Instituto Nacional de Estadística

Measurement of the effect of methodological changes on the Structural Business Statistics 2016

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Index

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I. Introduction

The INE, with the publication of the data corresponding to 2016, completes the integration project of the structural business statistics that has been extended during the years 2015 and 2016.

The integration project is based on an integrated questionnaire for all economic sectors, an efficient treatment in the sample design that allows for better use of administrative information, the joint and simultaneous collection of the three sectors of study, the homogeneous treatment of information and a simultaneous dissemination of all sectors. In addition, in accordance with the strategic lines for the National Statistical Plan 2017-2020, it has been sought to reduce the burden on respondent units by simplifying the questionnaires, adapting them to the Company Account Models and making more extensive use of administrative records.

The draft was submitted for opinion to the High Council on Statistics on 29 September 2015 and received a favourable opinion on 18 February 2016.

In 2016, the methodological changes introduced, both those related to the sample design and those arising from the use of administrative records in the estimation of employment-related variables, have an effect on the estimates. As a consequence, the evolution reflected by the variables in relation to the previous year is due not only to possible real changes produced in this period but also to the impact of methodological improvements on the estimation of the variables.

The objective of this document is to quantify these effects so that the user has additional information when interpreting the variation rates.

II. Changes in the estimation processes of the Structural Business Statistics.

The changes produced in the design, in terms of the determination of the comprehensive companies, stratification, allocation and estimator used (see details in the section on sample design in the SBS 2016 methodological document available on the INE website at the following link: http://www.ine.es/metodologia/t37/metodologia_eee2016_en.pdf), are intended to improve the accuracy of the estimates and therefore their effect is shown in the comparison between the variances of the estimates in 2016 with those corresponding to 2015.

On the other hand, the improvements made to reduce the bias have an effect on the estimates, which needs to be assessed when comparing the results for 2015 and 2016 in a homogeneous way.

There were two improvements: first, the treatment of active units that did not respond to the survey, because they refuse to collaborate or because they could not be located during the collection period, and second, the treatment of registrations and de-registrations.

The following subsections describe the changes introduced in the estimation process of the Structural Business Statistics 2016 whose effect is to be measured, and then present the comparison for the most relevant variables.

To measure the effect of these changes, the estimates of the totals of the main variables (number of companies, employed persons and turnover) are calculated without taking into account the two improvements described above and compared with those published in the Survey.

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1. Methodological changes

The most relevant changes to be measured are as follows:

Imputation of active companies that do not respond:

The active companies that do not respond are those that have refused to cooperate or have become unlocatable after completing the information collection. These companies are part of the target population but but no response has been received from them.

In the SBS 2015, the treatment for medium and small enterprises that did not respond because they were unlocatable or did not exist was their re-weighting within their stratum. This treatment was equivalent to 'imputing' the data of these companies by the mean of those responding in their stratum.

In the SBS 2016, data on employees and turnover of these companies are obtained through the information from administrative files, and are therefore imputed to their true value and the rest of the variables are imputed on the basis of these values.

This change, which was made possible by improved access to administrative files, was necessary because it was found that non-existent or unlocatable companies had on average a lower turnover than the companies that responded in their stratum.

Treatment of de-registrations and registrations.

The framework of the SBS is the Central Business Register CBR. When selecting the sample for the SBS for the year 't', the CBR refers to the companies existing as at 1 January of that year 't'.

In the SBS 2015 the treatment for estimating the number of companies registered during the year ‘t’ differed according to the economic sector:

- The SBS 2015 in the trade and services sectors was conducted on the assumption that definitive closures would compensate for new registrations and therefore they would not deflate the estimated population of companies, so that registrations were not taken into account.

- On the other hand, the SBS 2015 for the industrial sector did consider the companies registered in the Register during the year 't', so that the definitive de-registrations were also taken into account to deflate the population.

The SBS 2016 unifies this treatment in the three sectors in a manner similar to that used in 2015 for industry. In addition, the registrations of 20 or more employees are imputed in a similar way to the non-response (the data on employees and turnover are obtained through the information from administrative files, so they are imputed to their true value and the rest of the variables are imputed on the basis of these values) and the remaining registrations are re-weighted, taking into account the number of months of activity of the company for the economic variables.

As in the previous case, this change makes better use of administrative information and brings us closer to the actual data.

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2. Measurement of the effect of changes in the estimates

In order to be able to compare the data for 2015 and 2016 in a homogeneous way, the totals of three main variables have been estimated (number of companies, employed persons and turnover), not only by the new method, but also by the method that does not take into account the improvements that reduce the bias, which is called the previous method.

Table 1 shows, by activity section, the variation rate between the two estimates, calculated as follows:

$$TC = 100 \times \left(\frac{\hat{Y}_{nuevo16} - \hat{Y}_{anterior16}}{\hat{Y}_{anterior16}}\right)$$

Where:

$\hat{Y}_{nuevo16}$: Total estimated for variable Y in 2016, with the new methodology applied in the SBS 2016.

$\hat{Y}_{anterior16}$: Total estimated for variable Y in 2016, using the previous methodology.

Tabla1. Tasa de variación de los totales estimados, según la metodología nueva respecto a la anterior. En porcentaje

	Número de empresas	Número de ocupados	Cifra de negocios
TOTAL	**11,06**	**-0,18**	**0,29**
B Industria extractiva	0	-1,34	0,41
C Industria manufacturera	0,00	-1,01	-0,31
D Suministro de energía eléctrica, gas, vapor y aire acondicionado	0	-0,28	-0,08
E Suministro de agua, actividades de saneamiento, gestión de residuos y descontaminación	0	-0,21	-0,29
G Comercio al por mayor y al por menor; reparación de vehículos de motor y motocicletas	10,7	-0,55	0,70
H Transporte y almacenamiento	7,26	-0,57	1,12
I Hostelería	14,73	1,28	0,28
J Información y comunicaciones	13,25	-0,61	0,35
L Actividades inmobiliarias	11,55	3,00	-0,93
M Actividades profesionales, científicas y técnicas	9,84	-1,26	-0,19
N Actividades administrativas y servicios auxiliares	19,90	0,25	0,59
R Actividades artísticas, recreativas y de entrenamiento	16,80	-1,35	-0,37
S Otros servicios	15,73	3,72	2,17

In general terms, it is observed that the most important effect is presented in the estimation of the number of companies, in the trade and services sectors, as was expected due to the change in the treatment of registrations and de-registrations.

With the new methodology, applied in 2016, 11.06% more companies are obtained for the total number of sectors than those that would have been obtained if the previous treatment applied in 2015 had continued. In the case of Trade and Services it increased to 12.06%.

Table 2, which shows the impact by size of the companies on the total for Trade and Services, shows that the largest increase for the variable number of companies is presented

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in the size group of 0 employees.

Tabla 2. Tasa de variación del total estimado de empresas según la metodología nueva repecto a la anterior para los sectores de Comercio y Servicios. En porcentaje

	Número de empresas
TOTAL Comercio y Servicios	**12,06**
0 asalariados	17,68
de 1 a 49 asalariados	5,92
50 o más asalariados	0,95

On the other hand, the effect of the changes increases the total turnover estimate by 0.29% and reduces the estimate of the total number of employees by 0.18%.

In the Excel file available in this same section of INEBASE, we present the totals and variations thereof for the number of companies, employed persons and turnover, broken down by Autonomous Community, division and activity group. In the case of Industry, only the totals of employed persons and turnover are presented.

III Changes in the estimation of employment-related variables

Following the strategic lines of the National Statistical Plan 2017-2020, the integration project of the structural economic statistics has made more extensive use of administrative registers. One of these examples has been the use of Social Security registers for the estimation of employment-related variables.

The following subsections describe the changes in the estimates of these variables, which until 2015 were based exclusively on the information provided by companies in the questionnaires and from 2016 onwards they are a combination of the information in Social Security registers, data from the Quarterly Labour Cost Survey and that provided in the questionnaires. In addition, a measure of the impact of this change has been provided.

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1. Methodological changes

Until 2015, employment-related variables were estimated directly using the information requested from companies in the questionnaires. The questions were different in the Industry, Trade and Services sectors.

In the case of Industry, as can be seen in the following table, the average number of paid and unpaid staff and the total hours worked in the year were requested to calculate the full-time equivalent paid staff.

2. Personas ocupadas y horas trabajadas

Personal ocupado	Nº medio de personas ocupadas en el año	Total de horas trabajadas en el año (por el conjunto de los trabajadores)
Personal no remunerado	201	202
Personal remunerado	203	204
Total	205	206

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For Trade and Services companies, information was requested on the average number of paid and unpaid staff for each of the four quarters and the number of full-time equivalent paid employees in the reference year.

E.2 Personal ocupado de la empresa por trimestres durante 2014 (número medio)

	Nº medio 1º trimestre	Nº medio 2º trimestre	Nº medio 3º trimestre	Nº medio 4º trimestre
1. Personal no remunerado				
2. Personal remunerado				
Total				

E.2.1 Personal remunerado (asalariado) equivalente a jornada completa durante 2014

Un asalariado que trabaja todo el año a jornada completa se contabilizará como 1. Los asalariados que trabajan **menos** del **horario normal** de un trabajador a **jornada completa** que trabaja **todo el año** deben convertirse en **equivalentes de jornada completa**. Así, por ejemplo, si trabaja todo el año media jornada se contabilizará como **0,5**, si trabaja 3 meses a jornada completa se contabilizará como **0,25**, si trabaja 6 meses a media jornada se contabilizará por **0,5 * 0,5 = 0,25**.

1. Número de remunerados (*asalariados*) en equivalentes a jornada completa		

In addition, companies were required to provide a breakdown of staff at a fixed date, 30 September.

E.1 Personal ocupado de la empresa a 30 de septiembre

	Personal en jornada completa		Personal en jornada parcial	
	Hombres	Mujeres	Hombres	Mujeres
1. Personal no remunerado (*socios activos...*)				
2. Personal remunerado (*asalariados*)				
2.1 Remunerados fijos				
2.2 Remunerados eventuales				
Total				

In the SBS 2016 questionnaires, the information required from companies is similar for all three sectors: Industry, Trade and Services and is limited to the number of persons employed (paid and unpaid as at 30 September).

C. Personal ocupado de la empresa a 30 de septiembre

Personal no remunerado: constituido por personas que dirigen o participan activamente en los trabajos de la empresa sin percibir remuneración fija o salario, como propietarios y socios que ejercen una actividad en la empresa y ayudas familiares no remuneradas.

Personal remunerado: trabajadores ligados a la empresa por un contrato de trabajo y que son retribuidos con cantidades fijas o periódicas en forma de sueldo o salario, comisión o pago en especie.

	Número de personas a 30 de septiembre
Personal no remunerado	
Personal remunerado	
TOTAL	

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This information from the questionnaire is used, as of 2016, together with the information available from this company in the Social Security files and aggregate data from the Quarterly Labour Cost Survey, to estimate its employment-related variables, as shown in the SBS Methodology available in INEBASE.

Paid staff

Paid employed staff is comprised of workers linked to the company by an employment contract and who receive remuneration in the form of wage, salary, commission, reward, piecework or in kind. It includes both fixed and eventual staff, either full-time or part-time.

This includes both those persons who perform functions directly associated with the productive activities of the company, as well as those others whose tasks are not directly linked to the productive process (directors on salary, managers, technicians, office and administrative personnel, subordinates, sellers, etc.).

From the reference year 2016 onwards, it is calculated using the following formula:

$$NMR_i = NMAca_i + P30SREM_i - AFA30Sca_i$$

Where:

NMR_i:	Paid staff in company i.
NMAcai:	Average number of affiliates by others in company i in the Social Security registers
P30SREM:	Paid staff as at 30 September in company i completed in the questionnaire.
$AFA30Sca_i$:	Affiliates by others as at 30 September in company i in the Social Security registers

Employed personnel

Employed personnel is considered to be the group of people who, as part of the company, contribute through their work, whether remunerated or not, to the activities of the same. This includes working owners, partners who work regularly on the unit and unpaid family members who work regularly on the unit. Also included are people who, although they work outside the company, belong to it and are paid by it (for example, sales staff, courier staff and the repair and maintenance teams that work for the company). Employed staff includes both fixed and temporary staff, either full-time or part-time.

Employed staff include both paid and unpaid staff.

As of the reference year 2016, it is calculated using the following formula:

$$Employed = NMR_i + P30SNREM_i$$

Where:

NMR_i:	Paid staff in company i.
P30SNREMi:	Unpaid staff as at 30 September in company i completed in the questionnaire.

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Full-time equivalent paid personnel

It is a measure of paid staff, calculated as the sum of full-time paid staff working all year round, plus the sum of time fractions of paid staff working part-time or not working all year round, i.e. considering the fractions of time of those persons whose working hours are less than a standard working day,

less than the standard number of working days per week or less than the standard number of weeks or months per year.

Conversion to full-time equivalent must be carried out on the basis of the number of hours, days, weeks or months worked.

Starting from the reference year 2016, a new method of estimation of this variable is used by applying auxiliary information from the Quarterly Labour Cost Survey (QLCS) to each company of the SBS sample. The calculation formula is as follows:

$$\mathbf{EAE_i = NATC_i + [NATP_i*(HPTP_d/HPTC_d)]}$$

Where:

EAE_i:	Full-time equivalent paid staff in company i
$NATC_i$:	Full-time paid staff in the company i in the Social Security files
$NATP_i$:	Part-time paid staff in the company i in the Social Security files.
$HPTP_d$:	Part-time agreed hours in division d to which company i belongs (QLCS).
$HPTC_d$:	Full-time agreed hours in the division d to which the company i belongs (QLCS).

Hours worked by paid staff

It represents the aggregate of the hours actually worked by paid staff for the production of the observation unit during the reference period.

It includes the total hours worked, both normal and extraordinary. It does not include the hours not worked as a result of sick leave, strikes, vacations, holidays, etc., interruptions for meals, and hours spent on commuting from home to work and vice versa.

Starting from the reference year 2016, a new method of estimation of this variable is used by applying auxiliary information from the Quarterly Labour Cost Survey (QLCS) to each company of the SBS sample. The calculation formula is as follows:

$$\mathbf{HEF_i = (1 - PHNT_d + PHEX_d) * [(NATC_i*HPTC_d) + (NATP_i*HPTP_d)]}$$

Where:

HEF_i:	Hours worked by paid staff in company i.
$PHNT_d$:	Proportion of hours not worked in division d to which company i belongs (QLCS).
	$PHNT_d=HNT_d/HP_d$ (hours not worked in division d / hours agreed in division d).

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$PHEX_d$:	Proportion of overtime hours in division d to which company i belongs (QLCS). $PHEX_d=HEX_d/HP_d$ (overtime hours in division d / agreed hours in division d).
$NATC_i$:	Full-time paid staff in company i.
$NATP_i$:	Part-time paid staff in company i.
$HPTP_d$:	Part-time agreed hours in division d to which company i belongs (QLCS).
$HPTC_d$:	Full-time agreed hours in the division d to which the company i belongs (QLCS).

2. Measurement of the effect of changes in the estimates

In order to obtain a measure of the possible impact on the estimates of employment-related variables of the methodological change consisting of switching from using the information from the old questionnaires to considering the information from the new questionnaires, in combination with the individual data from the Social Security and the aggregated data from the Quarterly Labour Cost Survey, simulation exercises were carried out at the beginning of the *integration project of the structural business statistics* both to measure the impact and to study the feasibility of the new estimation method.

In the case of the Trade and Services sectors, where it was requested the average for each of the four quarters and the data as at 30 September, the estimation was replicated using both methods for 2013.

Table 3 presents the impact measured as:

$$Impacto = \frac{\hat{X}_{nuevo} - \hat{X}_{antiguo}}{\hat{X}_{antiguo}} * 100$$

Tabla 3. Impacto en las variables de empleo, según la metodología nueva respecto a la anterior. En porcentaje

	Personal remunerado	Personal no remunerado	Personal ocupado	Personal remunerado equivalente a tiempo completo
Sector Comercio	**0,1**	**1,0**	**0,3**	**-0,3**
45. Venta y reparación de vehículos de motor y motocicletas	0,1	0,7	0,3	-0,9
46. Comercio al por mayor e intermediarios del comercio, excepto de vehículos de motor y motocicletas	-0,1	0,4	0,0	0,0
47. Comercio al por menor, excepto de vehículos de motor y motocicletas	0,3	1,2	0,5	-0,3
Sector Servicios	**0,4**	**0,5**	**0,4**	**0,1**
H. Transporte y almacenamiento	0,3	0,3	0,3	-0,4
I. Hostelería	0,8	1,2	0,9	-0,4
J. Información y comunicaciones	0,3	-0,1	0,2	1,2
L. Actividades inmobiliarias	-0,1	0,9	0,3	-0,1
M. Actividades profesionales, científicas y técnicas	0,0	0,2	0,1	0,7
N. Actividades administrativas y servicios auxiliares	0,4	0,1	0,3	0,0
R. Actividades artísticas, recreativas y de entretenimiento	0,5	0,7	0,5	-0,6
S. Otros servicios (excepto División 94). Reparación de ordenadores, efectos personales y artículos de uso doméstico y otros servicios personales	0,9	0,2	0,6	0,2

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In the case of Industry, the fact that the data on paid staff as at 30 September was not available in the old questionnaires made it impossible to carry out an analysis of the impact of the change in the procedure for estimating the staff variables in those companies in which some or all of the paid staff are not included as affiliates in the company's Social Security contribution accounts, and which are mainly contributing to the Special Regime for Self-Employed Workers.

For this reason, comparisons were made between the average number of paid employees provided in the questionnaires by the companies and the average number of affiliates, in those companies where all the salaried employees appear as affiliates in the company's Social Security contribution accounts.

In the case of Industry, data on full-time equivalent staff and hours worked were also compared. Table 4 shows the impact of the change in the procedure for estimating these variables on the industrial sector.

Tabla 4. Impacto en las variables de empleo, según la metodología nueva respecto a la anterior. En porcentaje

	Personal remunerado	Personal remunerado equivalente a tiempo completo	Horas trabajadas por el personal remunerado
Sector Industrial	**1,7**	**2,1**	**-1,1**
B. Industrias extractivas	1,0	7,9	1,6
C. Industria manufacturera	1,7	2,3	-0,7
D. Suministro de energía eléctrica, gas, vapor y aire acondicionado	1,3	2,3	-0,8
E. Suministro de agua, actividades de saneamiento, gestión de residuos y descontaminación	1,8	-0,2	-5,4

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