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Alain GALLAIS
head of unit "Goods and services synthesis"
of French national accounts department
tél : (00 33/0)1 41 17 37 34
fax : (00 33/0)1 41 17 37 37
e-mail : alain.gallais@insee.fr

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MEASURING HOURS WORKED IN FRENCH NATIONAL ACCOUNTS "BENCHMARK 2000"

(update of a former paper redacted by Paul-Emmanuel PIEL and exposed in Lisbon in October 2004 on "Benchmark 1995")

The National Accounts series on hours worked and employment by (homogeneous) branches are the result of a transition to the use of National Accounts concepts, far from raw data from administrative files and surveys. This report presents the current method known as "benchmark 2000", which brings several improvements to the former "benchmark 1995" method. It looks in passing at some of the shortcomings of the current method which will, where possible, be rectified when the next National Accounts method is implemented ("benchmark 2008" ?).

Our focus here is on *employment*, which is defined in the 1995 European System of Accounts as covering "all persons – both employees and self-employed – engaged in some productive activity that falls within the production boundary of the system."

Hours worked are broken down by *branches*. Each branch is notionally engaged in a "pure" "unique" "homogeneous" productive activity (ESA 1995 2.112); however, the branch in which an employee works may differ from the principal activity of a unit producing several goods and services. Sources are not broken down directly by branch, but by the activity engaged in by the relevant unit (i.e. establishment = local kind of activity unit or enterprise = kind of activity unit ESA 2.106), hence the need for a shift to branches. Both employees and self employed are also broken down by institutional sectors.

The three components of "hours worked"

Most of our detailed sources on working time relate to registered employees. Consequently, the most complex aspect of the exercise involves measuring the number of hours worked by registered employees in each branch. We then estimate the other components of hours worked, i.e. hours worked by the self-employed (mostly in agriculture), and hours worked in concealed employment (the black economy).

For each industry, the equation is therefore:

Hours actually worked =
hours worked by registered employees
+ hours worked by the self-employed

+ hours worked in concealed employment.

We shall now look at how each of these components is calculated, in three separate sections that vary in length.

1. Hours worked by registered employees

The annual number of hours actually worked by employees is not directly available[1]. The French National Accounts therefore take as their primary source the weekly number of hours worked.

Weekly hours worked feature in numerous surveys but can unfortunately vary significantly with the type of survey. Establishment surveys and administrative sources tend to give the legal, theoretical working week, but in France it is common to give the "normal" number of hours before and after legislation to reduce the working week, i.e. 39 hours falling to 35 hours. Household surveys, such as the Labour Force Survey (LFS, or in french "enquête emploi"), also give the usual number of hours in a normal working week (which is more or less the number of hours offered by employers and probably includes regularly occurring overtime); the figure is usually higher than that given by "enterprise" sources, and it fell less sharply when France shortened the legal working week. Household surveys also give hours actually worked, which include irregularly occurring overtime and exclude various absences from work (the "hours worked in the week preceding the survey" variable in the annual Labour Force Survey[2]).

Although the National Accounts seek to measure actual working time, the working-hours series in the Labour Force Survey is so volatile that, when the focus is on more detailed levels of the industry classification (see Ch.2), the *preferred measure is theoretical working time in enterprise surveys* when available. Consequently, the starting point for measuring working time in most branches is theoretical working time as declared by employers. This gives us *annual hours theoretically worked* which we then try *to adjust so as to get a clearer idea of annual hours actually worked*.

Actual hours worked by registered employees =
theoretical hours worked by registered employees
(-) annual adjustments for various absences and (+) annual adjustments for occasional overtime.

The theoretical number of hours worked is obtained with the following equation:

Theoretical hours worked by registered employees =
Number of registered employees expressed in "full-time equivalent" persons
x number of weeks worked
x theoretical weekly hours in a full-time job.

We shall look, in order, at the three factors involved in the measurement of theoretical hours worked (1.1). We shall then go on to review the adjustments for absences and occasional overtime (this last correction is an innovation of benchmark 2000) that give us the number of hours actually worked by registered employees (1.2).

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1 An annual survey by the Ministry of Labour directorate DARES has attempted to estimate this, but the survey is about to be dropped and has been too shortlived to serve as input for the National Accounts.

2 This survey was in use until now but has just been replaced by a continuous Labour Force Survey.

1.1. Calculating the theoretical hours worked by registered employees

The theoretical number of hours worked by registered employees is the product of three factors : numbers employed in full-time equivalent persons (FTE) (1.1.1), number of weeks worked (1.1.2) and theoretical weekly hours worked in a full-time job (1.1.3).

1.1.1 Numbers employed, expressed in full-time equivalent persons

Employment has to be broken down by branches and institutional sectors. Our primary source, based on comprehensive census data (the latest was in 1999), gives a headcount of persons in employment, with no double counting, by establishment sector, but without any breakdown by institutional sectors.

Within the framework of the "Benchmark 1995" method, we started from those series by "establishment sectors" (= "industries" according to ESA 2.106) and turned them into series broken down by (homogeneous) branches, then we split each branch between institutional sectors, and finally we added up what belonged to an institutional sector in all the branches to get the total employment of that institutional sector. As a matter of fact output, wages, domestic product, and most of the estimates of the national accounts, especially Value Added start with an institutional sectors' approach and split then each institutional sector into branches.

One of the major improvements of the new "benchmark 2000" method is to follow that order (institutional sectors, then branches) in assessing the level of employment in sector S13 "General Government" and its sub-sectors.

But apart from "General Government" we had to maintain the "benchmark 1995" order (branches first, then institutional sectors)". Starting with a headcount of persons in employment by "establishment sector", we calculate the headcount by "enterprise sector", then we use data on part-time work to obtain employment by enterprise sector in full-time equivalent persons. Finally, we use a source giving a breakdown of each enterprise sector by branches to estimate the numbers employed by branch, expressed in full-time equivalent persons. At the last stage, after a few adjustments in order to reconcile those series by branch and what the specific processing of the "General Government" entails for branches as "Education", "Health and social work" or "Public administration", we split what remains in each branch (out of General Government) between the institutional sectors others than "General Government"

A specific processing for "General Government" and its sub-sectors

A public body, the "Observatoire de l'Emploi Public" ("Public Employment Observatory"), provides a synthetic table about the level of public employment broken out by the kind of contract of employment, and the extent of Governmental control. By merging the elementary data used for calculating this synthetic table with National accounts conventions on classification by sub-sectors within "General Government", we estimate employment in "Central Government" (S1311), "Local Government" (S1313), and "Social security funds" (S1314), apart from hospitals. For Central Government, our merging by budgetary rows ensures us of full consistence between wages and employment by branches. For the other sub-sectors, used at a fine detail (kind of public authority), we use similar ventilation between wages and employment. The level of employment in hospitals given by the synthetic table is adjusted to suppress double counting entailed by the fact that many doctors of the private sector have one or two jobs (half a day or one day a week) in Public hospitals. The Full Time Employment is calculated thanks to Civil servants pay slips statistics and data derived from the Labour Force Survey.

Employment by establishment sectors, based on census data

Some initial work done by INSEE (the French national statistical institute) outside National Accounts framework provides series on the employed population in metropolitan France and the overseas *departments*, in the form of a headcount based on comprehensive population censuses when they exist (e.g. 1990 or 1999), with no double counting and no distinction between market and non-market sectors. The figures are broken down according to the principal activity engaged in by the *establishment*. Between the points measured by the census years, the series are updated every year using employment trends obtained from unemployment insurance institutions, and additional data (employment by domestic firms, government pay files, local authority surveys). Contrary to the practice in some other countries, employees are counted only in the sector of the establishment in which they are principally employed.

Two types of series are published, one on employment at 31st of December broken down into 114 activities, and the other one on end-of-quarter employment, which gives a better approximation of average employment over the year, but only for the non-farm market sector and with a breakdown not exceeding 30 activities. We use this information to approximate an annual average (half sum of employment at 31st of December in agriculture and non-market sectors, more accurate owing to end-of-quarter data for the non-farm market sector). For 2001, the figure at this stage was 22.740 million employees.

To convert these initial estimates of the employed population into employment in the National Accounts sense of the term, we subtract residents working outside the economic territory (some 260 000 people in 2001), then add non-residents working within the economic territory and seasonal workers (some 20 000), together with conscripted armed forces (just over 10 000). These data are derived from various sources, including population censuses and data from ASSEDIC (unemployment insurance), health insurance funds, DADS (annual social welfare declarations), and the International Migration Office. The phasing-out of conscription (classed under public administration), with the numbers declining from 200 000 in 1995 to 0 in 2002, has had a significant impact on trends in per capita wages and productivity in government branches over the transition period.

From this stage onwards in the measurement process, there is no further change in the total headcount of persons in employment (22.510 million in 2001). The sole purpose of the operations described below is to give a breakdown by branch and by institutional sector, and measure employment in full-time equivalent jobs.

The transition to enterprise sector

At this point employment is still broken down by *establishment* sector, whereas National Accounts are published by branch. Hence the need to shift from "establishment sectors" to "branches". This is not done directly but in two stages. The shift from establishment sectors to branches can only be made using the *Système intermédiaire d'entreprise* or SIE (intermediate enterprise system) which collects data gathered from annual enterprise surveys (*Enquêtes anuelles entreprises*, or EAE) and tax information, and gives an branches distribution of full-time equivalent employment in *enterprises* (in fact the only sector of the economy in which this issue arises is manufacturing industry because employment in other branches of the economy is broken down in proportion to turnover). As the SIE only allows a conversion from the enterprise sector to branches, there must first be a *shift from establishment sector to enterprise sector*. The transition to enterprise sector involves the use of administrative data on unemployment insurance (to attach each establishment to an enterprise) and the SIE (to give each enterprise a main activity in line with the National Accounts classification, in which value added is measured from the SIE).

The transition from a headcount to jobs in "base 2000"

Some people have more than one job. The "benchmark 1995" method overlooked secondary employment, except in farming where the Ministry of Agriculture provides a direct estimate of FTE employment that takes full account of multiple job holding. A major improvement of the "base 2000" method is the better tackling of the problem of multiple job holding. The international comparability of the series is thus improved. Indeed, by multiplying the number of people whose main job (and not secondary job) was in a given industry by a factor taking into account part-time job, we overlooked part-time secondary jobs. The new method goes through an additional stage : the transition from persons without double counting to jobs (with double counting). This transition is calculated using compulsory DADS declarations completed by enterprises which provides an identifier for the person and another for the job.

The transition from jobs to full-time equivalent persons

By this stage, employment is broken down by enterprise sector and expressed as a number of jobs. Shifting to full-time equivalent persons requires data on part-time work from a variety of sources. For the non-farm market sector, the share of part-time employees is derived from two Ministry of Labour "enterprise" surveys. One is quarterly and covers enterprises with over 10 employees, while the other is annual and covers enterprises with under 10 employees. The average ratio of hours worked in a part-time job to hours worked in a full-time job is estimated from the Labour Force Survey, irrespective of activity.

For employees working outside the non-farm business sector, several sources are used depending on the activity, including the Labour Force Survey, internal civil-service sources, compulsory DADS declarations completed by enterprises, and annual statistics on healthcare institutions.

Full-time equivalent employment is then calculated by enterprise sectors to give overall employment in full-time equivalent persons. For 2001, for instance, the FTE figure was in benchmark 1995 21.056 millions, or 93% of the employment headcount. With the new benchmark 2000, this figure has been revised upwards to 21.840 millions, as the previous method overlooked secondary employment (except in farming where the Ministry of Agriculture provides a direct estimate of FTE employment that takes full account of multiple job holding).

The transition to branches

The FTE employment series in "enterprise sectors" are then broken down in branches, for each of the 108 activities concerning non-financial corporations and individual enterprises in the National Accounts nomenclature. We do not forget to remove the numbers employed in "General Government" that we have calculated before. The numbers employed in non-financial corporations and in individual enterprises are converted into branches using a branch/sector matrix from the *Système Intermédiaire d'Entreprises*[3]. An innovation has been introduced with "base 2000". When calculating the numbers employed in a given branch, we assume that the ratio 'employment divided by output' is a constant of the branch, and not , as was implicitly assumed before, a constant of the enterprise sector. As this ratio, which is the inverse of a labour productivity measurement, is usually higher in services than in more capitalistic industry, we obtain a stronger adjustment from services to industry, than with the former "base 1995" method. For the enterprise sectors that are not included in the 108 "non financial corporations" and "individual enterprises" activities, we assume that there is no discrepancy between enterprise sector and branch, so there is no transition from sector to branch.

[3] The impact of shifting from sector to branch is far from insignificant for the evolutions. There are two impacts : this of the fixed transition matrix structure and that of changing the matrix structure.

Reconciling the specific processing for "General Government" and the series by branches

What the specific processing for the "General Government" institutional sector, mainly based upon administrative data, entails for branches/industries as "Education", "Health and social work" or "Public administration", is not necessarily consistent with what we we obtain in the series by establishment sectors whose first source is the Census. So, a few adjustments to the series by branches/sectors are needed in order to achieve consistency.

We split what remains in each industry (out of the "General Government" S13 institutional sector) between the institutional sectors other than "General Government". In Non Profit Institutions Serving Households however, an institutional sector which is calculated as a balance, the breakdown between branches is not consistent with the NPISHs Account, so we reallocate employment in this institutional sector to achieve consistency with wages.

By this stage, we have an FTE employment series by branch and by institutional sector.

1.1.2 Number of weeks theoretically worked

The theoretical number of weeks worked is obtained by dividing by 5 the number of days worked in a full-time job[4]. The number of days worked, for an employee who does not work on Saturdays nor Sundays, is the number of working days that do not fall on Saturdays or Sundays, minus the number of annual leave days. The number of working days that do not fall on a Saturday or a Sunday varies from year to year. In France, unlike other countries, the impact of the calendar is important, as public holidays falling at the weekend are seldom made up. The initial approximation is further refined to cover week-end working, which is usual in some industries (particularly trade). Using the Labour Force Survey, we estimate the share of employees in each activity who take two days off per week other than the normal pair (Saturday and Sunday) and then recalculate the number of days worked in that pair pattern. Finally, we work out the average for these different estimates of days worked, weighted by the percentages associated with each weekly pair of days off. The number of days worked can have a significant impact (from +0.2 to +0.4 percentage points of the rate of growth in hours worked in 2001, and from -0.6 to -1.3 in 2000, depending on the activity).[5]

The number of days of leave per industry is derived from a one-off survey by the Ministry of Labour in 1990. When France shortened the working week, many firms combined the reduction in weekly hours with an increase in the number of days' leave. On the face of it, retaining an estimated number of days' leave that refers back to the situation prior to the working time reduction is therefore debatable. In the survey providing data on the theoretical working week, however, those employers who did combine a reduction in weekly hours with an increase in leave merely stated that they had moved to a 35-hour week. Thus we would be double counting part of the working-time reduction they achieved by increasing leave, whereas this alternative way of shortening the working week has already been counted in the declared weekly working time.

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4 Working all year round, since employment is given as an annual average.

5 However, there is no certainty that the loss of 2 or 3 days' leave generates a real increase in hourly productivity, as overtime can only be measured very imperfectly. According to a recent Ministry of Labour survey, regularly occurring overtime is apparently included in usual working time, whereas very little is known about irregularly occurring overtime because responses for the "overtime" variable that should provide an estimate are very incomplete and therefore unusable.

1.1.3. Theoretical working week in a full-time job

"Enterprise" working week in most sectors

At present, measurement of the theoretical full-time working week is based mainly on the two "enterprise" surveys by the Ministry of Labour mentioned earlier. The full-time working week in enterprises with over 10 employees is measured as an annual average based on "end-of-quarter" figures from the quarterly survey. That of enterprises with under 10 employees is derived directly from the annual small-enterprise survey. In both cases, this means the collective number of hours as declared by employers. Irregularly occurring overtime is excluded, whereas regularly occurring overtime would appear to be included (in fact, a specific estimation of occasional overtime is made afterwards.) Using data from the statistical departments of unemployment insurance funds, together with data on part-time work, we obtain the proportion of full-time employees in "large" and "small" enterprises, weightings that can be used to work out the theoretical average full-time working week.

Hours declared by employees : a few sectors only

The two Ministry of Labour surveys are confined to the non-farm market sector, however. The usual average number of hours worked in a full-time job in agriculture, social welfare and public administration are obtained from the Labour Force Survey. However, the Labour Force Survey, which is a household survey, tends structurally to overestimate hours worked compared with "enterprise" surveys (by around 2 hours, depending on the industry). By comparing working times derived from surveys on common activities in the non-farm market sector, we can adjust the "Labour Force Survey" hours to make them comparable with "enterprise survey" hours.

Adjusting the measurement unit following the move to a 35-hour week

With the move to the 35-hour week, the schemes known as "Robien" and "Aubry 1" prohibited any change in the definition of working time[6]. However, many firms that had not received any relief (because they went without, or because of the second wave of legislation known as "Aubry 2") did change the definition of working time. Thus rest periods, dressing time and travel time, for instance, were excluded from the measurement of actual working time, which facilitated the purely nominal reduction in working time, but the actual reduction (with no change in the measurement of working time) was lower than the nominal reduction. Without an adjustment in the number of hours declared by enterprises, the National Accounts series, expressed in a different "unit" before and after the move to the 35-hour week, would not have been consistent over time. By taking as a basis the two one-off DARES surveys estimating the ratio of the effective to the nominal (declared) reduction, it is possible to adjust the declared number of hours prior to the introduction of the shorter working week so as to ensure that the measurement unit remains homogeneous[7].

6 French laws on the working-time reduction take their names from the Ministers concerned, Mr. de Robien and Mrs Aubry.

7 Two one-off surveys by the Ministry of Labour suggest that, for enterprises not having committed to maintaining the definition of working hours with the advent of the shorter working week, the nominal shift from a 39- to a 35-hour week (a fall of some 10%) would actually generate a real reduction of 6 to 8% (depending on the year). The National Accounts thus reflected only some 80% of the reduction in declared working time in 2000.

1.2 Adjusting for occasional overtime and absences enables the transition to annual hours actually worked by registered employees

The source for occasional overtime is given in annual hours by full time job. The source used for the other adjustments is in days. To convert to weeks, we divide by 5 for working days and by 7 for calendar days. The figure is then converted to hours by multiplying the number of weeks by the number of hours in the theoretical working week.

1.2.1 Adjustment for occasional overtime

The Ministry of Labour gives us an estimate of annual overtime for a full time job in over 10 (employees) firms, based on its quarterly survey for the over 10 firms. For firms with less than 10 workers, the specific annual survey is of no use since it does not include a question about overtime. We use once again the quarterly survey for the over 10 firms, assuming that overtime bu full time job is the same in firms with less than 10 workers that in firms with 10 to 20 workers. Indeed the legal scheme for Working Time reduction is the same for all firms whose staff numbers under 20. The integration of occasional overtime improves the comparability of our estimates with countries whose main source is the Labour Force Survey. We do not have any reliable data about unpaid overtime, even if it is certainly widespread amongst executive staff. The LFS may be used, although this would induce a rather puzzling volatility problem, and it is not clear whether those hours are widely taken into account by other countries or not.

1.2.2 Adjustment for short-time working and bad weather

The Ministry of Labour provides us with the total number of days paid for short-time working. This is broken down by sector using ex-ante applications for the relevant payments, when a sectoral distribution is available. A support fund specific to the building and public works sector tells us how many days were lost through bad weather. This adjustment has little impact.

1.2.3 Adjustment for strikes

The Ministry of Labour takes count of the number of days lost through strikes in local disputes. Occasionally we also use statistics from the Civil Service Directorate-General, together with the social responsibility reports published by some of the country's major companies. Data on nationwide disputes come from labour inspectorates, which are unable to give an industry breakdown ; for the time being they are broken down by branches using a set formula. Apart from the energy and transport sectors, where the effect of this adjustment on the rate of growth in hours worked can exceed 0.1 percentage point, the adjustment has little impact.

1.2.4 Adjustments for sickness, maternity and work accidents

Days lost through sickness, maternity and work accidents are measured using statistics from several special insurance schemes and the general social security system. The leading special scheme is the *Mutualité sociale agricole* (agricultural social insurance) which provides information on living allowances for those on sick-leave, together with statistics on other risks. The general system is covered by the CNAMTS (*Caisse Nationale d'Assurance Maladie des Travailleurs*, or workers' health insurance fund), which, except in the case of work accidents, now provides only a total for each type of risk instead of an industry distribution. Maternity statistics are broken down in proportion to female employment, while the number of living allowances paid out for sick-leave under the general scheme is broken down using a set formula based on a Ministry of Labour survey dating back some time. There has been a sharp rise in the number of living allowances paid out for sickness in recent years, with a 6% rise in 2001 and over 8% in 2002. This is having a noticeable impact on the rate of growth in hours worked which in 2002, for instance, fell by 0.6 percentage point.

2. Volume of hours worked in self-employment

2.1 Measuring self-employment

Self-employment figures are also census-based. Trends are estimated from a variety of sources published by social insurance bodies, including retirement pension funds and mutual insurance companies. There is no transition from sector to branch for the self-employed. Full-time equivalent figures are worked out using data on part-time work from the Labour Force Survey.

In the specific case of agriculture, where multiple job holding is widespread, we make direct use of a full-time equivalent estimate of self-employment from the Ministry of Agriculture's statistical services (as we do for dependent employment, see above).

2.2 Measuring additional hours worked by the self-employed

Without special surveys, it is very hard to estimate the number of hours worked by the self-employed. The hours worked in dependent employment gives us the average annual number of hours actually worked. This number we adjust for the effect of strikes and multiply by a factor that adjusts for the additional hours worked by the self-employed compared with dependent workers, as derived from the Labour Force Survey. To allow for the fact that the self-employed are not well represented in the survey in most sectors, and to avoid excessive volatility, this factor must be calculated at a highly aggregated level of the nomenclature. The impact is far from insignificant in the farming sector, where self-employment is common. The impact on the rate of growth in hours worked in agriculture (dependent employment plus self employment) was 3.4 percentage points in 2000, a year when the additional hours worked by the self-employed reportedly rose by 5% according to LFS.

The annual number of hours actually worked by the self-employed is then multiplied by the number of full-time equivalent self-employed to obtain the estimated number of hours worked by the self-employed.

3. Hours worked in the black economy

3.1 Estimated number of hours worked in the black economy: set rates

In the National Accounts as they currently stand, measurement of full-time equivalent jobs in the black economy is based, for most industries, on the proportion of unregistered employees set for "benchmark 2000" as a whole. These constant rates, which depend on the branch, are multiplied by the total number of registered workers, both dependent and self-employed, in full-time equivalent persons. For 2001, the figure for the black economy stands at around 180 000 workers, mainly in the building industry, cleaning, personal services and education.

Unregistered childminders and cleaners are subject to special treatment. The National Accounts estimate the gross unrecorded wage for cleaners and childminders, then assume that the average unrecorded wage is the same as the average recorded wage. In 2001, an estimated 200 000 persons worked unregistered in these two fields.

3.2 Difficulty in measuring the number of hours

To measure the number of hours worked in concealed employment, we take the average number of hours actually worked by a registered employee, as for the self-employed. We then simply adjust for strikes, then multiply the adjusted number of annual hours by the number of full-time equivalent workers in the black economy.