THE 'TAXING WAGES' APPROACH TO MEASURING THE TAX BURDEN ON LABOUR

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Abstract

This paper outlines the methodology used by the OECD in its *Taxing Wages* publication, compares this approach to other measures of the effective tax rate on labour and uses recent results to illustrate its use. It argues that the strength of this methodology lies in its ability to make international comparisons of tax systems, without being affected by different population structures. However, it is limited by considering a restricted number of household types and a fairly narrow income range. Thus, this methodology should be seen as a complement to other methodologies, rather than a replacement for them.

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1. Introduction

The tax burden on labour has substantial policy relevance, and one that has been growing in recent years, particularly in Europe. On the one hand, the burden on labour as opposed to capital income, and on higher-paid workers as opposed to lower-paid workers, has obvious implications for the distribution on income. On the other hand, the tax burden on labour affects the efficiency of the labour market, influencing both participation rates and unemployment rates. This was highlighted a few years ago by the OECD's *Jobs Study* (OECD, 1995) and the heavy tax burden on labour has been recently recognised by the European Union as a factor that is holding back the performance of European economies.

In the light of this policy interest, the purpose of this paper is to describe the way that the tax burden on labour is calculated in the OECD's *Taxing Wages* publication, to discuss its relationship to other approaches to measuring the tax burden on labour, to identify the policy issues to which it is relevant and to illustrate its use.

The basic *Taxing Wages* methodology and initial results were first published as an annex to the 1975 edition of the OECD's *Revenue Statistics* publication. Independent status as a series was achieved in 1979 with the publication of *The 1978 Tax/Benefit Position of a Typical Worker*. In 1984 the series changed name to *The Tax/Benefit Position of Production Workers,* and with the 1996 edition it changed again to *The Tax/Benefit Position of Employees*. It finally became *Taxing Wages* with the 1999 edition. The methodology developed over these years, most notably by increasing the range of incomes and family types considered, but the focus has remained on the 'average production worker' (APW). The purpose of the publication is to complement the *Revenue Statistics'* reporting of economy-wide tax ratios with data on the taxes that are applied directly to 'typical' employees.

The basic approach is conceptually straightforward: a small number of 'typical families' are chosen and the tax rules for each country are applied to them in order to calculate both the average and the marginal effective tax rates. For the purpose of these calculations, universal family benefits paid in cash in respect of dependent children are treated as negative taxes. This is to permit comparisons between those countries that mainly assist families through the tax system and those that mainly assist them with cash benefits. The measures of effective tax rates, their uses and their limitations are discussed in section 2. There are a number of practical issues, described in detail in the publication, that need to be recognised in order to understand the nature of the results. These are dealt with in section 3. Following that, section 4 illustrates the methodology with results from the 2001 edition of *Taxing Wages*.

The *Taxing Wages* approach is fundamentally different from both the 'implicit average effective tax rate' studies that are based on macroeconomic

data and micro-simulation models that are based on household survey data. The significance of these differences, and what they imply about the utility of these three approaches, is discussed in section 5. Section 6 provides some concluding comments.

2. The measures of effective tax rates

The main measures of average effective tax rates provided in *Taxing Wages* are the personal taxes and the overall 'tax wedge' for each of the typical families. In addition, the corresponding marginal tax rates are provided, taking account of the fact that these rates can be different for the two workers in a two-earner household.

The tax wedge (and its corresponding marginal rates) is the measure that comes closest to the standard definition of an effective tax rate, such as that used in the King-Fullerton approach to taxation of capital, which can be expressed as 'the share of the value-added generated by an economic decision that is taken in tax'. It is the sum of income tax, social security contributions (employer's and employee's) and payroll taxes minus universal family benefits, expressed as a proportion of total wage cost (wage plus employer's social security contribution and payroll tax). However, it does not include the taxes that workers pay when they spend their income, an issue that is discussed further below.

The personal taxes, on the other hand, ignore employer's social security contributions and payroll taxes and simply report income tax and employee's social security contributions minus universal family benefits as a proportion of the wage. It can, therefore, be thought of as that part of the taxation of labour that is visible to the employee.

In a competitive labour market, the division of the tax wedge between the amount that legally falls on the employee (the personal taxes) and the amount that legally falls on the employer is irrelevant to any economic outcome in terms of employment, hours of work and after-tax income. This suggests that the personal taxes are a less useful measure than the tax wedge. However, for workers who are paid a legally defined minimum wage, the personal taxes are important in terms of determining their after-tax income in employment although it will be the employer's social security contributions and payroll tax that affects how many are employed. It may also be important for workers whose wages are determined by trade union agreements, at least until the agreement is renegotiated.

The tax wedge results from *Taxing Wages* were used in the *Jobs Study* (OECD, 1995) and continue to be extensively used by the OECD in their country *Economic Surveys*. The size of the tax wedge is used to analyse incentives for people to enter the formal labour market, while the marginal tax wedge is used to examine the incentives for workers to increase their hours of work. International comparisons have, in some cases, led to

recommendations that countries should try to reduce the size of the tax wedge in order to solve labour market problems: see, for example, the recent *Economic Survey* of Finland (OECD, 2002).

The comparison of tax wedges between different household types can also be used to examine the extent to which personal income tax and social security contributions have a distributional effect between households on different income levels or with different demographic characteristics.

However, users of the *Taxing Wages* results for these purposes need to take account of their limitations. Some of these are the result of the status of the publication as a basic statistical resource and so would be difficult to change, while others are the results of methodological assumptions that are subject to review and possible revision. However, even in the latter case, frequent revisions could compromise the value of *Taxing Wages* as a statistical resource that permits time-series comparisons.

Two important limitations follow from the status as a basic statistical resource, which is designed to permit independent researchers to undertake studies of their own. First, there is no attempt to measure the economic incidence of these taxes. This is because the estimation of such incidence would involve the estimation of demand and supply elasticities, together with a host of additional assumptions, resulting in measures that are much less firmly based than the tax wedge figures and therefore less likely to be accepted by Member countries. It is more appropriate for the OECD to produce the basic tax wedge information, and leave the analysis of their possible incidence to independent researchers. Second, there is no attempt to measure the incidence on labour of taxes that may affect labour demand, such as taxes on capital. While there is no doubt that taxes on capital can be expected to alter labour demand and thus have an incidence on labour, the difficulties of estimating this are even greater than those of measuring the incidence of labour taxes, and are again more suitable for study by independent researchers.

Probably the most important methodological limitation is the exclusion of taxes on the goods that workers consume. Theoretically, a uniform sales tax has the same incentive and distributional effects as a proportional income tax on workers who do not save. Thus, the exclusion of sales taxes can be seen as arbitrary. It also has the potential to distort international comparisons, as countries such as Japan and the United States have substantially lower sales taxes than European countries. It would, therefore, be desirable to include sales taxes if a suitable methodology could be agreed and the necessary data obtained. It is the availability of the data for all OECD countries that is the greatest obstacle. As different goods are subject to different sales tax rates, and the differences vary widely across OECD countries, any serious attempt to incorporate sales taxes requires household budget studies for each country that has enough detail in its classification of goods to match the tax classification reasonably well. This

represents a significant challenge, but one that the OECD is keeping under review.

Other methodological assumptions are described in Section 3. They include the assumption that the typical households have no capital income and do not receive non-standard tax reliefs. In principle, these limitations could also be removed if sufficient information were available from household survey and/or administrative data.

3.   The Methodology

It is assumed that each employee's annual income from employment is equal to a given fraction of the average gross wage earnings of adult, full-time workers in the manufacturing sector of each OECD economy. Additional assumptions are made regarding other relevant personal circumstances of these wage earners to enable their tax/benefit position to be determined. The taxes considered are personal income tax, social security contributions and more rarely payroll taxes, payable on gross wage earnings. Consequently, any income tax that might be due on non-wage income, as well as all other kinds of taxes —e.g., corporate income tax, net wealth tax and consumption taxes — are not taken into account.

Taxpayer characteristics
The present methodology identifies eight types of taxpayers:
–   a single individual with no children earning 67, 100 and 167 per cent of APW earnings, respectively;
–   a lone parent with two children earning 67 per cent of APW earnings;
–   a married couple with two children and a single earner at the APW level; and
–   three cases of two-earner married couples, with earnings split between the two partners at 100–33 per cent of APW earnings, both with and without children, and finally a couple with children with the earnings split 100–67 per cent of APW earnings.
In cases of families with children, the children are assumed to be aged between five and twelve. The family is assumed to have no income source other than employment and — depending on family-size — universal cash benefits.

An example
Before proceeding to a more detailed description of the methodology, it might be helpful to illustrate the calculations with an example. Tables 1 and 2 show the layout of the country tables for one of the countries in the 2001 edition of *Taxing Wages*. The columns (4 in each table) correspond to the eight types of taxpayers, while the rows represent the steps in the calculations

(several of which are too complicated to show in the tables and are based on tax equations for each country). The main sections are numbered:

Section 1 shows the gross earnings in national currency.

Section 2 shows the standard tax allowances that are subtracted from the central government tax base, separated by type.

Section 3 shows items that are added to the central government tax base.

Section 4 shows the central government income tax base.

Section 5 shows the result of using the country's tax schedule to calculate the central government income tax.

Section 6 shows the tax credits that are set against the calculated central government tax, separated by type.

Section 7 shows the result of subtracting these credits.

Section 8 shows the result of the same exercise as sections 2-7 for state and local taxes.

Section 9 shows employee social security contributions, separated by whether the contribution base is gross earnings or taxable income.

Section 10 reports the total of the three payments (7+8+9).

Section 11 shows cash transfers (benefits) from the government, separated by type.

Section 12 shows the take-home pay, after income taxes, social security contributions and transfers.

Section 13 shows the employer social security contributions.

Section 14 reports four average tax rates:
1. For income tax only.
2. For employee social security contributions only.
3. For income tax plus employee social security contributions minus cash transfers (the personal taxes).
4. For income tax plus employee and employer social security contributions minus cash transfers (the 'tax wedge').

The first three are measured as a percentage of the gross earnings, while the fourth is measured as a percentage of labour costs (gross earnings plus employer social security contributions).

Section 15 reports four marginal tax rates:
1. The marginal personal taxes for an increase in the income of the principal earner.
2. The marginal personal taxes for an increase in the income of the spouse.
3. The marginal 'tax wedge' for an increase in the income of the principal earner.
4. The marginal 'tax wedge' for an increase in the income of the spouse.

Calculation of gross wages

The data relate to average earnings (including both men and women) in the manufacturing sector for the country as a whole, but a few countries include firms in the mining sector. These differences do not significantly affect the comparability of the data since in most of these countries the mining sector is either very small or has wage levels more or less similar to those in the manufacturing sector. The type of worker is an adult directly engaged full-time in a production activity and is assumed to be fully employed during the year.

Where sickness payments are made by the employer, either on behalf of the government or on behalf of private sickness schemes, these amounts are included in the wage calculations. Average amounts of overtime and regular cash supplements (e.g. Christmas bonuses, thirteenth month) are included in the earnings calculation, as are vacation payments typically paid to production workers. Profit-sharing schemes that take the form of dividend distributions are excluded from the calculations.

Fringe benefits are, where possible, excluded from the calculation of average earnings because these types of benefits would be difficult to evaluate in a consistent way. Generally, such benefits rarely account for more than 1 per cent of gross wage earnings. Employers' contributions to private pension, family allowance or health and life insurance schemes are also excluded, although the amounts involved can be significant. The issue of comparability between countries with and without substantial private schemes is an issue that remains unresolved.

Coverage of taxes and benefits

The main taxes included are personal income tax and employee and employer social security contributions payable on wage earnings. All central, state and local government income taxes are included. In addition, payroll taxes are included in the calculation of the total wedge between labour costs to the employer and the corresponding net take-home pay of the employee.

Compulsory social security contributions paid to general government are treated as taxes because they are compulsory, unrequited payments to general government. They may, however, differ from other taxes in that the eligibility for social security benefits depends, in most countries, upon appropriate contributions having been made, although the size of the benefits is not necessarily related to the amount of the contributions and so they cannot be regarded as requited. Countries finance their compulsory public social security programmes to a varying degree from general tax and non-tax revenue and earmarked contributions, respectively. This means that better comparability between countries is obtained by treating social security contributions as taxes, but they are separately identified so that their amounts can be identified in any analysis.

Calculation of personal income taxes

The first step in the calculation of personal income taxes involves the determination of the tax allowances applicable to a taxpayer with the relevant characteristics and income level. Next, the schedule of tax rates is applied and the resulting tax liability is reduced by any relevant tax credits. An important issue that arises in the calculation of personal income tax due involves determining which tax allowances should be taken into account. Two broad categories of reliefs may be distinguished:

  − *Standard tax reliefs*: reliefs that are unrelated to the actual expenditures incurred by the taxpayer and are automatically available to all taxpayers that satisfy the eligibility rules specified in the legislation. Standard tax reliefs are usually fixed amounts or fixed percentages of gross income and are typically the most important set of reliefs in the determination of the income tax paid by production workers. Standard reliefs are taken into account in calculating the initial tax position of employees and include:

  − The <u>basic relief</u> which is fixed and is available to all taxpayers or all wage earners, irrespective of their marital or family status;
  − The <u>standard relief</u> which is available to taxpayers depending on their <u>marital status</u>;
  − The <u>standard child relief</u> granted to a family with two children between the ages of five and twelve;
  − The <u>standard relief</u> in respect of <u>work expenses</u>, which is usually a fixed amount or fixed percentage of (gross) wage earnings;
  − Tax reliefs allowed for <u>social security contributions</u> and other (sub-central government) <u>income taxes</u> are also considered as standard reliefs since they apply to all wage earners and relate to compulsory payments to general government.

  − *Non-standard tax reliefs*: These are reliefs that are wholly determined by reference to actual expenses incurred. They are neither fixed amounts nor fixed percentages of income. Examples of non-standard tax reliefs include reliefs for interest on qualifying loans (*e.g.,* for the purchase of a house), private insurance premiums, contributions to private pension schemes, and charitable donations. Non-standard reliefs are *not* taken into account in calculating the initial tax position of employees.

State and local income taxes

Personal income taxes levied by sub-central levels of government — state, provincial, cantonal or local — are included in the calculations. When tax rates and/or the tax base of sub-central government income taxes vary within a country, it is sometimes assumed that the average production worker lives in a typical manufacturing area. The income taxes (and benefits) applicable

in this area are used. In other cases, the average rate of sub-central government income taxes for the country as a whole is used.

Social security contributions
Compulsory social security contributions paid by employees and employers to general government or to social security funds under the effective control of government are included in the coverage of this report. Contributions to social security schemes outside the general government sector are not included in the calculations.

Payroll taxes
The tax base of payroll taxes is either a proportion of the payroll or a fixed amount per employee, but they are distinguished from social security contributions by the fact that they do not generate any entitlement to social benefits.

Family cash benefits from general government
Tax reliefs and family cash transfers universally paid in respect of dependent children between five and twelve years of age who are attending school are included. If tax reliefs or cash transfers vary within this age range, the most generous provisions are taken. The case of twins is explicitly disregarded.

Limitations of the income tax calculation
The exclusion of non-wage income and the limited number of tax reliefs covered imply that the average rates of income tax will not necessarily reflect the actual rates confronting taxpayers at these levels of earnings. Actual rates may be lower than the calculated rates because the latter do not take into account non-standard expense-related reliefs. On the other hand, actual rates may be higher than calculated rates because the latter do not take into account non-wage income received by employees and the tax on it. It also omits any deductions in respect of non-wage income that can offset tax on wage income.

The decision to exclude non-wage income *(e.g.*, dividends, interest) was taken because the main focus of *Taxing Wages* is on the tax treatment of wage income, as this is a major policy interest. For taxpayers at the income level of average production workers (APW), non-wage income is generally not significant. In Australia, Austria, Finland and Ireland, for example, non-wage income constitutes less than 0.5 per cent of the average production worker's total earnings. There are, however, some countries where APW-type taxpayers do typically have non-wage income. In the United States, for example, over 60 per cent of such taxpayers have non-wage income that accounts, on average, for about 5 per cent of their incomes.

Limitations to time-series comparisons
It should be noted that results up to and including the 1995 edition covered just two family-types: single individuals without children and married one-earner couples with two children. The earnings were the same in both cases and equal to those of an average production worker.

There are also a number of limitations that apply to the interpretation of the results over time. Any dynamic analysis of the results has to take into account the following qualifications:

– The earnings data do not necessarily relate to the same taxpayer throughout the period. The average earnings in manufacturing industry are calculated for each year. As such, the results do not refer to the changing earnings and tax position of particular individuals over time but rather to the position of workers earning a wage equal to average earnings in the manufacturing industry in each particular year.

– For technical reasons, the procedures countries follow to determine the benchmark earnings level of the national average production worker may change over time.

– In exceptional cases, the taxes covered in the report for a given country may differ over the years. Starting with the 1998 edition, Korea has extended the coverage of its social security contributions. This extended coverage largely explains why the wedge between labour costs and net take-home pay of a single average production worker in the case of Korea doubles from 6.3 per cent (1996) to 12.4 per cent (1997).
– In two (Switzerland and the United States) of the twelve countries with state and/or local income taxes, the rates of tax applied to an APW refer to a typical manufacturing region. Consequently, if movements in tax rates in this region are unrepresentative of changes in income taxes elsewhere in the country, they will provide a poor indication of how countrywide average rates of taxes are evolving.

Limitations to marginal rates
In the calculation of marginal tax wedges for the spouse, editions before 1998 considered the situation where the spouse upon entering the labour market saw his or her income increase from zero to one currency unit (e.g. one dollar per year) of employment income. This case seems to be hardly representative and therefore less interesting, given that typically a spouse entering the workforce will experience a more significant (discrete) jump in earnings than of just one single currency unit. Moreover, the former approach disregarded discrete jumps in social security contributions and wastable tax credits that occur in certain tax/benefit systems when the spouse's employment income increases from zero to one currency unit. Such payments/transfers which are not proportional to income were not factored into spousal marginal tax rates in the (100–0) case, given that their inclusion would result in misleadingly

large (positive/negative) tax wedge values (e.g. in excess of 1,000 per cent). To avoid the necessity of 'fudging' the approach in this way, it was decided — starting with the 1998 edition — to reconstruct the calculation of the marginal tax wedge in the (100–0) case to reflect the situation where the spouse, upon entering the workforce, experiences an increase in labour income from zero monetary units to 33 per cent of the gross wage earnings of an average production worker.

It is important to note that a number of OECD Member countries means-test universal cash benefits: benefits are reduced as income increases. For employees the benefit reduction is equivalent to an additional tax, which raises their combined (explicit and implicit) marginal rate.

4. Some results

The information in *Taxing Wages* can be used for a range of purposes: comparisons of average or marginal tax rates, compared across household types or countries or years. It is not practicable to illustrate all such comparisons in this brief paper. We have therefore decided to concentrate on one current issue that is attracting considerable attention, at least in Europe: the trend in the average tax rate on workers.

Table 3 reports the figures since 1995 for the personal taxes on a single worker with no children (and thus not receiving family cash benefits), earning the APW wage. From 1995 to 2001, increases of more than one percentage point have occurred in six countries: Austria, Hungary, Iceland, Japan, Korea, and Poland. Reductions of more than one percentage point have occurred in 11 countries: Canada, Denmark, Finland, Ireland, Mexico, the Netherlands, New Zealand, Portugal, Switzerland, the United Kingdom and the United States. In addition, Sweden has cut its personal taxes rapidly in the past two years. Thus, the picture is one of considerable diversity, but with some tendency to reduction.

Table 4 reports figures for the same worker, but now for the 'tax wedge'. The pattern here is basically similar to that shown in Table 3, but there are some interesting differences produced by adding in the employers' social security contributions. First, Italy now appears as one of the countries with a noticeable tax reduction. Second, Mexico's reduction in tax is seen as much larger than before. Third, in contrast, the reduction in the Netherlands is much smaller. Fourth, Poland changes from being a country with a substantial tax increase to a country with a modest decrease. Finally, Turkey had no discernible trend in its personal taxes but has experienced a substantial increase in its tax wedge.

These differences between Tables 3 and 4 show how important it is to define an appropriate measure of taxation for the situation that is being studied and the question that is being asked. As discussed in Section 2, standard competitive market theory suggests that it is only the tax wedge that

is important. However, this may well not apply if workers are near to the minimum wage or are represented by strong trades unions, and in such cases different measures may be relevant for distributional concerns from those appropriate to judging impacts on unemployment. Also, even in a basically competitive market, wages may take some time to adjust.

Tables 5 and 6 report equivalent figures to those in tables 3 and 4, but for a married worker on the APW wage who is married to a non-working spouse and has two children. The comparison between Tables 3 and 5 shows the very different tax treatment of the two types of household. Only Mexico and Turkey tax them at exactly the same rate, and only Greece applies a (very slightly) higher tax rate to the married couple. All other countries tax the married couple less, many very much so, and some even providing net transfers to the married couple.

The comparison also shows that the degree of preference shown to married couples with children has altered over the past six years. Australia, Germany, Italy and Spain have cut taxes for the family with children despite giving no significant tax cuts to single people. Austria even cut its taxes for the family with children while increasing taxes for single people. Ireland, Luxembourg, Portugal, the United Kingdom and the United States cut taxes more for the family than for the single person. On the other hand, Denmark cut taxes for singles without cutting them for families, while Belgium, Greece, Iceland and Norway noticeably raised taxes for families while holding the taxes on singles relatively constant. This shows that despite the near consensus on the desirability of taxing families less heavily than single people, there is variation in the size of this preference both across countries and through time.

A comparison of table 6 with table 4 shows the same as the comparison between tables 3 and 5 because employers' social security contributions do not depend on the type of household a worker lives in.

5. A comparison with alternative approaches

The *Taxing Wages* approach is not the only way in which the taxation of labour income can be assessed. One alternative is to calculate the implicit average effective tax rate, by estimating the total amount of tax paid on labour earnings in a country and dividing that by an estimate of total wages or labour costs. Pioneering work of this sort was undertaken by Mendoza, Razin and Tesar (1994). This stimulated a substantial literature including OECD (2001) and the paper in this volume by Carey and Rabesona. Another alternative is to use a micro-simulation model (based on publicly available sample survey data) to calculate labour taxes for a representative sample of a country's population. An interesting recent example of this has been the construction of the European tax-benefit model, EUROMOD, described by Sutherland (2001).

There are four major differences between these approaches.

- First, they differ in the amount of detail they provide. An implicit average effective tax rate calculation for any one country in one year produces just one tax ratio. The *Taxing Wages* methodology uses a clearly structured calculation to generate results for a small number (currently 8) of different typical families, while micro-simulation models can produce results for each of the households or stratified groups in the database that it uses.

- Second, they differ in the extent to which they are based on 'real' data. Implicit average effective tax rates have the advantage of being based entirely on observed quantities (although there are disputes over whether these are exactly the appropriate quantities), and thus reflect all the factors that influence the amount of taxes actually paid. Micro-simulation models are based on real households and the results are therefore more representative of the population, but the taxes paid are simulated in a similar way to the *Taxing Wages* calculation. The calculations in *Taxing Wages* take no account of observed data.

- Third, they differ in the tax rate information that they provide: both micro-simulation models and *Taxing Wages* are able to provide marginal and average effective tax rates, but implicit effective tax rate calculations yield only an average rate.

- Fourth, *Taxing Wages* takes account of cash benefits to families, as can micro-simulation models. This is not done with the currently calculated implicit effective tax rates, and would only be possible if data on aggregate cash benefits to families were available.

The quantitative significance of these differences can partly be assessed by comparing the results obtained for the implicit average effective tax rate on labour by Carey and Rabesona with the *Taxing Wages* 'tax wedge' results for two key household types: the single worker with no children and APW earnings, and the single-earner couple with two children and APW earnings. A cross-country correlation analysis, for the year 2000, shows correlation coefficients of 0.85 for the single worker and 0.83 for the couple.

However, a more complex picture emerges from time-series correlations for individual countries, shown in table 7. For six countries (Australia, Austria, Canada, Finland, Germany and Korea) the correlation coefficients for the single worker are larger than 0.9, and for three others (Belgium, Greece and New Zealand) they are larger than 0.8. In contrast, three countries (Czech Republic, Denmark and the United States) show negative correlation coefficients, while the rest show only weak positive correlations. The cases of Denmark (-0.84) and the United States (-0.47) are particularly interesting because they both show a declining tax wedge in recent years, while the implicit rate was increasing.

The results for the couple's 'tax wedge' show a similarly complex picture, but with a generally lower degree of correlation with the implicit rate. Only four countries (Canada, Finland, Korea and New Zealand) have a correlation coefficient above 0.9 and two extra countries have negative correlations: Italy (-0.12) and Switzerland (-0.68). The weaker correlations for the couples should be expected as the 'tax wedge' subtracts family cash benefits, while implicit tax rates do not. However, this cannot be part of the explanation for the mixed results for single workers because they do not receive cash benefits. The true explanation could come from changes in the extent to which the *Taxing Wages* households are representative of all workers and/or the various special assumptions that are required by each methodology to arrive at their results.

Whatever, the explanation, these results show that users of effective tax rates on labour need to choose their measure with care. The value of the approach that lies behind each measure depends on what is being studied, so that different approaches are likely to be most suitable in attempting to answer different questions. The particular strength of the *Taxing Wages* approach is comparability between countries: the typical households are the same in each country (with the wage received bearing the same relationship to the APW level) and so differences between effective tax rates are always due to differences in the tax systems and not to differences in the structure of the population. In contrast, differences in implicit average effective tax rates between countries reflect a combination of differences in tax systems (both policy and administration) and differences in population structure (in terms of income distribution, demographics and other factors that affect tax liability).

This source of strength for some purposes is also a limitation for others. For example, the limited range of incomes considered in *Taxing Wages* makes it impossible to obtain an overall picture of how labour is taxed. In contrast, the implicit average effective tax rate takes account of the taxation of all workers. This is useful in analysing how the tax base is allocated between labour, capital and consumption. However, neither of these approaches is able to cast light on the taxation of high-income workers, for whom international comparisons may be the most relevant because of their greater mobility. In principle, it is the micro-simulation model that can produce the combination of comprehensive coverage and individual detail. However, even these models can fail to produce accurate figures for the taxation of high-income individuals, as their databases do not contain enough information to identify all the tax deductions or tax avoidance techniques that are available to such people and rarely contain information on the amount of tax actually paid. The tax authorities, of course, do know how much tax people at different income levels pay and are sometimes prepared to make that information public. This is very useful in establishing the effective progressivity of the tax systems in individual countries, but international comparisons of these data are hard to make, as there is not enough

information on the situations of these taxpayers to ensure that they really are similar.

The reason why *Taxing Wages* does not cover a wider range of incomes partly reflects the difficulties that micro-simulation models have in dealing with high-income individuals. As explained in the section 3, *Taxing Wages* only takes account of 'standard' tax reliefs, in order to focus on the 'typical' taxpayer. This is not realistic for high-income individuals because of the significant opportunities to reduce tax liability on wage income that they have in many countries. This means that the mere extrapolation of the tax equations used in producing the publication could seriously over-state the amount of taxes paid. In addition, *Taxing Wages* assumes that households have no income from savings, an assumption that is untenable for high-income individuals but which would be very difficult to drop without adding considerable complications.

Taxing Wages also does not consider the situation of people on very low incomes, in order to avoid dealing with the complexities of social assistance programmes beyond the universal family benefits that it treats as negative taxes, although it is worth noting that the incomes covered are sufficiently low to require a modelling of the non-wastable tax credits that an increasing number of OECD countries are using to increase the incentives for low-skilled people to work. The inter-action of the tax and benefit systems and their effects on work incentives are covered in another OECD publication, *Benefit Systems and Work Incentives*, which uses the tax equations from *Taxing Wages* and combines them with information on benefit systems to analyse the incentives for greater work participation that faces households in a variety of situations.

In addition to extending the picture from *Taxing Wages* to lower income households, *Benefit Systems and Work Incentives* provides crucial information on out-of-work benefits that are needed to supplement average effective tax rates in any analysis of the incentives for labour force participation. Thus, the OECD's regular *Economic Surveys* of its member countries typically use it to analyse labour force participation, while using the marginal tax rates from *Taxing Wages* to analyse hours of work.

6. Concluding comments

This paper has aimed at providing a view of the contribution that the *Taxing Wages* methodology can make to the measurement of the tax burden on labour. It has shown that the effective tax rate measures obtained can differ significantly from those derived from the implicit tax rate approach. It is therefore necessary for users of effective tax rates to choose their measure with care, taking account of the questions that they wish to answer.

It has shown that the strength of the *Taxing Wages* methodology lies in its ability to make international comparisons of the tax systems, without

the results being affected by differences in the structure of populations. However, it is limited in that it only considers particular 'typical' workers, within a fairly narrow income range, and so does not capture the entire tax burden on labour or permit the comparison of tax burdens on the most mobile workers. Also it currently only considers a restricted range of household demographic characteristics, which may need to be extended in order to provide a more comprehensive picture of the taxation of labour. Thus, *Taxing Wages* represents a complement to other methodologies, rather than a replacement for them.

It is also important to note that taxes and the cash benefits included in *Taxing Wages* are not always sufficient to analyse the incentive for individuals to participate in the labour market. It is often necessary to take account of the social benefits that such people would receive if they did not work. Such information is provided in a related OECD publication: *Benefit Systems and Work Incentives*. It should also be noted that the methodology excludes consideration of non-tax factors that might affect the working of the labour market, including both compulsory and voluntary payments to social security schemes administered in the private sector.

Finally, the limited selection of data presented in this paper show the variety of tax systems within the OECD, and the very different directions that they have taken over the last few years.

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TABLE 1

Example of Country Table for Single Workers

Denmark	**2000**			
The tax/benefit position of single individuals				
Earnings (per cent of APW)	67	100	167	67
Number of children	none	none	none	2
1. Gross earnings	188400	282600	471000	188400
2. Standard tax allowances				
Basic allowance				
Married or head of family				
Dependent children				
Deduction for social security contributions and income taxes	17770	26248	43204	17770
Work-related expenses	6840	6840	6840	6840
Other				
Total	24610	33088	50044	24610
3. Tax credits or cash transfers included in taxable income	0	0	0	0
4. Central government taxable income (1 - 2 + 3)	163790	249512	420956	163790
5. Central government income tax liability (exclusive of tax credits)	11845	22989	67544	11845
6. Tax credits				
Basic credit	2338	2338	2338	2338
Married or head of family				
Children				
Other				
Total	2338	2338	2338	2338
7. Central government income tax finally paid (5-6)	9507	20651	65206	9507
8. State and local taxes	42768	70885	127119	42768
9. Employees' compulsory social security contributions				
Gross earnings	24610	33088	50044	24610
Taxable income				
Total	24610	33088	50044	24610
10. Total payments to general government (7 + 8 + 9)	76885	124623	242368	76885
11. Cash transfers from general government				
For head of family				
For two children	0	0	0	48980
Total	0	0	0	48980
12. Take-home pay (1-10+11)	111515	157977	228632	160495

13.	**Employer's compulsory social security contributions**	1353	1353	1353	1353
14.	**Average rates**				
	Income tax	27.7%	32.4%	40.8%	27.7%
	Employees' social security contributions	13.1%	11.7%	10.6%	13.1%
	Total payments less cash transfers	40.8%	44.1%	51.5%	14.8%
	Total tax wedge including employer's social security contributions	41.2%	44.4%	51.6%	15.4%
15.	**Marginal rates**				
	Total payments less cash transfers: Principal earner	50.7%	50.7%	63.3%	50.7%
	Total payments less cash transfers: Spouse	n.a.	n.a.	n.a.	n.a.
	Total tax wedge: Principal earner	50.7%	50.7%	63.3%	50.7%
	Total tax wedge: Spouse	n.a.	n.a.	n.a.	n.a.

TABLE 2

Example of Country Table for Married Workers

	Denmark	**2000**			
	The tax/benefit position of married couples				
	Earnings (per cent of APW)	100-0	100-33	100-67	100-33
	Number of children	2	2	2	none
1.	**Gross earnings**	282600	376800	471000	376800
2.	**Standard tax allowances**				
	Basic allowance				
	Married or head of family				
	Dependent children				
	Deduction for social security contributions and income taxes	26248	35539	44017	35539
	Work-related expenses	6840	13680	13680	13680
	Other				
	Total	33088	49219	57697	49219
3.	**Tax credits or cash transfers included in taxable income**	0	0	0	0
4.	**Central government taxable income (1 - 2 + 3)**	249512	327581	413303	327581
5.	**Central government income tax liability (exclusive of tax credits)**	17466	23690	34834	23690
6.	**Tax credits**				
	Basic credit	4676	4676	4676	4676
	Married or head of family				
	Children				
	Other				
	Total	4676	4676	4676	4676
7.	**Central government income tax finally paid (5-6)**	12790	19014	30158	19014
8.	**State and local taxes**	59930	85536	113653	85536
9.	**Employees' compulsory social security contributions**				
	Gross earnings	33088	49219	57697	49219
	Taxable income				
	Total	33088	49219	57697	49219
10.	**Total payments to general government (7 + 8 + 9)**	105807	153770	201508	153770
11.	**Cash transfers from general government**				
	For head of family				
	For two children	19000	19000	19000	0
	Total	19000	19000	19000	0
12.	**Take-home pay (1-10+11)**	195793	242030	288492	223030

13.	**Employer's compulsory social security contributions**	1353	2706	2706	2706
14.	**Average rates**				
	Income tax	25.7%	27.7%	30.5%	27.7%
	Employees' social security contributions	11.7%	13.1%	12.2%	13.1%
	Total payments less cash transfers	30.7%	35.8%	38.7%	40.8%
	Total tax wedge including employer's social security contributions	31.0%	36.2%	39.1%	41.2%
15.	**Marginal rates**				
	Total payments less cash transfers: Principal earner	45.2%	50.7%	50.7%	50.7%
	Total payments less cash transfers: Spouse	46.1%	50.7%	50.7%	50.7%
	Total tax wedge: Principal earner	45.2%	50.7%	50.7%	50.7%
	Total tax wedge: Spouse	46.8%	50.7%	50.7%	50.7%

TABLE 3

Income Tax plus Employee Contributions (in % of gross wage), 1995-2001, Single Workers

without Children

	1995	1996	1997	1998	1999	2000	2001
AUSTRALIA	24.0	24.4	24.8	25.4	25.9	22.8	23.1
AUSTRIA	27.0	27.3	28.3	28.6	28.8	27.9	28.5
BELGIUM	41.1	41.3	41.5	41.8	41.9	41.9	41.7
CANADA	27.1	27.6	27.7	27.1	26.5	26.6	25.3
CZECH REPUBLIC	23.2	22.5	22.9	22.8	22.7	23.2	23.1
DENMARK	45.2	44.8	44.9	43.4	44.2	44.1	43.8
FINLAND	38.0	37.6	35.8	35.4	33.7	33.6	32.4
FRANCE	27.4	27.8	28.1	27.3	27.7	26.8	27.0
GERMANY	40.5	41.3	42.3	42.1	41.9	42.0	40.6
GREECE	17.6	17.8	17.9	18.3	17.8	18.1	18.1
HUNGARY	27.9	29.6	29.3	28.9	30.1	32.4	34.3
ICELAND	20.6	21.7	21.5	21.6	20.6	21.4	22.2
IRELAND	29.2	28.5	26.0	24.9	24.3	20.3	16.9
ITALY	27.5	28.0	29.0	29.1	29.1	28.5	27.9
JAPAN	13.4	13.7	15.0	13.8	16.1	16.2	16.2
KOREA	4.8	4.2	5.6	6.4	8.8	9.2	9.3
LUXEMBOURG	25.6	25.9	26.4	24.6	25.8	26.6	24.8
MEXICO	7.7	5.3	1.4	2.6	1.6	2.9	3.1
NETHERLANDS	40.5	39.2	39.3	34.4	35.4	36.2	33.0
NEW ZEALAND	24.5	22.3	21.6	20.0	19.4	19.5	19.6
NORWAY	29.6	29.7	29.5	29.6	29.4	29.2	29.0
POLAND	18.1	18.0	16.9	15.8	31.4	31.4	31.3
PORTUGAL	18.0	18.1	18.2	18.1	17.6	17.7	16.5
SLOVAK REPUBLIC	-	-	-	-	-	19.9	19.9
SPAIN	19.6	19.9	20.2	20.2	18.2	18.5	18.9
SWEDEN	32.6	33.7	34.5	34.4	34.1	32.9	31.7
SWITZERLAND	22.5	22.4	21.9	21.9	21.7	21.3	21.4
TURKEY	30.5	31.6	32.8	33.1	22.9	28.7	30.4
UNITED KINGDOM	26.7	25.8	25.2	25.2	26.4	23.6	23.3
UNITED STATES	25.8	25.8	25.8	25.8	25.8	25.5	24.6

TABLE 4

Income Tax plus Employee and Employer Contributions (as % of labour cost), 1995-2001,

Single Workers without Children

	1995	1996	1997	1998	1999	2000	2001
AUSTRALIA	24.0	24.4	24.8	25.4	25.9	22.8	23.1
AUSTRIA	41.2	41.5	45.6	45.8	45.9	44.9	44.7
BELGIUM	56.3	56.4	56.6	56.8	56.9	56.2	55.6
CANADA	31.5	32.1	32.3	31.7	31.1	31.3	30.2
CZECH REPUBLIC	43.2	42.6	42.9	42.8	42.7	43.1	43.0
DENMARK	45.2	44.8	45.1	43.7	44.5	44.4	44.2
FINLAND	51.2	50.3	48.9	48.8	47.4	47.3	45.9
FRANCE	49.1	49.7	48.7	47.6	48.1	48.2	48.3
GERMANY	50.2	51.2	52.3	52.2	51.9	51.8	50.7
GREECE	35.6	35.8	35.8	36.1	35.7	36.0	36.0
HUNGARY	51.4	52.0	52.0	51.6	50.7	52.0	52.6
ICELAND	23.1	24.5	24.4	24.8	24.2	25.0	25.7
IRELAND	36.9	36.1	33.9	33.0	32.4	28.9	25.8
ITALY	50.3	50.8	51.5	47.5	47.2	46.7	46.2
JAPAN	19.5	19.4	20.7	19.6	24.0	24.1	24.2
KOREA	6.9	6.3	12.4	14.7	16.1	16.5	16.6
LUXEMBOURG	34.3	34.5	35.2	33.8	34.6	35.5	33.9
MEXICO	27.2	25.4	20.8	21.9	14.1	15.4	15.6
NETHERLANDS	44.8	43.8	43.6	43.5	44.3	45.1	42.3
NEW ZEALAND	24.5	22.3	21.6	20.0	19.4	19.5	19.6
NORWAY	37.5	37.6	37.4	37.5	37.3	37.2	37.0
POLAND	44.7	44.7	43.9	43.2	43.0	43.0	42.9
PORTUGAL	33.7	33.8	33.9	33.8	33.4	33.5	32.5
SLOVAK REPUBLIC	-	-	-	-	-	41.9	42.0
SPAIN	38.5	38.8	39.0	39.0	37.5	37.6	37.9
SWEDEN	49.3	50.2	50.7	50.7	50.5	49.5	48.6
SWITZERLAND	30.6	30.4	30.0	30.0	29.8	29.5	29.5
TURKEY	35.3	38.3	39.6	39.8	30.3	40.4	43.2
UNITED KINGDOM	33.4	32.6	32.0	32.0	30.8	30.1	29.7
UNITED STATES	31.0	31.1	31.1	31.0	31.1	30.8	30.0

TABLE 5

Income Tax plus Employee Contributions less Cash Benefits (in % of gross wage), 1995-

2001, One-earner Family with two Children

	1995	1996	1997	1998	1999	2000	2001
AUSTRALIA	16.1	15.0	14.5	15.5	16.1	13.5	13.1
AUSTRIA	9.5	10.3	10.7	11.3	10.0	7.6	8.7
BELGIUM	19.5	19.8	20.2	20.5	20.7	21.1	21.5
CANADA	16.6	18.2	18.2	17.7	15.9	16.0	14.9
CZECH REPUBLIC	3.3	7.1	7.1	-3.4	-2.1	-1.0	2.5
DENMARK	30.9	31.1	31.1	29.7	30.7	30.7	30.9
FINLAND	26.3	27.1	25.7	25.3	23.9	24.3	23.5
FRANCE	13.8	15.1	15.3	14.6	15.0	15.0	14.4
GERMANY	25.0	21.9	22.1	22.4	20.7	19.6	18.8
GREECE	16.7	17.0	18.4	18.7	17.8	18.2	18.3
HUNGARY	7.3	12.6	12.9	12.3	9.1	14.7	15.4
ICELAND	-14.5	-5.4	-6.8	-3.9	-4.3	-2.7	-1.8
IRELAND	17.9	14.6	14.6	13.2	10.5	5.4	2.3
ITALY	19.6	17.7	17.0	15.7	15.5	14.8	13.8
JAPAN	8.6	9.0	9.6	7.7	11.5	12.0	12.0
KOREA	3.8	4.7	4.7	5.6	8.0	8.4	8.5
LUXEMBOURG	1.2	1.4	1.3	-0.2	-1.3	-0.8	-0.7
MEXICO	7.7	5.3	1.4	2.6	1.6	2.9	3.1
NETHERLANDS	29.8	28.0	27.9	22.4	23.6	25.0	21.4
NEW ZEALAND	22.4	16.2	16.2	14.8	14.1	15.5	16.8
NORWAY	14.9	15.4	15.4	16.2	16.8	17.6	17.9
POLAND	10.1	10.3	9.5	7.2	25.4	25.6	25.4
PORTUGAL	9.2	9.5	9.4	9.0	8.4	8.7	6.2
SLOVAK REPUBLIC	-	-	-	-	-	3.2	3.6
SPAIN	12.8	13.0	13.2	12.8	8.9	9.3	9.9
SWEDEN	23.1	26.2	27.2	26.1	26.0	24.0	22.2
SWITZERLAND	9.5	8.2	8.2	8.3	8.4	8.2	8.4
TURKEY	30.5	31.6	32.8	33.1	22.9	28.7	30.4
UNITED KINGDOM	18.6	17.3	17.3	17.4	16.2	14.1	10.3
UNITED STATES	18.6	18.4	18.3	17.9	15.0	15.3	13.2

TABLE 6

Income Tax plus Employee and Employer Contributions less Cash Benefits (in % of labour costs), 1995-2001, One-earner Family with two Children

	1995	1996	1997	1998	1999	2000	2001
AUSTRALIA	16.1	15.0	14.5	15.5	16.1	13.5	13.1
AUSTRIA	27.2	28.0	32.2	32.7	31.6	29.5	29.4
BELGIUM	40.3	40.4	40.8	41.1	41.2	40.5	40.2
CANADA	21.7	22.7	23.4	22.9	21.2	21.4	20.5
CZECH REPUBLIC	28.5	31.4	31.2	23.4	24.4	25.2	27.8
DENMARK	30.9	31.1	31.3	30.1	31.1	31.0	31.3
FINLAND	42.1	42.0	40.8	40.7	39.6	39.9	38.8
FRANCE	39.5	40.7	39.5	38.5	38.9	39.8	39.4
GERMANY	37.3	35.0	35.6	35.9	34.4	33.3	32.6
GREECE	34.9	35.9	36.2	36.5	35.8	36.1	36.1
HUNGARY	37.4	40.4	40.8	40.3	35.9	39.5	38.9
ICELAND	-10.9	-6.6	-2.8	0.4	0.4	2.0	2.8
IRELAND	26.8	25.6	23.8	22.5	20.1	15.5	12.8
ITALY	44.9	43.8	43.3	37.5	37.0	36.5	35.6
JAPAN	15.1	15.1	15.6	14.0	19.8	20.2	20.4
KOREA	6.0	5.3	11.6	13.9	15.4	15.8	16.0
LUXEMBOURG	12.7	12.9	13.0	12.0	10.7	11.4	11.5
MEXICO	27.2	25.4	20.8	21.9	14.1	15.4	15.6
NETHERLANDS	34.9	33.5	33.0	33.2	34.1	35.5	32.4
NEW ZEALAND	22.4	18.8	16.2	14.8	14.1	15.5	16.8
NORWAY	24.4	25.0	24.9	25.6	26.2	26.9	27.2
POLAND	39.3	39.5	38.9	37.4	38.1	38.2	38.0
PORTUGAL	26.6	26.9	26.8	26.5	26.0	26.2	24.2
SLOVAK REPUBLIC	-	-	-	-	-	29.8	30.1
SPAIN	33.3	33.5	33.7	33.3	30.4	30.6	31.0
SWEDEN	42.2	44.6	45.2	44.4	44.4	42.9	41.4
SWITZERLAND	18.9	18.6	17.7	17.8	17.8	17.7	17.9
TURKEY	35.3	38.3	39.6	39.8	30.3	40.4	43.2
UNITED KINGDOM	26.1	25.3	24.8	24.9	23.3	21.4	17.8
UNITED STATES	24.4	23.9	24.1	23.7	21.1	21.3	19.4

TABLE 7

Correlations between the 'tax wedge' and the implicit average effective tax rate on labour

Countries		Years Covered	Correlation for single worker	Correlation for single-earner couple
Australia		1979-2000	0.92	0.65
Austria		1979-2000	0.90	0.89
Belgium		1979-2000	0.84	0.84
Canada		1979-2000	0.96	0.95
Czech Republic		1993-2000	-0.01	-0.51
Denmark		1989-2000	-0.84	-0.77
Finland		1979-2000	0.93	0.91
France		1994-2000	0.77	0.82
Germany		1979-2000	0.90	0.87
Greece		1991-2000	0.82	0.87
Ireland		1979-2000	0.34	0.46
Italy		1979-2000	0.44	-0.12
Japan		1979-2000	0.60	0.58
Korea		1995-2000	0.99	0.99
Netherlands		1991-2000	0.78	0.70
New Zealand		1991-2000	0.88	0.93
Norway		1979-2000	0.03	0.20
Portugal		1991-2000	0.37	0.54
Spain		1979-2000	0.03	0.11
Sweden		1979-2000	0.37	0.60
Switzerland		1979-2000	0.70	-0.68
United Kingdom		1979-2000	0.55	0.27
United States		1979-2000	-0.47	-0.73
Cross section correlation in 2000		-	0.85	0.83

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