INSTITUTO NACIONAL DE ESTADISTICA

Services sector activity indicators

Methodological Note

January 2017

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1 Background

The main purpose of the statistical operation of Services Sector Activity Indicators (SSAI) is to provide short-term performance indicators in nominal terms, that is, at current prices, of the economic activity of companies operating in the non-financial market services in Spain via two variables: turnover and employed personnel. The objective of this operation is to fulfil Regulation no. 1158/2005 of the European Parliament and Council, of 6 July 2005, modifying Regulation no. 1165/98 of the European Union Council dated 19 May 1998, on short-term statistics, although the latter remains in force.

These Regulations aim to create a common framework for the production of Community statistics on the short-term evolution of supply, demand, production factors and prices.

This entails an actual set of statistics with direct data collection. Results are presented as indices so as to measure variations as compared to base year 2010.

The Services Sector Activity Indicators study the population made up of companies whose main economic activity Is described in sections G, (Trade), H (Transport and Storage), I (Accommodation), J (Information and Communications), M (Professional, Scientific and Technical Activities) and N (Administrative and Support Services Activities) of the National Classification of Economic Activities 2009 (CNAE-09).

This operation began to be carried out in the year 2002. In the year 2005, the sample was increased in order to disseminate regional data, and as of January 2009 SSAI provides information in CNAE-09. In January 2013, coinciding with the base change from 2005 to 2010, the formulation used is modified, from direct Laspeyres-type indices with fixed base year 2005, to chain-linked Laspeyres indices, with base year 2010 (monthly chain-linking during last December.)

2 Scope of application

The application scope is defined relating to the population researched, in time and space.

On 13 April 2007, Royal Decree 475/2007 passed the 2009 Classification of Economic Activities, which is the national version of the European Classification of Economic Activities passed by Regulation (EC) no. 1893/2006 of the European Parliament and Council, of 20 December 2006.

As of the reference month of January 200, indices are published in the new Classification, CNAE-09 (and the retrospective series). Information collection in this new Classification began one year prior.

2.1 Population scope

The population studied is made up of the companies whose main economic activity corresponds to the following CNAE-09 codes (detailed down to the lowest level for the one for which national indices are being supplied):

TRADE (G)

Sale and repair of motor vehicles and motorcycles (45)

45.1+45.3+45.4: sale of motor vehicles, related spare parts and accessories, and sale, maintenance and repair of motorcycles and related spare parts and accessories,

45.2: maintenance and repair of motor vehicles,

Wholesale commerce and commerce intermediaries, except of motor vehicles and motorcycles (46)

46.1: commission trade,

46.2: wholesale of agricultural raw materials and live animals,

46.3: wholesale of food, beverages and tobacco,

46.4: wholesale of household goods,

46.5: wholesale of equipment for information and communications technologies,

46.6: wholesale of other machinery, equipment and supplies,

46.7: other specialised wholesale trade (of fuels, metals and others),

46.9: other non-specialised wholesale trade

Retail trade, except of motor vehicles and motorcycles (47)

This division is obtained through the Retail Trade Index survey

TRANSPORT AND STORAGE (H)

Land transport (49)

49.1+49.2+49.5: railway and pipeline transport,

49.32: transport by taxi,

49.31+49.39: other land passenger transport, (these two classes are obtained through the Passenger Transport Survey)

49.4: freight transport by road and removal services,

Sea transport and transport by domestic navigable routes

50: sea transport and transport by domestic navigable routes, both of passengers and of goods,

Air transport

51: air transport,

Storage and activities connected to transport

52: deposit, storage activities connected to land, sea and air transport, and cargo handling,

Postal and courier activities

53: postal activities subject to the obligation of universal service and other postal and courier activities.

ACCOMMODATION (I)

Accommodation services

55: accommodation services,

Food and beverage services

56: food and beverage services.

INFORMATION AND COMMUNICATIONS (J)

Publishing

58: publishing (of books, newspapers, magazines, directories; of video games and of other software programs),

Motion picture, video and television programme activities and music publishing

59: motion picture, video and television programme activities, sounds recording and music publishing,

Radio and television programming and broadcasting

60: radio and television programming and broadcasting activities,

Telecommunications

61: telecommunications (by cable, wireless, by satellite and other telecommunication activities),

Programming, consultancy and other IT-related activities

62: Programming, consultancy and other IT-related activities,

Information services

63: information services (data processing, hosting, websites and related activities; news agency activities and other information services).

PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES (M)

Legal, accounting and business and management consultancy activities

69+70.2: legal activities, accounting activities, bookkeeping, auditing and tax advisory, as well as business management consultancy activities,

Technical architecture and engineering services; technical trials and analysis

71: technical architecture and engineering services; technical trials and analysis,

Advertising and market studies

73: advertising agencies and media representation services. Market research and public opinion polling,

Other professional, scientific and technical activities

74: specialised design activities, photographic activities, translation and interpretation activities, technical consultancy and other professional, scientific and technical activities.

ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES (N)

Employment-related activities

78: recruitment company and temporary employment agency activities and other provision of human resources,

Travel agency and tour operators

79: travel agency and tour operator activities, reservation services and related activities,

Investigation and surveillance services

80: private security activities and security system services; research activities,

Cleaning activities

81.2: general building cleaning and other cleaning activities,

Office management activities

82: combined administrative services, photocopying activities, preparing documents and other office related activities; call centre activities; organisation of conventions and trade fairs; activities of debt collection agencies and commercial information, packaging activities by third parties and other 82. Administrative office activities and other business support activities.

2.2 Geographical scope

All statistical units located in the Spanish territory except Ceuta and Melilla, which are only collected in the activity of division 47 of the CNAE-09, whose source is the survey for the Retail Trade Index, are the object of the research.

2.3 Population scope

2.3.1 BASE PERIOD

The base period or reference period for the index is the one in which the index is made equal to 100. This is normally an annual period. In the new system, the arithmetic average of the twelve monthly indices published from the year 2010, in base 2010, equals 100; therefore, the reference period for the index is year 2010 (or in other words, the base is 2010). This means to say that all indices published will refer to this year.

2.3.2 VARIABLE REFERENCE PERIOD

This is the period with whose values the variables are compared (turnover and employed personnel) for the reference month. In other words, the period chosen for calculating the elementary indices.

With the calculation formula used for SSAI base 2010 – linked Laspeyres – the reference period of the variables varies each year, and is the month of December of the year immediately prior to the one being considered.

2.3.3 WEIGHTINGS REFERENCE PERIOD

The reference period for weightings is the one referred to by weightings acting as a system structure.

The reference period for weightings varies each year, and is the month of December of the year immediately prior to the one being considered.

The weightings were calculated taking the data from the Annual Services Survey of the year 2010, and from the Annual Commerce Survey for the year 2010, which provide structural information regarding turnover and employment for each sector. These two surveys survey more than 140,000 companies in the sector. The Annual Services Survey for the year 2010 and the Annual Trade Survey for the year 2010 refer to the average for the year 2010, and in order to correct the discrepancy occurring between this period and that of the weightings (December of the year immediately prior to the one being considered), the latter are updated using information regarding the performance of the indicators for turnover and employment, taken from the actual Services Sector Activity Indicators short-term survey.

Furthermore, a base change will be carried out every five years, in which weightings will be updated (with a new Annual Services and Trade Survey) for all functional and geographical breakdown levels.

3 Statistical Unit

The statistical unit is the enterprise whose main economic activity is the rendering of one or more services included in the population scope. The enterprise is also the respondent unit, due to the fact that as it is clearly defined, may be located and has its accounting and employment data available, response is facilitated and homogeneous information is obtained.

The enterprise is the smallest combination of legal units that constitute an organisational unit which provides goods and services and has a certain level of autonomy in decision-making, especially regarding the allocation of its current resources. An enterprise may carry out one or more activities in one or several local units.

4 Characteristics of the statistical process

4.1 Economic activity

The economic activity carried out by an enterprise is defined as the creation of added value through the production of goods and services.

Each one of the statistical units (companies) studied frequently carry out different activities that must be classified in separate classes of the National Classification of Economic Activities, but in this survey they are classified according to their main activity. In general, the activities carried out by an economic unit may be one of three types: main, secondary and auxiliary activities. The main activity is differentiated from the secondary as it is the activity which generates the greatest added value; in turn, auxiliary activities are those which generate services that are not sold on the market and which only serve the unit on which they depend (administration department, transport or storage services).

Faced with the difficulty implied in the companies calculating added value when they carry out several activities, the enterprise is offered the possibility of considering as its main activity that which generates the greatest business volume, or in its absence, that which employs the largest number of persons. This information is subsequently contrasted to determine the main activity of the enterprise.

4.2 Enterprise size

The size of the companies is one of the most important variables when it comes to determining enterprise performance. This dimension may be established in terms of the magnitude of the turnover or the production value, or by considering the number of persons who comprise the enterprise staff. These surveys opt for considering this latter option for determining the size of the companies, although the former is also taken into account, by comprehensively surveying smaller companies with significant turnover.

4.3 Definition of variables

4.3.1 INCOME OR TURNOVER

Income or turnover is the total invoicing for the enterprise. Its definition is deduced from accountancy definitions used by companies. This includes those amounts invoiced by the enterprise due to the provision of services and the sale of goods that are the traffic objective, including those carried out through subcontracting.

Expenses invoiced for packaging and transport are included; the sale of purchased goods for resale in the same conditions in which they were received, and sales of subproducts. As well as hours worked invoiced to third parties solely for subcontracted work.

These amounts are considered, including the taxes that are levied on the goods and services, and excluding the VAT paid by the client.

It does not cover subsidies received from public authorities or from the European Union, financial profit or other operating profit such as subsidies, sales of shares and fixed assets, income from interest, dividends and patents, leasing of company and production unit property and machinery. Neither does it include income from staff amenities (canteens etc.) and the supply of goods or services within the observation unit.

4.3.2 EMPLOYMENT

Employed staff are classified according to remuneration:

- *Unpaid staff (self-employed workers, partners and family aid)*: comprising persons who direct or actively participate in company work without receiving fixed remuneration or wages. Included are owners who are active within the enterprise and family aid. Not included are partners that solely provide capital, nor family members of the owner who do not actively participate in the enterprise or who are on the payroll of other companies as their main occupation.
- *Paid personnel*: this consists of those employees linked to the enterprise by an employment contract and who are paid fixed or periodic amounts in the form of a wage, salary, commission, efficiency wage or payments in kind. A distinction is made between *fixed personnel* (with an indefinite/permanent contract or labour relationship) and *temporary personnel* (with a fixed-term contract).

5 Sample Design and information collection

5.1 Sample Framework

The sampling frame is the Central Companies Directory (CCD), a list of companies that is updated once a year with administrative sources, primarily from the tax and social security area. It is also updated with information from the statistical operations of INE.

The CDD contains information on companies' main economic activity and on the number of employees, variables that are used in the sample design, and on identification and location data, which are necessary for correct information collection.

5.2 Sample design

Stratified random sampling is used. In each stratum a random sample is obtained, with the exception of the one formed by companies with 200 or more employees, in which all companies form part of the sample. In certain autonomous communities and activity groups, smaller strata are also comprehensive, due to having a very small population. For calculation of the sample size an optimal allocation is applied. The main stages of the design are then developed:

5.2.1 STRATIFICATION

The strata are formed by the crossing of Autonomous Community (17) x branch of main economic activity (36) x size group (6), measured by number of employees.

Activity branches are defined as follows:

Branch	CNAE-2009 Code	Branch	CNAE-2009 Code
1	451, 453, 454	19	53
2	452	20	55
3	461	21	56
4	462	22	58
5	463	23	59
6	464	24	60
7	465	25	61
8	466	26	62
9	467	27	63
10	469	28	69, 702
11	47*	29	71

12	491, 492, 495	30	73
13	4931, 4939**	31	74
14	4932	32	78
15	494	33	79
16	50	34	80
17	51	35	812
18	52	36	82

Note

* The index of branch 47 is obtained from the Retail Trade Index survey
** Data for this branch is obtained from the Passenger Transport Survey

The size groups are:

Size groups	Number of employees:
00	0
11	1 to 2 employees
12	3 to 9
14	From 10 to 49
16	From 50 to 199
18	200 years old and over

From 200 employees upwards the strata are comprehensive, that is, they investigate all of the companies. Furthermore, there are also comprehensive smaller companies belonging to strata with smaller population, multi-location companies (with establishments in different Autonomous Communities) with 50 or more employees and companies with large invoiced amounts and few employees.

5.2.2 SAMPLE SIZE

The size of the sample is calculated in order to provide indicators on the turnover and employment variables, with a permissible sampling error for the following populations:

- At national level for each branch of activity
- At Autonomous Community level by activity sector

The sectors of activities are aggregation of the branches and they are:

Sectors	CNAE-2009 code
Trade	45 to 47
Transport	49 to 53
Accommodation and food service activities	55 to 56
Information and communications	58 to 63
Professional, scientific and technical activities	69, 702, 71, 73, 74
Administrative and support services activities	78, 79, 80, 812, 82

For the calculation of the sample sizes, data from the Annual Services Survey and Annual Trade Survey is used, in order to form a dummy variable which takes into account the variability of the variables number of employees and turnover.

Optimal allocation is applied in order to calculate the sample sizes nh so that the overall sample size (n) is minimal, subject to:

- The relative error of the estimator of the dummy variable by activity sectors does not exceed 5% at the national level.
- The relative error of the estimator of the dummy variable by economic sectors does not exceed 5% at the autonomous community level.

The resulting sample contains approximately 28,000 companies.

5.2.3 ROTATION OF SAMPLING UNITS

The European regulation demands carrying out base changes every 5 years. Now, the sample is renewed so as to reflect the new population distribution. Nevertheless, in order to avoid weariness on the part of informing units, and the aging of the sample, without losing the representativeness of the current population, an annual rotation of between 20 and 25% of the sample in the sampling strata is made. Rotations are carried out during January each year.

The criteria used is to substitute the enterprises which have collaborated in the calculation of the index for approximately 4 or 5 years as well as those which have been delisted, unreachable, wrongly included and merged or taken over. Likewise, newly created companies with 200 or more employees enter the sample.

5.2.4 ESTIMATORS AND SAMPLING ERRORS

In order to have a measurement of the index quality, an approximate relative sampling errors is calculated for the inter-annual variation rates of turnover and total employed persons variables. The general expression of the estimated relative errors, which is supposedly a depreciation bias, is given by:

$$C\hat{V}(\hat{R}) = 100 \times \frac{\sqrt{V(\hat{R})}}{\hat{R}}$$

$$siendo \quad \hat{R} = \frac{\hat{Y}_t}{\hat{Y}_{t-1}}$$

$\hat{R}$ is the rate estimator, given by the quotient of the total of the variable estimate Y (invoicing or total employed persons) in month m of year t, $\hat{Y}_t$, and the estimate of Y is obtained in the same month m of year t-1, $\hat{Y}_{t-1}$.

The method used for the calculation of the variance estimator is Taylor Linearization. The expression of the variance estimator is:

$$\hat{V}(\hat{R}) = \frac{1}{\hat{Y}_{t-1}^2}[\hat{V}(\hat{Y}_t) + \hat{R}^2\hat{V}(\hat{Y}_{t-1}) - 2\hat{R}Co\hat{v}(\hat{Y}_t, \hat{Y}_{t-1})]$$

Where $\hat{V}(\hat{Y}_t)$ indicates the variance estimator of $\hat{Y}_t$, $\hat{V}(\hat{Y}_{t-1})$ indicates the variance estimator of $\hat{Y}_{t-1}$ and $Co\hat{v}(\hat{Y}_t, \hat{Y}_{t-1})$ indicates the covariance estimator between between $\hat{Y}_t$ y $\hat{Y}_{t-1}$.

5.2.5 REGIONALISATION

The company is the statistical and information unit. This leads to the need of regionalization for an adequate estimate of the turnover or number of employees in each region, in the case of companies with establishments in different Autonomous Communities (called multi-location). For this purpose, information is used from structural surveys.

As the samples of the short-term survey and the structural survey are common for large companies (there are comprehensives in both cases), information about regional localization of establishments is obtained through the autonomous distribution table. There is requested the disaggregated turnover and number of

employees in percentage terms, corresponding to each Autonomous Community.

For any month, turnover or invoicing for an activity, A, in a region, R, may be broken down as (similarly to employment):

[a] multi-located enterprise turnover (generally, with fewer than 50 wage earners) headquartered at R and with main activity A:

$$\sum_{h} \sum_{j=1}^{n_h} F_{h,j}^{A,R} w_h$$

where

$F_{h,j}^{A,R}$ is turnover of enterprise j (not multi-location) that belongs to stratum h headquartered in R and with main activity A.

w_h is the elevation coefficient for enterprises belonging to stratum h of the short-term survey.

n_h is the sample size of stratum h in the short-term survey.

[b] turnover of premises located in Autonomous Community R of multi-located companies with headquartered in that same Autonomous Community and whose main activity is A:

$$\sum_{j=1}^{m} \sum_{l=1}^{L_j} F_{j,l}^{A,R}$$

where

$F_{j,l}^{A,R}$ only turnover generated in premises located in the Autonomous Community R belonging to enterprise j (with 50 or wage earners and multi-location), which carries out its main activity A and is headquartered in the Autonomous Community R is collected. Enterprise j has L_j premises and there are m companies with these features.

[c] turnover generated in premises located in the Autonomous Community R for multi-located companies headquartered in an Autonomous Community other than R and whose main activity is A:

$$\sum_{i=1}^{s} \sum_{l=1}^{T_i} F_{i,l}^{A,C \neq R,R}$$

where

$F_{i,l}^{A,C\neq R,R}$ covers turnover generated in premises located in the Autonomous Community R belonging to enterprise i (with 50 or wage earners and multi-location), which carries out its main activity A and is headquartered in the Autonomous Community R. Enterprise i has T_i premises located in Autonomous Community R and there are s companies with these features.

Multi-located companies with 50 or more wage earners are studied comprehensively, as detailed in the sample design section, therefore the elevation coefficient for those companies is "one". It is assumed that the main activity of all premises for an enterprise coincides with the main activity of that enterprise.

As mentioned above, since the enterprise is the statistical and information unit, rather than it being the establishment or premises, the information in previous sections (b) and (c) (that is, premises turnover), it is estimated by means of the Autonomous Community distribution table of the Annual Services and Trade Survey, which collects information on the percentage of the turnover that the enterprise corresponding to each Autonomous Community and on the number of employed persons in each.

Thus, the section (b) is estimated by:

$$\sum_{j=1}^{m}\sum_{l=1}^{L_j} F_{j,l}^{A,R} \cong \sum_{j=1}^{m} F_j^{A,R} * p_j^R$$

where

p_j^R is the percentage of turnover for enterprise j which corresponds to Autonomous Community R.

In other words, turnover for premises located in R of multi-located companies headquartered in that same Autonomous Community and whose main activity is A is obtained by multiplying invoicing for those companies by the percentage of turnover corresponding to Autonomous Community R.

and section (c) by approximated by:

$$\sum_{i=1}^{s}\sum_{l=1}^{T_i} F_{i,l}^{A,C\neq R,R} \cong \sum_{i=1}^{s} F_i^{A,C\neq R,R} * p_i^R$$

where

p_i^R is the percentage of turnover of enterprise i (headquartered in an Autonomous Community other than R) corresponding to Autonomous Community R.

In other words, turnover generated in premises for Autonomous Community R belonging to multi-located companies, which carry out main activity A and headquartered in an Autonomous Community other than R is obtained by multiplying the turnover for each enterprise by the percentage corresponding to Autonomous Community R.

Thus, turnover for activity A in Autonomous Community R is estimated as:

$$F^{A,R} \cong \sum_{h} \sum_{j=1}^{n_h} F_{h,j}^{A,R} w_h + \sum_{j=1}^{m} F_j^{A,R} * p_j^R + \sum_{i=1}^{s} F_i^{A,C \neq R,R} * p_i^R$$

6 General calculation method

Pursuant to Regulation no. 1165/98, the indices must change base every five years, in the years ending in 0 and 5. All indices must be adapted to the new base year within three years from the end of said new base year.

Coinciding with the base change from 2005 to 2010, the formulation used when compiling the turnover and employment indices of the Annual Services Survey statistics, going from direct Laspeyres-type indices with year 2005 as a fixed base to chain-linked Laspeyres indices with base year 2010 (monthly chain-linking during last December) is modified.

Series linking

The first reference month for which the new indices are to be published in base 2010 will be January 2013, but work will begin on constructing them with this new formulation one year earlier, in January 2012, such that interannual rates published as of January 2013 are calculated with indices constructed using the same formulation.

Until December 2011, the base 2005 index series are linked to a base 2010 multiplying the series published in base 2005 by the structural link coefficient.

The structural link, which makes the average for the year 2010 100, is used. The values of each month until December 2011 for each of the series published In base 2005 are divided by the average in the year 2010 for those indices in base 2005. Alternatively, they are multiplied by the structural link coefficient in order to pass them to base 2010:

$$\text{link coefficient} = \frac{1200}{\sum_{m=1}^{12} {}_{05}I^{m10}}$$

In which:

${}_{05}I^{m,10}$ the index for month m for year 2010 in base 2005.

Thus, the linked index in base 2010 for month m in year t is:

$${}_{10}IE^{m,t} = {}_{05}I^{m,t} * \frac{1200}{\sum_{m=1}^{12} {}_{05}I^{m,10}}$$

A chain-linked index measures accumulative movements of indices in the short term in different base periods. In other words, it establishes comparisons between the current period (t) and the base period (0) albeit taking into account intermediate situations (k). In the SSAI base 2010, the intermediate situations considered correspond to the months of December for all years. Thus, the National General Index (of turnover or of

employment) in base 2010 for month m of year t, is obtained as a product of the following indices:

$$ {}_{10}I_G^{mt} = {}_{10}I_G^{dic10} \times \ldots \times \left(\frac{{}_{dic(t-2)}I_G^{dic(t-1)}}{100} \right) \times \left(\frac{{}_{dic(t-1)}I_G^{mt}}{100} \right) $$

The National General Index may be obtained by adding first by region and then by activity, or vice versa. This is for any aggregation level.

It is illustrated in the following table. First, for each activity (45.1, 45.2, etc.) it may be aggregated by Autonomous Community in order to obtain the national indices for each activity (vertical aggregation), and then activities may be aggregated into divisions, sectors, large sectors (horizontal aggregation) until obtaining the national indices by division, sector and general. or rather, firstly for each Autonomous Community it is possible to aggregate by activity in order to obtain the regional indices by division, sector, large sectors (horizontal aggregation) until obtaining the general indices for each Autonomous Community and afterwards aggregate the latter (vertical aggregation) in order to obtain the National General Index. The final result (National General Index) should be the same for one method or for the other.

⇑	⇒	⇒	⇒	⇒	⇒	⇒	⇒	
	R1	45.1	45.2	46.1	46.2	….	82	***R1 OVERALL***
⇑	R2	45.1	…	…	…	…	…	***R2*** **OVERALL** ⇑
⇑		…	…		…	…	…	⇑
⇑	….	…	…	…	46.2	…	…	…. ⇑
⇑	R17	…	…	…	…	…		***R17*** **OVERALL** ⇑
	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒

Detailed below is the calculation method for the turnover variable, which is similar to the one used for calculating the employment indices (although some peculiarities of these indices are detailed at the end).

6.1 Basic indices that are not publishable (in base December t-1)

Basic indices are constructed (non-publishable) for each of 17 Autonomous Communities (R) and for each branch of activity (A) referring to the month of December of the previous year:

$$ {}_{dic(t-1)}I_{A,R}^{mt,NP} = \frac{F_{A,R}^{mt}}{F_{A,R}^{dic(t-1)}} $$

where $F_{A,R}^{mt}$ and $F_{A,R}^{dic(t-1)}$ refer to invoicing (or turnover) for one month in year t and for December (t-1), respectively, and they have been calculated with the same set of companies (having carried out rotation).

Rotation

Each December a non-comprehensive 25% rotation of the sample will be carried out. This implies having two sets of companies in the months of December.

Thus, in December t-1:

The first set corresponds to the sample of companies that have been responding during the whole of year t-1 and is used for calculating the index for December for t-1:

Non-publishable index in December *t-1*:

$$ {}_{dic(t-2)}I_{A,R}^{dic(t-1),NP} = \frac{F_{A,R}^{dic(t-1)}(viejo\ \ conjunto\ \ empresas)}{F_{A,R}^{dic(t-2)}(viejo\ \ conjunto\ \ empresas)} $$

With the second set of companies, where we have substituted part of them (approximately 25%) with new ones, the index is calculated for January in year t:

Non-publishable index in January of *t*:

$$ {}_{dic(t-1)}I_{A,R}^{enet,NP} = \frac{F_{A,R}^{enet}(nuevo\ conjunto\ \ empresas)}{F_{A,R}^{dic(t-1)}(nuevo\ conjunto\ \ empresas)} $$

6.2 Weightings

The weightings involved in calculating aggregated indices are taken from the Annual Services Survey and from the Annual Commerce Survey for the year 2010. These surveys provide estimates of the average values in the year 2010 of turnover and of employed staff.

The weighting reference period (the one to which these refer) varies each year, and is the month of December of the year immediately prior to the one being considered.

The Annual Services Survey for the year 2010 and the Annual Trade Survey for the year 2010 refer to the average for the year 2010, as commented previously, and in order to correct the discrepancy occurring between this period and that of the weightings (December of the year immediately prior to the one being considered), the latter are updated using information regarding the performance of the indicators for turnover and employment, taken from the actual Services Sector Activity Indicators short-term survey.

Furthermore, a base change will be carried out every five years, in which weightings will be updated (with a new Annual Survey) for all functional and geographical breakdown levels.

Average turnover for the year 2010

This is obtained directly from Annual Services and Trade Survey for the year 2010.

Average employed personnel for the year 2010

In SSAI information is available on employed staff by category: unpaid and paid workers, and within this second category a distinction is made between those employed with a fixed contract (permanent remunerated personnel) and with a temporary contract (temporary remunerated personnel).

In structural surveys the following information is available on employed staff: (1) staff employed at 30 September with the full breakdown by employment category (unpaid workers, permanent remunerated personnel and temporary remunerated personnel), and (2) average employed personnel by quarter only with the breakdown between unpaid workers and paid workers.

Using average employed personnel per quarter due to seasonality problems that personnel employed at 30 September may entail, and the breakdown of paid staff Is estimated between permanent and temporary employees, using the information from the short-term survey for the year 2010 is opted for.

Weightings in December 2011 and subsequent ones

We take as a starting point the average values for 2010 from the turnover (and employed personnel) variables for the Annual Services and Trade Survey for the year 2010, and they are carried to December 2011 with the variation of the SSAI indices.

Thus, calculation of weightings for functional aggregation of S activities in the Autonomous Community R is:

$$_{Dec11}W_{A,R} = \frac{F^{Dec11}_{A,R}}{\sum_{\forall A \in S} F^{Dec11}_{A,R}} = \frac{F^{Dec11}_{A,R}}{F^{Dec11}_{S,R}} = \frac{\overline{F}^{2010}_{A,R} \times (1+tv)}{\overline{F}^{2010}_{S,R} \times (1+tv')}$$

where:

$F^{dic11}_{A,R}$ y $\overline{F}^{2010}_{A,R}$ correspond to the turnover figure for activity A in December 2011, and for the 2010 average, respectively.

$$tv = \frac{_{10}IE^{Dec11}_{A,R}}{_{10}\overline{IE}^{2010}_{A,R}} - 1$$

where:

$_{10}IE$ refers to the linked index in new base 2010.

Similarly,

$F^{Dec11}_{S,R}$ y $\overline{F}^{2010}_{S,R}$ correspond to the turnover figure for activity A in December 2011, and for the 2010 average, respectively.

$$tv' = \frac{_{10}IE^{Dec11}_{S,R}}{_{10}\overline{IE}^{2010}_{S,R}} - 1$$

Substituting these terms in the calculation of the weighting in December 2011:

$$_{Dec11}W_{A,R} = \frac{\overline{F}^{2010}_{A,R} \times (1+tv)}{\overline{F}^{2010}_{S,R} \times (1+tv')} = {}_{\overline{2010}}W_{A,R} \times \frac{_{10}IE^{Dec11}_{A,R}}{_{10}IE^{Dec11}_{S,R}}$$

Given that some terms are cancelled, and that the average for indices in the base year is equal to 100.

In general, weightings in December of year t are calculated:

$$ {}_{Dect}W_{A,R} = {}_{\overline{2010}}W_{A,R} \times \frac{{}_{10}I^{Dect}_{A,R}}{{}_{10}I^{Dect}_{S,R}} $$

where,

${}_{10}I^{Dect}_{A,R}$ is the publishable index, referring to year 2010, of activity A, in Autonomous Community R in the month of December of year t

${}_{10}I^{Dect}_{S,R}$ is the publishable index, referring to year 2010, of the aggregation of activities S, in Autonomous Community R in the month of December of year t

Similarly for employed personnel.

The weightings of each activity represent the relationship between turnover (or employment) for that activity, and total turnover (or employment) in the grouping of activities (S) covered by the index:

$$ W_A = \frac{facturacion \quad (o\ empleo)\ de\ actividad \quad A}{facturacion \quad (o\ empleo)\ de\ agregación\ S} $$

These weightings are different in each of the geographical aggregations (Autonomous Communities, and the nation as a whole), and from them, the weightings of the different aggregations are obtained.

6.3 Aggregate indices

The basic indices and the weightings used for calculating aggregates refer to December of the previous year, whereby consistency is maintained with the reference variables. The National General Index may be obtained by aggregating first by activity (functional aggregation), and afterwards by Autonomous Community (geographical aggregation) or vice versa. Calculation of the aggregated indices is described below.

6.3.1 FUNCTIONAL AGGREGATES WITHIN AN AUTONOMOUS COMMUNITY

Once the basic indices not publishable by activity and for each Autonomous Community have been obtained, indices aggregated by activity within an Autonomous Community, they are constructed as weighted indices, and are obtained using the weighting structure that reflects the importance of the different activities in each Autonomous Community.

The index, referring to December the previous year, for any functional aggregate S in an Autonomous Community R, is obtained as an aggregate of the basic non-publishable indices for activities belonging to said aggregate with the weightings for December the previous year.

The mathematical expression of this aggregated index (non-publishable extra) is:

$$_{dic(t-1)}I^{mt,NP}_{S,R} = \sum_{\forall A \in S} {}_{dic(t-1)}I^{mt,NP}_{A,R} \times {}_{dic(t-1)}W_{A,R}$$

where,

${}_{dic(t-1)}I^{mt,NP}_{A,R}$ is the basic non-publishable index, referring to December of t-1, of activity A in Autonomous Community R, in month m of year t,

${}_{dic(t-1)}W_{A,R}$ is the weighting (so much per one), referring to December t-1, of activity A in Autonomous Community R, within aggregate S; in other words:

$${}_{dic(t-1)}W_{A,R} = \frac{c\ negocios\ (o\ empleo)\ de\ actividad\ A\ en\ región\ R}{c\ negocios\ (o\ empleo)\ de\ agregación\ S\ en\ región\ R}$$

Once the aggregated indices have been calculated, it is necessary to link them. These indices are those which are finally disseminated and provide continuity for the series published in base 2010.

For any functional aggregate S, the publishable index in base 2010 in Autonomous Community R is calculated as follows:

$${}_{10}I^{mt,P}_{S,R} = {}_{10}I^{dic(t-1),P}_{S,R} \times \left[\frac{{}_{dic(t-1)}I^{mt,NP}_{S,R}}{100} \right]$$

where,

${}_{10}I^{dic(t-1),P}_{S,R}$ is the publishable index, referring to year 2010, of activities aggregate S, in Autonomous Community R in the month of December of year t-1

${}_{dic(t-1)}I^{mt,NP}_{S,R}$ is the non-publishable index, referring to December t-1, of activities aggregate S, in Autonomous Community R in month m of year t.

6.3.2 GEOGRAPHICAL AGGREGATES OF A FUNCTIONAL AGGREGATE

In the same way as the previous case, calculation of the geographical aggregate N index (in this case national total) for a specific functional grouping S is calculated as follows:

$$_{dic(t-1)}I^{mt,NP}_{S,N} = \sum_{\forall R \in N} {}_{dic(t-1)}I^{mt,NP}_{S,R} \times {}_{dic(t-1)}W_{S,R}$$

where,

${}_{dic(t-1)}I^{mt,NP}_{S,R}$ is the non-publishable index, referring to December t-1, of activities aggregate S, in Autonomous Community R in month m of year t,

${}_{dic(t-1)}W_{S,R}$ is the weighting (so much per one), referring to December t-1, of aggregate S in Autonomous Community R, within geographical aggregate N; in other words:

$${}_{dic(t-1)}W_{S,R} = \frac{c\ negocios\ (o\ empleo)\ de\ \ agregación\ S\ en\ \ la\ región\ R}{c\ negocios\ (o\ empleo)\ de\ agregación\ S\ en\ \ el\ conjunto\ \ nacional}$$

As with the functional aggregates, once the aggregate indices are calculated, it is necessary to link them.

For any functional aggregate S, the linked index, in base 2010, in the nation N as a whole(geographical aggregate), in month m of year t, is:

$${}_{10}I^{mt,P}_{S,N} = {}_{10}I^{dic(t-1),P}_{S,N} \times \left[\frac{{}_{dic(t-1)}I^{mt,NP}_{S,N}}{100} \right]$$

where,

${}_{10}I^{dic(t-1),P}_{S,N}$ is the publishable index, referring to year 2010, of activities aggregate S, in the nation N as a whole, in the month of December of year t-1.

${}_{dic(t-1)}I^{mt,NP}_{S,N}$ is the publishable index, referring to December t-1, of aggregate S, in the nation N as a whole in month m of year t.

In the same way, aggregated indices may be obtained by first calculating the geographical aggregate (national) of an activity, and then aggregating the latter (functional aggregate of a geographical aggregate).

7 EMPLOYMENT variable indices

Basic indices are compiled for the lowest categories (unpaid, permanent remunerated personnel and temporary remunerated personnel) and they are constructed by aggregating the indices for the highest employment levels (paid staff and employed personnel). Taking these aggregates, calculation of the following aggregates, functional and geographic, is similar to that described in the previous sections.

As previously mentioned, the overall employment index for an Autonomous Community (and the National General Index) may be obtained by first aggregating by category and then by activity, or vice versa.

Once again the different options for obtaining aggregated indices are illustrated with a chart. For example, in order to obtain the wholesale trade employment index (division 46 of the CNAE-09) for Autonomous Community R taking the eight trade groups (46.1…. , 46.9 of the CNAE 09) and of the employment categories (unpaid (NR), permanent remunerated personnel (RF) and temporary remunerated personnel(RE)), it may be added first by employment category within each group (vertical aggregate) in order to obtain the total employment indices for each of eight groups, and then the latter may be added in order to obtain the wholesale trade employment index for Autonomous Community R. or rather, aggregate first by activity (horizontal aggregate), thereby obtaining the wholesale trade indices (division 46 of the CNAE 09) of each employment category, and then add the latter (vertical aggregate) in order to obtain the wholesale trade employment index for Autonomous Community R..

	⇒	⇒	⇒	⇒	⇒	⇒	⇒	
	E46.1	E46.2	E46.3	E46.4	E46.5	E46.6	....	***E46***
⇑	NR46.1	NR46.2	…	…	…	…	…	NR46 ⇑
⇑	R46.1	…	…	R46.4	…	…	…	R46 ⇑
⇑	RF46.1	…	…	…	…	…	…	RF46 ⇑
⇑	RE46.1	…	…	…	…	…	RE46.9	RE46 ⇑
	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒

Obviously, weightings should be calculated for each aggregate grouping