Salary calculator

Statistics Explained

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This article introduces the **salary calculator** , a simple tool providing estimates of the average gross wages according to the variables entered by the user: gender, age, education, profession, job experience, type of contract, NUTS region, NACE economic activity and enterprise size , for each Member State of the European Union (EU) . These estimates are based on microdata collected through the EU Structure of earnings survey (SES) 2018 and extrapolated with the Labour Cost Index (LCI) up to reference year 2023.

The tool

The salary calculator is a simple interactive application giving access to regression-based information on the impact of personal, job and enterprise characteristics on gross wages. Regression analysis has several advantages over the use of cross-tables: apart from providing a much more detailed picture of gross wages, it shows the impact of each individual factor on wages, all else being equal. The salary calculator also provides a quick visual display of the estimated wages across EU countries for the selected set of characteristics.

How to use the salary calculator

The salary calculator can be accessed here .

- When saving the Excel sheet, please do not change the name. After opening the sheet and allowing macros, click on the button: **compare your salary** (see Figure 1).

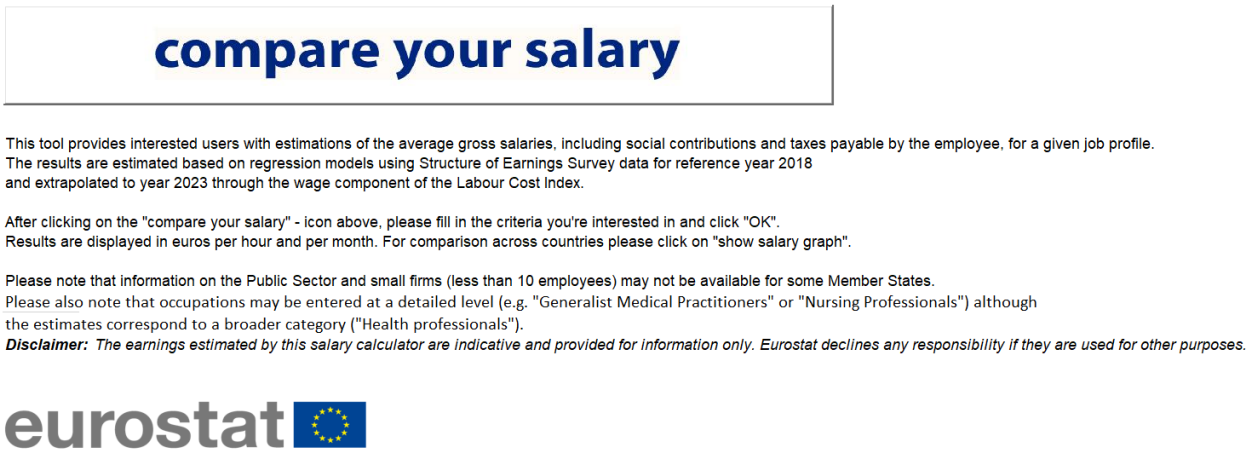

Figure 1: The tool

- A menu with a number of drop down lists will appear (see Figure 2); you can then select for each category the item you are interested in. More information on these categories is available in the methodology section of this page. For 'occupation', you may select a broad item among those proposed in the drop down list (in English). Alternatively, you may press **Translation** and type in the detailed occupation in any EU language. Please note that some economic activities and occupations (e.g. fishing industry, armed forces) are not included at all. Some are not available for several individual countries (e.g. public administration). After the selection is done, please press **OK** .

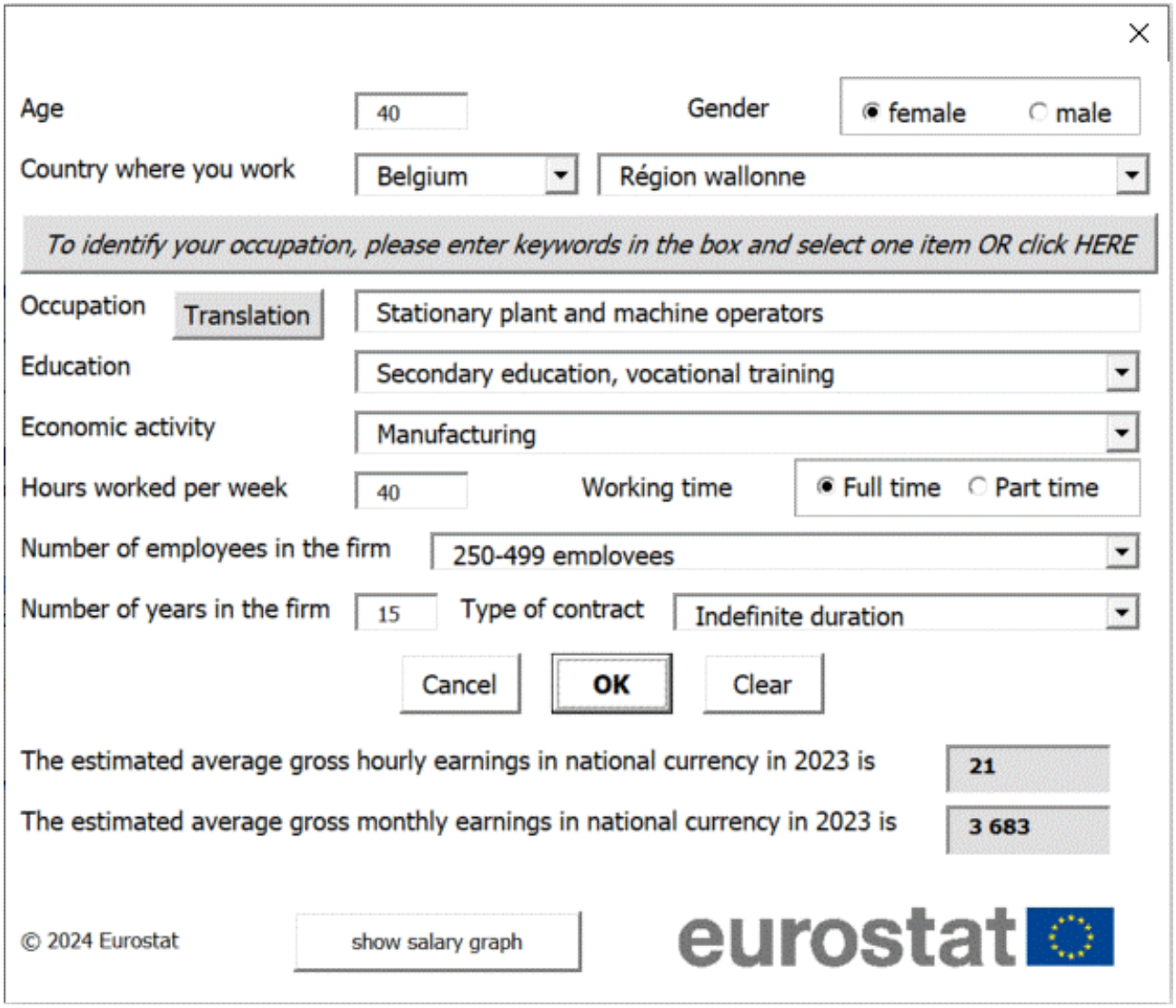

Figure 2: Input menu and numerical results

- In order to view the bar charts comparing the estimates across EU countries for the selected characteristics, press the button: **Show salary graph** . In order to get new results, repeat the steps - the graphs will only be adapted to a new selection after pressing **OK** and the relevant graph button. Please note that the calculator may not show graphs when using versions earlier than Excel 2010.

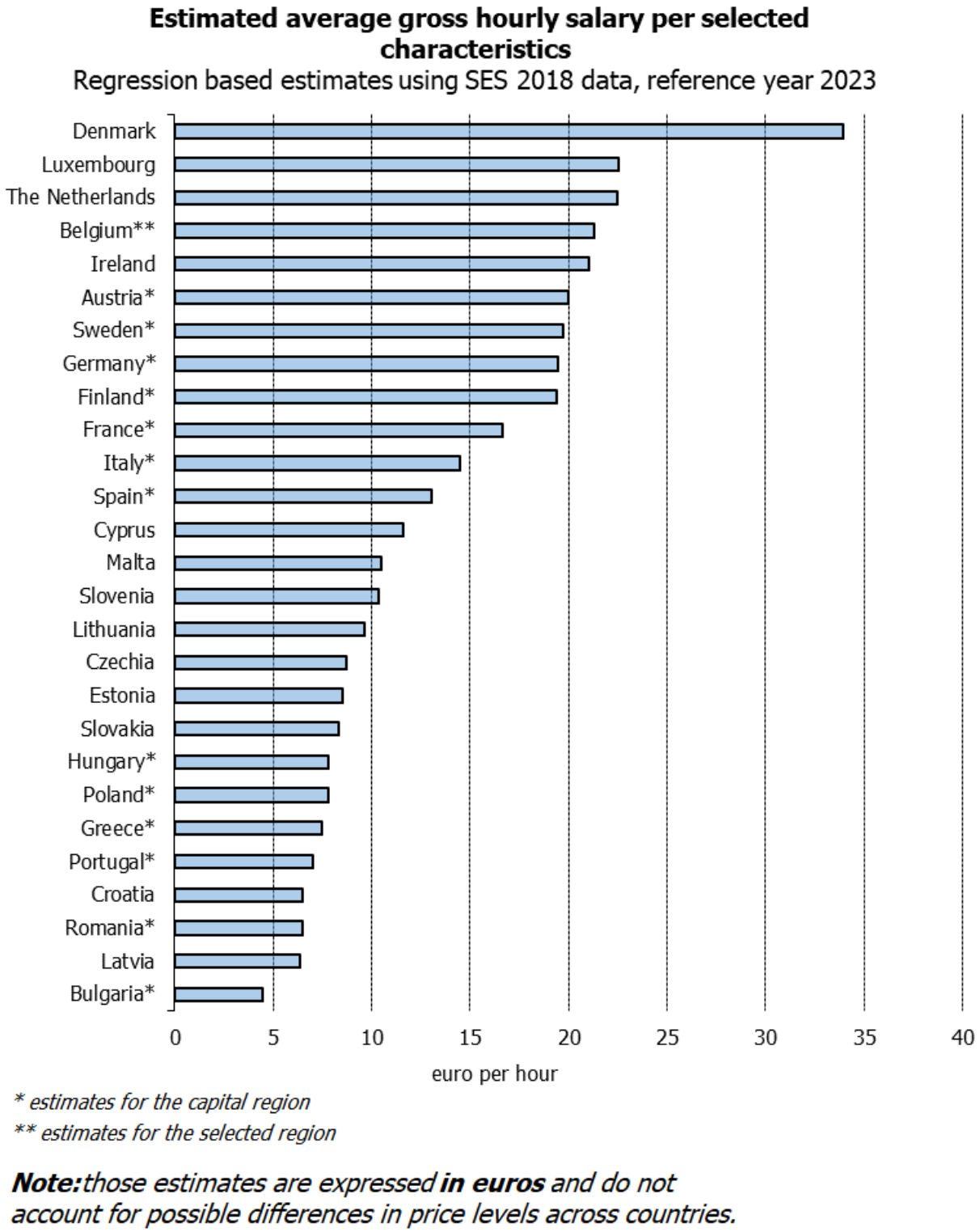

Figure 3: Example of graphical output salaries

Interpreting the results

Please note that the estimates are based on regression models, and are thus not directly comparable to SES aggregated data or any other (national) wage statistics. Regressions are used to calculate the average contribution of each particular characteristic to the hourly gross wage, while controlling for all other variables. The final wage estimates (for hourly gross wages) are calculated by adding up all coefficients from all chosen characteristics. Therefore, wage estimates for groups of persons who do not actually exist can nevertheless be calculated (e.g. it is possible to combine the occupation "skilled fishery worker", with the attributes "female", "tertiary education", "65

years old", "senior legislator"). In these cases, estimates are possibly meaningless. However, for all in-sample sub-groups, the tool provides relevant information on average wages.

Methodology

Method

The regression coefficients used by the salary calculator are estimated using the SES detailed information on individual earnings (endogeneous variable), which are matched with the individual characteristics of the employee and its employer (exogeneous). In addition, an enterprise-level random effect is included to take into account the unobserved characteristics, at enterprise level.

Finally, the regression model is the following:

$$y_{ij} = x'_{ij}\beta + \mu_j + \varepsilon_{ij}$$

Where:

- yijis the natural logarithm of hourly (gross) wages of an individual i working in enterprise j. Wages do not include bonuses or irregular payments;

- The vector xijof explanatory variables consists of personal characteristics, job characteristics and enterprise characteristics (see table below); interactions of several variables with the gender dummy were used where statistically significant;

- μjis the enterprise-level random effect, modelled through a cluster variable, which allows for different earnings within a given enterprise, irrespective of the characteristics of its labour force.

- εijis the error term for the individual employee i working in the enterprise j.

The analysis is constrained by the different effects that personal and job characteristics may have on wages in the different Member States, as well as the differences in sample sizes and coverage.

In line with the relevant scientific literature, persons below the age of 23, above the age of 65, those working fewer than 16 hours and apprentices were excluded from the analysis, as well as any cases with incomplete information in the variables of interest. The individuals with the lowest and highest 0.5 % of hourly wage are excluded as well in order to avoid a bias in the results due to outliers. Some industries and occupations (e.g. fishing industry, armed forces) are not included at all in SES data. In this case, no indication for the average salary for these particular industries and occupations can be given.

The provision of SES data on the public sector and firms with fewer than 10 employees is optional. As many Member States collected this data anyway, the salary calculator provides estimates for those countries where the corresponding SES2018 data are available.

The salary calculator is based on regression coefficients derived from SES 2018 data. The earnings estimates obtained for 2018 have been extrapolated up to the reference year 2022 by using the wage component of LCI 2023 data, at NACE section level.

Four ISCED categories are used, splitting tertiary education into lower tertiary (ISCED levels 5 and 6) and upper tertiary levels (ISCED levels 7 and 8).

The 2-digit level of the ISCO -08 classification of occupations has been used. Finally, a binary variable has been used to model part/full-time work. Indeed, the relation between earnings and the number of hours worked is generally not linear, part-time workers earnings generally less, per hour worked, than full-timers. For each explanatory variable, the regression coefficients were set to zero each time they were found to be not statistically significant.

Regression Model

We selected in the regression model those SES variables that had a significant effect on wages in a majority of Member States, as listed in the table below.

Type of variable	Values	Notes
Gross hourly wages	natural logarithm	Dependent variable; the lowest and highest 0.5% of wages were excluded from the sample.
Personal and job characteristics		
Gender	male (base), female	Interactions between female and age, age squared, education and occupation are included.
Age	age, age squared	Individuals aged 23 - 65 are included. Proxy for experience; the age squared term is necessary to capture changing returns to experience.
Education	ISCED level 1+2 (basic education), 3+4 (upper secondary), 5+6 (lower tertiary up to Bachelor and equivalent), 7+8 (upper tertiary up to Master and Doctoral)	The category used as reference (coefficient = 0) is ISCED level 1+2.
Occupation	2-digit ISCO-08 code	The category used as reference (coefficient = 0) is ISCO code 9.3 (Elementary occupations - subgroup “Labourers in Mining, Construction, Manufacturing and Transport”); ISCO code 6 (skilled agricultural and fishery workers) are not available for all Member States.
Job experience	in years	Only the experience in the current job is taken into account in this variable.
Type of contract	fixed term, permanent	Apprentices were excluded.
Working time	full-time / part-time	
Enterprise characteristics		
Industry	NACE rev. 2 sections	The category used as reference (coefficient = 0) is NACE Rev. 2 section F (“Construction”). Information for section "Public administration and defence; compulsory social security" is not available for all Member States.
Enterprise size	1-9; 10-49; 50-249; 250-499; 500-999; 1000+	Information for enterprises with fewer than 10 employees is not available for all MS.
Region	NUTS 1 regions in the EU	Some countries consist of one single NUTS1 region. For countries with several NUTS 1 regions, the category used as reference (coefficient = 0) is the NUTS 1 region where the capital city is located.

There are no cut-offs for the variable “tenure in the current firm”, but if the amount of years entered exceeds "age-14" it will not be accepted, as it implies the individual started to work at age 13 or younger. Individuals working fewer than 16 or more than 60 hours per week were excluded from the regression analysis.

Coefficients obtained through this regression model have been analysed in a separate methodological working

paper entitled " Wages determinants in the European Union ".

Other articles

See also

- Wages determinants in the European Union
- Earnings statistics
- Gender pay gap statistics
- Labour markets at regional level - Earnings at a regional level
- Minimum wage statistics
- Wages and labour costs

Publications

Publications

- Wages determinants in the European Union