

**Documentation of statistics for  
Standardized Index of Average Earnings 2020**

## 1 Introduction

The standardised index of average earnings documents the development in average hourly earnings – within sectors, industries or work functions in the Danish labour market – uninfluenced by any changes in the staff composition within the groups. The index is technically a price index. The statistics were first published in December 2018 with data dating back to 2016.

## 2 Statistical presentation

Standardized Index of Average Earnings is a quarterly estimate of the development in earnings for all employees in Denmark, except students and young persons under the age of 18. The indices are grouped by industry, function and sector.

### 2.1 Data description

The purpose of the standardised index of average earnings is to document the actual development of earnings in the labour market. By the actual development of earnings, we mean the development of average earnings adjusted for the influence of any changes in the staff composition. This is facilitated by designing the index as a price index, where employees are divided into groups according to industry, work function and age, and where the development of earnings in the separate groups is weighted together with fixed weights. The standardised index of average earnings shows the development of earnings for enterprises and organisations with at least 10 persons in employment as well as all of the public sector, broken down by main economic sector, industry and work function. To measure the development of average earnings, we use the concept of earnings in total including the employee's as well as the employer's pension scheme contributions, if any, but exclusive of holiday pay and other irregular payments. In principle, the total earnings are proportioned to the hours worked.

### 2.2 Classification system

The standardised index of average earnings is published broken down by industry groups based on Statistics Denmark's standard grouping in 10, 21, or 36 groups, respectively, cf. Danish Industrial Classification 2007. Statistics Denmark also publishes the average earnings index broken down by main groups according to DISCO-08, which Statistics Denmark collects and applies for e.g. the earnings statistics. The sectoral delimitation applied in the grouping of employees, and for publication, complies with the sector classification ESA2010.

### 2.3 Sector coverage

These statistics covers both of the private and the public sectors. The sectoral delimitation applied in the grouping of employees, and for publication, complies with the sector classification ESA2010.

### 2.4 Statistical concepts and definitions

Labour costs: Expenditure borne by employers in order to employ workers. A concept which has been adopted in the Community framework and complies broadly with the international definition of the International Conference of Labour Statisticians. Labour costs include compensation of employees, with wages and salaries in cash and in kind, employers' social contributions, vocational training costs, other expenditures, taxes relating to employment regarded as labour costs, less any subsidies received (Commission Regulation (EC) No 1726/1999 of 27 July 1999).

## **2.5 Statistical unit**

The counting unit is the individual employment relationship.

## **2.6 Statistical population**

All employees in Denmark, excluding students and young persons under 18 years of age.

## **2.7 Reference area**

Employees in Denmark.

## **2.8 Time coverage**

These statistics cover the time period from Q1 2016 and onwards.

## **2.9 Base period**

2016=100.

## **2.10 Unit of measure**

Index values and change in proportion to the same quarter last year (percent).

## **2.11 Reference period**

The quarterly calculations are based on a salary period in the middle month of each quarter, i.e. February, May, August and November.

## **2.12 Frequency of dissemination**

Quarterly.

## **2.13 Legal acts and other agreements**

Regulation (EC) No 450/2003 of the European Parliament and of the Council of 27 February 2003 concerning the labour cost index.

## **2.14 Cost and burden**

The data gathering system for earnings statistics is designed as a generally integral system with functionality to provide earnings and labour cost data for the official national statistics as well as the statistics of the EU and other international organisations. By making a system designed to provide data to diverse statistics, we limit the total reporting workload. With the design of the system, we emphasise maximum utilisation of the administrative data that already exists in the enterprises, and we make the most of the opportunities represented by modern IT technologies to collect and report information in an efficient and rational way. The total reporting workload for the earnings statistics, which includes the data collection for the indices of average earnings as well as the annual structure of earnings, amounts to DKK 6.3 million according to an analysis performed by AMVAB.

## **2.15 Comment**

For more information, please contact Statistics Denmark.

## **3 Statistical processing**

Statistics Denmark gathers data from a sample of enterprises and organisations with at least ten full-time employees as well as all of the public sector, and it covers a single earnings period in the second month of the quarter. Data is validated automatically on an individual level as well as on an aggregate level, and Statistics Denmark also makes manual adjustments. First, we group the employees with other employees doing roughly the same job, for which we calculate base indices. The base indices are weighted together for sub-indices with weights that are replaced

### **3.1 Source data**

For the sector enterprises and organisations the following applies: The data is collected quarterly, partly on the basis of a sample of approximately 5000 enterprises from the private sector with 10 employees or more, partly on information from all public undertakings not included in general government. Statistics Denmark collects the information for the private enterprises in collaboration with the Danish Employers' Confederation, the Danish Employers' Association for the Financial Sector and the Danish Pharmaceutical Association. For the public undertakings, Statistics Denmark collects data from the Agency for Modernisation, DSB (Danish state railways) and KRL (payroll data from local and regional authorities). The sample of private enterprises is stratified and drawn from ESR (the statistical business register) by size groups 10-19, 20-49, 50-99, and 100+ full-time employees. All enterprises with 100+ employees are included in the sample. The following applies for the sector general government: First and foremost, data stem from the major public payroll transfer systems (such as SLS (the government's payroll system) and KRL) supplemented by a small number of private payroll processing services. E.g., payroll information from the Lutheran Church of Denmark is reported via a private payroll processing service.

### **3.2 Frequency of data collection**

For the private sector, data is collected quarterly.

For the public sector, data is collected monthly, even though only data for the second month of the quarter is used to calculate the index.

### 3.3 Data collection

For the sector enterprises and organisations, the following applies: The collected data consists only of sampling from the IT systems of reporting enterprises and organisations for payroll administration of their employees on an individual level. For the main part, this takes place as system-to-system reporting, where the e.g. the payroll systems report data for their customers (enterprises and organisations) via extensive bulk submission directly to Statistics Denmark. Enterprises and organisations with proprietary payroll systems report their data either by uploading it via a web application or by submitting an encrypted file via e-mail to a separate e-mail address. The Danish Employers' Confederation and the Danish Employers' Association for the Financial Sector collect data from their own members and report it to Statistics Denmark via a special system-to-system solution. As provided by the Act on Statistics Denmark, reporting of this information is mandatory, and failure to do so will be reported to the police and is punishable by a fine. The following applies for the sector general government: Statistics Denmark receives the main part of the data material as extracts from the major public payroll transfer systems via system-to-system solutions. For government employees, Statistics Denmark receives data from the Agency for Modernisation, Danish Defence, and Silkeborg Data. For local and regional authority employees, data is provided mainly by KRL. In addition, data is reported from some relatively small private payroll processing services, also via system-to-system solutions.

### 3.4 Data validation

The compilation of the standardised index of average earnings primarily involves two validation processes. The first process is carried out on an individual level and varies depending on whether the observation belongs under the sector enterprises and organisations or under general government. For observations pertaining to enterprises and organisations, we do the following:

1. The observations are grouped according to work function (main groups in DISCO-o8), form of pay and two age groups. Already at this stage, adolescents (under 18 years) and apprentices are filtered out.
2. Extremes are identified by means of the Hidiroglou-Berthelot method (the HB method), which is run on the individual hourly earnings. The HB method is a statistical diagnostic procedure that uses interquartile ranges to identify outliers.
3. Observations identified as extremes are filtered out.

The following applies for observations in general government: Data are diagnosed based on an upper and a lower threshold value for the average hourly earnings. The threshold values are calculated in the beginning of the year using the average increase in hourly earnings from the previous year for projection of the old threshold values. Employment relationships that do not comply with the threshold values are removed from the data set. This first validation process is necessary as it ensures that extreme observations (outliers) do not distort the results, and it normalises the distribution of hourly earnings in the individual groups. The next validation process is made only for data belonging to the sector enterprises and organisations. First, establishments are filtered out if they are not within the same base index at the beginning and end of the quarter. Next, the HB method is applied to identify outliers, only this time the diagnosis on quarterly increases is made for the combination of the legal number, establishment number, industry (36 groups), form of pay and size group (same size group as the one by which the enterprise is stratified in the sampling).

The final validation process is also executed to eliminate extreme observations. However, it also contributes to ensure that roughly the same type of jobs are included in the beginning and end of the quarter. This reduces the risk of structural impacts.

### **3.5 Data compilation**

Base index Employees are grouped according to the following variables: 1. Sector. 2. Industry (36 groups in DBo7). 3. Work function (50 groups formed on the basis of DISCO-08). 4. Two age groups that vary according to main work function. 5. Form of pay (whether the employee is salaried or paid by the hour). The groups create the basis for the base indices, which constitute the most detailed level and are the first step in the calculation of the standardised index for average earnings. The separate base indices consist of employees who perform work of a relatively similar nature, of approximately the same quality and quantity. The base indices are calculated as the relationship between the average hourly earnings in the current and the previous period, where the average hourly earnings are calculated as the weighted average of the hourly earnings for all employees in a base index. The weight applied is the hours worked, minus any overtime. In addition, the weight attached to the individual employment relationship is limited to a maximum number of hours, where the limit is what is considered the full-time employment, which varies depending on form of pay. For salaried employees, the limit is 160.33 hours, whereas, for employees paid by the hour, it is 139 hours. This is done to stabilise the underlying weight basis, which also contributes to more stable and robust results at the overall level. The hourly earnings for the individual employee consist of the earnings in total including the employee's as well as the employer's pension scheme contributions, if any, but exclusive of holiday pay and other irregular payments. In principle, the total earnings are proportioned to the hours worked, where any reported sickness absence, however, is not deducted in practice. Additional weight is added to employees in enterprises and organisations to represent the raising factor on account of this data being collected from a sample. The raising factor takes the sample design into account, in that design weights are created, as well as the employment in the updated ESR population. Aggregation and calculation of sub- and total indices Sub-indices and total indices designate the aggregate indices, which are the indices that are published by industry and work function – as far as the standardised index of average earnings is concerned. Sub-indices and total indices are calculated as weighted averages of the underlying base indices. The weights are replaced once a year in connection with the calculation of the third quarter, since it is only at this point that the weight basis from last year's structural earnings statistics is available. The weight is the compensation, which is calculated as the earnings per hour worked, exclusive of irregular payments, times the hours worked. Chaining aggregate indices When the weights are updated, a new index calculation is started, but with chaining on the old indices to obtain unbroken series. In the standardised index of average earnings, the chaining is made on the aggregate index series, i.e. sub-indices and total indices.

### **3.6 Adjustment**

No corrections of data are made in addition to those already described under data validation and data processing.

## **4 Relevance**

The standardised index of average earnings varies from the implicit index in that it measures the development in the average hourly earnings, in a way that is far less influenced by underlying structural effects caused by changes in the volume or quality of employees. The statistics are particularly relevant for private enterprises and organisations as well as ministries and other public institutions demanding an indicator for the real development of earnings for their analyses, contractual adjustments etc.

#### **4.1 User Needs**

Multiple types of external users follow and use the two earnings indices, the standardised index of average earnings and the implicit index of average earnings. The biggest and most important users are organisations, ministries and government agencies, which use the indices to analyse trends, pressures on pay rates, international comparisons etc. In addition, the earnings indices are used for various contractual adjustments, including the escalator clause used for adjusting salaries in the public services. Other important users of the statistics are private enterprises, which use the earnings indices for contractual adjustments in particular. Furthermore, journalists also constitute an important user group.

#### **4.2 User Satisfaction**

Statistics Denmark developed the standardised index of average earnings to meet a demand from several users in the contact committee on earnings and absence statistics. The most central users are represented in this committee. Moreover, the majority of the contact committee members took part in the expert monitoring group for the project that developed the statistics, and thus they were able to offer their input throughout the process. This has helped ensure that the statistics meet the requirements of the most important users. Statistics Denmark continuously surveys the satisfaction of these users in connection with the semi-annual contact committee meetings for earnings and absence statistics. Agenda, summary and documents from these meetings are available here. As of yet, there are no actual user satisfaction surveys for the standardised index of average earnings.

#### **4.3 Data completeness rate**

There are no specific EU regulations or other guidelines for compilation of the standardised index of average earnings. However, the statistics rest on the same data basis as that collected and used for the quarterly labour cost index, which is delivered to Eurostat each quarter. This implies that e.g. data is not collected from enterprises with less than 10 persons in employment, nor from the industry agriculture, forestry and fishing. In the same way as for the implicit index of average earnings, a few industries – especially in the grouping into 36 industries – are not published in Statbank Denmark for reasons of confidentiality.

### **5 Accuracy and reliability**

For the public sectors, the statistics are based on more or less all employees. For enterprises and organisations, two factors may influence the accuracy, i.e. uncertainty in connection with the sample for the statistics, and issues of completeness in the reported data from the enterprise. In terms of reliability, the figures do not undergo revision; the published figures are usually final.

## **5.1 Overall accuracy**

The sample for enterprises and organisations has been drawn in a way that ensures that a high share of the employees in the target population is in fact included in the total sample of enterprises and organisations with at least 10 persons in employment. For example, the statistics include all enterprises with more than 100 persons in employment. This means that the accuracy in industries with a high share of large enterprises is estimated to be close to the true value. For industries with a high share of small enterprises, the uncertainty is higher. However, there is no way of knowing in which direction this uncertainty affects the accuracy. For private enterprises, the completeness of the submitted data is also a source of uncertainty, which can typically be attributed to set-up errors in the enterprises' payroll systems, which ultimately generate data for the earnings indices. It may be that e.g. a decomposition is missing in the individual salary components of payroll data, which may affect a calculated development of earnings, and that these flaws cannot necessarily be detected during the diagnostic process. Under-reporting of the extent of irregular payments, for example, may result in an overestimation of the measured development of earnings, since these should actually be included in the applied earnings concept. In general, however, the diagnostic process ensures that the total measured development of earnings and the development of earnings for the largest industry groups show robust results. For the sector general government, which includes the government as well as local and regional authorities, the accuracy is extremely high, since these are complete extracts from the public payroll transfer systems, where errors are extremely rare. The indices for public employees are consequently based on data for more or less everyone in the target population.

## **5.2 Sampling error**

The sector general government is not based on a sample, but contains information for more or less everyone in the total population. As a result, these statistics are not associated with any sampling error. For the sector enterprises and organisations, data is collected on the basis of a sample. However, the sample uncertainty has not been calculated at this point. Since all large enterprises (with 100 or more persons in employment) are included in the sample, however, and the quality of their reporting is normally good, the uncertainty mainly applies to small and medium-sized enterprises. In this way, industries with a large share of small enterprises will be more exposed to this uncertainty.



### **5.3 Non-sampling error**

For the sector enterprises and organisations: For private enterprises, under-reporting may occur of certain partial components for the employees' total earnings. This may be e.g. irregular payments, e.g. bonuses and subsequent adjustments, which are not reported correctly in the data from the enterprises' payroll systems and in this way, unintentionally influence the calculated development of earnings. It is the assumption that the under-reporting is not intentional, but rather an error caused by an incorrect set-up of the enterprises' payroll systems, which can be quite difficult to identify with the enterprises themselves. At the same time, it is not necessarily possible to detect data errors in the diagnostic process in connection with the production of statistics, since it is not in the cards that payments of this nature will take place in the relevant pay period. For the sector general government: Minor uncertainty may be associated with the delimitation of the individual earnings and hour concepts in the reporting of data. In connection with the transition of local authorities/institutions to new payroll systems, a number of transitional issues have occurred in the form of errors in the reporting. We discuss these issues with the providers of the reporting public payroll transfer systems on a current basis. A certain level of uncertainty is associated with placing public employees in the correct industry and sector, which is obtained in principle by linking the payroll reporting with Statistics Denmark's Statistical Business Register (ESR). This is partly due to quality issues with the reported production unit numbers in the payroll reporting, partly the fact that a number of employees with local and regional authorities are classified in terms of industry as local and regional government staff despite the fact that these groups of staff are not in fact working in administrative functions. Statistics Denmark is continuously trying to remedy these uncertainties to the extent possible by using the directly available system administrative information in the payroll reporting in the form of e.g. user numbers, work function codes etc. For all sectors, some uncertainty is associated with the information about the employee's work function code. This information can be difficult to verify, as it concerns detailed information about the tasks of the individual employee. However, the variable has several levels of detail, and as the standardised index of average earnings only uses the 3-digit level (there are 6 digits altogether), the uncertainty is reduced. It is not possible to indicate a figure for the total uncertainty.

### **5.4 Quality management**

Statistics Denmark follows the recommendations on organisation and management of quality given in the Code of Practice for European Statistics (CoP) and the implementation guidelines given in the Quality Assurance Framework of the European Statistical System (QAF). A Working Group on Quality and a central quality assurance function have been established to continuously carry through control of products and processes.

### **5.5 Quality assurance**

Statistics Denmark follows the principles in the Code of Practice for European Statistics (CoP) and uses the Quality Assurance Framework of the European Statistical System (QAF) for the implementation of the principles. This involves continuous decentralized and central control of products and processes based on documentation following international standards. The central quality assurance function reports to the Working Group on Quality. Reports include suggestions for improvement that are assessed, decided and subsequently implemented.

## 5.6 Quality assessment

The combined accuracy and reliability is influenced by two factors in particular. First, a sample survey is applied for the sector enterprises and organisations, and consequently, some uncertainty is associated with the earnings index. Second, the completeness of the enterprises' reported data is also a source of uncertainty, which can typically be attributed to set-up errors in the enterprises' payroll systems, which ultimately generate data for the earnings indices. Both of these factors may affect the accuracy and reliability of the statistics. Nevertheless, complete troubleshooting of data is performed on a quarterly basis, which ultimately ensures the reliability of the published figures.

## 5.7 Data revision - policy

Statistics Denmark revises published figures in accordance with the [Revision Policy for Statistics Denmark](#). The common procedures and principles of the Revision Policy are for some statistics supplemented by a specific revision practice.

## 5.8 Data revision practice

Only final figures are disseminated.

## 6 Timeliness and punctuality

These statistics are published approx. 60 days after the end of the reference quarter. These statistics are published without delay.

### 6.1 Timeliness and time lag - final results

These statistics are published approx. 60 days after the end of the reference quarter.

### 6.2 Punctuality

These statistics are published without delay.

## 7 Comparability

The Standardized Index of Average Earnings has a time series starting in Q1 2016 and was first published in December 2018. The Standardized Index of Average Earnings is based on the same data as the implicit wage index, but there are significant method differences that allow the two wage indices to be used only partially for comparison.

There are some other statistics abroad that can be partly compared with the Standardized Index of Average Earnings. The internationally used name for these indices is the Labor Price Index.

### **7.1 Comparability - geographical**

As far as we know, no other countries produce earnings indices that are designed in the exact same way as the standardised index of average earnings. However, some countries have earnings or labour cost indices for roughly the same purpose and using roughly the same method. Special mention may be made of the Employment Cost Index (USA) and the Wage Price Index (Australia). Both of these sets of statistics were used as an inspiration in connection with the development of the standardised index of average earnings. Internationally, the standardised index of average earnings is referred to as a Labour Price Index, but there is currently no international definition. Still, on the OECD website, a description has been made that sums up the most important principles in terms of method and content.

### **7.2 Comparability over time**

The index only goes back to the first quarter of 2016.

### **7.3 Coherence - cross domain**

There is a fairly high degree of coherence between the standardised index of average earnings and the implicit index of average earnings, but as for method and delimitation of population, there are still major differences between the two indices. The implicit index of average earnings is a so-called index of average values, where the development of earnings is generated based on a summary earnings average for all employees in the same industry, independently of the individual characteristics of employees. Consequently, changes in the composition of staff in a given industry can affect the measured development of earnings. The standardised index of average earnings is designed as a price index, where employees are divided into groups according to work function and age, and where the development of earnings in the separate groups is weighted together with fixed weights. In this way, the measured development of earnings cannot be influenced to the same extent by changes in the composition of the labour market. Further, there is a difference of population between the two indices, as adolescents (persons under the age of 18) and apprentices are included in the implicit index of average earnings but not in the standardised index of average earnings. The differences are described in more detail in the method report for the standardised index of average earnings. The coherence has to do with the fact that both of the indices use the same data basis (with population differences, however) and the fact that the same earnings and hour concept is used for calculation of the development of earnings.

### **7.4 Coherence - internal**

There is internal coherence between content, names and definitions of variables across sectors in the compilation of the standardised index of average earnings. Even though the reported information is relatively coherent across the sectors, certain differences exist. Some components are reported on a more detailed level in one sector compared to the others.

## **8 Accessibility and clarity**

The standardized index of average earnings is published in Statistics Denmark's newsletter, "Nyt fra Danmarks Statistik", together with the implicit index of average earnings. In Statbank Denmark, indices and annual increases are broken down by industry and sector in the table SBLON1, and by main Danish version of the International Standard Classification of Occupations (DISCO) and sector in SBLON2. Furthermore, the indices are available on the subject page for Earnings and labour costs.

### **8.1 Release calendar**

The publication date appears in the release calendar. The date is confirmed in the weeks before.

### **8.2 Release calendar access**

The Release Calendar can be accessed on our English website: [Release Calendar](#).

### **8.3 User access**

Statistics are always published at 8:00 a.m. at the day announced in the release calendar. No one outside of Statistics Denmark can access the statistics before they are published.

### **8.4 News release**

The standardised index of average earnings is published in Statistics Denmark's newsletter, "Nyt fra Danmarks Statistik", together with the implicit index of average earnings. The newsletter articles are available on the subject page Earnings and labour costs.

### **8.5 Publications**

This set of statistics is currently not included in any publications from Statistics Denmark.

### **8.6 On-line database**

The statistics are published in the StatBank in the following tables:

- [SBLON1](#): Standard (2016=100) by industry (DB07), sector and unit
- [SBLON2](#): Standard (2016=100) by occupation, sector and unit

### **8.7 Micro-data access**

The plan is to give access to Micro-data in the course of 2019.

## **8.8 Other**

The standardised index of average earnings is created on the same data basis as the implicit index of average earnings. A part of the data basis is also applied in the calculation of the labour cost part for Statistics Denmark's quarterly construction cost index. Moreover, the data basis is applied in the calculation of the Danish figures for the European labour cost index (LCI).

## **8.9 Confidentiality - policy**

In general, the preparation of the earnings indices comply with Statistics Denmark's Data Confidentiality Policy.

## **8.10 Confidentiality - data treatment**

The earnings index for the smallest industry groups is not published, e.g. mining and quarrying, and water supply and refuse collection. This applies in particular to general government where several industries cannot be published for reasons of confidentiality.

## **8.11 Documentation on methodology**

Method and content are described in more detail in a method report, which is available on the subject page for indices of average earnings under documentation. Here you will also find the documentation of statistics for the implicit index of average earnings.

## **8.12 Quality documentation**

Results from the quality evaluation of products and selected processes are available in detail for each statistics and in summary reports for the Working Group on Quality.

## **9 Contact**

In terms of administration, these statistics belong in the organisational unit Personal Finances and Welfare. Jesper Moltrup-Nielsen is the head of statistics, tel. +45 39 17 34 24, e-mail: [jmn@dst.dk](mailto:jmn@dst.dk).

### **9.1 Contact organisation**

Statistics Denmark

### **9.2 Contact organisation unit**

Personal Finances and Welfare, Earnings.

### **9.3 Contact name**

Jesper Moltrup-Nielsen

#### **9.4 Contact person function**

Responsible for the statistics

#### **9.5 Contact mail address**

Sejrøgade 11, 2100 Copenhagen

#### **9.6 Contact email address**

jmn@dst.dk

#### **9.7 Contact phone number**

+45 39 17 34 34

#### **9.8 Contact fax number**

+45 39 17 39 99