STATISTICS DENMARK

Documentation of statistics for Productivity 2023

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1 Introduction

The purpose of the statistics Productivity is to examine the change in production per unit of the resources involved and which contributes to the change. The simplest and most commonly used concept of productivity is labor productivity, which is used here. Labor productivity (LP) and the causes for the change in LP is calculated back to 1966. The statistics have been revised since the last publication. In this revision, the statistics have been revised back to 1966. The purpose of the revision is to incorporate new knowledge and new methods and to ensure uniform compilation methods for all countries. Read more at https://www.dst.dk/ext/national/HR2024_over_EN--pdf

2 Statistical presentation

Productivity is basically a measure of how efficiently you use your resources (labor, capital, etc.) when producing goods and services. In this statistic it is also calculated which resources contribute most to the change in productivity. Productivity change is distributed across industries for the various productivity components. The statistics are disseminated in News from Statistics Denmark and the StatBank.

2.1 Data description

Labor productivity (LP) is defined as the real value of Gross value added (GVA) per hour worked. The calculations are based on figures from market activity. In the statistic "Productivity" the growth in LP is derived from contributions from four sources: It capital deepening (It capital per hour worked) Non-it capital deepening Educational level Total factor productivity (TFP)

The method used in the statistic is based on Jorgenson et al. (2002), "Growth of U.S. Industries and Investments in Information Technology and Higher Education", and OECD (2001), "Measuring productivity. Measurement of aggregate and industry-level productivity growth".

In 2019 the productivity calculations were supplemented with numbers for the so called KLEMS method. After the KLEMS release in 2019 (with figures for 2017), in the future, the KLEMS statistics will be published irregularly approximately every 5 years.

In November 2010 the statistic was supplemented with the so called KLEMS method. The productivity measurement for this method is output per hours worked. The KLEMS method calculates the contributions from K, L, E, M and S (Capital, Labor and intermediate consumption of Energy, Materials and Services). After the publication of figures for 2017 the production of the KLEMS statistics has been put on hold. In the future, it will be published irregularly, approximately every fifth year.

2.2 Classification system

Statistics Denmark's industrial classification DB07, which is a Danish version of the EU NACE, rev. 2. and the UN's ISIC, rev. 4, contains a number of standard classifications: the 127, 36, 19, and 10 classifications.

Productivity is calculated from national accounts figures. The national accounts classification of 117 industries corresponds - with few deviations - to the 127 standard classification and the 117 industries of the national accounts can be aggregated to the other standard classifications. For this reason, productivity figures can easily be compared to and used in connection with other statistics that are based on the DB07-standard classifications.

Internationally there is a high degree of comparability with the productivity figures of other countries because the Danish productivity figures is compiled in accordance with the definitions in the European System of National Accounts ESA2010.

2.3 Sector coverage

All industries according to Danish Industrial Classification of All Economic Activities 2007 (DB07).

2.4 Statistical concepts and definitions

Labor productivity (Gross value added per hour worked): Labor productivity is defined as the real value of Gross value added per hour worked. The calculations are based on figures from market activity, i.e. the total economy excluding the sectors: General government (S.13) and NPISH (S.15).

It capital: covers:

- Computer hardware
- Telecommunication equipment
- Computer software and databases

Non-it capital: covers:

- Dwellings
- Buildings other than dwellings
- Other structures and land improvements
- Transport equipment
- Machinery and equipment excl. It capital (see definition above)
- Weapon systems
- Cultivated biological resources
- Research and development
- Mineral exploration and evaluation
- Entertainment, literary or artistic originals and other intellectual property products

Labor quality: The index of labor quality measures the contribution of substitution among the components of labor input to the volume obtained from a given number of hours. Labor quality is thus an indicator of the quality of the input of labor hours and captures the compositional change in the working force. The heterogeneity among the employees is here based on their educational attainment, and therefore the index is called educational level. The educational attainment of the employees are divided into five educational categories:

- Basic school
- Vocational
- Some college no BA
- BA
- More than BA

Output productivity (output per hour worked): Output productivity is defined as the real value of output per hour worked. Output is here defined as production excl. other taxes less subsidies on production. The calculations are based on figures from market activity, i.e. the total economy excluding the sectors: General government (S.13) and NPISH (S.15).

2.5 Statistical unit

For the compilation of output, intermediate consumption, taxes linked to production and subsidies, wages and salaries, employment, fixed capital formation and depreciation, the statistical unit is the local kind-of-activity unit. For the compilation of distributive and financial transactions, which cannot be divided up unambiguously among the individual kind-of-activity units belonging to a decision making unit (enterprise), the unit is the larger institutional unit, which in most cases will be the same as the legal unit which is the enterprise.

2.6 Statistical population

All units generating Danish economic activity.

2.7 Reference area

Denmark.

2.8 Time coverage

1966-2023 for Labor Productivity (the last year will appear in the name of the publication). 1966-2022 for Productivity (the last year will appear in the name of the publication).

2.9 Base period

Gross value added is compiled as chain volume indices (chained values) with 2010 as base year. This is an attempt to isolate the volume part of the monetary values.

2.10 Unit of measure

Percent and index.

2.11 Reference period

2023

2.12 Frequency of dissemination

Annually.

2.13 Legal acts and other agreements

Act on Statistics Denmark § 6 and §§ 8 - 12.

Council Regulation (EU) No 549/2013 of May 21 2013 on the European system of national and regional accounts in the European Union (ESA2010) (OJ L 174 26.06.2013, p. 1).

2.14 Cost and burden

There is no direct burden of response since data are collected for other purposes.

2.15 Comment

Further information can be found at the Subject page for these statistics, or by contacting Statistics Denmark directly.

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3 Statistical processing

Labor productivity is defined as the real value of Gross value added (GVA) per hour worked. The calculations are based on figures from market activity from national accounts, i.e. the total economy excluding the sectors: General government (S.13) and NPISH (S.15). The sources used for calculating the productivity growth is fixed capital, Labor force education statistics and sector account figures for Gross value added and hours worked.

3.1 Source data

The sources used for calculating labor productivity (LP) are sector figures from the national accounts on Gross value added and hours worked.

The sources used for calculating the productivity growth (the causes of the growth in LP) is the above, fixed capital and statistics of education. For the computation of KLEMS we use data from the input-output tables to split intermediate comsumption into energy, materials and services.

3.2 Frequency of data collection

Annual.

3.3 Data collection

Not relevant for this statistics.

3.4 Data validation

The sources for the statistic have been published before they are received and therefore they have already been validated. When the sources are received they are compared to the numbers already published.

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3.5 Data compilation

The data compilation is conducted on the most detailed level. Labor productivity is computed by 117 industries in the Industry classification in the Danish National Accounts and Productivity is computed by 69 industries. Labor productivity is defined as the real value of Gross value added (GVA) per hour worked. The calculations are based on figures from market activity from national accounts, i.e. the total economy excluding the sectors: General government (S.13) and NPISH (S.15). The Total is however based on figures for the total economy.

The growth in Labor productivity is derived from contributions from four sources: · It-capital deepening (computed with figures from the capital stock) · Non-it capital deepening (computed with figures from the capital stock) · Educational level (computed with figures from labor force education statistics) · Total factor productivity (computed residually when Labor productivity and the three above numbers are computed)

The KLEMS method is based on output per hour worked and is therefore derived from contributions from the above four sources (calculated in another way than by the GVA-method above) and the three sources below (computed with figures from the input-output tables): · Intermediate consumption of Energy · Intermediate consumption of Materials · Intermediate consumption of Services

3.6 Adjustment

Normally no corrections to data are made.

4 Relevance

The national accounts (including Productivity statistics) constitute core indicators of the analyses of economic growth. Users are primary researchers, economic departments and organizations.

The division of national accounts continuously evaluates feedback from our users.

4.1 User Needs

Labor Productivity is published separate and as a part of the publication "productivity". Both publications constitute core indicators of the analyses of economic growth. Users are primary researchers, economic departments and organizations.

4.2 User Satisfaction

The division of national accounts continuously evaluates feedback from our users.

4.3 Data completeness rate

This statistic is not mentioned in any regulations etc. Data for this statistic is primarily from other publications in the national accounts. These publications are all covered by EU regulations.

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5 Accuracy and reliability

The precision of the calculation of productivity growth is closely related to the uncertainty of the variables that are included in the calculation. I.e. how well, the value of an hour's work is reflected in the gross value added in fixed prices for the industry; the quality of the calculated hours and whether there are special conditions in the industry that make labor productivity less relevant, e.g. high capital intensity. For multiple industries, labor productivity growth should not stand alone in productivity analyzes. This applies, for example, to dwellings, public administration, education and health. Read more about this in kvalitetsvurderingen. (In Danish only).

5.1 Overall accuracy

The inaccuracy of this statistic relates to the inaccuracy of the figures used from the national accounts. See documentation of statistics for Annual national accounts. In addition, there is uncertainty connected with the assumptions made, for example in relation to production functions.

In the danish documentation note En kvalitetsvurdering af timeproduktivitet på brancheniveau an assessment is made of how usable each industry's productivity growth rates is in productivity analyzes.

5.2 Sampling error

Not relevant for these statistics.

5.3 Non-sampling error

The inaccuracy of this statistic relates to the inaccuracy of the figures used from the national accounts. See documentation of statistics for National accounts.

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

In the danish documentation note En kvalitetsvurdering af timeproduktivitet på brancheniveau an assessment is made of how usable each industry's productivity growth rates is in productivity analyzes. The idea comes from The Danish productivity commissions report 1, p.14 in which the quality of the productivity figures on industries is specified.

Productivity calculations are based on the Danish national accounts.

When the national accounts were based on the definitions in the European System of National Accounts ESA2010, the national accounts were at the same time undergoing a major revision, which means that all the levels were examined and evaluated, among other things for the sake of the Gross National Income compilations, which form the basis of a considerable amount of the financial contribution from Denmark to the EU.

A reasonable accuracy of the national accounts figures is maintained by compiling the product balances at a very detailed level. Furthermore, the compilation of the central variable GDP is to the greatest extent possible compiled from the point of view: production, expenditure and income.

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

Labor productivity is consistent with the rest of the national account. First preliminary version of Labor productivity (LP) for year t is published end of March in year t+1. The final version of LP for year t is published end of June in year t+3. First preliminary version of Productivity growth (Sources of LP) is published in February year t+2. The final version of Productivity growth (Sources of LP) is published in February year t+4.

6 Timeliness and punctuality

First preliminary version of Labor productivity (LP) for year t is published end of March in year t+1. The final version of LP for year t is published end of June in year t+3. First preliminary version of Productivity growth (Sources of LP) is published in February year t+2. The final version of Productivity growth (Sources of LP) is published in February year t+4. The productivity statistics are published according to schedule.

6.1 Timeliness and time lag - final results

First preliminary version of Labor productivity (LP) for year t is published end of March in year t+1. The final version of LP for year t is published end of June in year t+3. First preliminary version of Productivity growth (Sources of LP) is published in February year t+2. The final version of Productivity growth (Sources of LP) is published in February year t+4.

6.2 Punctuality

The productivity statistics are published according to schedule.

7 Comparability

This statistic is based on national accounts. Therefore this statistic is consistent with respect to national accounts and comparable over time. Moreover this statistic is comparable to other countries productivity figures if they are also based on ESA2010.

7.1 Comparability - geographical

Internationally there is a high degree of comparability with the national accounts of other countries because the Danish national accounts are compiled in accordance with the definitions in the European System of National Accounts ESA2010.

For all countries the productivity growth (including the Labor productivity) is based on data from the national accounts. Therefore it is possible to compare productivity figures across borders.

7.2 Comparability over time

One of the fundamental goals when compiling national accounts statistics is to achieve a high degree of comparability over time. The statistical sources are therefore adapted in order to be consistent with the concepts of the national accounts. Fundamental changes of nomenclatures as for example classification of industries, changes in definitions as a result of new guidelines as well as new and better sources will inevitably lead to changes in the national accounts and thus in the growth of productivity and its sources. A thorough revision of the data in national accounts was undertaken in the year 2014.

7.3 Coherence - cross domain

Statistics Denmark's industrial classification DB07, which is a Danish version of the EU NACE, rev. 2. and the UN's ISIC, rev. 4, contains a number of standard classifications: the 127, 36, 19, and 10 classifications.

The final national accounts classification of 117 industries corresponds - with few deviations - to the 127 standard classification and the 117 industries of the national accounts can be aggregated to the other standard classifications. For this reason, national accounts figures can easily be compared to and used in connection with other statistics that are based on the DB07-standard classifications.

However, comparisons with other statistics at a detailed industry level will often show differences, partly because of differences in definitions of variables, and partly because of the calendar year delimitation of the national accounts and its requirement of total coverage of the economic activity.

7.4 Coherence - internal

There is per se fully internal consistency in the National Accounts.

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8 Accessibility and clarity

These statistics are published yearly in a Danish press release and in the StatBank under Productivity. See more information here.

8.1 Release calendar

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

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.

8.2 Release calendar access

The Release Calender can be accessed on our English website: Release Calender.

8.4 News release

These statistics are published yearly in a Danish press release.

8.5 Publications

Link to Publications.

8.6 On-line database

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

- NP23: Labour productivity by industry and price unit
- NP25: Productivity by industry, type and price unit
- NP25V: Growth Accounts by industry, type and price unit
- NP28: Productivity, KLEMS by industry, type and price unit

8.7 Micro-data access

Basic material is stored electronically. In some cases more detailed material can be made available on a service basis at a charge.

8.8 Other

Not relevant for these statistics.

8.9 Confidentiality - policy

Data Confidentiality Policy for Statistics Denmark is complied.

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8.10 Confidentiality - data treatment

Not relevant for these statistics.

8.11 Documentation on methodology

A detailed description of sources and methods is published in (Danish) the theme publication, *Produktivitetsudviklingen i Danmark. 1966-2003*. Since then part of the method has changed, see the Danish publication *Nyt fra Danmarks Statistik* nr. 430 from 2010. The 3rd of November 2010 the traditional productivity measurement was supplemented by the KLEMS-method, see the Danish publication *Nyt fra Danmarks Statistik* nr.485 from 2010.

For a theoretical background and methods for deriving growth of productivity: "Growth of U.S. Industries and Investments in Information Technology and Higher Education", Jorgenson, D.W., Ho, M.S. and Stiroh, K. J. 2002 and "Measurement of aggregate and industry-level productivity growth", OECD 2001. The latter can be downloaded from OECD's homepage: http://www.oecd.org

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

The administrative placement of this statistics is in the division of National Accounts. The person responsible is Magnus B. Eriksen, tel. +45 39 17 36 68, e-mail: mbe@dst.dk

9.1 Contact organisation

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