

## Employment concepts in the Labour Force Survey, National Accounts and Working Time Accounts

The present paper compares three of Statistics Denmark's current quarterly statistics compiling the number of persons in employment, i.e. the survey-based *Labour Force Survey (LFS)*, *Working Time Accounts (WTA)* and *National Accounts (NA)*. The two last mentioned statistics are primarily compiled from register-based data.

The same unit is measured by the three statistics, i.e. persons employed, but within three different populations. *The Labour Force Survey* measures employment of the Danish population; taken to mean the number of citizens between 15 and 74 years, who have worked for at least one hour during the reference week or are temporarily absent from a job<sup>1</sup>. *The Working Time Accounts* show the Danish population's employment in Denmark, taken to mean the number of primary jobs in Denmark. *The National Accounts* provide information on employment within the economic territory Denmark. The National Accounts are based on the Working Time Accounts and other register-based sources<sup>2</sup>. The NA include, compared to the WTA and the LFS, foreigners working in Denmark and a supplement for moonlighting (undeclared work). However, Danish citizens working abroad are not included in the NA.

The purpose of this paper is to provide information on definitional as well as numerical differences in the three statistics, give guidelines as to when and which employment concepts should be applied, and to explain and quantify the differences in the statistics over a period of 10 years. This paper is a supplement to the detailed declarations of contents prepared for each of the three statistics and accessible from Statistics Denmark's website.

As the NA is based on the WTA, the development of the two statistics is very similar, and this paper focuses on how the LFS is related to the two register-based statistics. For an in-depth description of the relationship between the WTA and the NA and a quantification of the differences, please see the [papers](#) accessible from [www.dst.dk](http://www.dst.dk) and the transition table in annex 1.

### 1. When to use which employment statistics?

#### *LFS should be used*

- When you want to estimate the working time by persons employed (e.g. statistics on persons employed full-time/part-time)
- When you want information about conditions that cannot be compiled on the basis of register-based data (e.g. work carried out from home, would like to work more hours).
- When you want to conduct international comparisons of employment levels and developments in different countries. Particularly, comparability among EU countries is very high

#### *WTA should be used*

- When you want a cohesive time series
- When you want to examine employment analysed by relatively detailed industries
- When you want to examine employment for relatively small groups

#### *NA should be used*

- When you want a long time series, which can internationally be compared to the national accounts of other countries

---

<sup>1</sup> Only figures for persons aged 15-64 are shown in Statistics Denmark's database StatBank Denmark.

<sup>2</sup> In comparison with other European countries, the Danish National Accounts are only to a limited extent reliant on results from the Labour Force Survey.

- When you want to relate figures to the domestic production
- When you want to take into account moonlighting (undeclared work) and foreigners working in Denmark

## 2. Definitional differences between the employment concepts

In the present section of this paper, a range of differences between the three employment statistics due to definitional deviations are described<sup>3</sup> – and subsequently, in the next section, the specific developments and fluctuations are discussed.

Generally, the paramount difference is that the population of the three statistics differs. The National Accounts compile employment within the Danish economic territory, whereas the Labour Force Survey measures employment among Danish citizens and the Working Time Accounts measure employment among Danish citizens working in Denmark. Furthermore, there is a range of definitional differences between the employment concepts, which is summarized below.

|   | LFS        | WTA        | NA            |
|---|------------|------------|---------------|
| Owners of partnerships (I/S) employed in own business | Self-empl. | Self-empl. | Employees     |
| Danes working abroad with Danish employer             | +          | +          | -             |
| Danes working abroad with foreign employer            | +          | -          | -             |
| Non-residents, employed in DK                         | -          | - (*)      | +             |
| Undeclared employment                                 | +          | -          | +             |
| Assisting spouses with pay agreement                  | Employees  | Employees  | Self-employed |
| Persons in training programs with wage subsidies      | + (**)     | +          | +             |
| Persons in training programs in public traineeship    | - (**)     | -          | +             |

(\*) A very small group of non-residents is, exceptionally, included in the WTA, see declaration of contents

(\*\*) The status of persons participating in training programs in the LFS depends on whether they comply with the ILO's requirements for persons employed (as the LFS is based on interviews, the respondent's own assessment is here significant).

*ILO's definition* In accordance with the International Labour Office (ILO), the LFS and the WTA define a person to be employed, when the person in a given reference week has received wages for a minimum of at least one hour of work, or has been temporarily absent from a job. In both statistics, persons on leave, maternity and holiday, persons absent due to sickness, students economically active and conscripts are included in the group of persons employed. This operationalization in the LFS is recommended by the ILO and Eurostat, and the data collected are comparable with similar data from all EU countries.

*ESA/ENS 1995 definitions* The NA use the European standard for national accounts ESA/ENS 1995 and define persons in employment as persons who supply manpower for the production of goods and services in Denmark. The statistics include persons aged at least 15 years, who have received wages, corresponding to at least 80 hours of work per year (the hourly delimitation is an operationalization of the ILO requirement of one hour of work per week). Also here, the statistics include persons, who are temporarily absent from the labour market, students economically active and conscripts. The national accounts are comparable with the national accounts compiled in all countries of the world, and are compiled according to the same principles used in other European national accounts.

The ESA/ENS definition differs from the ILO definition as follows:

- Non-residents employed in Denmark are included in employment
- Owners of partnerships working in the partnership are defined as employees (according to the ILO, they are defined as self-employed)
- Assisting spouses with pay agreement are defined as self-employed

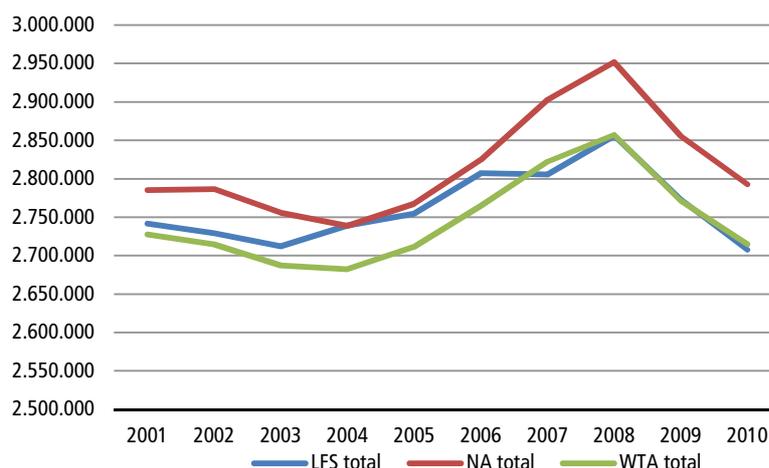
<sup>3</sup> For further details, see the paper "[Conceptual differences between employment statistics](#)"

*Undeclared work* In the National Accounts as well as the Labour Force Survey, moonlighting (undeclared work) is included in the employment statistics. In the LFS, which is based on surveys, the statistics on undeclared employment is based on the replies provided by the respondents. In the National Accounts, the number of persons engaged in undeclared work is estimated on the basis of a range of factors (e.g. an estimate of the undeclared production and payroll costs). Section 4 of the present paper gives a more detailed description of the compilation of undeclared work in the two statistics.

### 3. Development in employment in the three statistics

*General development* The three statistics compile employment in different populations, which implies that there is a certain difference in the employment frequencies. However, it must be expected that the data series relate to, more or less, the same economic conditions and that they follow each other to a reasonable extent. Figure 1 shows the development in employment at a general level in the three statistics during the period 2001-2010. As already mentioned, the National Accounts are based on the Working Time Accounts, and during this period of 10 years, they do also describe the same development, with a comparatively homogeneous difference in the level<sup>4</sup>. The employment series in the Labour Force Survey relate comparatively well to the others up to and including 2003 and subsequently after 2006.

**Figure 1. Development in the total employment series of the three statistics**



Note 1: Total employment consists of employees and other persons employed/self-employed

Note 2: Sampling errors of about (+/-)10,000-17,000 persons in the LFS employment series must be taken into account. From 2007 onwards, the sampling errors constitute about (+/-) 10,000 persons.

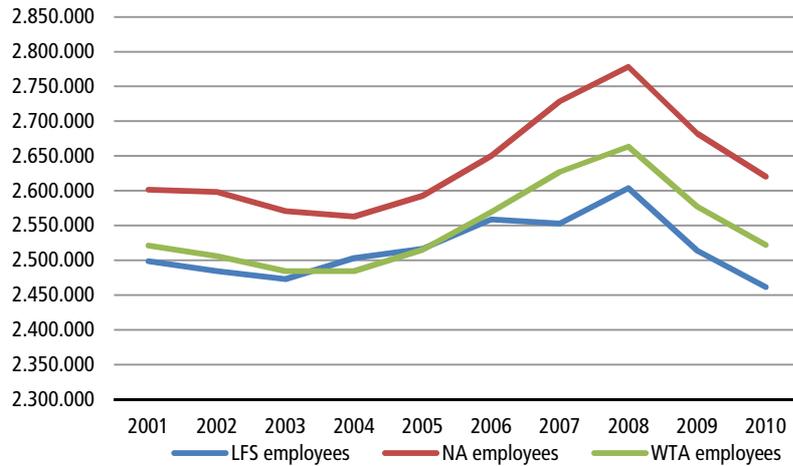
Note 3: Employment figures in the NA for 2008, 2009 and 2010 are provisional figures.

From 2003 to 2004, there is a substantial increase in employment according to the LFS and in the years 2004-2006 the level of employment in the LFS is close to the NA, despite the circumstance that the population in the NA is greater (see transition table in section 5). As far as concepts are concerned, the populations in the LFS and the WTA are closer to each other, and the employment series of the two statistics should be relatively close.

*Employees* The variation in total employment in the LFS is due to variations in the LFS's employment for employees, which is the absolutely largest group of persons employed.

<sup>4</sup> For a description of the relationship and development between the WTA and the NA, see the paper ["Differences in employment developments in the register-based labour force statistics. WTA and NA."](#) and transition table in Annex 1.

**Figure 2. Development in the employee series of the three statistics**

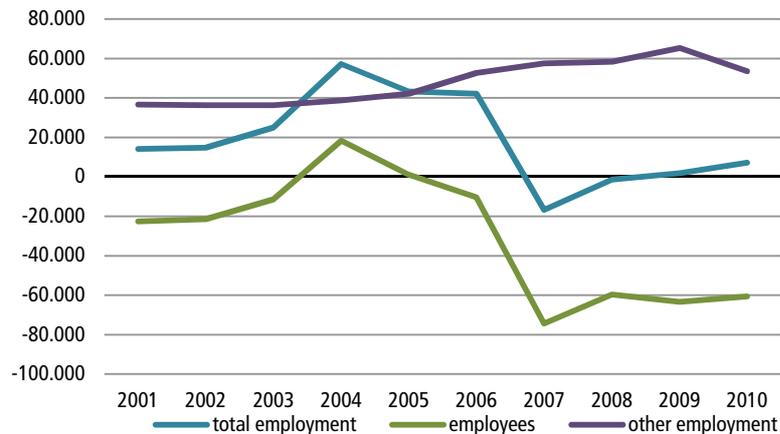


Note: Figures from the National Accounts for 2008, 2009 and 2010 are provisional figures

**Differences** When the employee series in the LFS and the WTA are at the same level with each other, the difference in total employment is increased. This is due to the circumstance that there are a consistently higher number of persons employed, who are not employees (self-employed, assisting spouses and family assistants) and who are categorised to “other persons employed” in the LFS, compared to the two other statistics. This is being counterbalanced in total employment, as long as the number of employees in the WTA is higher. When the employee series in the LFS is at the same level as that of the WTA, which was the case in the period 2004-2006, total employment in the LFS becomes higher (see figure 3).

It is important to pay attention to the ratio between the data series on employment analysed by sub-groups in comparing the statistics, as a transfer takes place from employees to other persons employed in the LFS. Consequently, this makes it difficult to conduct comparisons between the data series on employment analysed by sub-groups, independently from total employment.

**Figure 3. Differences between employment series in LFS and WTA (LFS minus WTA)**



The series in the WTA are relatively constant and the fluctuations in the relationship between the statistics must be found in the LFS’s employment, which increases dramatically in 2004, compared to the more moderate growth in the other statistics. After 2006, the correspondence becomes greater again, as employment in the LFS remains largely unchanged from 2006-2007, despite the circumstance that there is a sharp increase in employment according to the WTA (and the NA).

*Change in the LFS*

The development in employment in the LFS depends on the changes introduced in 2003, 2004 and 2007. In 2003, a statistical adjustment of sex and age was implemented in connection with the process of weighting, which gave rise to an increase in the number of persons employed. This increase explains to some extent the increase in the LFS (about one-fourth of the average difference between the WTA and the LFS during the period 2004-2006). In 2004, the pre-stratification of the sample survey was changed, which over a transitional period resulted in an imbalance, with the effect that the number of persons employed experienced a further increase. At the moment it is not possible to estimate the size of this effect. In 2007, a new and improved weighting method was implemented, the survey was expanded and the panel structure was changed. Figures dating back to 2007 were also revised in November 2011, following the implementation of yet another new weighting method and this resulted in an increase in the accuracy of the results in relation to the population. These changes have apparently implied that the data series in the LFS have reverted to a lower level and a trend in greater accordance with the register-based statistics.

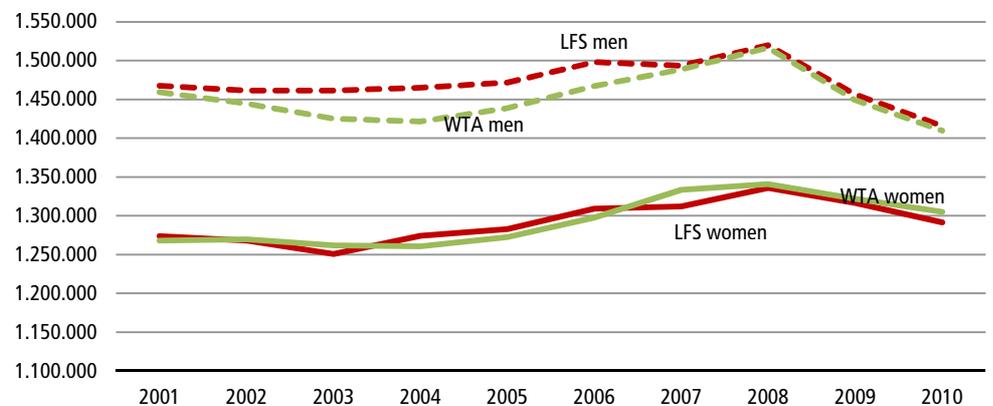
The fluctuations in LFS's employment implies that caution should be made with regard to drawing conclusions on the basis of changes in employment in the LFS between 2003 and 2004 and between 2006 and 2007.

*Increased employment*

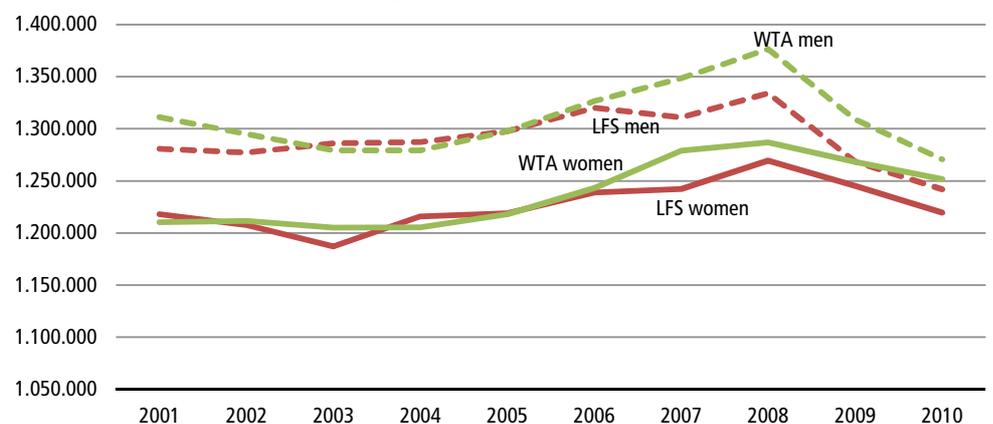
A sub-division of persons employed show that the fluctuations in the LFS's employment give rise to a deviating classification by sex during the period 2003 to 2006. In this period, the number of men, who are employed, is considerably higher in the LFS, compared to the WTA (there is no classification by sex in the NA). The highest difference is in 2004, with about 44,000 persons, and the lowest difference is seen in 2006, with about 31,000 persons.

**Figure 4.**

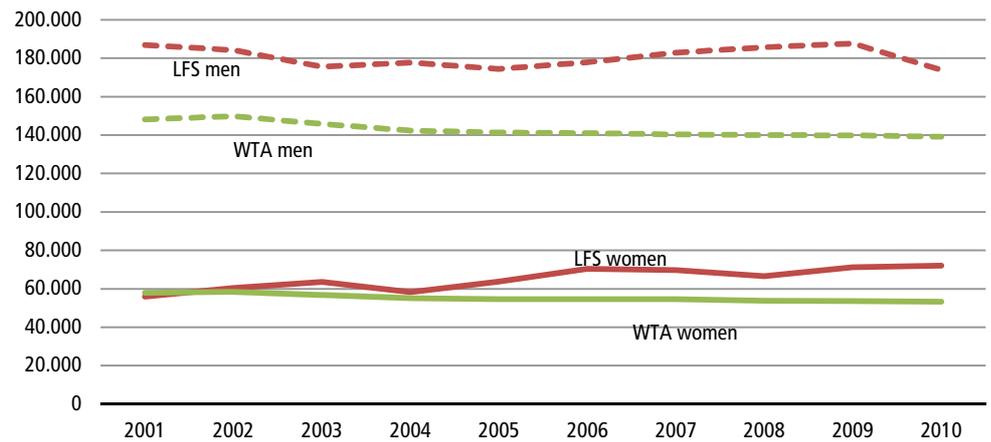
**Total employment by sex according to the LFS and the WTA**



**Employee employment by sex according to the LFS and the WTA**



**Other employment by sex according to the LFS and the WTA**



*More male employees*

It appears from figure 4 that there were between 30,000 and 48,000 more men in ‘other employment’ in the LFS compared to the WTA during the entire period 2001-2010. In 2003, the number of male employees in the LFS reaches the level for the number of male employees in the WTA, which have, generally, accounted for the highest number. The employee data series in the LFS and the total employment in the LFS are thereby raised until 2006. The equalization of the difference between total employment in the LFS and the WTA from 2007 relates to, among other causes, a fall in the employee series for males in the LFS, which is the result of the introduction of a new weighting-method. Subsequently, there are again both more male and female employees in the WTA.

*Conclusion*

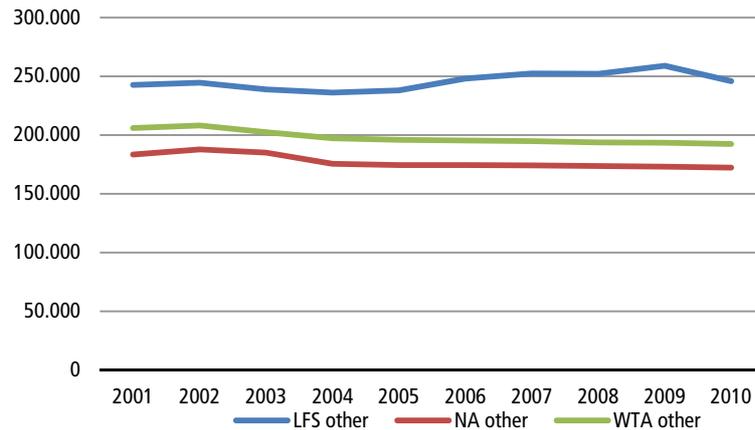
During the entire period 2001-2010, employment in the Working Time Accounts and the National Accounts relates constantly to each other and follows the same development, although they range at different levels. Employment in the Labour Force Survey follows employment in the other statistics before 2004 and after 2006, but during the intervening period there are fluctuations in employment. During this period, it seems that the LFS has overestimated employment, particularly in the case of male employees, and that the raised employment level is attributable to methodological changes introduced in 2003, 2004 and 2007.

**3.1 Other employment**

*Development in other employment*

The three statistics also compile employment for persons, who are not employees, primarily self-employed, but also different forms of assisting family members. The data series for the group of “other persons employed” evolve without any great fluctuations and the relationship between them is comparatively constant (see figure 5).

**Figure 5. Development in the series on other employed in the three statistics**



Note: Figures from the National Accounts for 2008, 2009 and 2010 are provisional

The National Accounts have consistently the lowest number of other persons employed, which can be expected in relation to the definitional delimitations<sup>5</sup>. The Labour Force Survey accounts consistently for the highest number of other persons employed, and the distance to the other statistics has slightly increased throughout the years. The weighting-method used in 2011 on the basis of which all LFS figures back to 2007 were, as already mentioned, revised, increases the number of self-employed in relation to the previous weighting of figures<sup>6</sup>, which has an impact on the increase.

**Composition in 2010**

As previously mentioned, there is a transfer from employees to other persons employed in the LFS in relation to the register-based statistics. It appears from the table below that it is primarily the number of self-employed, which is substantially higher in the LFS – with respectively 51,000 and 66,000 more self-employed than in the WTA and the NA in 2010.

**Composition of other persons employed 2010. Figures in thousands**

|                                    | LFS | WTA | NAR |
|------------------------------------|-----|-----|-----|
| <b>Self-employed</b>               | 238 | 187 | 172 |
| <b>Assisting family assistants</b> | 8   | 6   | (*) |

\*The National Accounts do not have a category called other persons employed, but have a broader-ranging definition of self-employed in which family assistants are included.

**Possible reasons**

For the time being, it is impossible to draw any conclusions as to the reasons for this transfer, but a range of conditions must be assumed to have an impact. In the LFS, it is the respondents' own subjective assessment of own primary job, which determines whether the person in question is allocated with the status of being self-employed or employee. In the register-based statistics, the job in which a person spends most registered hours of work is considered to be the primary job, which again is decisive of which socio-economic status is allocated to the person in question.

This can lead to a difference in status in respectively, surveys and register-based sources for persons, who have jobs both as self-employed and as employees. The reason why is that some of these persons will primarily consider themselves as self-employed, regardless of the job in which they spend the highest number of working hours, and because they may be self-employed, whose real working hours exceed the hours that are registered.

Simultaneously, a large number of owners of private limited companies (in Danish APS) presumably consider themselves to be self-employed in the LFS, but due to the

<sup>5</sup> For further details about the differences between the NA and the WTA, reference is made to the papers accessible from [dst.dk](http://dst.dk)

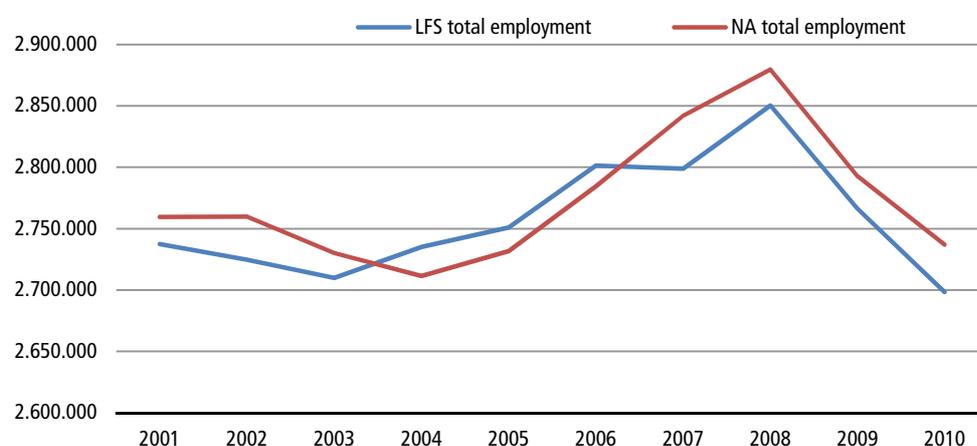
<sup>6</sup> See [papers on the weighting-method used in 2011](#)

type of ownership they are, legally speaking, employees and defined as such in the register-based statistics.

#### 4. Labour Force Survey and National Accounts

If we only look at total employment for persons aged 15-74, who both live and work in Denmark, the same population is covered by the National Accounts and the Labour Force Survey. However, it is impossible to withdraw persons employed aged 75 years and more from the National Accounts, and consequently they are included here. The employment series in the two statistics for this segment follows, similar to the total employment figures, the same development curve during the period prior to 2004 and the period after 2006. The intervening period must be considered to be an exception (see above) and is not dealt with in the present section. In the years 2001-2003 and 2007-2010, where the same development is seen in the NA and the LFS, the NA have a greater number than the LFS, with a relative modest difference of 20,000-43,000 persons employed (see annex 2).

**Figure 6. Employment for persons resident and working in DK, LFS: 15-74-year-olds, NA: +15-year-olds**



Note: Figures from the National Accounts for 2008, 2009 and 2010 are provisional

#### Undeclared work

Part of the explanation can be due to differences in the compilation of undeclared work included in the employment figures of both statistics. As mentioned previously, the National Accounts add a number of persons, who are engaged in undeclared work as their primary employment, to the registered number of persons employed. The number of persons added is an estimate. It is not possible to delimit the figures on undeclared employment in the National Accounts by upper age or place of residence, and cross-border workers and persons aged over 74 are included below.

#### Addition undeclared employment in the NA, number in thousands

|   | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|------|------|------|------|------|------|------|------|------|------|
| Number engaged in undeclared work as their primary employment | 17   | 17   | 19   | 19   | 19   | 19   | 19   | 17*  | 17*  | 16*  |

\* Provisional figures

Since 2010, the Labour Force Survey has compiled undeclared work on the basis of the replies provided by the respondents. Persons engaged in undeclared work during the most recent year are added up as well as the number of undeclared man-years. It is impossible to identify persons employed, who are exclusively engaged in undeclared work or have undeclared work as their main occupation. Neither is it possible to identify undeclared work in the reference week. Together with the problems involved in the delimitation in the National Accounts, it is, consequently difficult to compare the LFS with the NA: In 2010, there were according to the LFS

190,000 persons employed and 58,000 persons unemployed aged 15-74 years, who were resident and working in Denmark and who were engaged in undeclared work – which amounted to a number of working hours that corresponds to respectively, 5,000 and 2,000 man-years.

An approximate delimitation is to compare the addition to undeclared work in the NA (with the above-mentioned problems of delimitation) with the number of persons unemployed according to the LFS, who were engaged in undeclared work to such an extent during the most recent year that it can be considered to constitute employment, which can be said to be of a significant extent. In this context, the threshold is fixed at 180 undeclared hours of work or more during the course of the year (15 hours per month)<sup>7</sup>.

**Undeclared employment in the LFS in 2010, number in thousands**

|  | LFS<br>employed | LFS<br>unemployed |
|--|-----------------|-------------------|
| Number engaged in undeclared work, a minimum of 180 hours/year | 9               | 5                 |

Subsequently, the number of persons who during the year were engaged in undeclared work for more than 180 hours constitute 5,000 persons unemployed according to the LFS. An addition to these would raise the number of persons employed according to the LFS, but not to the level of the National Accounts.

The number of persons employed, who have been engaged in undeclared work for 180 hours or more, constitute 9,000, but as we do not know how many of these persons were engaged in undeclared work as their main occupation, this figure cannot be compared to the 16,000 persons engaged in undeclared work according to the National Accounts in 2010.

*Possible understatement*

There is a certain risk of understatement of moonlighting, which can be a sensitive issue, in the Labour Force Survey, where data are collected via telephone interviews, and where the respondents provide relatively detailed information about themselves and their job status. Consequently, there is, to some extent, a probability that the undeclared employment figures are, in reality, higher than can be measured by the LFS. It is, generally speaking, very difficult to measure moonlighting, and the estimate in the National Accounts is also subject to margins of uncertainty.

## 5. Transition table: National Accounts - Labour Force Survey

For the purpose of identifying the differences between the Labour Force Survey and the National Accounts, a transition table showing the differences between the complete populations of the two statistics is presented below. It appears from the table that the residue, when the conceptual differences are quantified, is comparatively small, seen in relation to the circumstance that an unknown number of 74-year-olds has to be drawn from the National Accounts as well as the statistical uncertainty of +/- 10,000-17,000 persons, who are incorporated in the general employment series of the Labour Force Survey.

<sup>7</sup> This delimitation is exclusively established for the purpose of showing an example and does not refer to limits or international regulations of other statistics.

Figure 7. Transition table National Accounts – Labour Force Survey. Number in thousands

|                                   | 2001         | 2002         | 2003         | 2004         | 2005         | 2006         | 2007         | 2008         | 2009         | 2010         |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>NR totalbeskæftigelse</b>      |              |              |              |              |              |              |              | <b>2.952</b> | <b>2.856</b> | <b>2.793</b> |
|                                   | <b>2.785</b> | <b>2.786</b> | <b>2.756</b> | <b>2.739</b> | <b>2.767</b> | <b>2.825</b> | <b>2.903</b> |              |              |              |
| Udlændinge der arbejder i DK      | -26          | -27          | -26          | -27          | -36          | -40          | -61          | -72          | -63          | -56          |
| Danskere der arbejder i udlandet  | 3            | 4            | 2            | 3            | 3            | 5            | 4            | 4            | 4            | 6            |
| NR Sort arbejde                   | -17          | -17          | -19          | -19          | -19          | -19          | -19          | -17          | -17          | -16          |
| Rest (inkl. beskæftigede > 74 år) | -4           | -17          | -2           | 44           | 39           | 37           | -21          | -11          | -7           | -19          |
| <b>AKU totalbeskæftigelse</b>     | <b>2.741</b> | <b>2.729</b> | <b>2.712</b> | <b>2.739</b> | <b>2.755</b> | <b>2.807</b> | <b>2.806</b> | <b>2.856</b> | <b>2.773</b> | <b>2.707</b> |

Note: It is impossible to delimitate persons employed aged 75 years and over, who are included in the population of the NA, but not in the population of the LFS. Consequently, they are included in the residue.

Note 2: Figures from the National Accounts for 2008, 2009 and 2010 are provisional

It is emphasized by the transition table that employment according to the LFS is too high during the period 2004-2006: in this respect, the residue constitutes an addition to the National Accounts, whereas it is an addition to the Labour Force Survey in the other years.

## Annex 1

### Relationship between employment in the Working Time Accounts and in the National Accounts

|                                       | 2004              | 2005         | 2006         | 2007         | 2008         |
|---------------------------------------|-------------------|--------------|--------------|--------------|--------------|
|                                       | —————1000 persons |              |              |              |              |
| <b>Working Time Accounts (WTA) ..</b> | <b>2 682</b>      | <b>2 711</b> | <b>2 765</b> | <b>2 822</b> | <b>2 857</b> |
| Alternative sources .....             | 11                | 7            | 5            | 19           | 15           |
| Addition to undeclared work .....     | 19                | 19           | 19           | 19           | 17           |
| Addition to domicile .....            | 27                | 36           | 40           | 61           | 72           |
| Other corrections .....               | - 1               | -6           | -4           | -17          | -5           |
| <b>National Accounts (NA) .....</b>   | <b>2 739</b>      | <b>2 767</b> | <b>2 825</b> | <b>2 903</b> | <b>2 957</b> |

## Annex 2

### Difference between total employment of persons resident and working in Denmark in the NA and the WTA (NA less WTA). Figures in thousands

| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|------|------|------|------|------|------|------|------|------|------|
| 22   | 35   | 20   | -24  | -19  | -17  | 43   | 29*  | 27*  | 38*  |

\*Provisional figures