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Employment in the Norwegian National Accounts

Contents

1. Introduction

Employment has traditionally constituted an integrated part of the Norwegian national accounts. The first comprehensive national accounts for Norway were published in 1952 with annual figures, including employment by industry back to 1930. Employment figures were estimated as full-time equivalent employment ("man-years"). The estimation approach was only moderately changed during the next decades.

In the last part of the 1980s, Statistics Norway introduced a new method for estimating employment figures in the national accounts. This project was inspired by principles and concepts from labour accounting systems (see Leunis and Verhage (1984), Harildstad (1986)).[1] These new employment figures, first published in 1989, included estimates on employed persons, full-time equivalent persons and total hours worked. The three employment concepts were classified according to industry, status in employment (employees/self-employed) and gender, and estimated for every year back to 1962.

In 1995, Statistics Norway published results from a general revision of the Norwegian national accounts. This revision was very comprehensive and included the implementation of new international guidelines from SNA 1993 (System of National Accounts) and ESA 1995 (European System of National and Regional Accounts). All national accounts figures, including employment, were re-estimated. The employment figures were, however, less amended than most of the other NA figures. The most important revisions of the employment estimates were due to the introduction of a new industry classification in the national accounts, based on the EU standard NACE Rev. 1. In addition, estimates on compensation of employees and wages and salaries were more closely linked to the employment estimates, and revised upwards 4 to 6 per cent for the total economy.

Statistics Norway published revised national accounts, including employment figures, back to 1978 in 1997. Revised figures further back to 1970 were published early in 2001. This means that consistent employment figures from the national accounts are now available for the period 1970-2000.

Since 1997, quarterly figures on employed persons by industry have been estimated and integrated in the Norwegian quarterly national accounts. Quarterly estimates on total hours worked are published from 1999.

Employed persons by county (19 counties) and industry have been estimated in the Norwegian regional accounts. The regional accounts, which are consistent with the national accounts, are published with some years of intervals. Preliminary estimates on employment and wages and salaries according to educational characteristics (5 groups) have also been carried out.

Employment and compensation of employees, integrated with other national accounts figures, are constructed and published in different versions. The first preliminary annual estimates, mainly based on short-time statistics, are published about one month after the end of the accounting year. Final figures are published about two years and four months after the accounting year.

Statistics Norway has recently started a new project, in order to improve the employment subsystem of the national accounts. The main objectives are to utilize new statistical sources which have been developed in the late 1990s in a more consistent way, to estimate the number of jobs in the system, and to develop more efficient methods of calculations by a new computer system. The Division for Labour

[1] The first plans for a labour accounting system in Norway were initiated already in the late 1970s, and preliminary work was conducted at the Division for Labour Market Statistics. Eventually, the responsibility was transferred to the Division for National Accounts.

Market Statistics and the Division for Income and Wage Statistics are participating actively in the project, together with the Division for National Accounts.

2. Definitions

The Norwegian national accounts contain three basic employment concepts:

- Employed persons
- Full-time equivalent persons
- Total hours worked

Employed persons are defined as the annual average number of employees and self-employed engaged in economic activity. Part-time workers, conscripts and persons temporarily absent from work are included. The definition is in accordance with SNA 1993 and ESA 1995.

The national accounts estimates also include foreign employees working on Norwegian ships in ocean transport. According to SNA 1993 and ESA 1995, Norwegian ships are part of the national economic territory.

Full-time equivalent persons are defined as the number of persons full-time employed, plus part-time employed converted to full-time equivalent basis. Full-time equivalent persons are particularly important when linking employment and wages and salaries.

Total hours worked are defined as actual hours worked by employees and self-employed, including overtime and excluding absence from work due to vacation, sick leave etc. The estimates are also influenced by calendar effects (movable public holidays, leap years). Total hours worked are considered to be the main concept for measuring the volume of labour input, or the amount of productive services rendered by employed persons. Total hours worked, in combination with volume estimates of output or value added, are used in productivity studies, see Fløttum and Skoglund (1997).

Compensation of employees, and the components *wages and salaries* and *employers' social contributions*, are also defined according to SNA 1993 and ESA 1995. Wages and salaries are both in kind and in cash (including pay for overtime, and sickness and maternity allowances paid by employers).

The three basic employment concepts are specified according to status in employment (employees/self-employed), according to gender, and according to industry. The three employment variables, together with variables describing compensation of employees, are linked by a set of relationships to a consistent subsystem of the national accounts.

The concept *jobs,* defined in SNA 1993 and ESA 1995, is not yet introduced in the Norwegian national accounts. Employed persons who have jobs in different industries are classified by the industry of their main employment. This is obviously unsatisfactory from a methodological point of view when statistics from different sources are to be reconciled. The problem will be dealt with in the newly started development project.

3. Sources

Statistics Norway has conducted quarterly *Labour Force Surveys* (LFS) since 1972. Concepts and definitions are in accordance with recommendations given by the International Labour Organisation (ILO). The reference period is one week. Since 1996, all weeks in a year are covered by the LFS (for

earlier years only one week each month or one week each quarter was covered). The strong point of this statistics is that the total population aged 16-74 is classified as either employed persons, as unemployed persons or as persons not being in the labour force. All persons working more than one hour in the survey week, or who were temporarily absent from work because of illness, holidays etc., are classified as employed persons. Conscripts are also classified as employed persons.

The estimates from the LFS on total employment, calculated as annual averages, are considered to be quite reliable and are heavily used in analysing and monitoring the labour market. Besides, the LFS contain information on personal characteristics like gender, age and education. The main weakness is that sampling errors may occur. The size of the sample is about 0.75 per cent of the total Norwegian population aged 16-74 years (about 24 000 persons per quarter). The statistical uncertainty may be significant when using detailed industry classifications etc. Besides, changes in definitions, estimation procedures and survey weeks have caused some breaks in the time series.

Statistics Norway is producing statistics from *establishment and enterprise surveys* focusing on specific industries: oil and gas activities, manufacturing, construction, wholesale and retail trade, business services etc. These statistics are based on the statistical units in Statistics Norway's Business Register, and contain data on employment, compensation of employees, output, value added etc. The data are considered to be quite reliable because a high fraction of the total number of establishments is surveyed in the industries covered (all large establishments). The main strength from a national accounting point of view is that estimates on compensation of employees and employment are fairly consistent with estimates on other economic variables. However, some industries are only covered by this type of data since the late 1990s (hotels and restaurants, transport, personal services).[2]

Another important source in the national accounts is the *financial statistics* for central and local government. The central and local government accounts provide information in a standardized form based on the same principles and definitions as in the national accounts. The statistics comprise data on compensation of employees and wages and salaries, but not employment.

Wage statistics based on surveys have been compiled by Statistics Norway and by the Confederation of Norwegian Business and Industry (CNBI) for many years. Wages and salaries have been specified per hour (manual workers on quarterly bases), or per month (other employees on annual bases). The wage statistics also provide data on overtime and absence from work. In 1997, Statistics Norway established a new set of comprehensive wage statistics, based on uniform definitions and terms. The CNBI terminated their production of statistics on wages and salaries except for hotels and restaurants. Statistics Norway has since 1997 included all industries earlier covered by the CNBI, and also extended the coverage considerably so as to include all private service industries except hotels and restaurants.

In addition to the annual wage statistics, which has census dates 1 September or 1 October, Statistics Norway has from 1998 published a quarterly wage index. The wage index is less comprehensive than the annual wage statistics, only industry totals are published.

During the last years, Statistics Norway has expanded the efforts on exploiting *administrative registers* considerably. Data from a central register of wages and salaries ("Register of End of the Year Certificates"), which is maintained by the Norwegian Directorate of Taxation, have been published since 1992. This register comprises all types of payments from employers to employees, which are recorded by tax authorities. Statistics Norway allocates the wage totals to industries by linking this register to the Business Register and other registers in Statistics Norway.

[2] These statistics have been considerably revised from 1995/96 by adapting to the EU regulations on structural statistics. The statistics are to a much larger degree than before based on the enterprises' accounts as the main information source.

A register of employees has been used by Statistics Norway to produce employee statistics since the early 1980s. The main administrative user is the National Insurance Administration. A major weakness has been a significant time lag of the employer reports to the register. Statistics Norway has however, by reconciling the register information with other statistical information, gradually improved the quality of the employment register. There are more stringent requirements to be defined as employed in the register of employees compared to the LFS. In the register of employees only employees who are expected to work for at least one week and at least four hours during the week are to be reported.

Statistics Norway publishes wage statistics based on information from three registers covering government employees:

- a register comprises persons employed in central government
- a register comprises employees in all publicly maintained schools
- a register comprises employees in local government (municipal and county municipal employees).

Administrative institutions outside Statistics Norway are responsible for these registers: the Ministry of Labour and Government Administration for the first two registers, and the Norwegian Association of Local and Regional Authorities for the third register.

The main sources on employment and wages and salaries used in the national accounts

Source	Contain information on	Periodicity
Labour force surveys	Employed persons/jobs Status in employment Part-time employment Actual working hours Gender Industry	Quarter
Establishment/enterprise surveys	Employed persons (jobs) Part-time employment Compensation of employees Industry	Year
Central and local government accounts	Compensation of employees Industry	Year
Survey-based wage statistics	Average earnings per month/hour Working hours Gender Industry	Year/quarter
Register of wages and salaries	Wage totals per year Type of wages Industry	Year
Register-based employee statistics	Employed persons (employees)/jobs Gender Industry	Year/quarter
Register of employees in central and local government	Employed persons/jobs Average earnings per month Gender Industry	Year

4. Estimation of employed persons and full-time equivalent persons

The procedure used for the estimation of employment figures in the national accounts may be outlined as follows:

First, basic statistics of different kinds are compiled by detailed industry (about 120 industries). Data referring to a single date (wage statistics etc.) are transformed to annual averages. Inconsistencies between the data sources are revealed either directly or indirectly through the use of formal relations between the variables. The estimation of employee figures is closely linked to the estimation of wages and salaries by industry. The main relations used are:

(1) (number of full-time equivalent persons) × (wages and salaries per full-time equivalent person) = total wages and salaries

(2) number of full-time equivalent persons = (number of employed persons) × (conversion factor for part-time employees)

The conversion of employed persons to full-time equivalent persons is based on information on part-time employment from the Labour Force Surveys, establishment surveys, wage statistics, and registers of employees in central and local government. The conversion factor (equal to or less than 1) varies according to industry and gender.

In industries which are covered by many statistical sources, consistency is obtained by mainly adjusting employment data (from establishment/enterprise surveys and registers) rather than adjusting wages and salaries (from establishment/enterprise surveys, central and local government accounts and wage statistics). The reason is that data on wages and salaries generally are assumed to be more accurate than employment data. The adjustments are rather comprehensive for manufacturing and central and local government industries. In some industries, like agriculture, information on total wages and salaries is not available from establishment surveys, but is estimated by relation (1) and (2) above.

Consistent estimates on employed persons, full-time equivalent persons, compensation of employees and wages and salaries (in cash and in kind) are then derived for all industries as a first step.[3] The estimates are based on detailed quality assessments of the different sources, and are a compromise of the available information. Branch specialists are participating in this process.

Next, the detailed industry estimates are aggregated to main industries and to national totals. The number of persons employed according to the Labour Force Surveys is then compared with these aggregates. Both employment level and change are analysed. The reason for making these comparisons on aggregated industries is that detailed industry estimates from the LFS may be biased by sampling errors or measurement errors. Besides, the definition of general government is not consistent in the LFS and the national accounts.

Discrepancies lead to adjustments of the detailed industry estimates. The adjustments are not implemented as an automatic procedure, but are mainly directed to industries with weak statistical information on employment. For industries covered by establishment surveys, the employment estimates are generally adjusted upwards. The main reason for this is that employees with short hours of work are not always reported by the establishments, but are covered by the LFS. The process of adjustments is repeated until the result is considered to be acceptable, which means that the total estimates on employed

[3] The process of estimation also embraces total hours worked, which are described in section 5, and wages and salaries per hour worked.

persons in the national accounts (minus foreign employees on Norwegian ships) and the LFS are approximately equal. The remaining discrepancy is generally less than 0.3 per cent (i.e. well below the sampling error of the LFS), see table 1. For the main industries, however, some deviations in the figures are accepted.

The reason for using the Labour Force Surveys as the frame of total employment estimates in national accounts is that the definition of employment is harmonized in SNA 1993/ESA 1995 and ILO/LFS (with the exception of foreign employees). Besides, Norway has a commitment to report unemployment estimates according to ESA 1995, and the LFS provide consistent estimates on employed and unemployed persons.

The process of reconciliation between the Labour Force Surveys and other data sources is conducted separately for employees and for self-employed persons. Industry data covering self-employed persons (about 10 per cent of total employment) are rather weak, and the employment estimates for this category are based more directly on the LFS.

The distribution of employment figures by gender is estimated from the LFS, from wage statistics and from registers of employees in central and local government. As part-time employment is considerably higher for women than for men, it is important to have a consistent treatment of the gender dimension in the estimation of employed person, full-time equivalent persons and hours worked. The gender dimension is, however, not yet fully integrated in the estimation of wages and salaries in the Norwegian national accounts.

As mentioned earlier, Statistics Norway has recently conducted a comprehensive general revision of the national accounts. In revising the estimates on employment and wages and salaries, register-based statistics have been used more extensively than before. Register statistics are used either directly in the estimation process, or indirectly in assessing estimation results from other sources.

Table 1. Employed persons estimated in the national accounts and in the Labour Force Surveys. 1000

	1997	1998	1999	2000
National accounts	2213	2269*	2282*	2293*
Labour Force Surveys	2195	2248	2258	2269
Foreign employees on Norwegian ships	25	26*	27*	24*
Remaining discrepancy between NA and LFS	-7	-5*	-3*	0*

* Preliminary figures.

New NA estimates, including backward revisions will be published in 2002.

5. Estimation of total hours worked

The Labour Force Surveys and some other sources contain data on actual hours worked. However, our experience has been that these data are more influenced by measurement errors than other data. The approach used in the national accounts is to estimate total hours worked from information on standard hours of work in each industry, according to legislation and agreements, and adjust for overtime and absence from work. The main relation used is:

(3) total hours worked = (number of full-time equivalent persons) × (standard hours of work per year) × (1+ rate of overtime - rate of absence from work)

An average number of holidays in a year (resulting in 230 working days and 46 working weeks), combined with a standard working week of 37.5 hours, will yield 1725 hours of work per year. However, some industries and groups of employees (employees above 60 years of age etc.) have shorter standard hours of work per year. Owing to year-to-year variation of movable public holidays, the standard hours of work per year have varied from 1718 to 1740 in the last years, this means 1.3 per cent.

Special calculations are carried out for employees with shift or rotation jobs. These employees, which we mainly find in oil industries, in some manufacturing industries and in health care, have also shorter standard hours of work per year than other employees.

Overtime and absence from work (sick leave etc.) are estimated from varies sources: wage statistics from the Confederation of Norwegian Business and Industry, the registers of employees in central and local government, the Labour Force Surveys etc. The estimates are most uncertain for overtime, and only paid overtime is covered.

Total hours worked are also estimated for self-employed persons, based on rather uncertain assumptions on average working hours. The main source is the Labour Force Surveys.

Since 1970, the growth of total hours worked has been considerably lower than the growth of the number of employed persons. This is displayed in figure 1. In the period 1970-2000, total hours worked increased by less than 10 per cent, while the number of employed persons increased by about 40 per cent. The main reason behind this is that average hours of work in a full-time equivalent man-year have decreased. The standard working hours per week were reduced from 42.5 to 40 hours in 1976, and further to 37.5 hours for many groups of employees in 1987. In 1982, the standard number of vacation days per year increased by one day (from 20 to 21).[4]

[4] According to agreements in the wage settlements, the standard number of vacation days is increased by 2 days in 2001, and 2 more days in 2002.

Figure 1. Employed persons and total hours worked 1970-2000*. Indices. 1970=100

* 1998-2000: preliminary figures.

New estimates, including backward revisions to 1990 will be published in 2002.

The parental leave facilities have also been strongly extended during the last 30 years, from 12 weeks in 1970 to 42 weeks today (with full wage compensation).

The reduction of the average annual hours worked per employed person by gender is shown in table 2. Females have considerably lower average working hours in a year then males, mainly due to more part-time employment among women. The female per cent of employed persons increased from 33 in 1970 to 47 in 1998.

Table 2. Average annual hours worked per employed person

	1970	1998*	Percentage changes 1970-1998
Total	1775	1400	-21.1
Males	1898	1625	-14.4
Females	1459	1140	-21.9

* Preliminary figures.

6. Quarterly estimates on employed persons and total hours worked

The Norwegian quarterly national accounts are compiled by using indicators to extrapolate annual figures from a base year, which is t-2. The number of employees in market production is estimated by combining quarterly information from the Labour Force Surveys and the register-based employee statistics. Register-based employees by industry are reconciled with the total number of employees from the LFS by proportional adjustments. The number of employees in non-market production,

including central and local government, is calculated by using quarterly estimates on compensation of employees and average wages and salaries in these industries.[5] The number of self-employed persons by industry is estimated from the LFS.

Total hours worked per quarter and by industry are estimated on the basis of the estimates on employed persons and estimates on changes in average working hours. The method of estimation is in principle the same as the one applied for the estimation of total hours worked in the annual national accounts, see section 5. The average working hours in a quarter are influenced in part by the calendar (number of public holidays etc.), and in part by estimates on absence from work and overtime. Absence due to vacation is assumed to have a stable quarterly pattern, with the exception of the timing of Easter, which occurs in turns in the first or second quarter. Absence due to vacation is estimated on the basis of the LFS. Estimates for other types of absence and overtime are based on information from the Confederation of Norwegian Business and Industry, wage statistics from Statistics Norway etc. Since quarterly information on absence from work and overtime is available for only a few industries, the quarterly estimates on total hours worked are rather uncertain for many industries.

Due to the generally high fraction of vacation days in the third quarter of the year, estimates on total hours worked are distinctly lower in this quarter compared with the other quarters. This is shown in figure 2.

Figure 2. Employed persons and total hours worked 1997-2000*, quarterly figures. Indices. 1997=100

* 1998-2000: preliminary figures.

New estimates, including backward revisions will be published in 2002.

[5] Estimates on compensation of employees and average wages and salaries are prepared by the Division for National Accounts in conjunction with the quarterly national accounts. These estimates are based on rather incomplete sources, however, and have not yet been published.

7. The Norwegian approach compared with a general LAS-structure

Labour accounting systems (LAS) have been developed in the Netherlands, Denmark, Switzerland, and a few other countries. The principles of LAS are described in Hoffmann (1999), International Labour Organisation (1992), Leunis and Altena (1996), Statistics Netherlands (1999), and Buhmann et al. (2000).

As outlined above, the Norwegian system is integrated in the national accounts. The focuse is on *employed persons*, while the concepts *jobs* and *posts*[6] are not used. This means that we, in contrast with the general LAS-structure and recommendations in SNA 1993 and ESA 1995, have no explicit treatment of second, third, etc. jobs of the same person. Estimates on jobs will, however, be introduced in the new version of the employment subsystem of the national accounts.

The Norwegian national accounts do not basically comprise *unemployed persons* or *persons outside the labour force*. However, consistent estimates for these concepts are provided by the Labour Force Surveys. This link is utilized in labour market analyses.

Statistics on the number of *vacancies* are compiled by agencies outside Statistics Norway. No attempt has been made in order to overcome the inconsistency problems involved in utilizing these data in the employment accounting system.

As outlined above, the Norwegian accounts contain estimates on *total hours worked,* in agreement with the general LAS-structure. The approach used is to estimate total hours worked from information on standard hours of work in each industry, according to legislation and agreements, and adjust for overtime and absence from work. However, only paid overtime is estimated.

The employment estimates are classified by industry, status in employment, gender, and region (county). Estimates on employment by education have also been carried out. Other possible LAS-classifications, as age, nationality etc., are not covered by the Norwegian national accounts.

The general LAS structure may comprise different kinds of data, see Buhmann et al. (2000). The Norwegian accounts emphasise average data (employed persons, full-time equivalent persons) and flow data (total hours worked, wages and salaries). Stock data (which refer to a point in time), transition data (which refer to sequences of changes occurred between two points in time), and events data (which give an overview of the very moment of change) are not included.

Estimates on employed persons, full-time equivalent persons, total hours worked and wages and salaries are internally consistent, and consistent with other figures in the Norwegian national accounts. The data, and especially the industry breakdowns, are, however, not in full harmony with other statistics. We are not presenting tables explaining the links to other data, or make adjustments in other sources in order to obtain consistency, as done in the Netherlands.

Transparency has been stated as one of the main principles of labour accounting systems. This means that all the steps in the process of adjusting data from various sources, and all the decisions taken, should be explicitly documented and published. This has not been emphasised in Norway, mainly due to capacity reasons. Besides, the statistical sources describing employment and wages and salaries in

[6] Posts are representing the demand side of the labour market, and are characterized by required education, branch of industry etc. A post may be filled or vacant.

Norway have been comprehensively reorganized and extended during the 1990s, and this has called for many subjective decisions in the process of reconciliation.

Other LAS principles, according to Buhmann et al. (2000), are high quality data, comparability over time, timeliness and data variable flexibility. These principles are more or less fulfilled by the Norwegian approach. Consistent time series are obtained by adjusting for changes in definitions etc. in the sources. Statistics Norway publishes both quarterly and annual figures rather shortly after the end of the reference period. The estimates are revised as more information becomes available from establishment/enterprise surveys and other sources which require long time of collecting and processing data.

In countries like the Netherlands, Denmark and Switzerland, labour accounts are developed in divisions of labour market statistics. In Norway, the task of harmonisation of employment and wages and salaries into a consistent system has been conducted by the Division for National Accounts. The link with national accounts has then been emphasised. There is close contact and cooperation with the divisions for Labour Market Statistics and Income and Wage Statistics in Statistics Norway. The demands from national accounts are given high priority by these divisions. However, the utilization of the knowledge gathered by, and the feedback to, producers of labour market and wage statistics may have been less by this approach than by the approach used by other countries.

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