd earner: tax credit for dependent spouse phased out; main tax credit slowly phased out for incomes > 30
Luxembourg	25/250	6/47 17 rates	-	family	deductions for lone parents and care expenditure; 3 tax credit per child	-	13.1	259	yes	-	14.6[4]	259	no	for 2nd earner: 17 additional (joint) deduction if both spouses work	
Netherlands	20/212	36[8]/60 3 rates	-	individual	additional 1240 tfa for lone parents	54 -	5.3 1.7	156 105	yes no	54 -	6.4 5.6 7.0[4]	156 105 156	no yes no		
Portugal	0/490	5[9]/40 5 rates	3	family	additional 1.5 tax credit per child	-	11	-	no	-	23.8	-	no		
Spain	22/492	20/56 8 rates	3	family (individual optional)	up to 2 tax credit per child (plus additional amounts in some regions)	46	30.8	177	yes	46	6.4	177	no	earners if income below 55 are exempt from tax	"spike" in METR once above exemption limit; phase out of main tax credit adds 5 pct. points to METR
United Kindgom	29/220	20/40 3 rates	-	individual	2 tax credit for married couples; 13 tax deduction for lone parents	23	8.4 to 10	177	no	23[10] 40 56 76	3 5 7 10	-	no		

Notes: tfa = tax free allowance. SIC = social insurance contributions. [1] in % of median gross employment income (not including employer social security contributions). [2] after adding any standard tax free allowances, deductions or exemptions available to single employees. [3] insurance is voluntary. [4] averages: rates differ between municipalities and/or employers. [5] including "Solidarity Surplus Tax" for German unification. MTR increases linearly between lower and middle; and middle and top tax band limits. [6] West Germany. [7] including regional income taxes where applicable. [8] including pension contributions (same tax base as income tax). [9] effective rate taking into account the allowance of 70% of the tax base for low incomes. [10] all earnings are subject to the applicable rate once they exceed these threshold levels.

Source: Adapted from Immervoll, *et al.*, 2004, Table A1.

Table C1. Distribution of Individual AETRs on Labour Income (non-civil servant employees)

	AT		BE		DK		FI		FR		GE		GR		IR		IT		LU		NL		PT		SP		UK	
median [%]	42.4		52.3		43.8		45.9		43.3		47.9		36.6		22.9		43.6		27.4		37.5		32.5		35.6		27.2	
mean [%]	40.9		51.6		50.4		46.0		41.9		44.9		33.4		21.6		43.0		29.0		36.1		33.6		34.1		22.3	
Std. Dev.	7.5		6.3		5.3		4.8		6.7		10.8		12.0		10.6		4.8		6.2		6.6		4.9		6.9		11.9	
AETR band [%]	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.	Frequ. [%]	n obs.
<=0	0.2	6	0.0	0	0.0	0	0.0	0	0.0	0	2.8	183	5.4	81	5.0	149	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	7.3	395
0-5	0.0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.8	67	5.7	71	4.6	139	0.1	1	0.0	0	0.0	0	0.0	0	0.0	1	0.8	40
5-10	0.1	3	0.0	0	0.0	0	0.0	0	0.1	4	0.5	28	0.7	8	5.8	156	0.0	0	0.1	1	0.3	12	0.0	0	0.9	28	4.7	248
10-15	0.1	3	0.0	0	0.1	2	0.0	0	0.1	6	0.1	9	0.0	0	9.9	245	0.0	0	0.0	0	0.9	26	0.0	0	2.2	52	4.3	222
15-20	3.6	68	0.0	0	0.0	1	0.0	1	0.2	14	0.2	7	0.1	1	14.7	361	0.0	1	0.6	11	2.8	85	0.0	0	2.8	71	6.8	327
20-25	0.3	4	0.0	0	0.6	8	0.0	0	1.4	84	0.1	8	0.0	1	**20.4**	488	0.0	0	**34.4**	631	2.7	80	0.0	0	2.5	64	14.4	703
25-30	1.4	21	0.0	0	1.1	15	0.1	5	3.3	183	0.2	13	0.0	0	18.5	428	2.0	84	28.4	576	6.8	183	23.2	782	11.3	321	**39.5**	1962
30-35	11.6	203	0.0	0	2.9	44	1.7	55	11.3	635	6.5	331	0.2	4	10.7	223	5.8	199	18.1	337	19.8	562	**50.1**	1498	25.3	682	19.9	956
35-40	16.2	309	6.8	85	16.8	237	6.4	230	15.6	876	7.7	569	**77.2**	1095	8.4	167	10.8	389	11.4	195	**37.8**	1043	15.5	370	**42.5**	1128	2.1	104
40-45	**35.3**	627	10.6	121	**41.6**	558	34.3	1212	30.4	1702	14.9	1032	9.0	118	2.1	39	**50.0**	1581	5.6	99	27.4	750	5.6	114	10.8	280	0.3	18
45-50	28.1	451	20.8	256	29.0	380	**38.8**	1473	**31.2**	1668	**33.1**	2219	1.5	19	0.0	0	27.0	882	1.4	24	1.2	34	5.5	73	1.2	31	0.0	0
50-55	3.0	49	**28.4**	366	6.3	85	15.5	737	5.6	287	29.7	1571	0.2	3	0.0	0	3.8	115	0.0	1	0.2	8	0.1	3	0.3	7	0.0	0
55-60	0.0	0	26.4	359	1.0	13	2.8	176	0.7	39	3.2	133	0.0	1	0.0	0	0.4	9	0.0	0	0.0	1	0.0	0	0.1	3	0.0	0
60-65	0.0	0	6.3	90	0.3	4	0.3	20	0.1	3	0.1	4	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
65-70	0.0	0	0.5	7	0.0	0	0.0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.1	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
>70	0.0	0	0.1	1	0.2	4	0.0	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0
	100.0	1746	100.0	1285	100.0	1351	100.0	3912	100.0	5501	100.0	6174	100.0	1402	100.0	2395	100.0	3262	100.0	1875	100.0	2785	100.0	2840	100.0	2668	100.0	4975

Source: EUROMOD, author's calculations. Frequencies are derived using weights supplied in the micro-data. Standard deviations have only been computed for those observations with AETR values between +/- 100%. See text for further explanations. Modal values are shown in **bold** typeface.

Table C2a. Distribution of METRs: women

	AT		BE		DK		FI		FR		GE		GR		IR		IT		LU		NL		PT		SP		UK	
median [%]	40.0		49.9		51.2		44.8		34.9		53.3		20.1		44.5		33.7		34.5		41.4		26.0		26.0		31.4	
mean [%]	40.4		46.0		53.2		42.3		36.3		64.1		19.4		44.0		36.4		34.4		40.2		28.8		20.7		32.8	
Std. Dev.	18.3		17.0		10.7		19.8		15.2		19.9		14.7		17.4		11.6		15.4		21.2		15.2		14.1		19.4	
METR band [%]	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.
<=0	10.8	152	2.1	18	0.1	2	6.3	826	0.7	39	5.1	226	**27.1**	498	5.8	118	0.7	29	0.3	4	9.4	203	1.8	49	21.3	470	8.9	279
0 to 5	0.0	0	0.0	0	0.0	0	1.0	161	0.5	31	1.3	54	4.1	63	2.9	65	1.2	30	0.3	3	0.1	3	0.0	1	1.7	36	0.1	2
5 to 10	0.0	0	0.0	0	1.7	31	2.2	222	0.7	41	0.1	3	1.1	21	0.1	2	4.2	151	0.8	7	0.0	0	0.1	2	12.6	277	3.7	112
10 to 15	0.3	4	8.7	106	0.0	0	0.5	53	0.6	35	1.3	51	2.4	45	0.5	11	0.6	14	**19.2**	240	0.0	0	17.1	365	0.1	2	0.2	6
15 to 20	18.1	223	0.3	3	0.0	0	0.4	41	1.9	106	0.7	46	11.3	204	2.0	31	2.5	85	5.1	53	0.1	3	8.0	246	3.5	84	3.1	94
20 to 25	1.3	13	0.7	9	0.0	0	4.1	299	10.0	567	4.8	233	16.5	251	6.1	107	4.0	114	4.9	54	0.0	0	3.7	80	10.4	223	5.3	159
25 to 30	0.8	11	1.8	21	0.0	0	6.4	431	13.0	746	1.5	83	12.0	190	16.8	282	10.8	367	11.1	135	0.1	4	**30.7**	731	19.7	453	21.7	643
30 to 35	4.0	57	2.6	34	0.0	1	5.3	334	**35.3**	1975	5.1	163	3.1	48	11.7	208	**30.7**	945	10.1	115	25.6	590	1.4	26	**25.8**	560	**45.0**	1322
35 to 40	14.7	191	6.0	75	0.0	0	6.4	416	15.8	881	3.5	143	18.2	284	1.7	33	23.0	750	8.6	102	13.4	279	19.6	431	2.0	48	2.4	74
40 to 45	**26.1**	289	9.4	123	0.0	0	19.9	1260	8.6	470	4.4	194	2.5	35	5.5	116	7.7	230	8.8	99	**34.1**	717	5.7	90	0.7	14	0.5	16
45 to 50	13.6	162	29.6	402	13.9	241	**21.0**	1342	5.6	293	7.7	356	1.7	21	17.8	280	10.3	289	11.8	114	3.4	69	8.7	163	0.0	2	0.4	11
50 to 55	4.5	55	**32.5**	446	**61.2**	1067	14.3	1004	1.2	68	**29.6**	1235	0.1	3	**20.8**	324	1.2	36	15.3	145	5.5	126	0.2	4	0.4	7	0.0	1
55 to 60	1.6	17	1.7	19	2.3	43	5.2	397	0.6	35	21.0	753	0.0	0	2.7	43	0.5	16	1.4	14	1.3	26	0.0	0	0.5	6	0.0	1
60 to 65	0.4	7	0.3	5	13.8	234	0.7	42	0.5	23	2.8	101	0.0	0	0.4	7	0.6	17	0.0	0	0.4	6	0.0	0	0.1	2	0.4	11
65 to 70	0.3	3	0.1	1	2.4	36	0.4	15	0.1	8	3.3	110	0.0	0	0.3	5	0.3	10	0.0	0	0.3	5	0.4	2	0.0	0	0.7	22
70 to 75	0.0	0	0.1	1	0.4	7	0.4	14	0.2	12	0.3	22	0.0	0	0.3	4	0.2	3	0.0	0	0.2	4	0.0	0	0.0	0	0.6	18
75 to 80	0.0	0	0.0	0	0.5	8	0.3	12	0.2	12	0.8	18	0.0	0	0.4	7	0.1	3	0.1	1	0.7	9	0.5	11	0.0	0	2.5	79
80 to 85	0.0	0	0.0	0	1.5	24	0.3	14	0.2	8	0.1	6	0.0	0	0.6	9	0.3	10	0.0	0	0.5	7	0.0	1	0.0	1	0.3	11
85 to 90	0.0	0	0.1	1	0.5	5	0.2	5	0.2	13	0.1	6	0.0	0	0.1	1	0.1	5	0.1	1	0.1	3	0.1	3	0.0	1	0.6	19
90 to 95	0.0	0	0.1	1	0.1	1	0.1	5	0.8	46	0.0	2	0.0	0	0.0	1	0.0	1	0.1	1	0.3	3	1.7	49	0.0	2	0.4	12
95 to 100	1.1	19	3.5	42	1.5	23	4.4	197	2.2	122	3.6	132	0.0	0	0.7	12	0.2	7	0.3	2	4.0	81	0.2	7	0.2	4	2.8	87
>100	2.2	25	0.4	5	0.2	4	0.2	10	1.0	57	2.7	102	0.0	1	3.1	53	0.9	25	1.8	16	0.5	11	0.0	2	1.0	19	0.4	11
	100.0	1228	100.0	1312	100.0	1727	100.0	7100	100.0	5588	100.0	4039	100.0	1664	100.0	1719	100.0	3137	100.0	1106	100.0	2149	100.0	2263	100.0	2211	100.0	2990

Source: EUROMOD, author’s calculations. Frequencies are derived using weights supplied in the micro-data. Standard deviations have been computed for observations with METR values between +/- 100% only. See text for further explanations. Modal values are shown in **bold** typeface.

Table C2b. Distribution of METRs: men

	AT		BE		DK		FI		FR		GE		GR		IR		IT		LU		NL		PT		SP		UK	
median [%]	42.8		49.9		51.2		48.2		34.9		51.3		30.0		30.8		39.9		36.4		42.6		26.0		26.8		31.4	
mean [%]	43.8		46.4		54.5		42.4		36.6		50.6		24.9		36.8		40.6		34.5		42.9		29.6		24.1		33.9	
Std. Dev.	13.8		17.0		10.2		21.5		14.7		17.6		14.8		16.5		13.0		14.0		23.5		14.9		13.1		13.0	
METR band [%]	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.	Frequ. [%]	n Obs.
<=0	2.6	49	4.7	60	0.2	4.0	9.6	1231	0.6	41	4.6	231	17.1	634	3.1	115	0.2	11	0.1	2	7.0	187	1.5	56	11.4	471	2.3	73
0 to 5	0.1	3	0.0	0	0.0	0	2.0	342	0.5	35	0.7	28	2.4	89	7.0	226	1.9	117	0.0	1	0.0	1	0.1	2	0.9	41	0.0	0
5 to 10	0.0	0	0.3	3	1.7	28	2.5	258	1.0	65	0.0	1	0.9	33	0.8	37	3.4	172	1.0	14	0.0	1	0.3	10	9.1	390	0.4	13
10 to 15	0.1	1	4.3	70	0.0	0	0.3	43	1.2	88	0.4	22	6.6	237	2.9	138	0.6	34	**19.0**	345	0.0	1	16.0	566	0.4	16	0.0	0
15 to 20	3.7	69	0.6	8	0.0	0	0.3	48	2.0	145	0.1	9	8.3	303	5.0	182	0.8	39	4.2	76	0.1	1	2.7	77	5.3	217	1.5	51
20 to 25	0.6	9	1.2	18	0.1	1	3.3	273	8.9	629	3.6	221	7.6	269	6.2	207	1.9	100	2.2	38	0.0	1	7.0	243	17.3	740	10.0	351
25 to 30	0.6	12	1.3	16	0.0	0	5.2	338	15.0	1057	2.0	93	18.2	618	14.1	426	4.9	265	7.1	141	0.0	0	**37.6**	1369	22.0	945	14.4	469
30 to 35	1.1	25	2.3	37	0.0	0	3.4	227	**31.5**	2178	6.2	324	7.8	262	16.5	481	23.1	1174	13.0	252	4.6	113	4.0	100	**25.1**	1011	**53.0**	1725
35 to 40	13.4	243	4.2	64	0.0	0	4.1	288	17.8	1223	6.5	273	**20.8**	655	1.1	35	**23.3**	1292	13.9	259	14.8	414	16.5	485	3.8	147	12.2	436
40 to 45	**44.0**	808	6.6	94	0.0	0	12.1	749	7.6	507	7.2	341	5.0	166	4.8	171	13.8	687	11.9	200	**28.1**	757	6.3	135	2.0	73	0.4	13
45 to 50	18.2	334	27.9	444	13.2	244	16.7	1046	5.6	365	13.1	664	4.7	139	**21.8**	596	16.1	817	16.4	258	18.2	546	4.0	105	0.1	3	0.8	24
50 to 55	8.6	141	**37.5**	613	**44.7**	857	**19.0**	1301	1.6	109	**30.3**	1611	0.5	16	12.5	329	4.0	196	8.8	154	16.4	467	0.0	1	0.7	29	0.0	0
55 to 60	3.5	69	4.9	83	1.6	28	13.5	1128	0.9	63	16.2	785	0.0	0	0.9	27	1.0	58	0.9	17	5.8	172	0.0	0	1.2	39	0.1	3
60 to 65	0.5	10	0.9	17	34.2	649	2.7	254	0.7	50	2.2	93	0.0	1	1.2	38	0.5	30	0.1	2	0.4	11	0.0	0	0.0	1	0.2	6
65 to 70	0.0	1	0.0	0	1.5	26	0.4	16	0.3	20	2.1	104	0.0	0	0.1	2	0.4	19	0.0	0	0.3	11	0.0	0	0.0	1	0.4	11
70 to 75	0.0	1	0.0	0	0.2	5	0.2	15	0.4	24	0.6	35	0.0	0	0.1	2	0.4	15	0.0	0	0.4	11	0.0	3	0.0	1	0.2	6
75 to 80	0.1	3	0.0	0	0.4	7	0.2	10	0.4	28	0.8	27	0.0	0	0.5	11	0.2	17	0.0	1	0.2	9	1.4	58	0.0	1	2.1	85
80 to 85	0.0	1	0.0	0	1.3	23	0.1	7	0.2	16	0.5	37	0.0	0	0.2	4	0.6	27	0.0	1	0.3	10	0.0	1	0.0	2	0.6	19
85 to 90	0.1	1	0.1	1	0.0	0	0.2	10	0.2	18	0.0	5	0.0	0	0.0	0	0.2	9	0.0	0	0.0	0	0.1	3	0.0	1	0.4	10
90 to 95	0.0	3	0.0	0	0.0	0	0.0	2	0.6	43	0.0	0	0.0	0	0.0	0	0.2	15	0.0	1	0.1	3	2.0	91	0.0	0	0.3	13
95 to 100	2.0	43	3.0	38	0.8	14	3.8	170	1.7	114	2.3	139	0.0	0	0.2	4	0.6	23	0.2	3	2.8	75	0.1	7	0.2	6	0.5	18
>100	0.4	9	0.4	6	0.1	2	0.2	12	1.2	80	0.7	35	0.1	4	1.1	37	1.9	99	1.2	19	0.3	8	0.3	12	0.4	17	0.2	6
	100.0	1835	100.0	1572	100.0	1888	100.0	7768	100.0	6898	100.0	5078	100.0	3426	100.0	3068	100.0	5216	100.0	1784	100.0	2799	100.0	3324	100.0	4152	100.0	3332

Source: EUROMOD, author's calculations. Frequencies are derived using weights supplied in the micro-data. Standard deviations have been computed for observations with METR values between +/- 100% only. See text for further explanations. Modal values are shown in bold typeface.