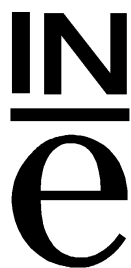


INSTITUTO NACIONAL DE ESTADISTICA



Housing Price Index (HPI), base 2007 Main characteristics

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1. Introduction

In recent years, the housing market has been one of the main issues in the area of official Spanish and European Union (EU) statistics. In fact, the Statistical Office of the European Communities (Eurostat) has permanently suggested the need to establish a harmonised system to measure the merchanting prices of housing in EU countries.

Thus, in the year 2002, a Study Group was created to study merchanting prices of housing, initially comprised of Germany, the United Kingdom, Poland, Finland and Spain, which had as main objectives the study of the situation of that market in each of said countries, the localisation of the main sources of information available and the proposal of a statistical procedure that would be valid for all EU countries, that would allow for making homogeneous comparisons on the evolution of housing prices.

Initially, the group carried out a pilot study for the purpose of contrasting different collection methods and available information sources. Once these preliminary tasks were completed, each country belonging to the group developed an optimal methodology according to the type of information used. As a result of this stage, data sources were selected that, due to their content and degree of reliability, were the most recommendable, and the methodological procedures that were most adequate for comparing the result from each of the countries.

In 2006, seven more countries joined the Study Group: Cyprus, France, Greece, Italy, the Netherlands, the Republic of Slovakia and Slovenia. Each of these countries defined its own estimation methodology, bearing in mind the recommendations of the initial Study Group, as well as the peculiarities of the housing market and the availability of information in each of them.

In December of 2007, the third phase of the project began. The group is already comprised of most of the EU countries, and among its aims are the periodical production of price indices and the improvement of its calculation methodology.

The participation of Spain in the Study Group from its creation has allowed for in-depth analysis of sources and methods with a great deal of detail. In this way, it has studied both the possible means of obtaining information on acquisition prices of housing, and the calculation methods used in existing statistics that could be adapted to European demands.

In Spain, the main statistics that traditionally provide information on the prices of housing and on its variations come from the Ministry of Housing, from the scope of the Public Administration, and from valuation companies and real estate agencies, as regards the private sector. Each of them uses different sources of information and calculation procedures and, as a result, offers descriptions of the real estate market in Spain obtained from different scopes and perspectives.

None of these statistical operations completely fulfils the methodological requirements established at the heart of said Study Group, and therefore, the INE has been obligated to introduce a new operation, the Housing Price Index (HPI), whose methodology, referring to both the information source and the calculation procedures used, is completely harmonised with that proposed by the EU.

Regarding the **source of information**, the HPI uses the databases with the information from all of the registry operations in all of the Spanish Notaries. The characteristics that make this information source the most adequate for the objectives established are, on the one hand, their content, granted that it includes all of the dwelling purchase operations, and on the other hand, the availability of the

information, which is practically instantaneous since it is registered at the moment in which the purchase transaction becomes effective. Finally, the fact that the prices collected refer to transactions actually carried out and not to theoretical valuations of the same has been a determining factor.

This is a very relevant source of information, which was not previously exploited, due to the fact that it was not available until the year 2004, when the General Council of Notaries implanted a computer system that has allowed for the aforementioned databases to be made available. Likewise, the signing of the INE-General Council of Notaries partnership agreement made it possible to exploit the variables contained therein, among which, worth noting is the merchanting price of the buildings.

The information contained in the notarial source has facilitated the obtaining of a new housing price indicator through a new **methodology**, whose most noteworthy characteristic is the use of statistical procedures based on quality change adjustment methods. These methods permit the establishment of homogeneous comparisons of the prices of the dwellings over time, this aspect being of enormous importance in the evolution of the prices in this type of market. It is the first time that this methodology is being used in this area by official Spanish statistics, and therefore, a specific section is dedicated to it in this Methodological Note.

In summary, the INE considers it essential to have the implementation of statistics destined to ascertaining the temporal evolution of housing purchase prices in Spain, which satisfies current information needs and allows for establishing international comparisons.

The new statistics, the HPI, are being published for the first time in September 2008, with the results referring to the first and second quarters of the year.

This document presents its main characteristics, among which, worth noting are the following: the use of administrative registers in line with the demand for the reduction of the workload of respondent units as proposed by official European statistics; the general calculation formula, conceived so that the indicator will permanently adapt to market movements; and the use of statistical techniques for the treatment of quality changes, which allow for making comparisons of the prices without these being affected by changes in the characteristics of the dwellings.

All of these elements have been conceived in order to produce a price index whose priority objective is to estimate, as precisely as possible, the variation of the purchase prices of the dwellings in Spain, under the terms and conditions required by official European statistics, which allow for the comparison of the results with the rest of the member countries of the EU.

2. Main characteristics of the Housing Price Index (HPI)

2.1 Objective

The objective of the HPI is to measure the temporal evolution of the merchanting price level of free price housing, for both new and second-hand dwellings.

In addition, in as far as the HPI fulfils the demand for information proposed in the area of the production of harmonised statistics of the European Union, another of its objectives is to serve as an element of comparison among its Member States, regarding the evolution of housing prices. In this sense, the index was conceived under certain methodological parameters, based on concepts used for the production of the Harmonised Index of Consumer Prices (HICP), which grant it a high degree of comparability with the indicators produced by other countries.

This is an indicator designed exclusively to establish a follow-up of the prices of dwellings over time. Therefore, the measurement of variables is not included among its objectives, as these may be the price per metre square or the merchanting value of dwellings according to specific characteristics, which are part of the objectives of other statistics existing in Spain.

2.2 Coverage

It includes all **free price** dwellings that are the object of transaction via merchanting contracts. As a result, **state-subsidised housing is excluded**, given that its prices are regulated and not determined by the customarily market mechanisms.

2.3 Information source used

The HPI uses information from the databases provided by the General Council of Notaries, through the Notarial Certification Agency (ANCERT), a company incorporated by the Council for the purpose of computerising operations commonly carried out by Spanish notaries.

The INE has had access to this information through the Partnership agreement signed with the General Council of Notaries. The databases for the production of the HPI have been usable once consolidated, after the changes experienced in recent years, and once the information transmission procedure guarantees compliance with the established publication calendar of the index.

The use of administrative registers makes the HPI an innovative type of statistics in its conception and with numerous advantages. On the one hand, it allows for having complete information available on the entire population that comprises the area of investigation of the indicator, which avoids the obligation of using sampling techniques with the corresponding increase in the precision of the estimations; on the other hand, it no longer requires the collection of information in the field. It is necessary to bear in mind that statistics of this type would require field work, with a very high cost and with uncertain results, since it would have to use either households or real estate agencies as respondent units on the merchanting price of the dwelling.

Lastly, the administrative registers have the additional advantage that the information from any merchanting transaction enters into the calculation of the index at the moment that it takes place. This is fundamental in an index that intends to be a short-term indicator.

Regarding the content of the databases provided by ANCERT, the basic variable refers to the prices of merchanting of buildings that are the object of transaction each quarter. In addition, it includes other variables that are essential for the production of the index, such as

- Locating the dwelling:
 - Autonomous Community.
 - Province.
 - Municipality.
 - Post code.
 - Type, name and number of the street.
 - Duplicated, block, staircase, floor and door.
- Date on which the transmission of the dwelling takes place.
- Characteristics of the dwelling:
 - Type of dwelling, distinguishing between flat and single-family dwelling.
 - Variable that indicates whether the dwelling is new or second-hand.
 - Built area in m².
 - Variable that distinguishes whether the dwelling has been purchased through a cooperative or not.
 - Variables that indicate whether the price of the parking space and of the storage room are included in the price of the dwelling.
 - Variable that indicates whether the dwelling is free-price or state-subsidised.
- Variables referring to the buyer:
 - Type of person. It collects the transactions made by individuals, excluding those made by legal entities.
 - Country, province and municipality of residence of the acquiring party.

2.4 Scope of research

Unit of Analysis

Bearing in mind that the objective of the HPI is to measure the evolution of the level of merchanting prices of free price housing in Spain, the unit of analysis is the **free price dwelling**.

Population scope

The reference population or stratum of the HPI includes those individuals, both resident and non-resident in Spain, who have acquired a dwelling during a reference period. Merchantings carried out by legal entities (including financial institutions) do not form part of the HPI population scope.

Geographical scope

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

Time scope

The statistics are quarterly, which allows for estimating the evolution of the prices between consecutive quarters, the variation accumulated over the year to date, as well as the annual variation.

2.5 Calculation methodology

The calculation system of the HPI is based on the combination of two basic elements that reflect the characteristics of the real estate market: **housing prices**, which represent the convergence of market supply and demand, and **weightings**, or relative importance of each type of housing, according to the purchase value.

Index basket and groupings of dwellings

The elementary units used in the calculation formula compose the **index basket**. These are the **grouping of dwellings with common types**, for each of which, an average price and elementary index are calculated, and this is added to the rest using the weighting, in order to obtain the general index.

Each grouping of dwellings is defined by a group of common characteristics, by which it contains similar dwellings.

Calculation formula: Linked Laspeyres

The general formula used in the calculation is a **linked Laspeyres index**, analogous to that used in the Consumer Price Index (CPI). In the case of the HPI, because it is a quarterly indicator, the period used for the linking is the fourth quarter of each year. The general calculation formula is as follows:

$$IPV^{T,t} = \sum_{i=1}^n W_i \times I_i^{T,t}$$

The formula indicates that, for year t , the HPI for each quarter (T) is calculated as the aggregation of the price indices for each group of dwellings, grouped according to common characteristics (+).

In this aggregation, each grouping of dwellings has a relative importance or weight, according to the expenditure made by the households (W_+). Therefore, the weightings of each grouping of dwellings represent the relationship between the purchase value of the dwellings of the same type, that is, those belonging to the same grouping (VC_+), and the purchase value of the total dwellings that are the object of transaction (VC_{Tot}).

$$W_i = \frac{VC_i}{VC_{Tot}}$$

The use of linked indices allows for the annual renewal of the weightings, the revision of types of dwellings used as price measurement elements, as well as the conduction of methodological changes, including the updating of the statistical model used. In this way, it is possible to achieve a permanent adaptation of the HPI to the changes that customarily occur in the real estate market.

2.6 Base period

The base period is that for which the arithmetic average of the quarterly indices is made to equal 100. The year 2007 is the base period for the new System, which means that all of the indices that are calculated will refer to this year.

2.7 Reference period of the prices

This is the period with whose prices the current prices are compared. In the HPI, base 2007, the reference shall be the last quarter of the year prior to the current year.

2.8 Reference period of weightings

The weighting structure establishes the importance of each grouping of dwellings with a common type, as compared with the rest. The measurement of these weightings is carried out from the purchase value of each group of dwellings during the reference period.

For the purpose of guaranteeing the stability of the weighting structure, it has been decided that the reference period will encompass the three years prior to the current year. Therefore, in the year 2008, the weighting structure has been calculated with the information from the transactions carried out in the years 2005, 2006 and 2007. On the other hand, the weightings for the year 2007, because they are for the base period, must refer to these same years.

The dynamism of the real estate market, whose conditions may vary in the short term, requires the annual updating of the weighting structure, in such a way that it represents the market situation as precisely as possible. As mentioned previously, this

updating can be incorporated in the HPI, because both the information from the notarial databases and the formula used for the index (linked Laspeyres) so allow.

2.9 Treatment of sample changes

What are quality changes?

One of the peculiarities of the real estate market is its lack of spatial and temporal homogeneity, which makes it practically impossible to follow the sale price of the same dwelling over time, since once it is sold, it will cease to belong to the HPI basket. This fact makes it extremely difficult to calculate the variation of prices, given that the possibility of following the sale price of dwellings of the same type in consecutive quarters is, in fact, non-existent.

Therefore, **the composition of the sample used for the calculation of the HPI changes over time, according to the dwellings that are purchased in each quarter. The direct comparison is affected by what are called changes in quality or, what comes to mean the same thing, in the characteristics of the elements whose price variations we intend to measure.**

Thus, for example, it could so happen that, the first quarter of the year, dwellings are sold, in a municipality with more than 10,000 inhabitants, with certain sizes and characteristics and that, in the second quarter of the year, the sold dwellings belong to other municipalities and have characteristics that are totally different from the former dwellings. Evidently, the resulting variation of the direct comparison of prices in both quarters would not adequately represent the merchanting market situation in Spain.

Therefore, and given its transcendence, an essential part of the calculation methodology of the HPI is dedicated to homogenising the temporal comparison of the prices.

Quality adjustment procedure

The methodology used so that the monitoring of the prices may be done under homogeneous conditions has been approved in the Eurostat Study Group and is beginning to be applied in most of the EU countries.

The process consists of grouping dwellings with similar characteristics and following the evolution of the average prices of each one of those groupings, rather than the variation of the individual prices of the dwellings.

These groupings are constructed according to certain qualities or characteristics that define the dwellings. In the case of the HPI, in addition to the previously described characteristics from the ANCERT files, other characteristics have been used that allow for more precisely delimiting each grouping; these variables, which are obtained from different sources of the notarial databases, are the following:

- **Grouping of provinces.** Grouping of the 52 provinces, according to the average annual value of the mortgages, using the data from the Mortgage Statistics (INE).

- **Size of the municipality.** Classification of the municipalities, distinguishing between provincial capitals and municipalities, according to population size brackets, using the latest population data available from the Continuous Municipal Register of Inhabitants (INE).
- **Tourist-oriented municipalities.** Classification of the municipalities by whether they are tourist-oriented or not, obtained from the information on the annual number of overnight stays made in each type of tourist establishment, provided by the *Hotel Occupancy and Holiday Dwelling Occupancy and Rural Tourism Accommodation Occupancy* surveys (INE).
- **Type of environment.** Classification of post codes, bearing in mind socio-economic information, from Population and Dwellings Census 2001 (INE), as well as the average annual price per metre square in each post code (notaries).

In this way, it is possible to obtain groupings, distinguishing, for example, between new or second-hand dwellings, according to built area brackets, or according to their location and type of environment. The dwellings belonging to each grouping will have common characteristics, which makes them more comparable with those belonging to said grouping in previous quarters.

In the subsequent quarters, each of the dwellings that are the object of transaction is assigned to one of these groupings, bearing in mind the particular characteristics of the same.

The comparison of the prices between two consecutive quarters will be made for the same grouping, although the number of dwellings in it may be different from one moment to the next. For example, in a certain quarter, the grouping related to new dwellings of more than 100 m², located in municipalities with more than 10,000 inhabitants, may be comprised of 30 dwellings, and in the following quarter, it may be comprised of 70 dwellings. The comparison will be made based on the grouping, which allows for qualifying the influence of the number and characteristics of the dwellings that are the object of transaction in each quarter.

Clearly, the more characteristics of the dwellings that are considered for establishing the groupings, the stronger the homogeneity of the dwellings contained therein, and the more precise the estimation of the housing price variation.

However, the problem arising from having a very high number of groupings available, is that the number of dwellings that are the object of merchanting can become too small, or even null in some of them, which would make the average price in these groupings of little significance.

Continuing with the example, if another characteristic is added to the characteristics considered, representing the socio-economic category of the location of the dwellings, the groupings will contain dwellings that are even more alike, which further facilitates the comparison of their prices. In turn, there will be groupings with a very reduced number of dwellings.

To solve this problem, the HPI uses statistical techniques to allow for the quarterly estimation of the average prices of the groupings, from the degree of relationship among them. The price index whose formula was indicated above, is calculated with the average prices adjusted in this way.

Thus, the general methodology used resolves the two main problems that arise when posing the measurement of the evolution of housing prices: on the one hand, through stratification, a large proportion of the **heterogeneity** problem is solved; and through the interrelation of the prices of all dwellings transacted, the possible **scarcity of dwellings** problem is solved in certain groupings, achieving a measurement of the variations with a high degree of homogeneity.

All of the groupings are favoured by the adjustment used, given that in some cases, the lack of information due to the scarcity of dwellings is compensated, and in others, the grouping is provided with homogeneity, even if the number of dwellings is significant.

The technique used consists of adjusting the price of each grouping, bearing in mind the relationship existing between each one of them and the rest. Therefore, the price and characteristics of a grouping as described previously (new dwellings of more than 100 m², located in municipalities with more than 10,000 inhabitants for an average socio-economic category zone), are related to the price and characteristics of each and every one of the remaining groupings. As is logical, the degree of interrelation among groupings will be different, according to the common characteristics of the same.

Specifically, the prices of a grouping containing new dwellings of more than 100 m², purchased in an average socio-economic condition zone, of a municipality with more than 10,000 inhabitants in a specific province, will be related, for example, to the prices of another grouping of dwellings with similar characteristics, in other, different provinces.

In this way, the housing market is fully represented, granted that the formation of prices is not a fact that is isolated into segments defined by their characteristics, but rather, each price is determined by the general behaviour of the market itself.

As mentioned previously, the higher the number of groupings of dwellings used, the greater the homogeneity in the temporal comparison of prices. Likewise, the lower the number of dwellings that are the object of transaction in a specific quarter, the greater the probability of a grouping remaining without dwellings, or including a scarce number of them. In both cases, this is when the statistical model described gains greater significance.

Thus, the reduction of the number of dwellings purchased in the last year in Spain, helps the HPI methodology to show all of its potential.

Listing of variables used for the formation of the groupings

The variables used to construct the groupings of dwellings according to type, collect the essential characteristics that define and differentiate some dwellings from others. The following lists the ten characteristics considered:

- New or second-hand dwelling.
- Single-family dwelling or flat.
- Built area.
- With or without parking.
- With or without a storage room.
- Whether or not it is through a cooperative.
- Grouping of provinces.
- Size of the municipality.
- Type of environment, according to socio-economic variables.
- Tourist-oriented municipality or not.

From these variables, we have established nearly 52,000 groupings in the shopping basket for the calculation of the HPI.

3. Dissemination

Data will be published for the national total, the Autonomous Communities and the autonomous cities of Ceuta and Melilla.

For the national total, information will be provided for the total dwellings and their breakdown into new and second-hand housing.

For the Autonomous Communities, and Ceuta and Melilla, information will be available on the general evolution of housing prices.

The following data will be published quarterly:

- indices in base 2007,
- quarterly variation rates,
- year-to-date variation rates,
- annual variation rates,
- quarterly repercussions (new and second-hand housing), and
- year-to-date repercussions (new and second-hand housing).