INSTITUTO NACIONAL DE ESTADISTICA

Service Sector Price Indices

Base year 2021

Methodology

Subdirectorate General for Short-term Statistics

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1 Introduction

The Service Sector Price Index (SSPI) is a statistic aimed mainly at measuring the evolution of service prices. To achieve this, the design used is based on the structures of various service activities and the most marketed products in each of them, based on the turnover of the companies that comprise them. These elements, along with others that make up the methodology of this indicator, need to be updated at more or less frequent intervals in order to maintain the representativeness of the SSPI.

The process of changing the SSPI base year primarily involves reviewing and updating each of its components to determine the best options for achieving a representative and accurate indicator that aligns with trends in the service sector.

In addition, Regulation (EU) 2019/2152 of the European Parliament and of the Council, of 27 November 2019, on European business statistics, whose aim is to create a common framework for the production of community statistics, and Regulation (EU) Implementing Regulation 2020/1197, which establishes the technical specifications to comply with the mandate of the Framework Regulation, mark the periodicity of base changes. In this regard, the Regulation provides that:

The first base year is 2015, the second base year is 2021, and the third base year is 2025. Thereafter, every five years, Member States must reset the base of the indices, taking as base years those ending in 0 or 5. All indices must be adapted to the new base year within three years from the end of that new base year.

Therefore, the base year 2021 SSPI, whose main characteristics are detailed in this methodology, addresses, on the one hand, the need to adapt to the changes that have occurred in the service sector in recent years, and, on the other hand, complies with the requirements stipulated by European regulations in this regard.

One of the requirements of this regulation comes into force with this base year change, thus a general index starts to be calculated for the national total and for all divisions (two digits) of the NACE sections H, I, J, L, M (except M72 and M75) and N.

Until the implementation of base year 2010, the SSPI was calculated using what is known as a fixed-base system. The main characteristic of this system is that both the composition of the product basket and its weightings remain unalterable throughout the duration of the base year. Therefore, the only way to be able to reflect changes in the behaviour of service producers and for the SSPI to adapt to new trends was to wait until the next base change. Clearly, in some cases this time frame was excessively long.

With the base year 2010 SSPI, a new approach to this indicator was introduced, based on an annual revision of the weightings for the main levels of functional aggregation, and the possibility of including any significant changes that occur in the service sector, such as the emergence of new products, changes in productive activity, or adjustments in the sample of companies. This way, the SSPI better adapts to economic realities and is much more dynamic than its predecessors.

As a consequence of this operational framework, in the first quarter of 2024, the base year 2021 Services Price Index will come into force, replacing the base year 2015 SSPI, which was in force until the fourth quarter of 2023.

The base year 2021 SSPI, maintains many of the main characteristics of the base year 2015 SSPI and, like the latter, will annually revise the weightings for certain levels of

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functional disaggregation. This update uses the latest available information from the *Structural Business Statistics: service sector*.

Furthermore, the main changes introduced in the new System were approved in the Plenary Session of the Higher Council of Statistics, after their evaluation by the Permanent Commission of said Council.

The main characteristics of the base year 2021 Service Price Index are included in this methodology.

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2 Definition of the indicator

The Service Sector Price Indices, which are published on a quarterly basis, aim to measure the evolution of the prices of services provided by companies operating in the service sector in Spain, from the supply side (producer's point of view). The prices considered for the calculation are those of the services provided to companies (business segment) and households combined.

The precision of this short-term indicator in measuring the evolution of the price level depends on two qualities that any price index must have: **representativeness and comparability time**.

The degree of **representativeness** of the SSPI is determined by the adaptation of this indicator to the economic reality of the moment; thus, the rate of change calculated based on the SSPI will be closer to the evolution of prices in the sector as a whole the more the components selected for measurement align with the behavior of producers. To achieve this, the selected products in the SSPI basket must be the best-selling products in the relevant industry, the enterprises in the sample must be the ones with the highest turnover in the industry, and the relative importance of each product in the basket must reflect sales trends in the service sector. The better the selection of these elements, the more representative this indicator becomes.

On the other hand, the SSPI is an indicator that only makes sense when comparisons are made over time; in fact, an index number has little meaning unless a comparison is made with indices for other periods, in order to obtain the corresponding rates of change (this can be a month, a quarter, a year or any other period of time). Therefore, the other quality attributable to a SSPI is **comparability over time**, that is, the need for the elements defining the SSPI to remain stable over time, except, logically, for the prices collected quarterly. This ensures that any variation in the SSPI is only due to changes in the prices of the selected products and not due to any change in the methodological content of this indicator.

The applications of the SSPI are numerous and of great importance in the economic and legal fields. These include its use as a measure of price inflation in the production of services, as well as its application as a deflator in National Accounting and in the Service Sector Activity Index (SSAI).

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3 Scope of the indicator

3.1 Time Scope

3.1.1 BASE PERIOD

The base period of the index, or reference period, is the one in which all indices are adjusted to be equal to 100. Normally this consists of an annual period. Under the new system, the arithmetic mean of the four quarterly indices for the year 2021, based on the 2015 base, is set equal to 100. This indicates that subsequent indices published under the new base refer to the year 2021, hence referred to as the base 2021 SSPI.

3.1.2 PRICE REFERENCE PERIOD

The price reference period is the period against which current prices are compared, in other words, the period chosen for the calculation of the elementary indices.

In the calculation formula used for the base 2021 SSPI (chain-linked Laspeyres), the reference period for prices is the last quarter of the year immediately prior to the year considered. Therefore, at the beginning of each year the reference period changes.

3.1.3 WEIGHTINGS REFERENCE PERIOD

The weightings reference period is the one that the weightings used to structure the system refer to.

For the year 2024, weightings have been calculated using data from the *Structural Business Statistics (SBS): service sector*, from the *Statistics on products in the service sector* and from the SSPI itself, referring to the year 2021, which provide information on turnover by branch of activity and, for some activities, by product.

Additionally, in order to correct the discrepancy that occurs between the reference period for the annual surveys and the reference period for prices (fourth quarter of the year 2023), the weightings have been updated using information on the evolution of prices from the SSPI.

Thus, the reference period for the weightings will be the last quarter of 2023, during the year 2024, and the last quarter of the immediately preceding year in subsequent years, as the weightings will be updated annually, using the latest available information from the *Structural Business Statistics* and the SSPI.

This annual revision of the weightings will be made for certain levels of functional disaggregation, using the information available closest to the time of the revision.

In addition, at each base change, the weightings will be updated for all levels of functional disaggregation.

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3.2 Population scope

The index population or reference stratum is the population group whose income structure serves as the basis for the selection of the representative products and the calculation of the product weightings.

In the base 2021 SSPI, the reference stratum of the index includes all enterprises providing services, both domestically and abroad.

3.3 Geographical scope

The geographical scope of the research is the entire national territory.

3.4 Scope of application

This is the set of services that the companies of the reference strata provide in both the domestic and foreign markets.

Each branch of activity in the CNAE is represented by one or more products in the SSPI, so that the evolution of the prices of these products represents all of the elements that comprise said branch of activity. This is called a *basket of products*.

3.4.1 BASKET OF PRODUCTS

This is the set of products selected in the SSPI, whose price evolution represents all those products that comprise the NACE branch to which they belong.

The selection of the products that make up the SSPI basket has been carried out based on the SSPI, in base year 2015, and the data from the *service sector SBS* 2021 and the *service sector Product Statistics* 2021. The criterion for determining which services should form part of the indicator consists of including all those that exceed a minimum threshold of the branch's turnover. In addition, meetings are held with the representative agents of each sector and the recommendations of international reports are followed in order to achieve an appropriate product selection.

Thus, the total number of products that make up the base year 2021 SSPI basket is 151.

3.5 Functional disaggregation of the indices

The base 2021 SSPI is completely adapted to the national classification of activities NACE-2009.

The functional structure of the base year 2021 SSPI is different from the structure of the base year 2015. The number of activities have been extended to cover sections H, I, J, L, M (except M701, M72 and M75) and N of the NACE.

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In addition, in base year 2021, a general index at national level and indices at the section and division level are calculated. The base year 2021 SSPI covers the following activities:

General Index (Total services)

Section H - Transportation and Storage

- 49 Land transport and transport via pipelines
- 50 Sea transport
  - 50.1 Sea and coastal passenger water transport
  - 50.2 Sea and coastal freight water transport
- 51 Air transport
  - 51.1 Passenger air transport
- 52 Warehousing and support activities for transportation
  - 52.1. Warehousing and storage
  - 52. 2 Activities related to transport
    - 52. 21 Activities related to land transport (*to be published as confidential)*
    - 52.22 Activities related to sea and inland waterway transport (*to be published as confidential*)
    - 52. 23 Activities related to air transport (*to be published as confidential*)
    - 52.24 Cargo handling
- 53 Postal and courier activities
  - 53B Postal and courier activities

Section I - Accommodation and Food Service Activities

- 55 Accommodation
- 56 Food and beverage service activities

Section J - Information and Communication

- 58 Editing
- 59 Film and television
- 60 Programming and broadcasting
- 61 Telecommunications (B2All)
  - 61B Telecommunications (business services)
  - 61H Telecommunications (household services)
- 62 Computer consultancy and programming
- 63 Information service
  - 63.1 Data processing, hosting and related activities; web portals
  - 63.9 Other information service activities

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Section L - Real Estate Activities

68 Real Estate

Section M - Professional, Scientific and Technical Activities

69 Legal and accounting activities (B2All)

70 Activities of head offices; management consultancy activities

71 Architectural and engineering activities; technical testing and analysis

73 Advertising and market research

73.1 Advertising

73.2 Market research

74 Professional services

Section N - Administrative and Support Service Activities

77 Rental services

78 Employment activities

79 Travel agencies and tour operators

80 Investigation and security services

81 Services to buildings and landscape activities

81.2 Cleaning activities

82 Office administrative, office support and other business support activities

3.6 Geographical disaggregation of the indices

Both the base Year 2021 SSPI and its predecessors do not calculate geographically disaggregated indices on the level of Autonomous Community or province, only indices are calculated for the national total.

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4 Sample Design

As in most European Union (EU) countries, the design of the sample of prices involved in the calculation of the SSPI is based on cut-off sampling, consisting of ordering the items to be sampled in decreasing order according to their values (in this case, turnover) and selecting for the sample those that exceed an established minimum threshold. It is, therefore, a non-probabilistic design, given the characteristics of the population under study.

In order to obtain meaningful indicators at the publication levels, the sample selection process has been structured into three main sections, each of which aims to select the different components of the sample. These are as follows:

– Selection of activities.

– Selection of products.

– Selection of companies.

4.1 Selection of activities

As mentioned above, the activities that form part of the SSPI calculation, in base year 2021, are those included in Sections H, I, J, L, M (except M701, M72 and M75) and N of the NACE, as indicated in the Implementing Regulation (EU) 2020/1197.

4.2 Selection of products

The heterogeneity of services and their intrinsic characteristics (intangibility, inseparability and perishability) makes it necessary to use different methods for the selection of representative services for each branch.

In principle, the products that make up the SSPI basket, in base year 2021, are included according to their turnover within the class to which they belong, until 70% of their turnover is covered.

The information to carry out the selection of products is obtained from the *Service Sector Products Survey*, referring to the year 2021, for those activities included in it. For the rest of the activities, a detailed study of the sector is carried out, meetings are held with the sector's representative agents and the recommendations of international research and reports are followed for an adequate selection of products.

With these selection criteria, in the base year 2021 SSPI, the basket consists of 151 products.

4.3 Selection of companies

For each of the products in the basket, the companies are selected in such a way as to guarantee that the estimation of the variation rates is statistically significant at the highest level of functional disaggregation published.

In general, the number of companies surveyed for each product, within each activity, is determined according to their respective weights, aiming to cover between 60% and 70% of the turnover of the activity in question.

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In *legal and economic consultancy activities* (groups 69.1, 69.2 and 70.2 of NACE 2009), *technical architectural and engineering services* (group 71.1 of NACE 2009), *real estate activities* (division 68 of NACE 2009), *professional services* (division 74 of NACE) and *administrative services* (division 82 of NACE), the population of companies is stratified according to turnover, with the largest stratum being exhaustive and with annual rotation of part of the sample in the smaller strata.

The information to carry out the selection of companies is obtained from the *Structural Business Statistics: service sector* and the *Service Sector Product Statistics*, referring to the year 2021.

Thus, in the base year 2021 SSPI, prices are collected in a sample of about 1,400 companies.

4.4 Number of observations

The number of observations for each product is determined by the sub-varieties reported by the companies.

Each company is asked to report information on the price of the sub-varieties (specific models of a service) that they sell the most.

Thus, approximately 8,500 sub-varieties are priced in base year 2021.

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5 General calculation method

The formula used to calculate the indices of the SSPI, in base year 2021, is the chain-linked Laspeyres formula, which has already been used in the SSPI, in base year 2010.

The general index corresponding to a moment in time *t* is mathematically expressed as follows:

$$ {}_0I^t_{LE} = \prod_{k=1}^{t} \frac{\sum_i p_i^k q_i^{k-1}}{\sum_i p_i^{k-1} q_i^{k-1}} $$

Where:

P_i^k and P_i^{k-1} represent the price of product *i* at times *k* and *k-1*, respectively.

q_i^k is the quantity produced of product *i* at time *k-1*.

Similarly, it can be expressed as:

$$ {}_0I^t_{LE} = \prod_{k=1}^{t} \frac{\sum_i \frac{p_i^k}{p_i^{k-1}} p_i^{k-1} q_i^{k-1}}{\sum_i p_i^{k-1} q_i^{k-1}} = \prod_{k=1}^{t} \sum_i {}_{k-1}I_i^k W_i^{k-1} $$

where:

$$ {}_{k\text{-}1}I_i^k = \frac{p_i^k}{p_i^{k-1}} \quad \text{and} \quad W_i^{k-1} = \frac{p_i^{k-1} q_i^{k-1}}{\sum_i p_i^{k-1} q_i^{k-1}} $$

As can be seen, a chained index establishes the relationship between the current period (*t*) and the base period (*0*) based on intermediate situations (*k*).

In the base year 2021 SSPI, the intermediate situations considered correspond to the last quarter of each year. Thus, the base year 2021 index for quarter m of year t is obtained as a product of indices as follows:

$$ {}_{21}I_G^{mt} = {}_{21}I_G^{4T(t-1)} * \left(\frac{{}_{4T(t-1)}I_G^{mt}}{100} \right) = $$

$$ = {}_{21}I_G^{4T21} * \left(\frac{{}_{4T21}I_G^{4T22}}{100} \right) * \ldots * \left(\frac{{}_{4T(t-2)}I_G^{4T(t-1)}}{100} \right) * \left(\frac{{}_{4T(t-1)}I_G^{mt}}{100} \right) $$

where:

${}_{21}I_G^{mt}$ is the general index, in base year 2021, for quarter *m* of year *t*.

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$_{4T(t-1)}\square I_G^{mt}$ is the general index, referenced to the last quarter of year (t-1), for quarter *m* of year *t*.

The main drawback of chain indices is the lack of additivity. This means that it is not possible to obtain the index of any aggregate in base year 2021 as a weighted average of the indices in base year 2021 of the aggregates that comprise it.

5.1 Elementary indices

An elementary aggregate is the component with the lowest level of aggregation for which indices are obtained and in whose calculation no weightings are involved; the price indices of these aggregates are called elementary indices. In the SSPI, an elementary index is calculated for each product in the basket within defined strata for each activity. In this case, the elementary aggregate is the product-stratum.

The index of elementary aggregate *i* is obtained as the ratio of the average price of this elementary aggregate in the current period and the average price in the price reference period, that is, the fourth quarter of the previous year:

$$_{4T(t-1)}\square I_i^{mt} = \frac{\bar{P}_i^{mt}}{\bar{P}_i^{4T(t-1)}} \times 100$$

where:

$_{4T(t-1)}\square I_i^{mt}$ is the index, referenced to the fourth quarter of year *(t-1)*, of elementary aggregate *i* in quarter *m* of year *t*.

$\bar{P}_i^{mt}$ is the average price of elementary aggregate *i*, in quarter *m* of year *t*.

$\bar{P}_i^{4T(t-1)}$ is the average price of elementary aggregate *i*, in the fourth quarter of year *(t-1)*.

Similarly, the average price of aggregate *i* in period (*m, t*), $\overline{P}_i^{mt}$, is the simple geometric mean of the prices collected during that period.

$$\overline{P}_i^{mt} = \sqrt[n_i^{mt}]{\prod_{j=1} P_{i,j}^{mt}}$$

where:

$P_{i,j}^{mt}$ is the price of elementary aggregate *i* collected in company *j*, in period *(m,t)*.

n_i^{mt} is the number of prices processed for elementary aggregate *i*, in period *(m,t)*.

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The geometric mean assigns equal significance to changes in all prices, regardless of their level.

5.2 Weightings

The weighting structure of the SSPI, in base year 2021, has three fundamental sources of information:

– The *Structural Business Statistics (SBS): service sector*, which provides data on the turnover of service companies, by branch of activity.

– The *Service Sector Product Statistics*, which provides information on turnover by product, for certain activities.

– The SSPI survey itself, which provides information on the distribution of the turnover of the company among the services it provides.

From the first, the weighting of each of the branches represented in the SSPI is obtained, as the ratio of the turnover of the companies whose main activity is said branch and the total turnover of the higher-level aggregate branch. Before calculating the weightings, the turnover of the branches not represented is distributed among the higher-level aggregate branches.

Subsequently, in order to obtain the weightings of the products, based on the information on the distribution of turnover among the services provided, obtained from the *Service Sector Product Statistics*, or requested from each company in the SSPI survey, the weighting of the branch is distributed among the services that constitute the SSPI basket.

Finally, within each product, two strata are established: the first is made up of the companies with the highest turnover, representing at least 70% of the total turnover of the product in the companies that form part of the sample, while the second includes the rest of the selected companies. The weighting of each product is allocated to these two strata according to their respective weight.

The data used in the calculation of the weightings, used during the year 2024, correspond to the year 2021.

Additionally, in order to correct the discrepancy that occurs between the reference period for the weightings and the reference period for prices (fourth quarter of the year 2023), the weightings are updated using information on the evolution of prices from the SSPI. Thus, the reference period for the weightings used during the year 2024 is the fourth quarter of 2023.

As previously mentioned, the weight or importance of the aggregates that make up this indicator is updated annually, which allows the indicator to be adapted to the changes that occur in the activities of the service sector.

The weighting of each branch reflects the relationship between the turnover of said branch and the total turnover:

$$W_i = \frac{cifra\ de\ negocios\ de\ la\ rama\ i}{cifra\ de\ negocios\ agregado\ superior}$$

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The weight of each class is distributed among the products included in said activity based on the relationship between the turnover of said product and the turnover of all the products included in the branch to which they belong:

$$W_{ij} = W_i * \frac{cifra\ de\ negocios\ del\ producto\ j}{cifra\ de\ negocios\ en\ la\ rama\ i}$$

Thus, the weighting of functional aggregation *A* is obtained from the sum of the weightings of the products that make up that aggregation:

$$W_A = \sum_{i \in A} W_i$$

The annual updates of weightings, to be carried out in the SSPI, base 2021, will use the latest available annual information from the *Structural Business Statistics: service sector*.

5.3 Aggregate indices

As previously mentioned, elementary indices refer to the fourth quarter of the immediately previous year. Moreover, the weightings used for the calculation of the aggregates also refer to the last quarter of the previous year, thus maintaining consistency with the reference prices.

The aggregate indices are calculated using weighted sums of the elementary indices. Thus, different functional aggregations can be obtained, as detailed below.

Functional aggregations for the national aggregate

To calculate the index referenced to the fourth quarter of the year prior to the current year of any functional aggregation *A* (products, divisions, etc.) in the national aggregate, the elementary indices of the products belonging to that aggregation shall be aggregated using their weightings in the SSPI basket of products, as follows:

$$_{4T(t-1)}I_A^{mt} = \frac{\sum_{p \in A}\ {}_{4T(t-1)}I_{Ap}^{mt} * {}_{4T(t-1)}W_{Ap}}{\sum_{p \in A}\ {}_{4T(t-1)}W_{Ap}}$$

where:

$_{4T(t-1)}W_{Ap}$ is the weighting of functional aggregation *A* in stratum *p*, referenced to the fourth quarter of *(t-1)*, which takes effect in the first quarter of year *t*.

$_{4T(t-1)}I_{Ap}^{mt}$ is the index referenced to the fourth quarter of (t-1) for functional aggregation *A* in stratum *p*, in quarter *m* of year *t*.

Once the aggregate indices have been calculated as detailed above, it is necessary to chain them. These indices are the ones that are finally disseminated and provide continuity to the series published.

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For any functional aggregation *A*, the index in base year 2021, is calculated as follows:

$$ {}_{21}I_A^{mt} = {}_{21}I_A^{4T(t-1)} * \left(\frac{{}_{4T(t-1)}I_A^{mt}}{100} \right) = \frac{{}_{21}I_A^{4T\,(t-1)}}{100} * {}_{4T(t-1)}I_A^{mt} = C_A^t \; * {}_{4T(t-1)}I_A^{mt} $$

That is to say, each index calculated with reference in the fourth quarter of *t-1* is multiplied by a coefficient, obtained as the ratio between the index in base year 2021 of the fourth quarter of *t-1* and 100. This coefficient is called the **chaining coefficient**.

5.4 Calculation of variation rates

5.4.1 QUARTERLY VARIATION RATES

The quarterly variation rate of an index in period *(m, t)* is calculated as the ratio of the index of the current quarter *m* to the index of the previous quarter *(m-1)*, according to the following formula:

$$ V^{mt/(m-1)t} = \left(\frac{{}_{21}I_{\square}^{mt}}{{}_{21}I_{\square}^{(m-1)t}} - 1 \right) * 100 = \left(\frac{{}_{4T(t-1)}I_{\square}^{mt} * C_{\square}^{t}}{{}_{4T(t-1)}I_{\square}^{(m-1)t} * C_{\square}^{t}} - 1 \right) * 100 $$
$$ = \left(\frac{{}_{4T(t-1)}I_{\square}^{mt}}{{}_{4T(t-1)}I_{\square}^{(m-1)t}} - 1 \right) * 100 $$

where:

${}_{\square}V_{\square}^{mt/(m-1)t}$	is the quarterly variation rate for quarter *m* of year *t*.
${}_{21}I_{\square}^{mt}$	is the index, in base year 2021, for quarter *m* of year *t*.
${}_{4T(t-1)}I_{\square}^{mt}$	is the index, referenced to the fourth quarter of the previous year, for quarter *m* of year *t*.
$C_{\square}^{t}$	is the chaining coefficient for year *t*.

In other words, the quarterly rates of change may be calculated with the published indices, in base year 2021, or with the unchained indices (referring to the fourth quarter of the previous year).

5.4.2 CUMULATIVE VARIATION RATES

The cumulative variation rate (or year-to-date) is calculated as the ratio between the index of the current quarter and the index of the fourth quarter of the previous year:

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$$V^{mt/4T(t-1)} = \left(\frac{{}_{21}I^{mt}_{\square}}{{}_{21}I^{4T(t-1)}_{\square}} - 1 \right) * 100 == \left(\frac{{}_{4T(t-1)}I^{mt}_{\square} * C^{t}_{\square}}{{}_{4T(t-1)}I^{4T(t-1)}_{\square} * C^{t}_{\square}} - 1 \right) * 100 =$$
$$= \left(\frac{{}_{4T(t-1)}I^{mt}_{\square}}{{}_{4T(t-1)}I^{4T(t-1)}_{\square}} - 1 \right) * 100 = \left(\frac{{}_{4T(t-1)}I^{mt}_{\square}}{100} - 1 \right) * 100$$

where:

${}_{\square}V^{mt/4T(t-1)}_{\square}$ is the cumulative variation rate for quarter *m* of year *t*.

${}_{21}I^{mt}_{\square}$ is the index, in base year 2021, for quarter *m* of year *t*.

${}_{4T(t-1)}I^{mt}_{\square}$ is the index, referenced to the fourth quarter of the previous year, for quarter *m* of year *t*.

$C^{t}_{\square}$ is the chaining coefficient for year *t*.

In other words, the cumulative rates of change may be calculated with the published indices, in base year 2021, or with the unchained indices (referring to the fourth quarter of the previous year). In the latter case, the index of the fourth quarter of *t-1* referred to the fourth quarter of *t-1* is equal to 100, by definition.

5.4.3 ANNUAL VARIATION RATES

The annual variation rate is calculated as the ratio between the published indices of the current quarter and the same quarter of the previous year, both in base year 2021:

$$V^{\frac{mt}{m(t-1)}} = \left(\frac{{}_{21}I^{mt}_{\square}}{{}_{21}I^{m(t-1)}_{\square}} - 1 \right) * 100$$

where:

${}_{\square}V^{mt/m(t-1)}_{\square}$ is the cumulative variation rate for quarter *m* of year *t*.

${}_{21}I^{mt}_{\square}$ is the index, in base year 2021, for quarter *m* of year *t*.

In the case of annual variations, these cannot be calculated with the indices referring to the fourth quarter of the previous year, as is the case with quarterly and cumulative variations. The reason for this is that each of the two indices involved in the formula has been chained with different chaining coefficients (one referring to year t and the other to t-1), so they do not cancel out, as in the previous formulas:

$$V^{\frac{mt}{m(t-1)}} = \left(\frac{{}_{21}I^{mt}_{\square}}{{}_{21}I^{m(t-1)}_{\square}} - 1 \right) * 100 = \left(\frac{{}_{4T(t-1)}I^{mt}_{\square} * C^{t}_{\square}}{{}_{4T(t-2)}I^{m(t-1)}_{\square} * C^{t-1}_{\square}} - 1 \right) * 100$$

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5.5 Calculation of Contributions

5.5.1 QUARTERLY CONTRIBUTIONS

The contribution of the quarterly variation of a product or an aggregate on the general index is defined as the portion of the quarterly variation of the general index that corresponds to that product or aggregate. In other words, the sum of the quarterly contribution of all products in the SSPI basket is equal to the quarterly variation of the general index.

In other words, the contribution that the quarterly price variation of a product or aggregate has on the quarterly variation of the general index is the variation that the latter would have undergone if all the prices of all the other products had remained stable in that quarter.

The mathematical expression of the quarterly contribution of a given product (or aggregate) *i*, in quarter *m* of year *t*, is as follows:

$$R_i^{mt/(m-1)t} = \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}} * {}_{4T(t-1)}W_i * 100$$

where:

${}_{4T(t-1)}I_i^{mt}$ is the index, referenced to Q4 of year *(t-1)*, of product *i*, in quarter *m* of year *t*.

${}_{4T(t-1)}I_G^{(m-1)t}$ is the general index, referenced to Q4 of year (t-1), in quarter *(m-1)* of year *t*.

${}_{4T(t-1)}W_i$ is the weighting, referenced to Q4 of year *(t-1)*, of product *i*, as a fraction.

Expanding the previous formula provides an alternative method to calculate the contributions through variation rates:

$$R_i^{mt/(m-1)t} = \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}} * {}_{4T(t-1)}W_i * 100 =$$

$$= \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}} * \frac{{}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_i^{(m-1)t}} * {}_{4T(t-1)}W_i * 100 =$$

$$= \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_i^{(m-1)t}} * 100 * {}_{4T(t-1)}W_i * \frac{{}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}}$$

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$$=V_i^{mt/(m-1)t} * {}_{4T(t-1)}W_i * \frac{{}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}}$$

Therefore, the quarterly impact of a specific product i is the product of its quarterly variation rate ($V_i^{m,t/(m-1)t}$), its weighting (${}_{4T(t-1)}W_i$), and the ratio between the product index and the general index from the previous quarter (${}_{4T(t-1)}I_i^{(m-1)t} / {}_{4T(t-1)}I_G^{(m-1)t}$). Thus, a product in the sample will have a greater contribution on the general index variation rate the more its prices have varied, the higher its weighting, and the greater its index value relative to the general index.

Moreover, as mentioned above, the sum of the quarterly contribution of all products in the SSPI basket is equal to the quarterly variation of the general index. This is demonstrated as follows:

$$\sum_i R_i^{mt/(m-1)t} = \sum_i \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}} * {}_{4T(t-1)}W_i * 100 =$$

$$= \frac{\left(\sum_i {}_{4T(t-1)}I_i^{mt} * {}_{4T(t-1)}W_i - \sum_i {}_{4T(t-1)}I_i^{(m-1)t} * {}_{4T(t-1)}W_i\right)}{{}_{4T(t-1)}I_G^{(m-1)t}} * 100 =$$

$$= \frac{{}_{4T(t-1)}I_G^{mt} - {}_{4T(t-1)}I_G^{(m-1)t}}{{}_{4T(t-1)}I_G^{(m-1)t}} * 100 = V_G^{mt/(m-1)t}$$

5.5.2 CUMULATIVE CONTRIBUTIONS

The CONTRIBUTION of year-to-date variation (or cumulative variation) of a product or aggregate on the general index represents the cumulative variation that the general index would experience if the rest of the products had not undergone any price variation so far this year. In other words, it is the portion of the cumulative variation attributed to that specific product or aggregate.

The formula for the cumulative contribution of a specific product (or aggregate) *i* in quarter *m* of year *t* is as follows:

$$R_i^{mt/4T(t-1)} = \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{4T(t-1)}}{{}_{4T(t-1)}I_G^{4T(t-1)}} * {}_{4T(t-1)}W_i * 100 =$$

$$= \frac{{}_{4T(t-1)}I_i^{mt} - 100}{100} * {}_{4T(t-1)}W_i * 100 = \left({}_{4T(t-1)}I_i^{mt} - 100\right) * {}_{4T(t-1)}W_i$$

where:

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$_{4T(t-1)}I_i^{mt}$ is the index, referenced to Q4 of year *(t-1)*, of product *i*, in quarter *m* of year *t*.

$_{4T(t-1)}W_i$ is the weighting, referenced to Q4 of year *(t-1)*, of product *i*, as a fraction.

Using the alternative formula for calculating contributions developed in the previous section, it is found that the cumulative impact is equal to the product of the year-to-date variation and the weighting:

$$R_i^{mt/4T(t-1)} = \frac{{}_{4T(t-1)}I_i^{mt} - {}_{4T(t-1)}I_i^{4T(t-1)}}{{}_{4T(t-1)}I_G^{4T(t-1)}} * {}_{4T(t-1)}W_i * 100 =$$

$$= V_i^{mt/4T(t-1)} * {}_{4T(t-1)}W_i * \frac{{}_{4T(t-1)}I_i^{4T(t-1)}}{{}_{4T(t-1)}I_G^{4T(t-1)}} =$$

$$= V_i^{mt/4T(t-1)} * {}_{4T(t-1)}W_i * \frac{100}{100} = V_i^{mt/4T(t-1)} * {}_{4T(t-1)}W_i$$

For cumulative contributions, it is also verified that the sum of these impacts equals the cumulative variation rate, following the same steps as in the previous section.

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6 Price Collection

The collection of prices for products included in the SSPI basket is conducted by the central services of the INE through quarterly questionnaires filled out by businesses

Since 2011, the INE has increased the completion of the questionnaires via the Internet, through the IRIA collection platform (Integration of Information Collection and Administration, in Spanish). Information requests are made using customised questionnaires for each company in the sample, and the informants complete the questionnaire mainly via the website or by e-mail, or by using traditional methods such as telephone, fax or post.

The prices collected must comply with the following conditions:

– Any discounts, rebates, surcharges, etc., possibly applied to customers must be taken into account.

– Since the price reflects the revenue obtained by the producer, taxes levied on services should be excluded from the price, and any subsidies received by the producer should be added.

– Actual sales which lead to actual prices should be taken into account. Transactions within the same company that only result in accounting prices are not included.

– Services sold both domestically and internationally are included.

– The price must correspond to the date of service provision.

In the case of service prices, due to the intrinsic characteristics of the services themselves, the selection of the best-selling sub-variety (service type) is complicated, since in many cases the services are provided only once or it is difficult to identify a single service due to the fact that several services are provided at the same time in packages.

Despite these challenges, within each service category, types (sub-varieties) must be chosen based on the following criteria:

– that they are the most frequently offered services (representative),

– that they maintain the same characteristics (technical and commercial criteria determining the price: quality, quantity, type of customer, etc.) over time (homogeneous),

– that their price evolution is similar to the rest of the services they represent within the product,

– that they have permanence in the market,

– that they are easily observable.

In cases where it is not possible to observe the price of the specific service, one of the following alternatives can be used, depending on the type of services considered:

– For contract prices: Service providers select one or more specific service contracts that are recurring over time.

– For prices of services repeated over time: Prices are collected from actual transactions or price lists.

– Unit value: When services are homogeneous, the total billing value of the service can be divided by the quantity of the service performed.

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– Component pricing: The service is divided into a number of key components and each is priced separately.
– Percentage-based pricing: The price is estimated by multiplying the percentage charged by the value of the service to which the percentage is applied.

It is possible that, although the service is clearly specified, the price is not directly observable, and in this case the following method is used:

– Model prices: The price of a fictitious service or model agreed upon by the INE (National Statistics Institute, in Spain) and the company is collected.

Finally, when the service cannot be clearly specified, the price is approximated using the necessary production costs:

– Prices based on hourly costs: The price of a standard amount of work (e.g., one hour) for different labour categories within the company is collected.

There are several exceptions to the above methods: CPI data, with necessary adjustments, are used for a number of services that are mostly provided to households (e.g. in the transport or catering sector). The data used for the calculation of the *Advertising Price Index* (73.1 CNAE-2009) are provided by the company INFOADEX, which monitors and analyses advertising in Spain. The *Land transport and transport via pipelines Price Index* (49 CNAE-2009), is elaborated with data from the Ministry of Public Works and the CPI. And the *Accommodation Price Index* (55 CNAE-2009), which is elaborated with data from the Hotel Price Index (IPH).

6.1 Organisation of fieldwork

The information is collected by the staff assigned to the survey at the Central Services of the National Statistics Institute (INE).

Technical responsibility lies with the survey inspector. The survey inspector is in charge of organising and distributing the work, analysing the price series, planning the distribution of questionnaires and data collection and, in general, solving any problems that may arise during the price collection.

Surveyors are responsible for sending and receiving the price questionnaires, monitoring the products, verifying that the price is always the same and, if it is not, making sure that the sub-varieties proposed as substitutes are correct, as well as claiming this substitution, if the company does not propose substitutes; they will also transmit to the survey inspector all those incidences that may arise.

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7 Processing of information

7.1 Information reception

As previously mentioned, the data collection is carried out using a questionnaire in which the company informant records the prices of the requested products and any corresponding incidents, if any. Once completed, the questionnaire is sent to the Central Services of the INE.

After an initial filtering of the questionnaires by the surveyor, the data is recorded.

After each questionnaire recording phase, software applications are used to detect possible errors.

Surveyors are also responsible for checking for atypical prices before proceeding to the next stage of the process. This system allows for the detection and resolution of any errors in data collection without much delay from the moment the information is collected.

The final phase is the analysis of the price series by the survey inspector.

The total number of prices processed on a quarterly basis, around 8,500, is analysed by requesting, when necessary, confirmation from the enterprises regarding atypical variations. Once the prices have been filtered and analysed, the indices and their corresponding rates of change are obtained and published provisionally at the end of the quarter following the data reference quarter. The data will become final one year after their initial publication.

7.2 Price review

As mentioned in the previous section, all prices collected quarterly are received, filtered and analysed at INE's Central Services.

In general, all variations of more than 10% or less than -10% are reviewed, for all products as well as those within the range of (-10%, 10%) that have a significant contribution on the index.

Additionally, missing prices are addressed by estimating the prices of products that were not available at the time of completing the questionnaire.

The method for estimating missing prices involves applying the average variation of the other prices collected for the same product from the other companies in the sample, within the relevant activity sector.

7.3 Quality changes

The accuracy of the SSPI in estimating price variations depends, to a large extent, on the stability over time of the conditions initially established. This implies that the product selected for the sample should not change its technical and commercial characteristics.

However, this homogeneity requirement is not always possible, especially in the service sector, because of the heterogeneous nature of services and because the market itself is characterised by product differentiation and market segmentation. These issues are

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more pronounced in certain sectors. In such cases, adjustments are required to correct for changes in the sample of products and to estimate the price variation without being affected by these changes. These adjustments are known as quality change adjustments.

This issue can be solved, to some extent, by an appropriate selection of sub-varieties and sometimes by using certain price collection methods, such as contracts, models or unit values, even if these do not correspond to actual transactions. As a general rule, when a price variation occurs due to a change in the specifications of a sub-variety, it is assumed that the change is not only due to a price variation. In the absence of additional information to determine what portion of the variation is due to the price variatiion and what portion is due to the quality change, the price variation is estimated using the average variation of the other prices for that product.

7.3.1 DEFINITION

As indicated above, a quality change adjustment is necessary when one sub-variety, whose price is part of the SSPI calculation, is substituted by another. When this occurs, it is necessary to determine what portion of the price difference between the new sub-variety and the old one is due to differences in quality.

Substitutions of subvarieties may be due to several reasons:

– the company stopped providing the service corresponding to the recorded sub-variety;

– the sub-variety ceased to be representative within the company;

– the company from which the sub-variety price is collected ceased to be representative, closed, or changed its economic activity.

The subvarieties that make up the product basket remain fixed over time as they define the most representative type of marketing of a service, but they must be substituted when they are no longer marketed or are no longer the most sold in the company.

When the disappearing sub-variety and the new one coexist over time, it is possible to establish a relationship between the two, and the quality adjustment is almost automatic. However, there is not always an overlap period between products, nor is there an exact match between a service and its replacement. It is then necessary to estimate what portion of the price difference is due to changes in the service conditions and what portion is purely a price variation.

7.3.2 QUALITY ADJUSTMENT METHODS

The most commonly used quality adjustment methods in SSPI, in base year 2021, are the following:

a) Total quality adjustment.

   This method assumes that the difference between the price of the substituted product and the substitute product is entirely driven by the difference in quality between the two, or that the products are so different that they cannot be compared. It is then assumed that the price difference between the two products is only due to

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the different quality of the two products, so that the index will not reflect a price variation. This adjustment assumes that had the substituted product remained on sale, its price would have remained unchanged.

b) Adjustment for same quality.

It is assumed that the substitute product is of the same quality as the substituted product, in other words, that the price difference between the two is due to a real price variation. This adjustment assumes that had the replaced product remained on sale, its price would have been the same as that of the substitute product.

c) Other adjustment methods.

This section includes all adjustment methods to estimate the value of the difference in quality between a service and its substitute. The most common practices are:

- Imputation Prices.

  The variation in the average price of a larger aggregate to which the product belongs is imputed.

- Information provided by experts:

  Experts or specialists in the product are asked how much of the difference between the prices of the products (substitute and substituted) is due to the difference in quality between the two.

- Price overlapping:

  The quality difference value between the substituted and substitute products is the price difference between them during the overlap period when both products are on sale.

In most cases, the method commonly used for quality adjustments in the SSPI is imputation prices.

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8. Series linking

For the new SSPI, base year 2021, as it is a chained index, it has not been necessary to calculate any link coefficient, since the chaining calculation method allows for making changes in weightings, sample and methodology every fourth quarter, and to chain the indices obtained from these new calculations, with the series that was being published calculated using the old sample, weightings and methodology.

Thus, for the SSPI, base year 2021, only the reference period of the indices or base period has been changed from the year 2015 to the year 2021. This has been done by calculating a **rescaling coefficient**, which has converted the indices published in base year 2015, from the first quarter of 2007 to the fourth quarter of 2023, into indices in base year 2021.

This coefficient is that which makes the simple arithmetic average of indices published in base 2015 for the year 2021 equal to 100:

$$\left(\frac{1}{4} * \sum_{m=1T}^{4T} {}_{15}I^{m21}_{\square}\right) * C_{re-escala} = 100 \rightarrow$$

$$\rightarrow C_{re-escala} = \frac{100}{\left(\frac{1}{4} * \sum_{m=1T}^{4T} {}_{15}I^{m21}_{\square}\right)}$$

Multiplying the series published in base 2015 by this rescaling coefficient, a series of indices for base year 2021 is obtained, which preserves the variation rates published, and with which the new indices in base year 2021 have been chained, calculated as of the first quarter of 2024.

In this way, the National Statistics Institute (INE) ensures continuity for all series previously published.

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Annex I. Calculation of aggregate indices

With the formula for calculating the base year 2021 SSPI (chain-linked Laspeyres), the indices referring to the *fourth quarter of the year (t-1)* start from a value equal to 100 in the last quarter of that year. Given that it is necessary to give continuity to the SSPI series published, the indices must be chained to obtain other indices that give continuity to those already published in previous periods.

Thus, the chained index (the one that will be published) in quarter *m* of year *t*, in base year 2021, is obtained by multiplying the index of the *fourth quarter of (t-1)*, in base year 2021, by the index of quarter *m* of year *t* referring to the *fourth quarter of (t-1)*, divided by 100:

$$_{21}I^{mt}_{\square} = {}_{21}I^{4T(t-1)}_{\square} * \left(\frac{{}^{\square}_{4T(t-1)}I^{mt}_{\square}}{100}\right)$$

The chained indices are not additive, in other words, from the published indices it is not possible to calculate the indices of the functional aggregations. These aggregations are calculated using the indices referring to the fourth quarter of the previous year (the non-chained ones), which are additive.

The steps to obtain the index in base year 2021 of an aggregate *A*, from the published indices, in base year 2021, of its *A1* and *A2* components, are described below:

1. The indices referring to the fourth quarter of the previous year must be obtained for each *A1* and *A2* component. This is done by dividing the published index of quarter *m* of year *t*, by the published index of the fourth quarter of the previous year:

$$_{4T(t-1)}^{\square}I_i^{mt} = \left(\frac{{}^{\square}_{21}I_i^{mt}}{{}^{\square}_{21}I_i^{4T(t-1)}}\right) * 100 \quad i = A1\ y\ A2$$

2. The indices obtained in the previous step are aggregated using the weightings in force in the reference period of the index *(m,t)*. In this way, the index of aggregate *A* is obtained, referenced to the fourth quarter of *(t-1)*:

$$_{4T(t-1)}^{\square}I_A^{mt} = \frac{{}^{\square}_{4T(t-1)}I_1^{mt} \times {}^{\square}_{4T(t-1)}W_1 + {}^{\square}_{4T(t-1)}I_2^{mt} \times {}^{\square}_{4T(t-1)}W_2}{{}^{\square}_{4T(t-1)}W_1 + {}^{\square}_{4T(t-1)}W_2}$$

3. The index in base year 2021 of aggregate *A* is calculated as the product of the published index of the fourth quarter of the previous year by the ratio of the aggregate index obtained in step 2 to 100:

$$_{21}I^{mt}_{A} = {}_{21}I^{4T(t-1)}_{A} * \left(\frac{{}^{\square}_{4T(t-1)}I^{mt}_{A}}{100}\right)$$

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