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Topic 2: methodological issues: hours worked and hours paid
Item 2.3 of the agenda:
Measurement of hours worked in LCS and comparison with other sources in Luxembourg

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1) Background

The Labour Cost Survey (LCS) has been conducted in Luxembourg according to European regulations on a four-yearly basis since 2000. Since the beginning, it has served as the main source for hours worked and hours paid. The LCS covers local units with 10 or more employees in sectors B to S excluding O (Public administration), with 2 447 responding units in 2012. However, during the field work of the LCS, many firms complained about the fact that they had to fill in a lengthy questionnaire with data that - in their view - they had already given to other public administrations. Hours worked and paid must indeed be delivered monthly to the social security. But could this data be used for LCS purposes? As both the legislation for social security and for the National Statistical Institute have been modified during the last years, it seemed a good opportunity to analyse in how far this administrative source could be used to complement or even replace the questions in the LCS concerning hours worked and paid, in order to reduce the response burden of the enterprises. Another alternative source, at least for some sectors, is the Structural Business Survey. Finally, the Labour Force Survey also provides useful data on hours worked from the employee's perspective.

2) How are hours worked measured in the LCS in Luxembourg?

As the Labour Cost Survey serves as the main source of hours actually worked in Luxembourg, much effort had been put in the past into the LCS questionnaire in order to capture this variable as detailed and exact as possible. Therefore, as the Commission Regulation provides for the possibility of using the method considered to be "the most appropriate", LU opted from the beginning for a detailed questionnaire, asking the local units a maximum of data, from which the actual number of hours worked and paid would then be calculated by the Statistical Office.

The questionnaire asks for

- the average number of full-time employees
- the normal weekly contractual hours of a full-time employee, excluding overtime and main meal breaks
- the average annual number of days of holiday leave for a full-time employee
- the total number of days of special leave (for family reasons, moving, etc.)
- the total number of days of sickness and maternity leave
- the total number of days lost due to labour disputes, short-time working or technical reasons
- the total number of other holidays
- the total number of hours of overtime worked (paid and unpaid).

The number of hours actually worked is then calculated by the Statistical Office according to the formula:

Total hours worked = average number of employees * average weekly contractual hours * 52
              + total of all overtime hours - total of all days of absence converted into hours

This detailed method is however only applied for full-time employees, whereas the total number of hours worked and paid is simply asked for part-time workers and for apprentices, along with the average number of part time workers and apprentices, as these two categories historically represented but a small part of overall employment and a detailed approach was therefore deemed an unnecessary burden.

The detailed method used for full-time employees has the advantage that the local units provide many interesting details such as sickness leave, overtime hours, etc., which we would not get hold of if we were only asking for a total number of hours worked. It also allows us to compute the number of hours worked for those enterprises that do not keep track of that variable themselves. It also ensures that hours actually worked are defined and calculated in the same way for all local units. The drawback is that especially in small firms, the detailed information is not always available in the way it is asked for in the questionnaire. For example, providing the different reasons for an absence or making the split between the absences of full-time and part-time employees demands an extra effort of the Human Resource Department or its mandated accounting firm. One also has to admit that this method, while looking very accurate, however relies on averages that might not be fully adequate and for which we cannot be fully sure of the way they have been calculated by the local unit (even if they are given clear instructions on how to do so): the average number of employees, the average weekly "normal" working hours and the average annual number of holiday leave.

3) Alternative sources for the number of hours worked

In many phone calls or e-mails we received during the LCS fieldwork, local units complained that they had already submitted similar data to the **Social Security**, and that it meant a lot of work for them to recalculate it in order to make it fit into our questionnaire, because the splits or definitions were different. But up to the 2008 data collection, the data we could get from the social security records did not meet the LCS requirements.

In 2009, a new law restructured the social security system in Luxembourg, and with this reform, the employers had to provide more detailed monthly data to the social security administration. For example, before the reform, employers would typically report 173 hours per month as the normal, contractual working time each month. After the reform, this figure would have to be adapted to the real number of working days in that particular month. Also, employers would have to report the sickness leave of all employees, as well as separate data on overtime hours worked, which was not the case before the reform.

The **Structural Business Surveys (SBS)** also used to collect information on hours worked, but switched to using social security data a few years ago. So today, SBS is not an alternative source to social security data anymore and it can be dropped for our analyses.

The **Labour Force Survey (LFS)** could also be considered as an alternative source for hours worked. Being a household survey, it shows hours worked from the point of view of the employee.

National Accounts are not to be considered as an alternative source, as they built their figures on LCS and other sources.

4) Comparison of the LCS with other sources: methodology

So basically, this leaves us with only two alternative sources for the LCS on hours worked: social security records and the labour force survey. In Table 1, we briefly describe the main characteristics of these three sources and the way hours actually worked are collected or computed in order to highlight methodological differences.

Table 1: Main characteristics of the three sources for hours worked

	Labour Cost Survey (LCS)	Social Security	Labour Force Survey (LFS)
1) Timing 　a) periodicity 　b) reference period	every 4 years calendar year	monthly calendar year	permanently ref. week (* 52)
2) Coverage 　a) enterprises 　　i) NACE sections 　　ii) Size classes 　b) employees	B - N and P - S 10+ employees (= all persons who have a direct employment contract with the enterprise + remuneration)	All All employees (self-employed filtered out for comparability)	All All employees (self-employed and unpaid family workers filtered out for comparability) LU residents only
3) Hours worked 　a) Definition 　b) Are "hours actually worked" collected directly (Yes/No)?	aggregate number of hours actually worked by all employees during the year * full-time employees: No * part-time employees and apprentices: Yes	Definition is different, so a comparable number has to be computed (see below) No	Actual hours worked in the reference week by the respondent (HWACTUAL) Yes

In section 2, we have explained how hours actually worked are determined in the LCS. In the LFS, no computation is needed as the actual number of hours worked in the reference week is directly asked to the respondent. This number is then multiplied by 52 weeks in order to get an annual figure.

In the Social security data, the "regular hours worked" (A) include all absences paid for by the employer, but exclude absences paid for by social security. Overtime (B) is declared separately. So in order to have a comparable definition to that of the LCS, one has to add overtime to the regular working hours worked and subtract hours paid by the employer but not actually worked. The latter are of two kinds:

- absences due to sickness, family or accident reasons paid for by the employer (C). These are declared separately and can be subtracted.
- absences due to annual leave and public holidays (D). Unfortunately, these are not declared to the social security, so they have to be estimated using an alternative source.
  For that purpose, a correction coefficient is calculated using LFS data:
  $$c = \text{hours worked} / (\text{hours worked} + \text{hours of holiday leave})$$
  c has been estimated for several years and it appears that it is relatively stable in time.
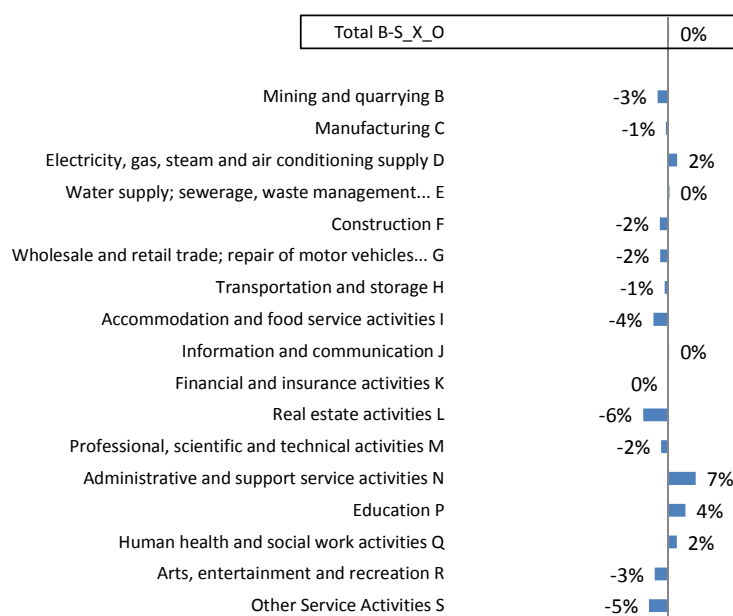 On average, c = 0.9. This figure seems plausible as it is close to the ratio of normal working days - legal holidays - legal annual leave to normal working days: $(260 - 10 - 25) / 260 = 0.87$. So we used this average figure to correct the number of hours worked obtained by the social security. (A similar correction is also applied in the SBS when using hours worked from social security records).

So finally:　　Hours actually worked = $(A + B - C) * 0.9$

5) Comparison of the LCS with other sources: results

The results obtained after adapting the **social security** data to the needs and definitions of LCS are overall very good. For 2012, the average number of hours worked was 1632 hours in LCS and 1634 hours according to social security data, so the difference is below 0.1% (**Graph 1**). While the results are also very similar in some sectors, such as the financial and insurance activities or the information and communications sector, there are however differences of up to 7% in some other sectors. The biggest difference is found in sector N (administrative and support service activities), of which the employment-related services make up the biggest part. Among these, especially the temporary work agencies show a big difference, where the social security figures are 10% higher than those found in the LCS. Other problematic sectors in the LCS are those, for which the number of observations is very small, but the type of activities covered is very diverse, such as sector B (mining and quarrying), L (real estate activities), and R (arts, entertainment and recreation). There is also a large difference in the education sector (P), where a methodological problem subsists, because the actually worked hours of teachers are difficult to assess.
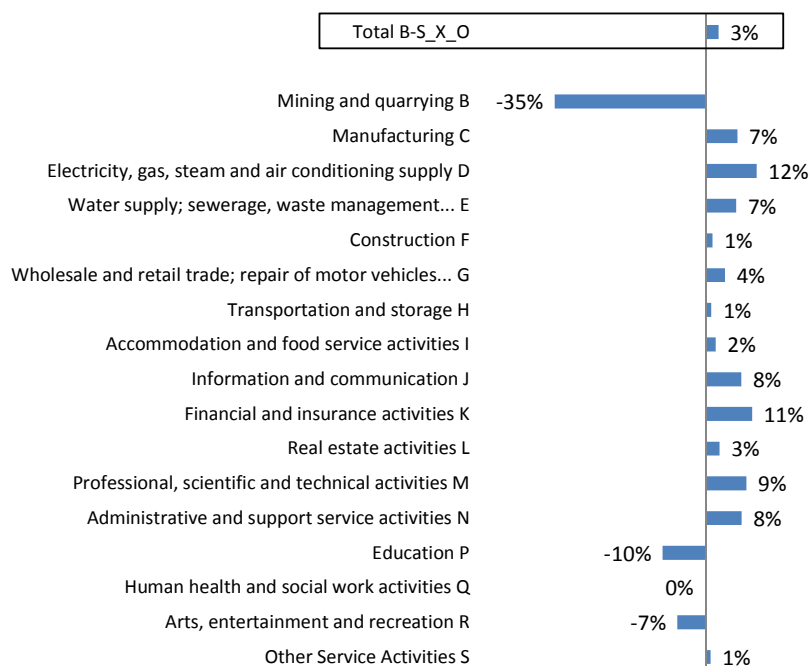
Graph 1: Difference in % between "Hours actually worked" according to Social security data and according to Labour Cost Survey, Luxembourg, 2012

Source: STATEC

The overall result when comparing hours actually worked according to the **LFS** with those obtained from the LCS is also quite good, with only a difference of 3% on average (1680 hours in the LFS and 1632 hours in the LCS). However, there are much bigger differences by sector (**Graph 2**). Many sectors (e.g. B, D, E, L, R) are problematic for sample size reasons in both surveys. Whilst the education sector yields a much lower working time on average in the LFS, the number of hours worked is higher for most sectors in the LFS as compared to the LCS. In some sectors, such as the financial and insurance services (K), the information and communications sector (J) and the professional, scientific and technical activities (M), this might be in part due to unpaid overtime that respondents in a household survey are more likely to report than local units in a business survey. More generally, LFS figures are subject to possible measurement errors (see below).

Graph 2: Difference in % between "Hours actually worked" according to Labour Force Survey and according to Labour Cost Survey, Luxembourg, 2012

Sector	Difference
Total B-S_X_O	3%
Mining and quarrying B	-35%
Manufacturing C	7%
Electricity, gas, steam and air conditioning supply D	12%
Water supply; sewerage, waste management... E	7%
Construction F	1%
Wholesale and retail trade; repair of motor vehicles... G	4%
Transportation and storage H	1%
Accommodation and food service activities I	2%
Information and communication J	8%
Financial and insurance activities K	11%
Real estate activities L	3%
Professional, scientific and technical activities M	9%
Administrative and support service activities N	8%
Education P	-10%
Human health and social work activities Q	0%
Arts, entertainment and recreation R	-7%
Other Service Activities S	1%

Source: STATEC

6) **Main methodological issues:**

a) LCS:
- The actual survey makes use of two different methodologies for full-time employees on one hand and for part-time employees and apprentices on the other hand.

b) LFS:
- There are some concerns about the quality of the self-declared number of hours actually worked. For example: in the questionnaire, hours usually worked and hours actually worked in the reference week are collected, and many respondents answer 40 for both, even if there has been an official holiday during the reference week.
- NACE sectors are self-declared or encoded ex post, based on the declared name of the employing enterprise, so splits into NACE-sections are subject to caution.
- As the LFS is a household survey, it covers only LU residents. However, 44% of all employees in LU are cross-border workers, and their working time profile might be different.

c) Social security
- The hours actually worked are not declared to the social security according to the definition used in the LCS, but have to be adjusted to take into account holiday leave and public holidays.

d) Unpaid overtime
- According to the definition of hours actually worked in the LCS, unpaid overtime should be included. However, it is questionable, whether this data is available in the local units.
- On the contrary, unpaid overtime is not declared to social security, so it is excluded from their data.
- In the LFS, the respondents declare paid and unpaid overtime hours worked, which are included in the overall hours actually worked. Unpaid overtime accounts for about 1.75% of hours worked on average. This could be part of the explanation, why LFS figures are higher than LCS figures in some sectors.

e) Education (P)

There are important differences between the hours actually worked according to LCS, social security data and LFS in this particular sector. Two main problems may explain these differences:

- The LCS only covers the private education institutions and sample size is small. The bulk of education institutions are however public, which are covered in the two other sources.
- In all three sources, all actual hours worked directly related to teaching should be considered (teaching in or out of the class, preparation and planning the course, marking, attending meetings and conferences related to teaching, …). However, it is not clear in how far this definition is actually applied by the respondents.

The measurement of hours actually worked (on an annual basis) in the education sector remains one of the most challenging methodological issues to be tackled in the future.

7) Conclusions, paths for further analyses

For social security data, we may conclude:

- Social security data on hours worked is now available in Luxembourg and could be used as an alternative source in order to reduce response burden in the LCS questionnaire.
- The correction that has to be applied for holidays using LFS seems to be acceptable.
- Social security data seems to fit the LCS well on average. In those sectors, where big differences appear, these might be due to the limited sample size in the LCS, which would mean that the social security records could be even a better source than the actual LCS.
- A remaining issue is that social security records do not cover unpaid overtime; but we are not sure whether it is covered in a satisfactory way in the LCS either.

As for the labour force survey:

- The LFS is not suitable as an alternative source for average hours worked per year if it comes to breakdowns by sector.
- However, the fact that the overall average is only 3% higher than in the LCS and the social security confirms the quality of these three sources.

Overall,

- We consider this exercise on "hours worked" an encouraging starting point. Additional analyses will have to be conducted, e.g. splitting down the data into full-time employees, part-time employees and apprentices and according to enterprise size.
- For the Labour Cost Survey 2016, we will further examine in how far the social security records could be used to replace other variables (such as remuneration) in order to reduce the response burden for the local units.