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MEASURING EMPLOYMENT IN NATIONAL ACCOUNTS¹

Submitted by Eurostat

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INTRODUCTION

1. Employment has traditionally been considered an auxiliary variable in national accounts, outside the core variables of the System. The place devoted to population and labour inputs in the texts SNA93 and ESA95 in a late and somehow detached chapter also reinforces this impression. However, the interest in productivity analysis has raised attention on the importance of measuring labour inputs in national accounts. Today users demand high quality employment data that can be put in relation to GDP and output measures in national accounts. In addition, users constantly (and increasingly) request explanations to reconcile national accounts labour inputs to other statistics measuring the labour market. The most important of these statistics is the labour force survey (LFS), but there are others like earning statistics, structural business statistics, population censuses, administrative registers of unemployment and employment, etc.

¹ This paper has been prepared by Arturo de la Fuente, Eurostat, and François Lequiller (OECD) at the invitation of the secretariat.

2. A first step in this direction is knowing more on how national accountants estimate employment. Although there is extensive literature on individual country practices, initiatives to gather information from several countries in a simultaneous and comparable way are scarce. OECD and Eurostat undertook the project of preparing a questionnaire about labour inputs in national accounts, gathering explanations about sources and methods for persons employed and total hours worked. Eurostat gathered the information from the European Union Member States and candidate countries, whereas OECD gathered it from other non-EU OECD country members. The questionnaires were sent during 2005 and early 2006. This paper presents the summary findings of a first analysis of these questionnaires. Eurostat and OECD will continue the discussion with the countries on the details of the questionnaire returns. One of the objectives is to use them as a basis for harmonised metadata information which will be made available to users. A possible model for presenting the metadata exists for Australia, Canada, France, Japan, Mexico, New Zealand, and USA (see annex II for the examples for France and Canada).

THE QUESTIONNAIRE RESULTS: COUNTRY PRACTICES

3. The purpose of the OECD/Eurostat questionnaire was gathering information on current practices for estimating employment in national accounts, measured both in persons and total hours worked. Due to space constraints, this paper will focus only on the estimation of persons¹ and the role played by LFS in this procedure.

4. The questionnaire was answered by 35 countries, as follows:

- EU member states: Austria, Belgium, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden and United Kingdom.
- EU candidate countries: Bulgaria and Romania.
- EFTA countries: Island, Norway and Switzerland.
- Other OECD member countries: Australia, Canada, Japan, Mexico, New Zealand and USA.

5. From the questionnaires, country practices to estimate persons can be broadly grouped as follows:

Group	Method	Countries
1.	Countries using LFS as their only source for employment in national accounts. LFS needs to be adjusted to align it to SNA93 or ESA95 (see section III below).	Australia, Canada, Cyprus, Estonia, Hungary, Ireland, Lithuania, Switzerland, United Kingdom
2.	Countries using mainly LFS, but replacing it in a few industries (or labour status), on a case-by-case basis.	Bulgaria, Greece, Latvia, Portugal, Romania
3.	Countries combining sources for labour supply and demand, LFS being one source among others. This group is rather heterogeneous and can be sub-divided as follows:	
3a.	Countries giving precedence to labour-supply sources (i.e. LFS).	Finland, Italy, Norway, Slovakia, Spain, Sweden
3b.	Countries not giving precedence to any labour side.	Austria, Germany

3c.	Countries giving precedence to labour-demand sources (i.e. employment registers and/or enterprise surveys)	Denmark, Malta
4.	Countries not using LFS, or making minimal use of it	Belgium, Czech Republic, France, Iceland, Japan, the Netherlands, Mexico, Poland and Slovenia, USA

Table 1

References to these groups 1-4 will be made in the rest of this document.

6. Some observations immediately strike the reader's eye: All in all, LFS is undoubtedly the most important single source to measure employment in national accounts. It would not be possible to create an equivalent table according to the use made of any other employment source. In spite of this, countries use LFS in rather different ways and to different degrees. There is no clearly dominant approach; moreover it is surprising how evenly the countries are distributed in the groups in table 1.

LFS PROS AND CONS

7. The distinctive use of LFS in countries is due to manifold reasons, including amongst others reliability of LFS results, existence of alternative sources, traditions in compiling national accounts, etc.

8. Countries in groups 1, 2 and 3a find the following advantages in LFS:

- It is a natural source for the labour market. There is hardly any other household survey with comparable periodicity and level of detail.
- LFS is in most countries a continuous survey that covers all the weeks of the year, hence capturing both seasonal employment trends and employment levels.
- LFS provides estimates usable for quarterly and annual accounts.
- It provides information on persons, jobs and hours worked. Frequently it is the only source for comparing (or transforming) persons to jobs (and vice versa).
- It captures better than other (single) sources the informal employment and the self-employment (but some countries argue that a suitable combination of other sources captures them better)
- It is reasonably harmonised within the EU countries and therefore it provides results comparable among countries.
- Other sources from the demand-side (e.g. enterprise surveys) shed light on the main activity of the employer instead of the activity of the employee, which demands further adjustments.

9. Countries in groups 3c and 4 put forward the following arguments against LFS or to give preference to other sources:

- They prefer to use for employment the same sources as for output and/or compensation of employees. It is worth noting that several countries estimate employment simultaneously and consistently with wages and salaries and/or output. This has several advantages in ensuring consistency, integration with adjustments for hidden output/income, etc.
- Sometimes there are other exhaustive sources considered more reliable (censuses,

employment registers based on employers' compulsory registration, administrative records on Government payroll, data derived from labour income tax records, integrated labour accounts, etc.)

- Other countries defend the principle of not to refer to one source only (i.e. LFS) but to take into account all available statistical information on employment.
- LFS is sometimes considered biased, particularly in some industries or for some labour status (employees). Many countries also find the industry breakdown from LFS not reliable enough. This applies even for some countries in groups 1 & 2. Examples are: Cyprus, Ireland, Portugal, Sweden, Slovakia, United Kingdom.
- A frequent criticism to LFS is that it is very sensitive to sampling error and to grossing up sampling results to the population. LFS includes in the sample (i.e. collects direct information from) about 1% of the persons in employment, whereas business surveys can collect direct information from some 50%, and registers/censuses can collect direct information from more than 95% of the persons in employment. In addition, in certain countries the quarter-on-quarter LFS evolution is found too volatile². Other countries feel that LFS underestimates marginal part-time employment.
- In some countries LFS is a recently introduced survey not tested enough, or it is only an annual survey underestimating seasonal employment.

LFS ADJUSTMENTS TO ALIGN WITH SNA93/ESA95

10. Although both LFS and SNA93/ESA95 follow International Labour Organisation employment definitions, there are some coverage and conceptual differences that must be adjusted before LFS results can be used in (or compared to) national accounts. This stands for any country using LFS irrespective of the group 1-4 they fall in. It is worth noting that national LFS may not cover the same populations, not even within the EU, and small coverage differences persist³. This means that LFS results in different countries demand slightly different adjustments, and these are not 100% comparable. Having said that, the following adjustments are reasonably common:

11. Firstly, differences in scope, in particular different geographical coverage, age boundaries and exclusion of some households.

- As for the geographical coverage, SNA93/ESA95 acknowledges two employment concepts: resident persons employed (i.e. the so-called national employment concept) and employment in resident production units irrespective of the place of residence of the employed (i.e. domestic concept). On its side, LFS inquires the resident households and hence gives information on the major part of the national concept, but national households living abroad usually are not covered, e.g. staff of national embassies working abroad and/or crews in national fishing boats. In practical terms, most of the national accounts analyses are based on the domestic concept because it is more adequate to put employment in relation to GDP (e.g. for productivity analysis). This means that LFS data must be adjusted, mainly for cross-border workers, for aligning to national accounts' employment.
- Regarding the age boundary, LFS usually excludes persons below 15 years old from the definition of employment (in some countries below 16 years old) and also persons above 75 years old. On its side, national accounts do not exclude individuals from employment because of age. An adjustment is potentially necessary although it is very small in developed economies, and it is listed here only for completeness; some countries consider it negligible or unnecessary because infant work is outlawed.

- In the majority of countries LFS leaves out of scope persons living in institutional or collective households.
12. Secondly, conceptual differences: SNA93/ESA95 and LFS have slight differences in the employment borderline, the most important ones being conscripts, unpaid apprentices and trainees, and persons in extended parental leave. Although they are not all considered as ILO-employed, they are within the SNA93/ESA95 employment borderline and mostly out of it (or simply not captured) in LFS. Appropriate adjustments are hence needed.
13. Finally, there are other differences that affect the borderline employees/self-employed while not influencing the total employment levels. For instance, sometimes owners of quasi-corporations must be re-allocated from self-employed (in LFS) to employees (in national accounts).
14. The size of these adjustments is modest, with the possible exception of conscripts and cross-border workers for small countries (see table in annex I). It is worth noting that hardly any countries listed there do make an adjustment for underground economy.

INDUSTRIES WHERE LFS IS REPLACED

15. Countries in group 2 and some countries in group 3a identified the industries where they replace LFS by other sources. There is a pattern in some of these activities, where a clear replacement is available. Some other activities vary from country to country.

- Agriculture: replaced by farm survey in Bulgaria and Greece
- Fisheries: replaced by farm survey in Greece, business register in Finland and social security data in Spain
- Mining: replaced by enterprise survey in Greece Romania and Spain and by a combination of business register and enterprise survey in Finland.
- Energy, gas and water distribution: replaced by enterprise surveys in Latvia and Spain
- Manufacture: replaced by enterprise survey in Greece, Romania and Spain
- Construction: replaced by enterprise survey in Spain
- Trade and HORECA services: replaced by a combination of business register and LFS in Finland
- Transport: direct inquire to big producers in Spain.
- Government: replaced by administrative sources in Greece, Finland, Latvia, Portugal, Romania and Spain.
- Financial services: replaced by administrative sources in Greece, Finland, Portugal, Romania and Spain.
- Other personal services: replaced by administrative sources in Finland

METHODS OTHER THAN LFS

16. Countries not using LFS (or using it as a non-predominant source) normally need to combine several sources, sometimes many of them, to ensure comprehensiveness of employment estimates. Some countries can not identify one single source as the main one. Frequently the integration process also includes adjustments to avoid double counting and to ensure consistency with other national accounts estimates (e.g. output, salaries), etc.

17. The data sources used are roughly the following:

- Employment register(s) either of mandatory registration by employers or based on social security records or related reporting systems. Countries in this group are the following: Belgium (integration of registers from several agencies), Denmark (combined with earning statistics and LFS), Germany (combined with household surveys, LFS), Malta (employment register combined with LFS), the Netherlands (integrated with survey on employment and wages) and Slovenia (combined with income tax declarations for self-employed)
- Tax records: Austria (combined with business surveys, microcensus and LFS) and Iceland
- Population Census: Italy (combined with business census, LFS and many other sources), France (combined with administrative data for Government) and Japan
- Business statistics, frequently integrating several surveys: Czech Republic, Mexico, Poland and USA.

18. The above list of sources is rather crude and does not really do justice to the labour intensive, sometimes very complex methods used in many of these countries. Space constraints do not allow explaining properly these methods. In almost all cases other secondary sources not named above are also used.

19. Other common observations are the following:

- Some countries use benchmark calculations (Germany, France, Italy, Japan), whereas others do not. In Italy and Japan, LFS plays an important role in the extrapolation of the benchmark calculation, and this role is different in the benchmark calculation and in the extrapolation.
- Normally there are small differences between the sources and methods for estimating employees and self-employed.
- Industry-specific sources are frequently used for agriculture, financial activities and Government.

20. In spite of the minor use made of LFS by the countries named above, almost all they use LFS at some point of their calculation, even if only for minor aspects or fine adjustments. Some areas where LFS is used are the following:

- To calculate ratios of full-time equivalents and to convert jobs estimates to persons estimates (or vice versa).
- To calculate adjustments for cross-border workers
- To estimate trends in self-employment.
- To calculate other adjustments for e.g. maternity leave and informal economy.

21. It is not surprising that the employment estimates of some of countries in groups 3b, 3c and 4 show considerable differences with LFS results. In some cases the employment levels differ by several million persons. This needs further study. However, the simple conclusion should be avoided that LFS results are biased or that national accounts estimates are wrong (or

both). It is not true either that countries in groups 1 or 2 have more accurate estimates simply because LFS 'confirms' their national accounts estimates.

CONCLUSIONS

22. A recent OECD/Eurostat questionnaire shows that LFS is used in very different ways and to very different extent in national accounts. The quantitative table in annex I gives a first picture of the size of the adjustments applied by national accountants in some countries. This kind of quantitative information will be part of the metadata which will be made available in Eurostat and in the OECD. Examples of possible standard notes are given in Annex II.

23. Overall, the transparency of the different adjustments applied to the original data source(s) in order to obtain the national accounts data for labour input is an important aspect of the credibility of the national accounts in this field. The OECD/Eurostat survey is a step forward in this direction.

¹ Some countries do not estimate persons, only jobs. Unless otherwise said, the term 'persons' in this paper denotes both kinds of estimates, and it is used as opposed to total hours worked.

² LFS experts in Eurostat hold the view that a better sampling design (particularly as for the sampling overlaps) would improve the results in countries suffering volatility.

³ This is so because the legal act that harmonises the LFS survey in EU countries only states that private households must be covered but leaves free choice for collective households.

ANNEX I: QUANTIFICATION OF ADJUSTMENTS LFS TO NATIONAL ACCOUNTS

The following table is compiled for countries using LFS as the only or main source for employment in national accounts. A similar table could be envisaged for countries identifying another main or single source for employment (e.g. business surveys), although the adjustments would be correspondingly different.

The table hereby summarises the sizes of the adjustments LFS-NA for available countries in groups 1 and 2. Several countries in these groups did not quantify these adjustments in their questionnaires.

	Australia	Canada*	Cyprus	Estonia	Hungary	Latvia	Lithuania	Greece*	New Zealand*	Portugal	UK*
Main source (LFS)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Conscripts	0.5%	1.0%	2.7%	0.5%	0.0%	0.2%	0.3%	0.0%	0.4%	0.4%	0.0%
Residents working abroad			- 0.9%	-1.0%	- 0.5%	-1.1%	0.0%	0.0%		-0.3%	0.0%
Non-residents working in territory			2.0%			0.0%				0.1%	
Other adjustments		1.1%	0.1%								
From persons to jobs		+5%							+4%		
Exclusion of unpaid absentee workers and self-employed with zero hours		-3.8%									
Replacement of LFS by other sources								-2.6%			
Total adjustments	0.5%	2.1%	3.9%	-0.5%	- 0.5%	-0.9%	0.3%	-2.6%	0.4%	0.2%	0.0%
National Accounts	100.5%	102.1%	103.9%	99.5%	99.5%	99.1%	100.3%	97.4%	104.4%	100.2%	100.0%

**Canada, Greece, UK and New Zealand are special cases because the national accounts data are presented in terms of jobs, instead of persons. In Canada and New Zealand LFS is measured in persons, hence creating a significant adjustment. In Greece and UK, LFS is jobs-based, as in national accounts, and no adjustment is done; the resulting lack of comparability is not visible in the table above.*

ANNEX II: EXAMPLE METADATA SHEETS

Canada: sources of employment and hours worked data in national accounts.

Generalities: the main source used is the Labour Force Survey, both for employment and hours worked. Dissemination of data on employment and hours worked is strongly coordinated in Canada, leading to exactly consistent measures in the Labour Force Statistics and Canadian System of National Accounts (CSNA). Measures of employment are conducted at a very detailed level (286 industries * 13 regions).

Main source for employment: Labour Force Survey (LFS). The survey is in terms of persons but as Canadian national accounts are compiled in terms of number of jobs, an adjustment is conducted for multiple job holders. As the LFS is not reliable for estimates at detailed industry level, Canada uses extrapolated Census data, benchmarked on aggregate LFS results, to derive the detailed estimates.

Adjustments conducted to main source for employment:

- From stocks to flows:

- From persons to jobs: Addition of +708 jobs for multiple job holders

- Economic territory: Addition of jobs to take into account territories not covered by the LFS (jobs in aboriginal reserves, military personnel, northern territories and civil servants working outside Canada). Exclusion of population (unpaid absentee paid workers, self-employed with zero hours worked) considered as employed in LFS but not in national accounts. They represent persons absent from work who were not paid during the week of the survey. They are excluded in view to make the job concept as consistent as possible with establishment surveys that capture only employment on payroll.

- Underground economy: No adjustment is made. The LFS is considered to include “grey” employment. No estimate is made of any employment corresponding to owner-occupied housing.

- Other adjustments: None

Main source for hours worked: LFS. The definition of hours worked in the survey matches closely the SNA/ILO definition of hours worked, so no coverage adjustments are necessary.

Adjustments conducted to main source for hours worked: There are only two technical adjustments: (1) Compilation of average hours per job, from LFS average hours per person, by cumulating hours of main job and other jobs and dividing it by total number of jobs. (2) Annualisation of LFS data: extrapolation of hours worked as reported in specific weeks of the month of the survey to other weeks of the month, taking into account civic and other holidays. This process is five steps: - first step: hours actually worked in the reference week are first adjusted for civic holidays and other non-random events, leading to “standardized LFS weeks”;

- second step: these standardized weeks are then extrapolated linearly between the reference weeks to obtain hours worked for all weeks of the year; - third step: civic and other holidays are now excluded, on an annual basis, taking into account specific holidays by

industries and regions; - fourth step: adjust the monthly data to take into account the fact that each month does not start with a Monday nor ends with a Sunday. Use of specialized survey on average number of hours worked per day of the week, by industry, to calculate daily weights that will be used to estimate the number of hours worked from the first day of each month to the last day of each month; - fifth step: monthly total hours worked is obtained by multiplying each month's average hours worked by the number of jobs during the reference week of that month; annual total hours is obtained by adding the twelve months; annual average hours worked is the obtained by dividing total annual hours by the annual average number of jobs in the LFS survey.

Canada, year 1999

I. Employment:

Number of employees and self-employed (official source: Labor Force Survey):	14531
<i>Adjustment to SNA concept of jobs:</i>	
Addition of multiple job holders:	+708 (+4.9%)
Inclusion of jobs in aboriginal reserves and military personnel:	+122 (+0.8%)
Inclusion of jobs in Northern Territories and civil servants working outside Canada):	+47 (+0.3%)
Exclusion of unpaid absentee paid workers:	- 415 (-2.8%)
Exclusion of self employed with zero hours worked	- 142 (-1.0%)
Total NA employment in terms of jobs	14851
(a) Of which employees	13169
(b) Of which self-employed	1682

II Annual hours worked per job

<i>Employees</i>	
LFS x 52 hours worked (persons)	1735.5
Adjustments to the SNA class of workers definition (persons) ⁴	1827.5
Adjustments to the number of jobs	1774.6
Adjustments for LFS reference weeks (civic and other holidays)	
(c) CSNA annual hours worked	1756
<i>Self-employed</i>	
LFS x 52 hours worked (persons)	1989.1
Adjustments to the number of jobs and to the SNA concept	1974.4
Adjustments for LFS reference weeks (civic and other holidays)	1804.0
(d) CSNA annual hours worked	1784

III Unobserved economy

IV Total hours worked

Employees = (a) * (c)	23 125 384
Self employed = (b) * (d)	3 000 537
Total	26 125 921
Implicit annual hours worked per <u>job</u>	1759

France: sources of employment and hours worked data in national accounts⁵.

Generalities: the method used in France to estimate labour input in national accounts distinguishes three domains: employees, self-employed, unobserved economy. It does not use the Labour Force Survey as an essential source, but rather administrative sources. The concept of full-time equivalent is used in the compilation process, but is not a headline figure for dissemination.

Main source for employment: (1) Employees: Census extrapolated with administrative sources (UNEDIC: unemployment agency) benchmarked on the Census. The Labour Force Survey is used only as a secondary source. The source is in terms of persons. It includes professional military. (2) Self-employed: obtained from various sources and benchmarked on population census. LFS is used to estimate partial time of self-employed.

Adjustments conducted to main source for employment:

- From stocks to flows: average of end quarters.
- Economic territory: Inclusion of employees of “department d’outre-mer” (+434 in 2001); exclusion of residents working outside the economic territory (Luxembourg, Germany Switzerland) (-260); inclusion of an estimate of non residents working in the economic territory (+20) and the non professional military (+10, general conscription –which was suppressed in following years).
- Underground economy: An estimate of full time equivalent number of “unobserved persons” is made (+376 in 2001): constant coefficients (consistent with those applied for production) are used to increase the number of employees of some specific industry (construction, cleaning, personal services and education).
- Other adjustments: No other adjustments are currently conducted.

Main source for hours worked: Employees: The method is not directly based on the Labour Force Survey, which is considered as too volatile. The method is in four steps: (1) using surveys on employers (quarterly for enterprises above 10 employees, annual for others, specific data for non market sector), compile data on proportion of employees at partial time, (2) using LFS, derive average ratio between a part-time job and a full-time job, (3) obtain a figure for full-time equivalent number of employees⁶; (4) calculate a theoretical number of weeks worked, taking into account holidays and annual leaves, (5) compile a theoretical number of hours worked per week, based on surveys on employers (known to be biased towards legal hours) and on adjusted LFS data for the non market sector; (6) derive a theoretical number of hours worked from the two prior steps; (7) introduce adjustments to take into account sickness leaves, temporary lay-offs and strikes. For self-employed, the method is based on the average hours for employees multiplied by a special quite significant adjustment for “overwork”, obtained from the LFS. For unobserved economy, the average hours is obtained as equal to the average hours of employees (excluding the adjustment for strikes).

Adjustments conducted to main source for hours worked: see previous paragraph.

Table 6: France: Year 2001⁷

I. Employees:

Number of persons (Census extrapolated by administrative sources):	22 306
+ employees of "Départements d'Outre Mer (DOM)" :	+434
<i>From national concept to domestic concept:</i>	
Exclusion of residents working outside the economic territory:	-260
Inclusion of non residents working inside the economic territory:	+20
Inclusion of general conscription:	+10
Number of declared employees, domestic concept:	22 510
<i>Calculation of theoretical total hours worked</i>	
Number of employees in full-time equivalent	20 857
x Theoretical number of weeks worked during the year	44.31
x Theoretical number of hours per week	36.61
=	
Total number of theoretical hours worked ⁸	33 866 000
<i>Adjustments to theoretical number of hours worked</i>	
Adjustment for temporary lay-offs	-14 000
Adjustments for strikes	-14 000
Adjustments for sickness leaves	-2 140 000
Total number of hours worked for employees	31 698 0000
II. Self employed	
Number of self-employed (including DOM)	2220
In terms of full-time equivalent	2168
Average annual hours worked (full time, adjusted for « overwork»)	2193
Total number of hours worked for self employed	4 755 000
III Unobserved economy	
Number of unobserved persons (full time equivalent)	376
Average annual hours	1531
Total hours unobserved economy	576 000
IV Total economy	
Total number of workers (at full time equivalent)	23400
Total number of hours	37 029 000
Implicit annual hours worked by worker at full time	1582
Implicit annual hours worked by worker (excluding unobserved economy)	1474

* * * * *

⁴ The hours worked per employee is revised up when Canada moves from the official LFS data to the number of persons as measured by the SNA because the former includes proprietors of incorporated business in its self-employed category while this population is moved to the employee category in the SNA classification.

⁵ This sheet was compiled from the French reply to the pilot questionnaire in June 2005. It does not take into account changes in methods introduced in the new "Base 2000" French national accounts. France replied to the final questionnaire in February 2006 including updated information.

⁶ This method understated the number of full-time equivalent because omitted to include ancillary activities. A change was subsequently introduced in the "Base 2000" accounts (see previous footnote).

⁷ This table does not include the significant changes made to the estimates in the latest version of the French national accounts (Base 2000), which was published in 2005.

⁸ The multiplication of the three above figures does not give the exact result, as this multiplication is done at a detailed level of industries.