Annex

Methodology and limitations

Methodology

Introduction

The personal circumstances of taxpayers vary greatly. This Report therefore adopts a specific methodology to produce comparative statistics covering taxes, benefits and labour costs across OECD member countries.[1] The framework of the methodology is as follows:

- The Report focuses on eight different family types which vary by household composition and level of earnings.
- Each household contains a full-time adult employee working in one of a broad range of industry sectors of each OECD economy. Some of the households also have a spouse working less than full-time.
- The annual income from employment is assumed to be equal to a given fraction of the average gross wage earnings of these workers.
- Additional assumptions are also made regarding other relevant personal circumstances of these wage earners in order to calculate their tax/benefit position.

The guidelines described in the following paragraphs form the basis for the calculations shown in Chapter 1 and Parts I, II and III. Table A.1 sets out the terminology that is used. Where a country has had to depart from the guidelines, this is noted in the text and/or in the country chapters contained in Part III of the Report. The number of taxpayers with the defined characteristics and the wage level of the average workers differ between OECD economies.

Taxpayer characteristics

The eight household types identified in the Report are set out in Table A.2. Any children in the household are assumed to be aged between six and eleven inclusive.

The family is assumed to have no income source other than from employment and cash benefits.

The range of industries covered

The standard assumption for calculating average wage earnings is based on Sectors B-N of the International Standard Industrial Classification of All Economic Activities (ISIC Revision 4, United Nations)[2] (see Table A.3). Many countries (for more detailed country information, see Table 1.8) have now adopted this approach

Table A.1. **Terminology**

General terms	
Average worker (AW)	An adult full-time worker in the industry sectors covered whose wage earnings represent the average for workers.
Single persons	Unmarried men and women.
Couple with two children	Married couple with two dependent children between six to eleven years of age inclusive.
Labour costs	The sum of gross wage earnings, employers' social security contributions and payroll taxes.
Net take-home pay	Gross wage earnings less the sum of personal income tax and employee social security contributions plus cash transfers received from general government.
Personal average tax rate (tax burden)	The sum of personal income tax and employee social security contributions expressed as a percentage of gross wage earnings.
Tax wedge	The sum of personal income tax, employee and employer social security contributions plus any payroll tax less cash transfers expressed as a percentage of labour costs.
Elasticity of income after tax	Percentage change in "after-tax" income following an increase in one currency unit of income before tax (defined more precisely as one minus a marginal tax rate divided by one minus a corresponding average tax rate).
Terms used under the income tax	
Tax reliefs	A generic term to cover all the means of giving favourable income tax treatment to potential taxpayers.
Tax allowances	Amounts deducted from gross earnings to arrive at taxable income.
Tax credits	Amounts which a taxpayer may subtract from his tax liability. They are described as payable if they can exceed tax liability (sometimes the terms "refundable" and "non-wastable" are used).
Standard tax reliefs	Reliefs unrelated to the actual expenses incurred by taxpayers and automatically available to all taxpayers who satisfy the eligibility rules specified in the legislation are counted as standard reliefs. These also include deductions for compulsory social security contributions.
Basic relief	Any standard tax relief available irrespective of marital or family status.
Marriage allowance	Additional tax relief given to married couples. (In some countries, this is not distinguished from the basic relief which may be doubled on marriage).
Non-standard tax reliefs	Reliefs wholly determined by reference to actual expenses incurred.
Average rate of income tax	Amount of income tax payable after accounting for any reliefs calculated on the basis of the tax provisions covered in this Report, divided by gross wage earnings.
Schedule rate	The rate which appears in the schedule of the income tax and in the schedule of social security contributions.
Terms used under cash transfers	
Cash benefits	Cash payments made by general government (agencies) paid to families usually in respect of dependent children.

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Table A.2. **Characteristics of taxpayers**

Marital status	Children	Principal earner	Secondary earner
Single individual	No children	67% of average earnings	
Single individual	No children	100% of average earnings	
Single individual	No children	167% of average earnings	
Single individual	2 children	67% of average earnings	
Married couple	2 children	100% of average earnings	
Married couple	2 children	100% of average earnings	33% of average earnings
Married couple	2 children	100% of average earnings	67% of average earnings
Married couple	No children	100% of average earnings	33% of average earnings

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This approach broadly corresponds to the previous calculation based on sectors C-K incl. defined in the International Standard Industrial Classification of All Economic Activities (ISIC Revision 3.1, United Nations) which was adopted in the 2005 edition of Taxing Wages. The reasons for moving to a broadened average wage definition were set out in the Special Feature of *Taxing Wages* 2003-04.

Table A.3. **International Standard Industrial Classification of All Economic Activities**

Revision 3.1 (ISIC Rev. 3.1)	
A	Agriculture, hunting and forestry
B	Fishing
C	Mining and quarrying
D	Manufacturing
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	Hotels and restaurants
I	Transport, storage and communications
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work
O	Other community, social and personal service activities
P	Activities of private households as employers and undifferentiated production activities of private households
Q	Extraterritorial organisations and bodies

Revision 4 (ISIC Rev.4)	
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goodsand services-producing activities of households for own use
U	Activities of extraterritorial organizations and bodies

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Defining gross wage earnings

This section sets out the assumptions underlying the calculation of the average earnings figures for "the average worker". The gross wage earnings data have been established using statistical data and the methodologies for calculating the earnings data in each country are set out in Table A.4. Further information on the calculation of the earnings figures is provided in the country chapters in Part III. The sources of the statistical data for each country are set out in Table A.5.

Table A.4. **Method used to calculate average earnings**

	Items included and excluded from the earnings base					Types of worker included and excluded in the average wage measure			Basic method of calculation used	Income tax year ends	Period to which the earnings calculation refers
	Sickness[1]	Vacations	Overtime	Recurring cash payments	Fringe Benefits	Supervisory workers	Managerial workers	Part-time workers			
Australia	Inc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Average weekly earnings x 52	30th June	Fiscal year
Austria	Exc	Inc	Inc	Inc	Taxable value Inc	Inc	Inc	Exc	Average annual earnings	31st December	Calendar year
Belgium	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Monthly earnings in October x 12 (plus recurring bonuses)	31st December	Calendar year
Canada	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Inc[6]	Average weekly hours x average hourly earnings x 52	31st December	Calendar year
Chile	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Inc	Hourly earnings x hours worked	31st December	Calendar year
Czech Republic	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Inc[6]	Average monthly earnings x 12	31st December	Calendar year
Denmark	Exc	Inc	Exc	Inc	Exc	Inc	Inc	Inc[6]	Hourly earnings x hours worked	31st December	Calendar year
Estonia	Inc	Inc	Inc	Inc	Exc	Inc	Inc	Inc	Average earnings	31st December	Calendar year
Finland	Exc	Inc	Inc	Inc	Exc	Inc	Inc[5]	Exc	Hourly wages x usual working time or (monthly earnings x months) + vacation payments+ end of year bonuses	31st December	Calendar year
France	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Annual earnings	31st December	Calendar year
Germany	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Annual earnings	31st December	Calendar year
Greece	Exc	Inc	Inc	Inc[2]	Inc	Inc	Inc	Exc	Hourly earnings x hours worked	31st December	Calendar year
Hungary	Exc	Inc	Inc	Inc	Exc	Inc	Inc[5]	Exc	Average monthly earnings x 12	31st December	Calendar year
Iceland	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Hourly earnings x hours worked x 12	31st December	Calendar year
Ireland	Exc	Inc	Inc	Inc	Exc	Exc	Exc	Inc	Average weekly earnings in each quarter for four quarters/4*52	31st December	Calendar year
Israel	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Average earnings	31st December	Calendar year
Italy	Exc[3]	Inc	Inc	Inc	Exc[4]	Inc	Inc	Inc[6]	Average monthly earnings x 12	31st December	Calendar year
Japan	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Monthly earnings in June x 12	31st December	Calendar year
Korea	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Average monthly earnings x 12	31st December	Calendar year
Latvia	Inc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Average monthly earnings x 12	31st December	Calendar year
Luxembourg	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Aggregate annual earnings divided by annual average number of full-time employees. Any parts of earnings that exceed the upper social contribution limit (7 times the minimum wage) are not recorded.	31st December	Calendar year
Mexico	Exc	Inc	Exc	Inc	Exc	Inc	Inc	Exc	Average monthly earnings x 12	31st December	Calendar year
Netherlands	Exc	Inc	Exc	Inc	Exc	Inc	Inc	Exc	Annual gross earnings	31st December	Calendar year
New Zealand	Exc	Inc	Inc	Inc	Exc	Inc	Inc[5]	Inc[6]	Average weekly earnings in each quarter x 13	31st March	Tax year

Table A.4. **Method used to calculate average earnings** (cont.)

	Items included and excluded from the earnings base					Types of worker included and excluded in the average wage measure			Basic method of calculation used	Income tax year ends	Period to which the earnings calculation refers
	Sickness[1]	Vacations	Overtime	Recurring cash payments	Fringe Benefits	Supervisory workers	Managerial workers	part-time workers			
Norway	Exc	Exc	Inc	Inc	Exc	Inc	Inc	Inc[6]	Annual wages + estimated overtime	31st December	Calendar year
Poland	Inc	Inc	Inc	Inc	Exc	Inc	Inc	Inc[6]	Average monthly earnings x 12	31st December	Calendar year
Portugal	Exc	Inc	Inc	Inc	Inc	Inc	Inc	Exc	Weighted monthly average x 12	31st December	Calendar year
Slovak Republic	Exc	Inc	Inc	Inc	Inc	Inc	Inc	Inc	Average monthly earnings x 12	31st December	Calendar year
Slovenia	Inc	Inc	Inc	Inc	Exc	Inc	Inc	Inc	Average monthly earnings x 12	31st December	Calendar year
Spain	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Weighted monthly average x 12	31st December	Calendar year
Sweden	Exc	Inc	Inc	Inc	Actual value Inc	Inc	Inc	Inc[6]	Average hourly earnings in September x hours worked; and monthly earnings in September x 12	31st December	Calendar year
Switzerland	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Inc[6]	Monthly earnings x 12	31st December	Calendar year
Turkey	Exc	Inc	Inc	Inc	Actual value inc	Exc	Exc	Inc	Average annual earnings	31st December	Calendar year
United Kingdom	Exc	Inc	Inc	Inc	Exc	Inc	Inc	Exc	Average gross annual earnings	5th April	Fiscal year
United States	Exc	Inc	Inc	Inc[2]	Exc	Inc	Inc	Inc[6]	Average weekly earnings x 52	31st December	Calendar year

1. Usually includes compensation paid by employer whether paid on behalf of the government or as part of a private sickness scheme.
2. Excludes profit sharing bonuses in Greece and the United States plus end of year bonuses in the United States.
3. Sickness payments are only included to the extent that they are paid by the employer. For manual workers, this is only the case during the first three days of sick leave, while payments for the fourth day onwards are made by INPS.
4. Partly: the (small) taxable part of fringe benefits is included.
5. Except for top management (Finland); except if income from profits exceeds 50% of total income (Hungary); except for proprietors (New Zealand).
6. Part-time wages are converted to full-time equivalents before calculating the average wage measure.

Note: Exc = Excluded, Inc = Included, '-' = information not available.

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Table A.5. **Source of earnings data, 2017**

Country	Type of sample	Source
Australia	Quarterly survey of firms resulting in a representative sample of wage and salary earners in each industry.	Australian Bureau of Statistics "Average Weekly Earnings, Australia" and "Labour Force, Australia".
Austria	Annual Wage Tax Statistics.	"Lohnsteuerstatistik".
Belgium	Data collected or estimated on the basis of an annual establishment survey and social insurance registers of employees.	Statistics Division of the Ministry of Economy (Federal Public Service, Economy, SMEs, Self-employed and Energy). Same source as for Eurostat "Annual gross earnings" data.
Canada	Monthly survey of all firms.	Statistics Canada, "Survey of Employment Payrolls and Hours".
Chile	Monthly sample of businesse with 10+ employees.	National Statistics Institute of Chile (INE).
Czech Republic	Employer survey data.	National Statistical Office.
Denmark	Danish Employers Confederation survey of earnings.	Annual Report Danish Employers Confederation (Dansk Arbejds Giverforening).
Estonia	-	Statistics Estonia/Ministry of Finance.
Finland	(1) Finnish Employers Federation survey of hourly and monthly earnings; (2) Survey for unorganized employers "Structure of Earnings Statistics" published by the Central Statistical Office.	"Wages Statistics" published by the Central Statistical Office.
France	Social insurance registers covering all employers.	INSEE, "Déclarations Annuelles des Données Sociales" (DADS).
Germany	Survey carried out by the Federal Statistical Office.	National Statistical Office.
Greece	Survey carried out by National Statistics Service and Social Security Institutions.	National Statistical Service Labour Statistics. Same source as for Eurostat "Annual gross earnings" data.
Hungary	Monthly surveys among enterprises with at least five employees.	Central Statistical Office.
Iceland	Monthly survey of earnings in the private sector market.	Statistics Iceland.
Ireland	Quarterly surveys of industrial employment, earnings and hours worked.	Central Statistics Office.
Israel	-	Central Bureau of Statistics.
Italy	Quarterly indicators of wages in industry and services (OROS).	National Institute of Statistics.
Japan	Basic survey on wage structure of all establishments with more than 10 employees.	Ministry of Health, Labour and Welfare, Annual Report.
Korea	Labour Force Survey at Establishments.	Ministry of Employment and Labour.
Latvia	Average monthly wages and salaries (DSG01)	The Latvian Central Statistical Bureau.
Luxembourg	Monthly aggregated files of Social security services.	National Statistical Office and Social Security Services.
Mexico	Administrative data from the Mexican Social Security Institute (Instituto Mexicano del Seguro Social (IMSS)).	The National Minimum Wage Commission (Comisión Nacional de Salarios Mínimos (CONASAMI)).
Netherlands	Survey "Employment and Wages".	Central Bureau of Statistics, Statline.
New Zealand	The quarterly employment survey is a sample survey of significant business with an employment count of 1 or more.	Statistics New Zealand INFOS.
Norway	Sample of enterprises based on published sector statistics for 3rd quarter – except agriculture, forestry and fishing and private households.	Statistics Norway Wage.
Portugal	April and October survey of earnings carried out by the Ministry of Labour.	Ministry of Labour.
Poland	Estimates for different sectors.	Monthly Statistical Bulletin.
Slovak republic	Quarterly and annual statistical data.	Slovak Statistical Office.
Slovenia	Monthly survey of employees.	Statistical Office of the Republic of Slovenia.
Spain	Quarterly survey of firms.	Instituto Nacional de Estadistica "Encuesta Trimestral de Coste Laboral" (Labour Cost Survey).
Sweden	September survey of Swedish employers.	Statistics Sweden.
Switzerland	Swiss Statistics Office. Personnes actives occupées selon la branche économique.	La vie économique, SECO (Secrétariat d'État à l'économie) table B.8.1, *www.bfs.admin.ch/bfs/portal/fr/index/themen/03/04.html*.
Turkey	Annual Manufacturing Industry Survey.	Turkish Statistical Institute.
United Kingdom	1% sample of PAYE earnings.	Office for National Statistics, Annual Survey of Hours and Earnings (ASHE).
United States	Monthly surveys by Department of Labour on the basis of a questionnaire covering more than 40 million non-agricultural wage and salary-workers.	Employment, Hours, and Earnings from the Current Employment Statistics Survey.

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The main assumptions are as follows:

- The data relate to the average earnings in the relevant industry sectors for the country as a whole.

- The calculations are based on the earnings of a full-time adult worker (including both manual and non-manual). They relate to the average earnings of all workers in the industry sectors covered. No account is taken of variation between males and females or due to age or region.

- The worker is assumed to be full-time employed during the entire year without breaks for sickness or unemployment. However, several countries are unable to separate and exclude part-time workers from the earnings figures (see Table A.4). Most of them report full-time equivalent wages in these cases. In four countries (Chile, Ireland, Slovak Republic and Turkey), the wages of part-time workers can be neither excluded nor converted into full-time equivalents because of the ways in which the earnings samples are constructed. As a result, average wages reported for these countries will be lower than an average of full-time workers (for example, an OECD Secretariat analysis of available Eurostat earnings data for selected European countries has shown that including part-time workers reduces average earnings by around 10%). Also, in most of the OECD countries 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. It is unlikely that this has a marked impact on the results since employers usually make these payments during a short period and the amounts usually correspond very closely to normal hourly wages.

- Two of the household types include a second earner at 33% of average earnings. Such individuals are more likely to be working part-time rather than full-time (as shown in the Special Feature of the 2005 edition). However, the Special Feature also showed that the assumption of all employees working full-time does not significantly affect the tax rates calculated in Taxing Wages, except in the case of Belgium for married couples where the spouse is earning 33% of the average wage level. This is because any special provisions made for part-time workers tend to be either of minor importance or not applicable for the household types currently presented in Taxing Wages.

- The earnings calculation includes all cash remuneration paid to workers in the industries covered taking into account average amounts of overtime, cash supplements (e.g. Christmas bonuses, thirteenth month) and vacation payments typically paid to workers in the covered industry sectors. However, not all countries are able to include overtime pay, vacation payments and cash bonuses according to the definition.

- The earnings figures include supervisory and/or management employees, though some countries are not able to do this. In such countries, the reported averages are lower than would otherwise be the case (for example, an OECD Secretariat analysis of available Eurostat earnings data for selected European countries has shown that excluding this type of workers can reduce average earnings by 10% to 18%).

- Fringe benefits – which include, for example, provision of food, housing or clothing by the employer either free of charge or at below market-price – are, where possible, excluded from the calculation of average earnings. This could affect comparability of tax wedges – as the reliance on fringe benefits may vary between countries and over time. However, the lack of comparability is limited as fringe benefits rarely account for more than 1-2% of labour costs and are normally more common among high-income employees than in the income ranges covered by Taxing Wages (33% to 167% of average

earnings). Table A.4 shows that some Member countries are not able to exclude fringe benefits from the earnings figures reported and used in Taxing Wages. The decision to exclude was been taken because:

❖ these types of benefits are difficult to evaluate in a consistent way (they may be valued at the actual cost to the employer, their value to the employee or their fair market value).

❖ in most countries, they are of minimal importance for workers at the average wage level.

❖ the tax calculations would be significantly more complicated if the tax treatment of fringe benefits were to be incorporated.

● Employers' contributions to private pension, family allowance or health and life insurance schemes are excluded from the calculations, though the amounts involved can be significant. In the United States, for example, these contributions can account for more than 5% of the earnings of employees. The country chapters in Part III indicate of the existence of schemes which may be relevant for an average worker.

Calculating average gross wage earnings

Table A.4 indicates the basic calculation method used in each country while more details are, where relevant, provided in the country chapters in Part III. In principle, countries are recommended to calculate annual earnings by referring to the average of hourly earnings in each week, month or quarter, weighted by the hours worked during each period, and multiplied by the average number of hours worked during the year, assuming that the worker is neither unemployed nor sick and including periods of paid vacation. A similar procedure was recommended to calculate overtime earnings. For countries unable to separate out part-time employees from the data, it is recommended that earnings of part-time employees should if possible be converted into their full-time equivalents.

Statistical data on average gross wage earnings in 2017 are generally not available at present. For most countries, estimates of gross wage earnings of average workers in 2017 were therefore derived by the Secretariat on the basis of a uniform approach: year 2016 earnings levels are multiplied by the country-specific annual percentage change of wages for the whole economy reported in the most recently published edition of the OECD *Economic Outlook*.[3] This transparent procedure is intended to avoid any bias in the results. In some countries, there were varying different approaches;

● The final 2017 average gross wage earnings was used for Australia.

● National estimates were used for the Chile, New Zealand and Turkey as the OECD Economic Outlook does not provide percentages changes in wages for those countries.

● In some countries, average wage earnings were also estimated for prior years – Finland (2016), France (2015 and 2016), Ireland (2016), Portugal (from 2013 to 2016) and Switzerland (2007, 2009, 2011, 2013, 2015 and 2016) as no country information on average wage earnings levels was available for these years in these particular countries.

Fourteen OECD member countries have opted to provide national estimates of the level of gross wage earnings of average workers in 2017. These estimates were not used in the Taxing Wages calculations (except for the countries listed above) because of potential inconsistency with the Secretariat estimates derived for other countries. However they are included in Table A.6 to enable comparisons to be made between the estimates obtained by applying the Secretariat formula and those from national sources. In most cases, the two categories are fairly close.

Table A.6. **Estimated gross wage earnings, 2016-17 (in national currency)**

	Average wage 2016	Average wage 2017 (Secret. estimates)	Average wage 2017 (country estimates)	EO102 forecasted rates for 2017[1]
Australia[2]	82 114	82 942	83 542	1.0
Austria	45 073	45 977	45 974	2.0
Belgium	46 528	47 324		1.7
Canada	50 822	51 642		1.6
Chile[2]	8 976 758		9 349 964	
Czech Republic	332 424	355 150	344 600	6.8
Denmark	406 600	413 503	416 765	1.7
Estonia	14 033	14 810		5.5
Finland	43 716	43 986		0.6
France	37 906	38 582		1.8
Germany	48 300	49 450		2.4
Greece	20 678	20 886		1.0
Hungary	3 343 284	3 578 651		7.0
Iceland	8 364 000	8 903 714		6.5
Ireland	35 430	36 358	40 934	2.6
Israel	143 916	147 984	148 236	2.8
Italy	30 721	30 838		0.4
Japan	5 149 844	5 201 391		1.0
Korea	44 640 408	46 140 296	45 438 852	3.4
Latvia	10 140	10 905	10 560	7.5
Luxembourg	56 448	58 565		3.7
Mexico	111 754	118 204	116 276	5.8
Netherlands	50 120	50 909		1.6
New Zealand[2]	57 649		58 824	
Norway	566 162	577 664		2.0
Poland	47 708	49 570		3.9
Portugal	17 778	17 993		1.2
Slovak Republic	10 975	11 426	11 293	4.1
Slovenia	18 338	18 904	18 505	3.1
Spain	26 449	26 535		0.3
Sweden	424 963	434 859		2.3
Switzerland	86 153	86 042		-0.1
Turkey[2]	37 357		40 308	
United Kingdom	37 142	38 208		2.9
United States	51 945	52 988		2.0

1. Increase of compensation per employee in the total economy (*Economic Outlook No. 102*).
2. The country AW estimate is used instead of the OECD Secretariat's AW estimate in the Taxing Wages calculations.

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Table A.7 indicates the exchange rates and purchasing power parities of national currencies for 2017 that are used to calculate comparative earnings figures across countries in the report.

Coverage of taxes and benefits

The Report is concerned with personal income tax and employee and employer social security contributions payable on wage earnings. In addition, payroll taxes (see section on 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.

The calculation of the after-tax income includes family benefits paid by general government as cash transfers (see section on Family cash benefits from general

Table A.7. **Purchasing power parities and exchange rates for 2017**

	Monetary unit	Exchange rates[1]	Purchasing power parities
Australia	AUD	1.30	1.52
Austria	EUR	0.89	0.80
Belgium	EUR	0.89	0.81
Canada	CAD	1.30	1.26
Chile	CLP	648.68	413.42
Czech Republic	CZK	23.39	12.90
Denmark	DKK	6.60	7.36
Estonia	EUR	0.89	0.55
Finland	EUR	0.89	0.90
France	EUR	0.89	0.80
Germany	EUR	0.89	0.78
Greece	EUR	0.89	0.59
Hungary	HUF	274.48	137.58
Iceland	ISK	106.82	139.86
Ireland	EUR	0.89	0.81
Israel	ILS	3.60	3.77
Italy	EUR	0.89	0.71
Japan	JPY	112.18	98.24
Korea	KRW	1 130.64	878.77
Latvia	EUR	0.89	0.50
Luxembourg	EUR	0.89	0.89
Mexico	MXN	18.87	9.29
Netherlands	EUR	0.89	0.81
New Zealand	NZD	1.41	1.48
Norway	NOK	8.27	10.24
Poland	PLN	3.78	1.78
Portugal	EUR	0.89	0.58
Slovak Republic	EUR	0.89	0.49
Slovenia	EUR	0.89	0.60
Spain	EUR	0.89	0.66
Sweden	SEK	8.55	9.12
Switzerland	CHF	0.98	1.21
Turkey	TRL	3.65	1.38
United Kingdom	GBP	0.78	0.70
United States	USD	1.00	1.00

1.   Average of 12 months daily rates.

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government). Income tax due on capital income and non-wage labour income, several direct taxes (net wealth tax, corporate income tax) and all indirect taxes are not considered in this Report. However, all central, state and local government income taxes are included in the data.

In this Report, compulsory social security contributions paid to general government are treated as tax revenues. Being compulsory payments to general government they clearly resemble taxes. They may, however, differ from taxes in that the receipt of social security benefits depends upon appropriate contributions having been made, although the size of the benefits is not necessarily related to the amount of the contributions. Countries finance compulsory public social security programmes to a varying degree from general tax and non-tax revenue and earmarked contributions, respectively. Better comparability between countries is obtained by treating social security contributions as taxes, but they are listed under a separate heading so that their amounts can be identified in any analysis.

Calculation of personal income taxes

The method by which income tax payments are calculated is described in the country chapters in Part III. First, the tax allowances applicable to a taxpayer with the characteristics and income level related to gross annual wage earnings of an average worker are determined. Next, the schedule of tax rates is applied and the resulting tax liability is reduced by any relevant tax credits. An important issue arising in the calculation of the personal income tax liability involves determining which tax reliefs should be taken into account. Two broad categories of reliefs may be distinguished:

● Standard tax reliefs: reliefs which are unrelated to actual expenditures incurred by the taxpayer and are automatically available to all taxpayers who satisfy the eligibility rules specified in the legislation. Standard tax reliefs are usually fixed amounts or fixed percentages of income and are typically the most important set of reliefs in the determination of the income tax paid by workers. These reliefs are taken into account in the calculations – they include:

   ❖ The basic relief which is fixed and is available to all taxpayers or all wage earners, irrespective of their marital or family status;

   ❖ The standard relief which is available to taxpayers depending on their marital status;

   ❖ The standard child relief granted to a family with two children between the ages of six to eleven inclusive;

   ❖ The standard relief in respect of work expenses, which is usually a fixed amount or fixed percentage of (gross) wage earnings; and,

   ❖ Tax reliefs allowed for social security contributions and other (sub-central government) income taxes are also considered as standard reliefs since they apply to all wage earners and relate to compulsory payments to general government.[4]

● Non-standard tax reliefs: These are reliefs which are wholly determined by reference to actual expenses incurred. They are therefore 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. These are not taken into account in calculating the tax position of employees.

Standard reliefs are separately identified and their impact on average tax rates is calculated in the results tables shown in the Country chapters. The latter include a brief description of the main non-standard reliefs in most cases.

State and local income taxes

Personal income taxes levied by sub-central levels of government – state, provincial, cantonal or local – are included in the scope of this study. State income taxes exist in Canada, Switzerland and the United States. Since 1997, Spain has an income tax for the Autonomous Regions. Local income taxes are imposed in Belgium, Denmark, Finland, Iceland, Italy, Japan, Korea, Norway, Sweden, Switzerland and the United States. In Belgium, Canada (other than Quebec), Denmark, Iceland, Italy, Korea, Norway and Spain they are calculated as a percentage of taxable income or of the tax paid to central government. In Finland, Japan, Sweden and Switzerland, local government provides different tax reliefs from central government. In the United States, the sub-central levels of government operate a separate system of income taxation under which they have discretion over both the tax base and tax

rates. Except for Canada, Spain and Switzerland, the rate schedule of these sub-central taxes consists of a single rate.

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 worker lives in a typical area and the income taxes (and benefits) applicable in this area are presented. This is the procedure followed in Canada, Italy, Switzerland and the United States where the tax base and tax rates vary very widely throughout the country. Belgium, Denmark, Finland, Iceland and Sweden have preferred to select the average rate of sub-central government income taxes for the country as a whole. The local rates do not vary in practice in Korea and Norway. Japan and Spain have used the widely prevalent standard schedule.

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. In most countries, contributions are levied on gross earnings and earmarked to provide social security benefits. In Finland, Iceland and the Netherlands, some contributions are levied as a function of taxable income (i.e. gross wage earnings after most/all tax reliefs). Australia, Denmark and New Zealand do not levy social security contributions.

Contributions to social security schemes outside the general government sector are not included in the calculations. However, information on "non-tax compulsory payments" as well as "compulsory payment indicators" is included in the OECD Tax Database, which is accessible at *www.oecd.org/ctp/tax-database.htm*

Payroll taxes

Payroll taxes have a tax base that is either a proportion of the payroll or a fixed amount per employee. In the OECD Revenue Statistics, payroll taxes are reported under heading 3000. Fifteen OECD countries report revenue from payroll taxes: Australia, Austria, Canada, Denmark, France, Hungary, Iceland, Ireland, Israel, Korea, Latvia, Mexico, Poland, Slovenia and Sweden.

Payroll taxes are included in total tax wedges reported in this publication, given that they increase the gap between gross labour costs and net take-home pay in the same way as income tax and social security contributions do. The main difference with the latter is that the payment of payroll taxes does not confer an entitlement to social security benefits. Also, the tax base of payroll taxes may differ from the tax base of employer social security contributions. For example, certain fringe benefits may only be liable to payroll tax. Because this Report presents the standard case, the payroll tax base can be – depending on the relevant legislation – gross wage (excluding fringe benefits and other items of compensation that vary per employee), gross wage plus employer social security contributions, or a fixed amount per employee.

Five of the OECD member countries include payroll taxes in the Taxing Wages calculations: Australia, Austria, Hungary, Latvia and Sweden. The other countries reporting payroll tax revenue in Revenue Statistics have not included these taxes in the calculations for the present Report for a variety of reasons.

Family cash benefits from general government

Tax reliefs and family cash transfers universally paid in respect of dependent children between the ages of six to eleven inclusive who are attending school are included in the scope of the study. If tax reliefs or cash transfers vary within this age range, the most generous provisions are adopted, except that the case of twins is explicitly disregarded. The implications of this are illustrated below – suppose the child benefit programme of a country is structured as follows:

Age group	Benefits per child
Children 6-8	100 units
Children 9-10	120 units
Children 11-14	150 units

The most favourable outcome arises in the case of 11-year old twins: 300 units. However, as the case of twins is excluded, the best outcome (given that children are between 6 and 11) now becomes 270 units (one child 11 years old, one child 9 or 10 years old). This amount would be included in the country table. Often, the amount in benefits is raised as children grow older. The calculations assume that the children have been born on 1 January so the annual amount received in child benefits may be calculated from the benefit schedule that is in place at the start of the year with any revisions to these amounts during the year being taken into account.

Relevant cash payments are those received from general government. In some cases, the cash benefits include amounts that are paid without consideration to the number of children.

Payable tax credits

Payable (non-wastable) tax credits are tax credits that can exceed tax liability, where the excess, if any, can be paid as a cash transfer to the taxpayer. In principle, these credits can be treated in different ways according to whether they are regarded as tax provisions or cash transfers or a combination of these. The Special Feature in the 2016 edition of Revenue Statistics discusses these alternative treatments and the conceptual and practical difficulties that arise in deciding which is the most appropriate approach for the purpose of reporting internationally comparable tax revenue figures. It also provides figures which show the impact of different treatments on tax to GDP ratios.[5]

Based on this review, the Interpretative Guide of the Revenue Statistics requires that

- only the portion of a payable tax credit that is claimed to reduce or eliminate a taxpayer's liability (the "tax expenditure" component)[6] should be deducted in the reporting of tax revenues;
- the part of the tax credit that exceeds a taxpayer's tax liability and is paid to the taxpayer (the "cash transfer" component) should be treated as an expenditure item and not deducted in the reporting of tax revenues.

However, additional information is provided in Revenue Statistics on aggregate tax expenditure components and aggregate transfer components of payable tax credits to show the effect of alternative treatments.[7]

In Taxing Wages, the situation is different as the full amount of the payable tax credit is taken into account in the income tax calculation.

Strict consistency with the Revenue Statistics would require that only the tax expenditure component be offset against derived income tax, with the excess (if any) treated as a cash transfer. However, this approach would diminish rather than strengthen the informational content of the derived results in Taxing Wages. In particular, limiting tax credit claims to tax expenditure amounts would yield a zero income tax liability and zero average income tax rate where cash refunds are provided. Where tax credits claims are not constrained in this way, negative income tax liabilities and negative average income tax rates would result where cash transfers are provided. Arguably, these negative amounts more clearly convey the taxpayer's position (which is improved relative to the no-tax situation). Also, not including the cash transfer portion of payable tax credits in the "cash transfers from general government" item of the country tables permits greater transparency of the latter which focuses on 'pure' cash transfers only.

However, in order to improve the informational content of country tables as regards payable tax credits, the memorandum item reporting at the bottom of the relevant country tables shows tax expenditure amounts on one line, with a second line showing cash transfer amounts. Where more than one payable tax credit program applies, the figures represent aggregates covering all the programs. Total program costs in each of the household cases considered can be derived by adding the tax expenditure and cash transfer amounts.

The calculation of marginal tax rates

In all except one case, the marginal tax rates are calculated by considering the impact of a small increase in gross earnings on personal income tax, social security contributions and cash benefits. The exception is the case of a non-working spouse where the move from zero to a small positive income is unrepresentative of income changes and therefore of little interest. So, for this case, the marginal rates for the spouse are calculated by considering the impact of an income increase from zero to 33% of the average wage.

Limitations

General limitations

The simple approach of comparing the tax/benefit position for eight model families avoids many of the conceptual and definitional problems involved in more complex international comparisons of tax burdens and transfer programmes. However, a drawback of this methodology is that the earnings of an average worker will usually occupy a different position in the overall income distribution in different economies, although the earnings relate to workers in similar jobs in various OECD Member countries.

Because of the limitations on the taxes and benefits covered in the Report, the data cannot be taken as an indication of the overall impact of the government sector on the welfare of taxpayers and their families. Complete coverage would require studies of the impact of indirect taxes, the treatment of non-wage labour income and other income components under personal income taxes and the effect of other tax allowances and cash benefits. It would also require that consideration be given to the effect on welfare of services provided by the state, either free or below cost, and the incidence of corporate and other direct taxes on earnings and prices. Such a broad coverage is not possible in an international comparison of all OECD countries. The differences between the results shown here and those of a full study of the overall impact on employees of government interventions in the economy would vary from one country to another. They would depend on the relative shares

of different kinds of taxes in government revenues and on the scope and nature of government social expenditures.

The Report shows only the formal incidence of taxes on employees and employers. The final, economic incidence of taxes may be quite different, because the tax burden may be shifted from employers onto employees and vice versa by market adjustments to gross wages.

The income left at the disposal of a taxpayer may represent different standards of living in various countries because the range of goods and services on which the income is spent and their relative prices differ as between countries. In those countries where the general government sector provides a wide range of goods and services (generous basic old age pension, free health services, public housing, university education, etcetera), the taxpayer may be left with less cash income but may enjoy the same living standards as a taxpayer receiving a higher cash income but living in a country where there are fewer publicly provided goods and services.

As mentioned in Chapter 1 and detailed in the Special Feature of the 2005 edition of Taxing Wages, second earners who are earning 33% of the average wage are very likely to be working part-time, although the Taxing Wages methodology effectively assumes that they are working full-time. However, this only affects the accuracy of the results in Taxing Wages for one family type in Belgium (married couple where a second earner is earning 33% of average wages). Therefore, one should be cautious when interpreting the results for this family type for Belgium. In addition, for all countries with hour-based rules, (see the 2005 Special Feature), caution should be used in applying the results in this Report to other household types.

Some specific limitations on the income tax calculation

The exclusion of non-wage income and the limited number of tax reliefs covered mean that the average rates of income tax in the tables in this publication do 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 tax on non-wage income received by employees.

The decision not to calculate separately average rates of income tax taking into account the effect of non-standard tax reliefs was taken because:

- In many cases, expense-related reliefs are substitutes for direct cash subsidies. To take into account these reliefs while ignoring any corresponding direct subsidies would distort comparisons of take-home pay plus cash transfers;

- The special tax treatment of certain expenses may be linked to special treatment of any income associated with these expenses (e.g. the tax treatment of social security contributions and pension income) which is beyond the scope of this study;

- A few countries were unable to estimate the value of these reliefs and even those countries which could do so could not limit their estimates to taxpayers with the characteristics assumed in the above part on methodology; and,

- Not all countries could calculate separately the reliefs available to different family-types. Where a split is provided between single individuals and families with children, there are large differences in the value of the reliefs typically received by these two categories of households.

Limitations to time-series comparisons

The calculations of the tax burden on labour income in OECD countries reported in the 2004 and previous editions of Taxing Wages, are based on an average earnings measure for manual full-time workers in the manufacturing sector (the "average production worker").

Any analysis of the results over time has to take into account the fact that the earnings data do not necessarily relate to the same taxpayer throughout the period. The average earnings are calculated for each year. As such, the results do not reflect 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 covered industry sectors in each particular year. This, in turn, may mean that the earnings levels referred to may be at different points in the income distribution over the period covered and changes in tax rates may be influenced by these trends.

There have been changing definitions of the average worker over time. From the 2005 edition, Taxing Wages has reported tax calculations under a broadened average worker definition that includes all full-time employees covering industry sectors C-K (reference to ISIC Rev.3.1). The implications of adopting this new definition for time-series comparisons are discussed in the 2005 edition of Taxing Wages. As of the 2010 edition of the Taxing Wages Report, many countries have started reporting average wage earnings for full-time employees covering industry sectors B-N of the ISIC Rev.4 industry classification (which broadly corresponds to sectors C-K in ISIC Rev.3.1).

A Note on the tax equations

Each country chapter contains a section describing in a standard format the equations under-pinning the calculations required to derive the amounts of income tax, social security contributions and cash transfers. These algorithms represent in algebraic form the legal provisions described in the chapter and are consistent with the figures shown in the country and comparative tables. This section describes the conventions used in the definition of the equations and how they could be used by those wishing to implement the equations for their own research.

The earlier sections of the country chapters describe how the tax and other systems work and present the values of the parameters of those systems such as the levels of allowances and credits, and the schedule of tax rates.

In the first part of the equations section is a table showing a brief description of each parameter (such as "Basic tax credit"), the name of the parameter as used in the algebraic equation ("Basic_cred") and the actual value for the relevant year (such as "1098"). Where there is a table of values – for example a schedule of tax rates and the associated thresholds of taxable income – a name is given to the entire table (for example "tax_sch"). These variable names are those used in the equations.

After each table of parameters is the table of equations. The four columns contain information as follows:

- The first two columns give a description and a variable name for the result of the equation on that row of the table. These always include the thirteen main financial value entries in the country tables. Additional rows define any intermediate values which are calculated either to show the detail included in the tables (such as the subdivision of total tax allowances into the different categories) or values which make the calculation clearer.

- The third column shows the range of the calculation in that row. This is necessary to allow for the different way that tax may be calculated for married couples. The options are:

  ❖ **B** The calculation is carried out separately for both the principal earner and the spouse using their individual levels of earnings. This applies in the case of independent income tax and usually also in respect of social security contributions.

  ❖ **P** The calculation applies for the principal earner only. An example is where the principal earner can use any of the basic tax allowance of the spouse which cannot be set against the income of the spouse.

  ❖ **S** The calculation applies for the lower earning spouse only.

  ❖ **J** The calculation is carried out only once on the basis of joint income. This applies to systems of joint or family taxation and is also usual for the calculation of cash transfers in respect of children.

- The final column contains the equation itself. The equation may refer to the variables in the parameters table and to variables which result from one of the rows of the equations table itself. Use is also made of the two standard variables "Married", which have the value 1 if the family consists of a married couple and 0 in the case of a single individual, and "Children" which denotes the number of children. Sometimes there is a reference to a variable with the affix "_total" which indicates the sum of the relevant variable values for the principal earner and the spouse. Similarly, the affixes "_princ" and "_spouse" indicate the value for the principal earner and spouse, respectively.

In the equations a number of functions are used. Some of these are used in the same way as in a number of widely available "spreadsheet" computer packages. For example, MAX(X,Y) and MIN(X,Y) find the maximum and minimum of the two values, respectively. IF(condition X,Y) chooses the expression X if the condition is true and the expression Y if it is false. Boolean expressions are also used and are taken to have the value 1 if true and 0 if false. As an example, (Children=2*CB_2 is equivalent to IF(Children=2, CB_2,0).

There are also three special functions commonly used which denote calculations often required in tax and social security systems. These are:

- Tax (taxinc, tax_sch): This calculates the result of applying the schedule of tax rates and thresholds in "tax_sch" to the value of taxable income represented by "taxinc". This function may be used in any part of the equations, not just in the income tax calculation. For some countries it is used for social security contributions or even for allowance levels which may be income dependent.

- Positive (X): This gives the result X when this value is positive and zero otherwise. It is therefore equivalent to MAX(0,X).

- Taper (value, income, threshold, rate): This gives the amount represented by "value" if "income" is less than "threshold". Otherwise, it gives "value" reduced by "rate" multiplied by (income- threshold), unless this produces a negative result in which case zero is returned. This provides the calculation which is sometimes required when a tax credit, for example, is available in full provided that total income is below a threshold but is then withdrawn at a given rate for each currency unit in excess of the threshold until it is withdrawn completely.
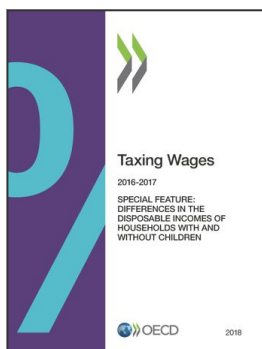
In some circumstances, there are country specific special functions. These functions involve programming that is designed to simplify the tax calculations. The programming underlying these functions is based on the description of the particular measure given in

the relevant country chapter found in Part III. For example, the Earned Income Credit in the United States is calculated using the function called EIC.

Anyone wishing to make their own implementation of the equations will have to write functions corresponding to these special functions or make appropriate modifications to any equations that use them.

Notes

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

2. Not all national statistical agencies use ISIC Rev.3.1 or ISIC Rev.4 to classify industries. However, the Statistical Classification of Economic Activities in the European Community (NACE), the North American Industry Classification System (NAICS) and the Australian and New Zealand Standard Industrial Classification (ANZSIC) include a classification which is broadly in accordance with industries C-K in ISIC Rev.3.1 or industries B-N in ISIC Rev.4.

3. The Wage estimates reported in the Economic Outlook are prepared by the Economics Department (ECO) of the OECD. They are consistent with the December 2017 issue of the *Economic Outlook*.

4. In this case, the amount of tax relief is related to actual social security contributions paid by the employee or withheld from his wage – thus in this respect this item deviates from the general definition of standard tax relief under which relief is unrelated to actual expenses incurred.

5. OECD, *Revenue Statistics 1965-2015*, p. 62.

6. This characterisation must be viewed as informal, as the determination of tax expenditures requires the identification of a benchmark tax system for each country, or preferably, a common international benchmark. In practice it has not been possible to reach agreement on a common international benchmark for such purposes.

7. See Table D in *OECD Revenue Statistics 2016*.