



# wiiw Growth and Productivity Database

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# 1 Overview

This document summarises information on the data provided at [www.euklems.eu](http://www.euklems.eu) on growth accounts and total factor productivity (TFP) growth. This follows the standard growth accounting framework as outlined in Chapter 2. Data are provided for the EU member states at the total economy and A\*21 industry level. The coverage of underlying data, adjustments, and imputations are summarised in Chapter 3. To maximise coverage, three data sets are provided for contributions to value added and labour productivity growth (based on hours worked); see Chapter 2 for details:

1. *TFP growth and growth accounts based on growth rates of capital stocks and labour inputs in terms of hours worked and persons employed.* This approach allows growth accounts for a large set of countries over a longer time period (1995-2023) to be provided, as these calculations do not rely on information concerning detailed asset types or employment categories.
2. *TFP growth and growth accounts taking changes in capital composition (and therefore capital services) into account.* These data are provided for the 1996-2023 period at the total economy level and for all countries, although – depending on data availability – only for selected countries at the industry level.
3. *TFP growth and growth accounts taking changes in capital and labour composition (and therefore labour services) into account.* These accounts are provided for the 2011-2024 period for those countries, provided that the necessary underlying data are available.<sup>1</sup> providing the necessary underlying data.<sup>2</sup>

In addition, shares for various asset types (ICT and Non-ICT, and tangible and intangible assets) based on user-costs of capital calculations are provided. This allows users to split growth contributions of capital services into these dimensions.

## 2 Growth decomposition and total factor productivity growth

In this section, we summarise the approach used to calculate total factor productivity growth and contributions to growth, which basically follows the method as outlined in Jorgenson et al. (1987), Jorgenson et al. (2005), and Timmer et al. (2010).

### 2.1 Inputs for calculating growth accounts

#### 2.1.1 Value added and productivity growth rates

Value added growth is calculated as log growth rate  $\Delta \ln Y_t = \ln Y_t - \ln Y_{t-1}$ , where  $Y_t$  denotes value added in chain-linked volumes at time  $t$ . Analogously, the log growth rate of persons employed is calculated as  $\Delta \ln E_t = \ln E_t - \ln E_{t-1}$ , and the log growth rate of hours worked is given by  $\Delta \ln H_t = \ln H_t - \ln H_{t-1}$ . Labour productivity growth (in terms of hours worked) is the difference between log value added and log hours-worked growth, i.e.  $\Delta \ln LPH_t = \Delta \ln Y_t - \Delta \ln H_t$ .<sup>3</sup>

<sup>1</sup>Austria and Ireland do not provide data on hourly wages in the EU SES microdata and therefore cannot be included.

<sup>2</sup>Labour services are calculated only differentiating between age and educational groups, so gender differentiation is not taken into account. Gender wage differentials are often driven by discrimination rather than productivity aspects.

<sup>3</sup>This can also be calculated from labour productivity levels given by  $LPH_t = Y_t/H_t$ .

### 2.1.2 Labour and capital income shares

The labour income share, taking into account the income of self-employed persons, is calculated as

$$s_{L,t} = \frac{1}{Y_{CP,t}} \cdot \text{COMP}_t \cdot \frac{H_t}{H_{\text{Employees},t}},$$

where  $Y_{CP}$  denotes value added in current prices,  $\text{COMP}$  denotes labour compensation in current prices, and  $H_{\text{Employees}}$  is the number of hours worked of employees.<sup>4</sup> In the case that  $s_L > 1$ , the shares are set to the long-run average (by country and industry); in the case that  $s_L > 1$  over the whole period, this is set to  $s_L = 2/3$ . The capital income share is by definition then given by  $s_{K,t} = 1 - s_{L,t}$ .

### 2.1.3 Labour services

Using the employment shares by educational attainment and age groups for each industry combined with the hours worked at the industry level allows users to calculate hours worked by labour type  $l$  in industry  $j$ , denoted by  $H_{l,j,t}$ . Having also the hourly wages for these labour types  $p_{L,l,j,t}$  allows the respective income shares of these labour groups by industry to be calculated, given by

$$v_{L,l,j,t} = \frac{p_{L,l,j,t} H_{l,j,t}}{\sum_l p_{L,l,j,t} H_{l,j,t}}.$$

From this, labour services growth is calculated as

$$\Delta \ln L_{j,t} = \sum_l \bar{v}_{L,l,j,t} \Delta \ln H_{l,j,t} \quad \text{with } \bar{v}_{L,l,j,t} = \frac{1}{2} \cdot (v_{L,l,j,t} + v_{L,l,j,t-1}).$$

Labour services growth differs from hours worked growth, as the change in labour composition shares (weighted by wages) is taken into account. The labour composition part of labour services growth is thus given by

$$\Delta \ln L_{c,j,t} = \Delta \ln L_{j,t} - \Delta \ln H_{j,t}.$$

### 2.1.4 Capital services

The growth rate of capital services is derived in the following way. The user-costs of capital of asset type  $k$  in industry  $j$  are calculated as

$$p_{K,k,j,t} = p_{I,k,j,t-1} \cdot i_{j,t} + \delta_{k,j} \cdot p_{I,k,j,t} - (p_{I,k,j,t} - p_{I,k,j,t-1}).$$

Here,  $\delta_{k,j}$  denotes the depreciation rate of asset type  $k$  in industry  $j$ .<sup>5</sup>  $p_{I,k,j,t}$  is the price index of gross fixed capital formation of asset type  $k$  in industry  $j$ . The nominal rate of return  $i_{j,t}$  of industry  $j$  is given by

$$i_{j,t} = \frac{\text{CAP}_{j,t} + \sum_l (p_{I,l,j,t} - p_{I,l,j,t-1}) \cdot K_{l,j,t} - \sum_l \delta_{l,j} p_{I,l,j,t} \cdot K_{l,j,t}}{\sum_l \delta_{l,j} \cdot p_{I,l,j,t-1} \cdot K_{l,j,t}},$$

where  $\text{CAP}_{j,t} = s_{K,t} \cdot Y_{CP,t} = Y_{CP,t} - \text{LAB}_t$  is nominal capital income and  $K_{l,j,t}$  is the capital stock of asset  $l$  in industry  $j$  in chain-linked volumes. In cases in which the user-costs of capital or the nominal rate

<sup>4</sup>This implicitly assumes that self-employed persons get the same wage as employees as total labour income (including income of self-employed persons), is defined as

$$\text{LAB}_t = \frac{\text{COMP}_t}{H_t - H_{\text{SelfEmpl},t}} \cdot H_{\text{Employees},t} + \frac{\text{COMP}_t}{H_t - H_{\text{SelfEmpl},t}} \cdot H_{\text{SelfEmpl},t},$$

from which the formula above results.

<sup>5</sup>However, this is assumed to differ only across asset types and thus is not differentiated by industry.

turn negative, these are set to zero. These user-costs of capital are then used to calculate the cost shares of each asset by industry, i.e.

$$v_{K,k,j,t} = \frac{p_{K,k,j,t} \cdot K_{k,j,t}}{\sum_l p_{K,l,j,t} \cdot K_{l,j,t}}$$

which allows capital services growth to be calculated as

$$\Delta \ln C_{j,t} = \sum_l \bar{v}_{K,l,j,t} \cdot \Delta \ln K_{l,t} \quad \text{with } \bar{v}_{K,l,j,t} = \frac{1}{2} \cdot (v_{K,l,j,t} + v_{K,l,j,t-1}).$$

The capital composition part of capital services growth in industry  $j$  is then given by

$$\Delta \ln K_{c,j,t} = \Delta \ln C_{j,t} - \Delta \ln K_{j,t}.$$

## 2.2 Growth accounts

The growth accounts and decomposition are provided in three different ways depending on the details in the underlying data (i.e. availability of capital data by asset type and detailed labour categories).<sup>6</sup>

### 2.2.1 TFP0: Decomposition based on capital stocks and hours worked

When considering only growth of capital stocks and hours worked (i.e. not the more sophisticated measures of labour or capital services as inputs), the growth of value added decomposition is given by

$$\Delta \ln Y_t = \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{L,t} \Delta \ln H_t,$$

with  $\bar{s}_{L,t} = \frac{1}{2} \cdot (s_{L,t} + s_{L,t+1})$  and  $\bar{s}_{K,t} = 1 - \bar{s}_{L,t}$ . The growth rate of  $\text{TFP}_0$  is calculated as a residual. The contribution of the changes in the average hours worked per employee is taken into account by rewriting this equation as

$$\begin{aligned} \Delta \ln Y_t &= \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{L,t} \Delta \ln H_t - \bar{s}_{L,t} \Delta \ln E_t + \bar{s}_{L,t} \Delta \ln E_t \\ &= \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{L,t} (\Delta \ln H_t - \Delta \ln E_t) + \bar{s}_{L,t} \Delta \ln E_t, \end{aligned}$$

which results in the decomposition

$$\Delta \ln Y_t = \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{L,t} \Delta \ln H_{\text{avg},t} + \bar{s}_{L,t} \Delta \ln E_t. \quad (2.1)$$

This is the first decomposition provided in the data with the largest coverage across countries, industries, and years.

### 2.2.2 TFP1: Growth contributions taking capital services growth into account

In a second step, capital services growth is considered, resulting in the decomposition

$$\Delta \ln Y_t = \Delta \ln \text{TFP}_{1,t} + \underbrace{\bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{K,t} \Delta \ln K_{c,t}}_{=\bar{s}_{K,t} \Delta \ln C_t} + \bar{s}_{L,t} \Delta \ln H_{\text{avg},t} + \bar{s}_{L,t} \Delta \ln E_t. \quad (2.2)$$

This changes the total factor productivity growth rate, as the weighted share of capital composition growth is taken out, resulting in  $\Delta \ln \text{TFP}_{1,t} = \Delta \ln \text{TFP}_{0,t} - \bar{s}_{K,t} \Delta \ln K_{c,t}$ . This constitutes the second decomposition provided in the data.

<sup>6</sup>In the following outline, we omit the industry subscript for the sake of simplicity.

### 2.2.3 TFP2: Growth composition taking capital and labour services growth into account

Analogously, the change in labour services growth can be considered, resulting in

$$\Delta \ln Y_t = \Delta \ln \text{TFP}_{2,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{K,t} \Delta \ln K_{c,t} + \underbrace{\bar{s}_{L,t} \Delta \ln H_{avg,t} + \bar{s}_{L,t} \Delta \ln E_t + \bar{s}_{L,t} \Delta \ln L_{c,t}}_{=\bar{s}_{L,t} \Delta \ln L_t} \quad (2.3)$$

where  $\Delta \ln L_{c,t} = (\Delta \ln L_t - \Delta \ln H_t)$ . This further changes the growth rate of total factor productivity. Specifically, it holds that

$$\Delta \ln \text{TFP}_{2,t} = \Delta \ln \text{TFP}_{1,t} - \bar{s}_{L,t} \Delta \ln L_{c,t} = \Delta \ln \text{TFP}_{0,t} - \bar{s}_{K,t} \Delta \ln K_{c,t} - \bar{s}_{L,t} \Delta \ln L_{c,t}.$$

This is the third value added growth decomposition provided in the data.

### 2.2.4 Contributions to labour productivity growth (hours worked)

The contributions to labour productivity growth (based on hours worked) can be derived by subtracting the growth rate of hours worked from both sides and rearranging the equation as follows:

$$\begin{aligned} \Delta \ln Y_t - \Delta \ln H_t &= \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{L,t} \Delta \ln H_{avg} + \bar{s}_{L,t} \Delta \ln E_t - \Delta \ln H_t \\ &= \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{L,t} \Delta \ln H_{avg} + \bar{s}_{L,t} \Delta \ln E_t - \bar{s}_{K,t} \Delta \ln H - \bar{s}_{L,t} \Delta \ln H_t, \end{aligned}$$

resulting in

$$\Delta \ln Y_t - \Delta \ln H_t = \Delta \ln \text{TFP}_{0,t} + \bar{s}_{K,t} (\Delta \ln K_t - \Delta \ln H_t). \quad (2.4)$$

In other words, labour productivity growth (based on hours worked) depends on total factor productivity growth and capital-deepening (i.e. the change in the capital-labour ratio in terms of hours worked). Analogous expressions can be derived for the other two decompositions in equations (2.2) and (2.3). (In these cases, capital-deepening might also be expressed in terms of capital services.) Note that total factor productivity growth is unchanged and therefore the same for value added and labour productivity growth.

### 2.2.5 Additional dimensions

Using these decompositions, contributions of various aggregates can be easily calculated from the data:

1. Contribution of hours worked growth:

$$\bar{s}_{L,t} \Delta \ln H_t = \bar{s}_{L,t} \Delta \ln E_t + \bar{s}_{L,t} \Delta \ln H_{avg,t}$$

2. Contribution of labour services growth:

$$\bar{s}_{L,t} \Delta \ln L_t = \bar{s}_{L,t} \Delta \ln E_t + \bar{s}_{L,t} \Delta \ln H_{avg,t} + \bar{s}_{L,t} \Delta \ln L_{c,t}$$

3. Contribution of capital services growth:

$$\bar{s}_{K,t} \Delta \ln C_t = \bar{s}_{K,t} \Delta \ln K_t + \bar{s}_{K,t} \Delta \ln K_{c,t}$$

4. Capital-deepening in terms of capital services growth:

$$\bar{s}_{K,t} (\Delta \ln C_t - \Delta \ln H_t) = \bar{s}_{K,t} (\Delta \ln K_t - \Delta \ln H_t) + \bar{s}_{K,t} \Delta \ln K_{c,t}$$

### 2.3 Summary of the indicators provided

In the data, we therefore provide the indicators and growth contributions for value added growth (as listed in Table 2.1) and labour productivity per hour worked growth (as listed in Table 2.2). These correspond to equations (2.1) to (2.3) and (2.4) above (and, correspondingly, to the more detailed LPH growth decompositions).

Table 2.1: Value added growth decomposition

| Dataset | Variable | Description          |                                               |
|---------|----------|----------------------|-----------------------------------------------|
| TFP0    | VA_0     | Value added          | $\Delta \ln Y_t =$                            |
|         | VA_1     | Persons employed     | $\bar{s}_{L,t} \Delta \ln E_t$                |
|         | VA_2     | Average hours worked | $+ \bar{s}_{L,t} \Delta \ln H_{\text{avg},t}$ |
|         | VA_3     | Capital stock        | $+ \bar{s}_{K,t} \Delta \ln K_t$              |
|         | VA_4     | TFP0                 | $+ \Delta \ln \text{TFP}_{0,t}$               |
| TFP1    | VA_0     | Value added          | $\Delta \ln Y_t =$                            |
|         | VA_1     | Persons employed     | $\bar{s}_{L,t} \Delta \ln E_t$                |
|         | VA_2     | Average hours worked | $+ \bar{s}_{L,t} \Delta \ln H_{\text{avg},t}$ |
|         | VA_3     | Capital stock        | $+ \bar{s}_{K,t} \Delta \ln K_t$              |
|         | VA_4     | Capital composition  | $+ \bar{s}_{K,t} \Delta \ln K_{c,t}$          |
|         | VA_5     | TFP1                 | $+ \Delta \ln \text{TFP}_{1,t}$               |
| TFP2    | VA_0     | Value added          | $\Delta \ln Y_t =$                            |
|         | VA_1     | Persons employed     | $\bar{s}_{L,t} \Delta \ln E_t$                |
|         | VA_2     | Average hours worked | $+ \bar{s}_{L,t} \Delta \ln H_{\text{avg},t}$ |
|         | VA_3     | Labour composition   | $+ \bar{s}_{L,t} \Delta \ln L_{c,t}$          |
|         | VA_4     | Capital stock        | $+ \bar{s}_{K,t} \Delta \ln K_t$              |
|         | VA_5     | Capital composition  | $+ \bar{s}_{K,t} \Delta \ln K_{c,t}$          |
|         | VA_6     | TFP2                 | $+ \Delta \ln \text{TFP}_{2,t}$               |

Source: Own elaboration.

Table 2.2: Labour productivity per hour worked growth decomposition

| Dataset | Variable | Description         |                                                     |
|---------|----------|---------------------|-----------------------------------------------------|
| LPH0    | LPH_0    | Labour productivity | $\Delta \ln \text{LPH}_t =$                         |
|         | LPH_1    | Capital deepening   | $\bar{s}_{K,t} (\Delta \ln K_t - \Delta \ln H_t)$   |
|         | LPH_2    | TFP0                | $+ \Delta \ln \text{TFP}_{0,t}$                     |
| LPH1    | LPH_0    | Labour productivity | $\Delta \ln \text{LPH}_t =$                         |
|         | LPH_1    | Capital deepening   | $\bar{s}_{K,t} (\Delta \ln K_t - \Delta \ln H_t)$   |
|         | LPH_2    | Capital composition | $+ \bar{s}_{K,t} \Delta \ln K_{c,t}$                |
|         | LPH_3    | TFP1                | $+ \Delta \ln \text{TFP}_{1,t}$                     |
| LPH2    | LPH_0    | Labour productivity | $\Delta \ln \text{LPH}_t =$                         |
|         | LPH_1    | Labour composition  | $\bar{s}_L \Delta \ln L_{c,t}$                      |
|         | LPH_2    | Capital deepening   | $+ \bar{s}_{K,t} (\Delta \ln K_t - \Delta \ln H_t)$ |
|         | LPH_3    | Capital composition | $+ \bar{s}_{K,t} \Delta \ln K_{c,t}$                |
|         | LPH_4    | TFP2                | $+ \Delta \ln \text{TFP}_{2,t}$                     |

Source: Own elaboration.

In addition, the time series on labour and capital income shares ( $\bar{s}_L$  and  $\bar{s}_K$ , respectively) are provided. Further, the contribution of capital services can be split into various categories, for which reason shares based on the user-costs of capital are provided according to the following dimensions:

1. ICT and Non-ICT asset types:
  - (a) Non-ICT: Dwellings (N111), Other buildings and structures (N112), Transport equipment (N1131), Other machinery and equipment (N110), Cultivated biological resources (N115), Research and development (N1171), Other intellectual property products\*
  - (b) ICT: Computer hardware (N11321), Telecommunications equipment (N11322), Computer software and databases (N1173)
2. Tangible and intangible asset types
  - (a) Tangibles: Dwellings (N111), Other buildings and structures (N112), Transport equipment (N1131), Other machinery and equipment (N110), Cultivated biological resources (N115), Computer hardware (N11321), Telecommunications equipment (N11322)
  - (b) Intangibles: Research and development (N1171), Computer software and databases (N1173), Other intellectual property products (N117X)

Users can split the growth contributions of capital services by applying these shares to split the capital income share ( $\bar{s}_K$ ) into these dimensions.

### 3 Classifications and data sources

In this section, we summarise the information underlying the data on productivity indicators and growth contributions provided in the database. Data were downloaded from Eurostat on 15 July 2026.

#### 3.1 Industry breakdown

The indicators and growth accounts in this database are provided at the NACE Rev. 2 1-digit industry classification (A\*21), which is presented in Table 3.3. This is dictated by the availability of the underlying data concerning detailed capital asset types by industry and detailed employment data, as discussed below. Specifically, the data include the total economy (industries A-U) and 19 1-digit industries (no data are provided for industries T and U).

#### 3.2 Value added and labour

Data are taken from Eurostat using series *nama\_10\_a64* for value added in current prices and in chain-linked volumes, and for compensation in current prices.<sup>7</sup> For employment data, the series *nama\_10\_a64\_e* is used for the number of persons employed and hours worked. Data are generally available over the 1995-2024 period, with a few countries only reporting data until 2022 or 2023 or starting in year 2000.

<sup>7</sup>Data in NCU are used; the series in chain-linked volumes are calculated using the data in current and previous-year prices.

Table 3.3: List of A\*21 industries

| Code | Description                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------|
| A-U  | Total economy                                                                                                              |
| A    | Agriculture, forestry and fishing                                                                                          |
| B    | Mining and quarrying                                                                                                       |
| C    | Total 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    | Health and social work                                                                                                     |
| R    | Arts, entertainment and recreation                                                                                         |
| S    | Other service activities                                                                                                   |
| T    | Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use |
| U    | Activities of extraterritorial organisations and bodies                                                                    |

Note: T and U not included in data, but in the aggregate A-U (Total economy).

Source: Eurostat.

### 3.3 Capital stocks and gross fixed capital formation

The series *nama\_10\_nfa\_st* is used for net capital stocks, and the series *nama\_10\_a64\_p5* for gross fixed capital formation (GFCF). Data in chain-linked volumes are calculated from the data in current and previous-year replacement costs. Table 3.4 provides a list of the available asset types.<sup>8</sup> To calculate capital services, the detailed assets marked by \* are used. Asset type N117X is calculated as residual.<sup>9</sup> For this asset category, the price index of asset type N117 is applied. Some countries do not provide data for capital stocks at the industry level or data by industry and detailed asset types, which are required to calculate capital services. In such cases, no growth decompositions are calculated.

Various adjustments are made to make the coverage as comprehensive and consistent as possible. First, missing GFCF price indexes at the industry level by asset type are replaced with total economy GFCF price index by asset type. Second, if the time series of GFCF is longer than the series for stocks, the two series are completed using the PIM method. In some cases, the time series for stocks starts later than that for GFCF,

<sup>8</sup>The transmission programme (Table 20) requires that all asset types, except for total construction and research and development, must be delivered at the total economy level. However, all countries deliver R&D stocks at the total economy level. At the A\*21 industry level, only assets N111, N112, N11M, N1131, and N115 are compulsory; thus, not even total stocks by industry are compulsory. Nonetheless, all countries deliver total stocks by A\*21 industries, and many countries also provide all detailed assets.

<sup>9</sup>Note that this is not an official code.

Table 3.4: List of capital asset types

| Code                         | Description                                               |   |
|------------------------------|-----------------------------------------------------------|---|
| N11                          | Total fixed assets                                        |   |
| ... N11K                     | ... Total construction                                    |   |
| ... ... N111                 | ... ... Dwellings                                         | * |
| ... ... N112                 | ... ... Other buildings and structures                    | * |
| ...N11M                      | ... Machinery and equipment and weapons systems           |   |
| ... ... N1131                | ... ... Transport equipment                               | * |
| ... ... N1132                | ... ... ICT equipment                                     |   |
| ... ... ... N11321           | ... ... ... Computer hardware                             | * |
| ... ... ... N11322           | ... ... ... Telecommunications equipment                  | * |
| ... ... N11O                 | ... ... Other machinery and equipment and weapons systems | * |
| ... N115                     | ... Cultivated biological resources                       | * |
| ... N117                     | ... Intellectual property products                        |   |
| ... ... N1171                | ... ... Research and development                          | * |
| ... ... N1173                | ... ... Computer software and databases                   | * |
| ... ... N117X <sup>(1)</sup> | ... ... Other intellectual property products              | * |

Note: <sup>(1)</sup> Calculated as N117N - (N1171N + N1173N).

Source: Eurostat, own elaboration.

in which case backward PIM is applied.<sup>10</sup> Third, some countries report an entry in only one year, in which case the data are set to missing. Fourth, in some cases stocks are reported, but not data on GFCF. In this case, the PIM formula is used to construct flows. Fifth, if there are no data available for the entire period, these are set to zero. Sixth, in some cases, country-specific adjustments have to be made. A few countries do not report detailed asset types at the industry level, so these are set to missing.

### 3.4 Detailed employment data

Finally, data on employment and wages by educational attainment (ISCED 0-2, ISCED 3-4, and ISCED 5-8) and age (15-19, 20-24, ..., 60-64, 65+) are taken from the EU Labour Force Survey (EU LFS) and the European Structure of Earnings Survey (EU SES), respectively. The EU LFS data are available from 2011 to 2023; data for 2024 are calculated using trend changes. Using these data, hours worked from the National Accounts are split by educational attainment and age categories.<sup>11</sup> To calculate the nominal labour cost shares, these are multiplied by the hourly wages derived from the EU SES data. Industries not covered by the EU SES (e.g. agriculture) are approximated with the wage rates at the total economy level. These are only available for the years 2014 and 2018, so the rates for the remaining years in the 2011-2024 period are estimated by inter- or extrapolation using trends consistent with the EU LFS data. Applying these imputations, detailed labour and wage data are available for all countries except Austria and Ireland, which do not provide these data in the EU SES microdata.

<sup>10</sup>The PIM equation is  $K_{t+1} = K_t(1 - \delta) + J_t$ , where  $K$  denotes the capital stock,  $\delta$  denotes the depreciation rate, and  $J$  is GFCF.

<sup>11</sup>The EU LFS data provide this breakdown at the level of persons employed; these shares are applied to the hours worked.

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