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Abstract

Using information on individual products obtained from the Food Consumption Panel, quality-adjusted price indices have been constructed, by type of establishment, for a representative set of fresh foods purchased by Spanish households. As the Food Consumption Panel does not provide information on product quality, the information available on household characteristics has been used to obtain such indices. With these indices it has been possible to analyse the differences in changes in fresh food prices, according to the type of establishment at which the products are acquired.

Keywords: Hedonic price index, retail trade, fresh foods, types of establishment.

JEL Classification: C33, E31 y L81.

1 Introduction

This paper is a continuation of the study by Esteban and Matea (2003a) of the retail food trade. It seeks to investigate one of the hypotheses suggested in that paper: the existence of significant differences in price revisions according to the type of establishment. Based on information from the Food Consumption Panel of the Ministry of Agriculture, Fisheries and Food *(Panel de Consumo Alimentario del Ministerio de Agricultura, Pesca y Alimentación),* that study seemed to show that the largest increases in food prices generally occurred in hypermarkets, although in some cases they also occurred in traditional shops. However, it was acknowledged that these results could be concealing notable differences in product characteristics or qualities (different varieties of the same product, different presentations, etc.), according to the type of establishment, or changes in the characteristics of the products sold by the same type of establishment from one year to another, which would invalidate the results that seemed to be implied by the price growth rates[1]. In consequence, it was suggested that comparisons of price changes across different retail distribution channels should be based on prices adjusted for changes in quality. The aim of this study is precisely to estimate quality-adjusted prices. It will be attempted, at a later stage, to determine to what extent the prices so estimated corroborate the differences in changes in prices by type of establishment that were detected using the gross data (without adjusting for quality).

Information on individual transactions has been used from the Food Consumption Panel, from which a small number of products were selected, on the basis of various criteria. First, given that the highest rates of price growth in the CPI in recent years have been recorded in the unprocessed food component (with annual average growth of between 6% and almost 9% in the period 2001-2003), it was decided to focus the analysis on fresh foods. Second, for each group of fresh food products, those foods have been selected that, according to the panel information, Spanish households consume most. As a result, the sample contains, in addition to potatoes and eggs, 48.7% of the fresh vegetables consumed by Spanish households, 46.3% of the fresh fruit, 80.7% of the fresh meat and 40.5% of the fresh fish[2].

The Food Consumption Panel includes, for each of the products for which prices are compiled, information on the type of establishment at which the transaction is made and the characteristics of the household making the purchase. However, it does not supply information on the quality of the products. As a result, hedonic methodology cannot be used directly to construct quality-adjusted indices. However, as in Bover and Velilla (2001), panel data techniques can be applied to estimate the hedonic regression with unobservable

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1. These problems are illustrated by the following examples: according to the Ministry of Agriculture, Fisheries and Food, during the week 19-25 July 2004, the weighted average national retail selling price of a kilo of hake (€ 17.79) was almost double that of a kilo of whiting (€ 9.41), although, in the Food Consumption Panel, these two fishes come within the same product category. The same situation was observed that week in relation to fresh anchovies (€ 6.15) and sardines (€ 3.31). Moreover, the changes in the prices of these products tend to be very different. Thus, fifteen weeks later, the price of hake was 2.5% lower, while that of whiting was 10% higher, the price of anchovies had risen by 14.1%, but sardines were 4.2% cheaper. The differences can also occur between different categories of the same product. That same week, the average national price received by farmers for grade L eggs was € 0.43, while that for grade M eggs was € 0.36. Moreover, while the grade L price was unchanged the following week, that of grade M had fallen by one euro cent.

2. According to the consumption of Spanish households in 2002 [see *La alimentación en España*, Ministerio de Agricultura, Pesca y Alimentación (2004)].

variables. In particular, this paper uses the information relating to households to try to isolate, within the developments in prices, those changes that are attributable to the characteristics of the products. For this purpose, it is assumed that a particular household acquires the same quality of a product, provided that the type of establishment does not change and that its own characteristics do not change (housewife's employment situation, number of members, etc.). Clearly, this is the key element of the whole analysis and, therefore, the validity of the results depends on the reliability of this assumption.

Following this introduction, the document is structured as follows: the next section sets out the main characteristics of the database used; Section 3 describes the econometric model proposed; Section 4 presents the results obtained; and the paper ends with some brief conclusions.

2 The database

The firm that compiles the Food Consumption Panel for the Ministry of Agriculture, Fisheries and Food (TNS Worldpanel) has supplied individual information on the prices of 17 fresh foods paid by a sample of households, the amount purchased in each transaction, the type of establishment at which the purchase is made and some characteristics of the household that made it. However, one significant limitation of the database is the lack of information on the characteristics of the foods (e. g. the variety, category, presentation and degree of freshness or ripeness), which would be necessary to estimate hedonic price indices. The products making up the sample are: potatoes; tomatoes; onions; lettuces and endives; oranges; apples; bananas; eggs; whole chickens; chicken fillets; chicken pieces; pork; veal; yearling beef; mature beef; hake and whiting; and sardines and fresh anchovies.

The sample considers the following types of establishment:

- Hypermarkets: large retail outlets with a surface area of more than 2,500 m^2 and more than 15 tills.
- Self-service stores and supermarkets: with more than one till and a surface area of less than 2,500 m^2. Hard discount stores are included in a separate category.
- Hard discount stores: supermarkets selling a limited range of products, of which more than 55% are own brand[3].
- Food shops: have only one till. Specialised food shops are included in a separate category.
- Specialised food shops, distinguishing between butchers and poulterers, fruiterers and greengrocers and, finally, fishmongers.
- Markets.
- Other, including personal consumption, gifts, hawking, door-to-door selling, purchasing directly from wholesalers, mail order and any other kind of distribution channel not considered above.

The information on household characteristics is as follows:

- Region (c*omunidad autónoma*) in which the household resides.
- Size of community:
    - Less than 2,000 inhabitants
    - 2,000-10,000 inhabitants
    - 10,000-100,000 inhabitants
    - 100,000-500,000 inhabitants
    - More than 500,000 inhabitants
- The age group of the person responsible for shopping:
    - 0-34
    - 35-49
    - 50-64
    - 65 and over

3. Own brands are the name of the establishment.

- Whether or not the housewife works.
- Number of members.
- Whether there are children under the age of 16, and if so, whether there is at least one child aged:
    - 0-5
    - 6-15
- Socio-economic level[4], distinguishing between:
    - Low
    - Medium-low
    - Medium
    - Medium-high and high

The frequency of the database is weekly and information is available for the period 2001-2003. Each week, the sample is made up of some 6,000 households, which change over time. This is an incomplete panel, not only because of the foregoing, but also because the households do not purchase the same products every week, so that the observations available for a particular product of a specific household are not usually consecutive. In fact, for some products and some distribution channels data are not even available for every week[5]. To minimise this problem, it has been decided to transform the weekly data into average four weekly data, so that 13 observations are available for each year[6]. They were not converted into monthly data because of the difficulty of assigning or dividing weeks that belong to two different months. With regard to household characteristics, the situation assigned to each four-week period is that corresponding to the last week of such period. This significantly reduces the range of possibilities for the characteristics, but, given the characteristics considered, it may be expected that the estimates are not affected by this simplification.

A number of observations have been excluded from the definition of the sample that is going to be used in the estimation. First, the distribution channel "other" has been removed from the sample, owing to its high degree of heterogeneity and small size. Second, observations corresponding to products sold in specialised shops that are not typical of such establishments (e. g. the sale of chicken by fishmongers) have not been considered, with the sole exception of eggs [since a large number of observations would have been lost (more than 4,000). Third, all price observations that are clearly atypical have been eliminated. Finally, owing to the requirements of the model to be estimated, those cases in which only one observation is available for a specific product, a specific household and a particular type of establishment have not been taken into account. Following this elimination of observations, the sample has, for the three-year period, a total of 1,499,329 average observations for four-week periods, relating to 9,980 households. The average period of collaboration by

4. This classification is based on the level of education and profession of the family head. For further details, see Ministerio de Agricultura, Pesca y Alimentación.

5. Specifically, as well as this being the case of specialised food shops with products that are not typical of such establishments, this is also the case of particular products in food shops (yearling beef, mature beef and sardines and anchovies) and in hard discount stores (mature beef).

6. Also, as mentioned below, reducing the frequency of the sample makes the model assumption regarding the stability of the quality of each household's shopping basket more plausible.

households was almost 21 four-week periods (over a year and a half), although, by product, the average time households remained in the sample ranges from 20.8 to 15.6 periods[7].

As Table 1 shows, the characteristics of the households do not, generally, tend to vary. In fact, for none of the characteristics do the changes recorded exceed 2.5% of the sample available of each of the products in the study. Moreover, the location of the households remains constant in all cases. At the same time, the socio-economic level of the household is the only characteristic that the surveyed household does not provide. Instead, at the beginning of each year, the firm that provides the panel decides to which level it belongs. In consequence, this variable can only change at the start of a new year, so the information it might provide on changes in household purchasing habits is generally lost.

7. See Table B.1 of Annex B. Also, Table B.2 gives detailed information on the number of observations available for each product by type of establishment, while Table B.3, also by product, shows the structure of the sample according to the different characteristics of the households.

3 Econometric model

The model that is going to be used is a hedonic function in which the characteristics of the product are not known. This type of model was used in Bover and Velilla (2001) to estimate the quality-adjusted price of new housing. That paper used the information provided by new housing developments to control for changes in unobserved characteristics, like the quality of construction and the concrete location (this latter characteristic summarises a number of aspects such as traffic, noise and proximity to services).

The hedonic methodology assumes that the observed price of a product is a function of its characteristics. Using the form of a double logarithmic function[8], the price of a particular product in a specific type of establishment will be given by the following equation:

$$\ln P_{it} = \alpha + \sum_{t=2}^{T} \delta_t D_t + \sum_{k=1}^{m} \beta_k \ln C_{ikt} + \varepsilon_{it} \qquad [1]$$

where P_{it} is the price paid by household i in period t, α is a constant, D_t is a time dummy variable that takes the value one in period t and zero in other periods, δ_t reflects the changes in prices between periods not attributable to changes in the product's characteristics, C_{ikt} is the level of characteristic k acquired by household i in period t, β_k is the "implicit" price of characteristic k and ε_{it} is an error term. However, it is not possible to estimate equation [1] using the database, as the characteristics of the products are not observable.

Since the coefficients of interest for constructing hedonic prices are the δ_t, the solution to this problem involves transforming equation [1] so that the time variables are maintained and, in consequence, the coefficients of interest can be estimated, but the unobservable variables simultaneously disappear, this being achieved using panel data techniques. Specifically, if the variables of equation [1] are transformed into deviations from the household averages and an equation is estimated for each product and each type of establishment, then the equation is transformed into:

$$\ln P_{it} - \overline{\ln P_i} = \sum_{t=2}^{T} \delta_t D_{it}^{*} + \sum_{k=1}^{m} \beta_k (\ln C_{ikt} - \overline{\ln C_{ik}}) + (\varepsilon_{it} - \overline{\varepsilon_i})$$

where $\overline{\ln P_i}$ is the average of the natural log of the prices paid by household i and D_{it}^{*} takes the value $1-(1/T_i)$ in period t, T_i being the number of periods for which information is available on household i, and zero in other periods, $\overline{\ln C_{ik}}$ is the average level in natural logs of characteristic k acquired by household i. After this transformation,

8. This functional form has the advantage of providing a simple interpretation of δ_t (see Annex A).

imposing the assumption that each household always acquires the same quality of the product (or products with similar characteristics) when purchasing it at the same establishment[9], $\ln C_{ikt}$ and $\overline{\ln C_{ik}}$ shall be identical and therefore the second sum to the right of the equals sign is cancelled[10]. In other words, it is no longer necessary to know the characteristics of the product, so that the equation to estimate is reduced to:

$$\ln P_{it} - \overline{\ln P_i} = \sum_{t=2}^{T} \delta_t D_{it}^{*} + (\varepsilon_{it} - \overline{\varepsilon_i}) \qquad [2]$$

One limitation of equation [2] is that it does not permit any changes in the characteristics of the product acquired by households over time. Such changes may arise, among other reasons, from the disappearance of a particular quality of the establishment at which households make their purchases (because, for example, certain varieties are only available at one time of year[11]), or from seasonal changes in household consumption habits. Imposing constant quality on households may be very restrictive. However, a number of considerations should be taken into account that reduce the limitations imposed by the constancy assumption. First, this assumption does not mean that a household only purchases a certain variety of a product, but that the share in different varieties of a product remains constant over time[12]. The fact that the period of collaboration of the households in the Panel is not very long makes this assumption realistic. Second, this assumption may be somewhat restrictive, but for those products consumed in small quantities, so that the average quality of the basket of the product purchased is more likely to vary from week to week, the assumption is relaxed when, as in this paper, a lower time frequency is taken.

Meanwhile, the assumption of the model can be made more flexible if changes in certain household characteristics are allowed to give rise to changes in the quality (or characteristics) of the products they acquire. In particular, those circumstances have been taken into account that are considered relevant when explaining possible changes in quality and that display some variability (see Table 1): the housewife's employment situation, the existence of children and their ages and, finally, the number of household members. In consequence, equation [2] has been expanded to include these household characteristics. Again, such characteristics appear as deviations from the household averages, giving rise to the following equation:

$$\begin{aligned} \ln P_{it} - \overline{\ln P_i} = & \sum_{t=2}^{T} \delta_t D_{it}^{*} + \alpha_1 (A_{it} - \overline{A_i}) + \alpha_2 (B_{it} - \overline{B_i}) \\ & + \alpha_3 (I_{it} - \overline{I_i}) + \sum_{j=1}^{4} \alpha_{3+j} (Mj_{it} - \overline{Mj_i}) + (\varepsilon_{it} - \overline{\varepsilon_i}) \end{aligned} \qquad [3]$$

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9. Although when estimating an equation for each type of establishment, this quality can change if the household changes retail distribution format.

10. It would be sufficient to assume that $\sum_{k=1}^{m} \beta_k (\ln C_{ikt} - \overline{\ln C_{ik}}) = 0$. However, although this assumption is somewhat less restrictive, its interpretation in economic terms is less intuitive.

11. However, the selection of the products has been made in order to reduce the significance of this effect.

12. The fact that the variety does not change over time does not mean that a household only purchases, for example, a single variety of apples (Golden), but rather that it may acquire different varieties of apples (Golden, Reineta, etc.), though always in the same proportions.

where A_{it} is a dummy variable that takes the value 1 when the housewife of household i works outside the home and zero otherwise, B_{it} and I_{it} are dummy variables that take the value 1 when there are children in household i aged 0-5 or 6-15, respectively, and zero in all other cases and Mj_{it} are four dummy variables that take the value 1 when in household i there are 2, 3, 4 or 5 or more members, respectively, and zero otherwise.

Note that the above equation does not mean that two households with identical characteristics must purchase products with identical qualities. It simply allows changes in household characteristics to entail changes in preferences or needs and, therefore, in the qualities of products acquired, but again these changes are specific to each household.

Equation [3] is estimated for each product and type of establishment, so that the quality-adjusted price index in period t for such product and type of establishment, based on the initial period and in basis points, can be approximated by $\exp(\delta_t)$ [13]. Using the price indices adjusted for individual changes in quality, price indices are calculated by establishment, aggregating the prices of the different products, using as weights the spending on their acquisition. One limitation of this procedure is that quality-adjusted price levels cannot be recovered and, in consequence, the price levels of the various retail distribution formats cannot be compared.

The estimation of equation [3] enables comparisons to be made of the rates of change of quality-adjusted prices across different types of establishment, for Spain as a whole. It has been observed, however, that the prices of a single retailer may vary according to the degree of competition existing in each geographical area in which its establishments are located. In fact, Yagüe (1995) finds that the geographical dispersion of the prices in Spain of some hypermarket and supermarket chains is significant. In consequence, it would be desirable to be able to use some variable in the estimates to reflect this effect. However, this is not possible because this information is not available and the variables that could be used as a proxy (i. e. the region to which the household belongs and the size of the community in which it is located) do not vary over time. As a result, and as the differences between regional trade laws[14] are one of the factors that determine the different degrees of competition, equation [3] has also been estimated by region.

13. See Annex A for further details on the index.
14. See Esteban and Matea (2003b) on the regional laws for this sector.

4 Results of the estimation

4.1 Estimates for Spain as a whole

As already mentioned, the quality-adjusted price index for each product and type of establishment in period t is calculated from the exponential of δ_t estimated in the relevant equation[15]. It is very difficult to draw conclusions from the indices by products and types of establishment, given the sheer variety of cases[16]. To resolve this difficulty various product aggregates have been constructed by type of establishment. The same weights are used to aggregate each product in all the retail distribution channels, so that differences in the changes in prices cannot be attributed to composition effects[17]. The weighting of each product corresponds to the spending of households on that product as a percentage of total household spending in the whole of the sample period.

Chart 1 presents unadjusted and quality-adjusted aggregate price indices for all the products for each retail distribution format[18], while Table 2 compares the average rates of change of both types of index. As seen in Chart 1 and Table 2, the difference between adjusting and not adjusting for quality changes can be of some magnitude, so that average growth rates may differ in a particular year by up to one percentage point (pp). In markets, the quality-adjusted index is systematically higher than the unadjusted index, which may indicate that, over the period analysed, these establishments reduced the average quality of the fresh foods they sold. However, in the other retail distribution formats comparison of these two types of index gives different results according to the sub-period considered.

As regards the quality-adjusted price indices, the comparison between different types of retail distribution channels has been made on the basis of various aggregates represented in Chart 2, while Table 3 presents summarised information on the changes in such indices. First, indices have been constructed for all the products (see the first section of Table 3). According to such indices, the different types of establishment may have been modifying their marketing policies during the period analysed. In this respect, it is noted that the establishments that were the most inflationary in 2001 (hypermarkets) turned out to be the least inflationary in the period as a whole. The opposite result is obtained for non-specialised shops, which recorded the lowest price growth in 2001 and the largest increases between 2001 and 2003. Thus, hypermarkets raised their prices least between the beginning of 2001 and end-2003 (12.8% cumulative growth), while non-specialised

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15. The estimates of equation [3] are available upon request from the authors. It should be noted in relation to these estimates that as the variability of the household characteristics is very small, the variances of the intra-group coefficients associated with such variables are very large and, therefore, the estimates of these effects are imprecise and often not significant. However, it was decided to leave these variables in the equations since, that way, the possible effect that the modifications of household characteristics may have on the changes in the quality of the products they acquire is controlled for.

16. Annex C gives the cumulative growth rates at the end of each year, with respect to the first period of the sample, and the annual average growth rates recorded in 2002 and 2003 by the quality-adjusted prices of each of the products, distinguishing by type of establishment. The information provided by these tables shows that for all retail distribution formats, with the exception of markets, there is at least one product for which each type of establishment has been the least inflationary over the whole of the period studied and some other product for which it has been the most inflationary. However, there is no case in which markets were the establishments with the lowest price growth, the smallest price increases frequently being observed in hypermarkets.

17. The sole exception is eggs in specialised food shops. Thus, prior to incorporating them with the common weighting applied in all the establishments analysed, an index of egg prices in specialised food shops is constructed using the prices observed in butchers and poulterers, fruiterers and greengrocers and fishmongers, the prices of these three type of shops being aggregated according to the relative weight of spending on eggs in each of them.

18. Annex A explains how the various indices were constructed.

food shops were at the other extreme (17.1%). In between these extremes were specialised food shops (14.4%), hard discount stores (15.5%), markets (16%) and supermarkets and self-service stores (16.1%).

It is difficult to determine the reasons for the change in the marketing policies of hypermarket and non-specialised food shops that appears to have taken place in around 2002. However, it is known that hypermarkets suffered a loss of market share in fresh food in 2001 and 2002[19], and this may have led to a strategy of raising prices more moderately than competitors. The price increases applied by hard discount stores in 2002 were also more moderate than in the previous year, having been the most inflationary in 2001, but in their case this behaviour did not continue in 2003. Markets behaved in precisely the opposite manner to hard discount stores. As regards the other establishments considered, while price increases in supermarkets and self-service stores are generally always in a high band, those in specialised food shops are in the low band.

During the period analysed the rises and falls in price indices were synchronised to some extent across all types of establishment (see Chart 2). It is very likely that they correspond to price changes in stages prior to the marketing chain[20], although the degree to which the latter are passed through to retail prices seems to differ according to the type of retail establishment. In order to illustrate this possible relationship, Chart 3 presents, by way of example, reference prices[21] for two products (chicken fillets and eggs) together with their quality-adjusted price indices by type of establishment. This chart appears to confirm the existence of some relationship between the behaviour of the quality-adjusted price indices constructed in this study and prices at the first level of the wholesale trade, although the degree of pass-through differs somewhat according to the retail distribution channel considered.

The fact that the degree of pass-through of changes in producer prices to those prices which consumers eventually pay differs by type of establishment must reflect differences in marketing policies and discrepancies in the cost structure. As indicated in Green (2002), the structure of logistical and commercial costs differs greatly according to the type of distribution channel. In general, traditional shops use a wholesale market distribution channel, while the large hypermarket and supermarket chains use purchase centres and private logistical platforms[22]. Since they eliminate intermediaries, the purchases made by such chains from industry and producers' centres are more direct than those made by traditional shops. Moreover, as the volume of their orders is very large they start from a very favourable bargaining position[23]. If it is also taken into account that, in the case of fresh products, costs connected with transport and with the number of intermediaries involved in the distribution chain have a very high impact on final prices, it is not surprising that there may be significant

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19. According to the Ministry of Agriculture, Fisheries and Food, the market share of hypermarkets in fresh food was 11.7% en 2000, 11.4% in 2001, 10.9% in 2002 and 11% in 2003.

20. In fact, the largest price rises are observed at times of problems in the productive process. Thus, for example, tomato prices rose most after the fall in their production in observations 16 and 17, due to the incidence of virosis, and in observation 36, following the high temperatures in August 2003. In the case of eggs, the large price increases in late 2003 were attributable to the conjunction of low production, owing to the high summer temperatures and the reduction in laying hens in other Community countries for health reasons. Likewise, the storms in January 2003 led to a reduction in the supply of hake and a substantial rise in its price.

21. The reference prices are based on the national prices of specific markets, abattoirs, etc., that belong to the bottom level of the wholesale trade. Information on these types of price is only available for a very small number of foods.

22. Fairly detailed information can be found for fruit and vegetables for both types of intermediation chain in Ministerio de Economía y Hacienda (2004). Ministerio de Agricultura, Pesca y Alimentación (2004a, 2004b and 2004c) addresses the distribution of meat, fish derivatives (with some references to fresh fish) and fruit and fresh vegetables, respectively.

23. See Cruz et al. (1999).

differences in the changes in final prices by type of establishment. Even so, the results do not show greater concordance between the changes in prices in hypermarkets and in supermarkets and self-service stores, probably because the latter must include a significant number of establishments that do not belong to large distribution chains[24] and, therefore, do not use purchase centres or private logistical platforms.

When the changes in prices are analysed by type of establishment at a higher level of product disaggregation, systematic behaviour by type of establishment is not appreciated. In particular, three aggregates have been analysed: fruit and vegetables; meat and eggs; and fish. According to these indices (the lower three sections of Table 3), in the case of fruit and vegetables non-specialised food shops seem to have applied the largest price revisions between the beginning of 2001 and the end of 2003, while hypermarkets and hard discount stores increased their prices least. Also, the differences in the rates of growth of prices in this group of products are of some magnitude. Hard discount stores also stand out for having applied the largest price increases for meat and eggs, while the least inflationary retail distribution format for these products, during the period analysed as a whole, was that of poulterers and butchers. Finally, the largest increases in fish prices were seen in hard discount stores, while the smallest increases in such prices were seen in hypermarkets.

4.2 Estimates by region

When the information is broken down by region (*comunidad autónoma*), the number of observations available to estimate each possible equation is notably reduced, so that in many cases it has not been possible to make similar estimates to those made for the nation as a whole, while in the case of many of the equations information is not available for all the periods. In consequence, the results obtained with the estimates[25] that enable the aggregates whose analysis is of most interest to be obtained are presented below. The weights used to aggregate the products for the regional indices were the same as those used in the national indices[26].

Indices have been compiled, with all the products considered, for hypermarkets, self-service stores and supermarkets, specialised food shops and markets for three regions (Catalonia, Madrid and the Basque Country). As in the case of the national focus, there is generally some degree of coincidence in the timing of turning points in the evolution of prices in all the regions (see Chart 4). Even so, the regional discrepancies are not insignificant (see Table 4); in fact, the regional differences in the cumulative price growth during the period considered amount to 7.7 pp in self-service stores and supermarkets, 7 pp in hypermarkets and 4 pp in specialised food shops and markets. Comparing the cumulative growth in prices over the whole of the sample period, by type of establishment, the largest price increases were generally seen in the Basque Country, while Catalonia (in self-service stores and supermarkets and specialised food shops) and Madrid (in hypermarkets and markets) recorded the lowest growth. Despite this overall result, the relative situation of the regions has been varying over time[27]. When the cumulative growth rates of the prices applied by the

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24. In fact, comparing the results obtained from price level studies by the Complutense University of Madrid shows that price developments in supermarkets are not homogeneous when this distribution format is broken down by size (see Ministerio de Industria, Turismo y Comercio (2004 and 2005).

25. The estimates are available upon request from the authors.

26. With the sole exception of eggs, whose sales by fruiterers and greengrocers and by fishmongers have not been taken into account here, given that information is often not available on these establishments for all periods.

27. In fact, if the annual average growth rates of 2002 and 2003 are compared, these regions have swapped relative positions, so that in 2002 the Basque Country was the least inflationary region in the case of three of the four distribution formats considered (in all expect hypermarkets), while once year later it was the most inflationary in all the types of establishment analysed.

various retail distribution channels within a single region are compared, the differences are even greater (18.8 pp in the Basque Country, 16.9 pp in Madrid and 16.4 pp in Catalonia). As at the national level, the least (most) inflationary distribution format within each region has been changing over time[28].

Also, indices have been constructed that group the products into broad categories. First, quality-adjusted indices were calculated for all fruit and vegetables. As the number of observations in this group of products is greater, it was possible to compile indices for all the retail distribution formats, with the exception of non-specialised food shops, and for a broad sub-set of regions (Andalusia, Aragón, Castilla la Mancha, Castilla y León, Catalonia, Galicia, Madrid, the Basque Country and Valencia). As seen in Chart 5, a certain synchronisation is again detected in the changes in prices that is common to all the distribution formats and to all the regions, although the intensity of this phenomenon is very variable. This does not prevent (see Table 5) regional differences in cumulative rates of price growth in a single type of establishment being very significant (ranging from 9.6 pp in the case of markets to 25.9 pp in that of specialised food shops). As regards the regions, none stand out as recording systematically lower price growth, although Castilla la Mancha can be singled out as one of the regions in which the prices of fruit and vegetables rose most. By type of establishment, hypermarkets, followed by hard discount stores, generally applied the smallest price increases between the first four weeks of 2001 and the last four of 2003, while markets and supermarkets and self-service stores most often recorded the largest cumulative price growth[29]. In the period 2001-2003, the differences in the cumulative growth rates of the prices applied by the various retail distribution channels within a single region are also substantial, Galicia and Madrid standing out as having a gap between the most and least inflationary type of establishment of 18.6 pp. It should also be noted that by type of product, fruit and vegetables displayed the largest price increases, by a long way.

Second, aggregate indices were compiled for meat and eggs for hypermarkets, self-service stores and supermarkets, specialised food shops and markets for Catalonia, Madrid and the Basque Country (see Table 6 and Chart 6). For these products, the differences in cumulative price growth in the same type of establishment may be very large (in the case of hypermarkets in the period studied it was 9 pp). Of the three regions analysed, it was in Catalonia that the prices of these foods increased least, while the largest price rises, depending on the retail distribution channel, were recorded in Madrid and/or the Basque Country. It should also be noted that over the period considered, as a whole, the format with the lowest inflation varies according to the region[30]. Again the discrepancies between the prices of the different distribution formats within a single region are also high, Catalonia standing out on this occasion, with differences between its cumulative inflation rates of 5.4 pp.

Finally, fish price indices were constructed for hypermarkets, supermarkets and self-service stores, fishmongers and markets for Catalonia, Madrid and the Basque Country (see Table 7 and Chart 7). The markedly different behaviour at the regional level is repeated at

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28. Even so, for the period analysed as a whole, self-service stores and supermarkets were the establishments that raised their prices least in Catalonia and in the Basque Country, while in Madrid it was the hypermarkets. By contrast, the largest increases in Catalonia were in markets, in the Basque Country in hypermarkets and in Madrid in self-service stores and supermarkets.

29. Catalonia seem to avoid this characterisation since, in this region, the smallest price increases were observed in self-service stores and supermarkets.

30. Hypermarkets in Catalonia; markets in Madrid; and, self-services stores and supermarkets and specialised food shops in the Basque Country.

the level of retail distribution formats. In fact, the divergences between the cumulative inflation over the three years are almost 16 pp in self-service stores and supermarkets. In these three regions, for the period studied as a whole, the smallest price increases, by far, were applied by the hypermarkets, while specialised food shops applied the largest, although in the Basque Country self-service stores and supermarkets applied the largest price increases between the beginning of 2001 and the end of 2003. It should also be pointed out that, of the regions considered, Madrid generally recorded the smallest fish price revisions for the whole of the period, although during a large part of the period considered the Basque Country did. If the price revisions of the various types of establishment are analysed by region, the divergences are also very large, ranging from 6.5 pp in Catalonia to 12.1 pp in the Basque Country.

In short, the behaviour of the prices of the various groups of fresh food is very heterogeneous at the regional level. As at the national level, the same type of establishment may simultaneously be the most inflationary for one group of fresh foods and the least inflationary for another in a particular region, while in another region the relative position of the same type of establishment may be very different.

5 Conclusions

This study uses available information on the characteristics of households to obtain quality-adjusted price indices by type of establishment. It has been possible to use these indices to analyse the differences in price changes for a representative set of fresh foods consumed by Spanish households, according to the type of establishment at which they are acquired. However, the methodology used does not allow price levels to be compared. It should once again be noted, moreover, that the results depend on the appropriateness of the assumption that households do not change the quality of the products they purchase unless they change type of establishment or their own characteristics vary. It should also be noted that the results should not be extrapolated to non-fresh foods as they may be altered by, for example, the presence of own brands in hypermarkets and supermarket chains.

The difference between the changes in quality-adjusted prices and the changes in unadjusted prices may be significant, with an average annual price growth differential of up to one percentage point. Comparing quality-adjusted indices with unadjusted prices shows that, in the period 2001-2003, markets may have reduced the average quality of the fresh food they sold. However, in the other types of establishments comparison of these two types of index gives different results according to the sub-period considered.

It is inferred from the quality-adjusted indices that the marketing policies of the various retail distribution formats may have changed during the period considered. It can be seen that those establishments that increased their prices most (least) in 2001 ultimately recorded the smallest (largest) price increases over the three year period as a whole. This change appears to have occurred in 2002. In line with one of the results of Esteban and Matea (2003a), it is confirmed that hypermarkets were the establishments in which fresh food prices increased most in 2001[31]. It is difficult to determine the reasons for this possible change in the marketing policies of hypermarkets, but it may have been prompted by their loss of market share in fresh food in 2001 and 2002. The behaviour of non-specialised food shops, in relation to the change in fresh food prices, was precisely the opposite of that observed for hypermarkets: having been the least inflationary in 2001 they ultimately recorded the largest price increases in the period analysed as a whole.

Despite the foregoing, some degree of simultaneity is generally observed in the price movements of all retail distribution formats, which is most likely attributable to the changes in the prices of these same products at a stage prior to the marketing chain. However, the strength of the pass-through of these changes depends on the retail distribution channel concerned, not only because they have different marketing policies, but also because of the peculiarities of their cost structures.

Within a single group of fresh foods, the price changes of the different types of establishment are generally very heterogeneous, both when comparing the growth rates of the prices of a single type of establishment across regions and when comparing the growth

31. Note that there is no reason why the rest of the results that seemed to be inferred in Esteban and Matea (2003a) should necessarily coincide with those obtained here, for three reasons: first, the time period is very different (in the paper referred to its was 1994-2001); second, in the paper cited the set of products was not restricted, as it is here, to a sub-set of fresh foods; and, third, the types of establishment also differ, as only three types of format were considered in that paper (hypermarkets, supermarkets –including hard discount stores– and traditional shops).

rates of prices across different distribution formats within a single region. However, during the period studied as a whole, it is not possible to identify one type of establishment as the most (least) inflationary for all groups of fresh foods, or even for a particular group of foods. All this would seem to suggest that the various types of establishment may at any given moment use some product or products to attract customers. In fact, it is increasingly frequent for establishments to change their offers regularly. Even so, it should be noted that prices are not the only variable on which establishments may compete, as geographical location, the product range and service are also important[32]. At the same time, the relative situation with regard to rates of growth of prices in the different regions has also varied notably during the period analysed.

32. See Cruz et al. (1999).

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PERCENTAGE OF CHANGES IN HOUSEHOLD CHARACTERISTICS (a) TABLE 1

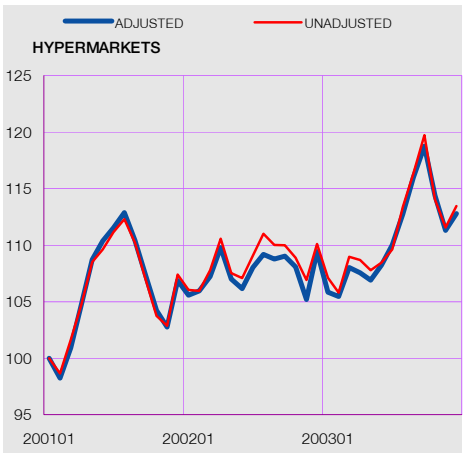
	HOUSEHOLD CHARACTERISTICS						
PRODUCT	REGION	Size of community	Age of person responsible for shopping	Activity of housewife	No. of members	Children and their ages	Socio-economic level
Potatoes	0	0	0.51	0.32	0.66	0.59	1.09
Tomatoes	0	0	0.42	0.27	0.53	0.48	0.89
Onions	0	0	0.56	0.35	0.72	0.64	1.19
Lettuces and endives	0	0	0.45	0.28	0.56	0.51	0.95
Oranges	0	0	0.55	0.32	0.69	0.60	1.11
Apples	0	0	0.53	0.32	0.64	0.59	1.07
Bananas	0	0	0.46	0.29	0.56	0.53	0.95
Eggs	0	0	0.44	0.27	0.53	0.48	0.90
Whole chicken	0	0	0.70	0.42	0.90	0.83	1.53
Chicken fillets	0	0	0.70	0.46	0.84	0.85	1.50
Chicken pieces	0	0	0.57	0.37	0.71	0.66	1.20
Pork	0	0	0.41	0.26	0.50	0.47	0.85
Veal	0	0	0.53	0.33	0.66	0.59	1.12
Yearling beef	0	0	0.71	0.47	0.98	0.88	1.68
Mature beef	0	0	1.04	0.65	1.32	1.09	2.49
Hake and Whiting	0	0	0.75	0.40	1.02	0.85	1.54
Sardines and fresh anchovies	0	0	0.69	0.41	0.92	0.84	1.55

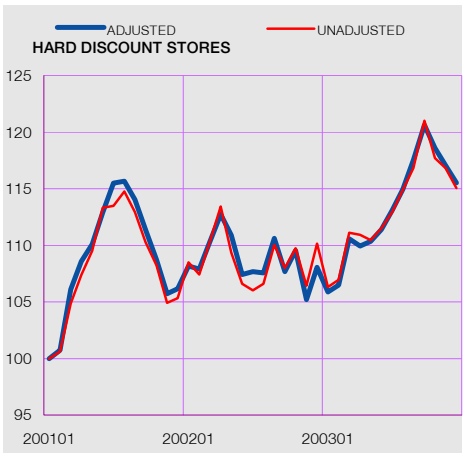
SOURCE: Banco de España, based on Food Consumption Panel.

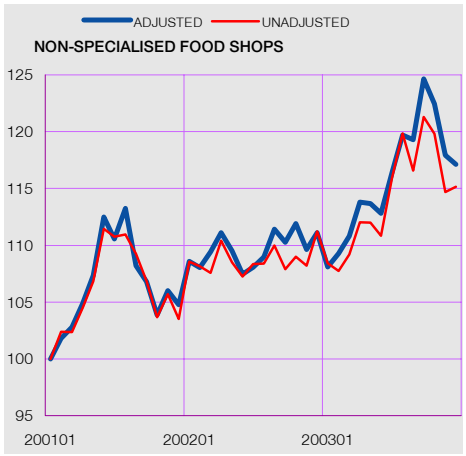
a. Percentage of observations for a single household in which changes occur in the characteristic considered. Note that the same household may have more than one change in a particular characteristic.

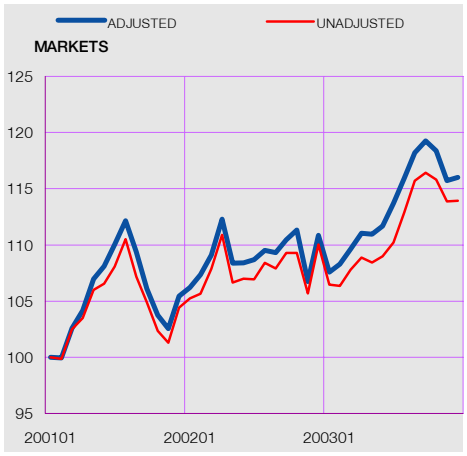
COMPARISON OF QUALITY-ADJUSTED AND UNADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT (a)

CHART 1









SOURCE: Banco de España.

a. The indices depicted were obtained by aggregating all the products.

COMPARISON OF QUALITY-ADJUSTED AND UNADJUSTED INDICES BY TYPE OF ESTABLISHMENT
AVERAGE ANNUAL RATES

TABLE 2

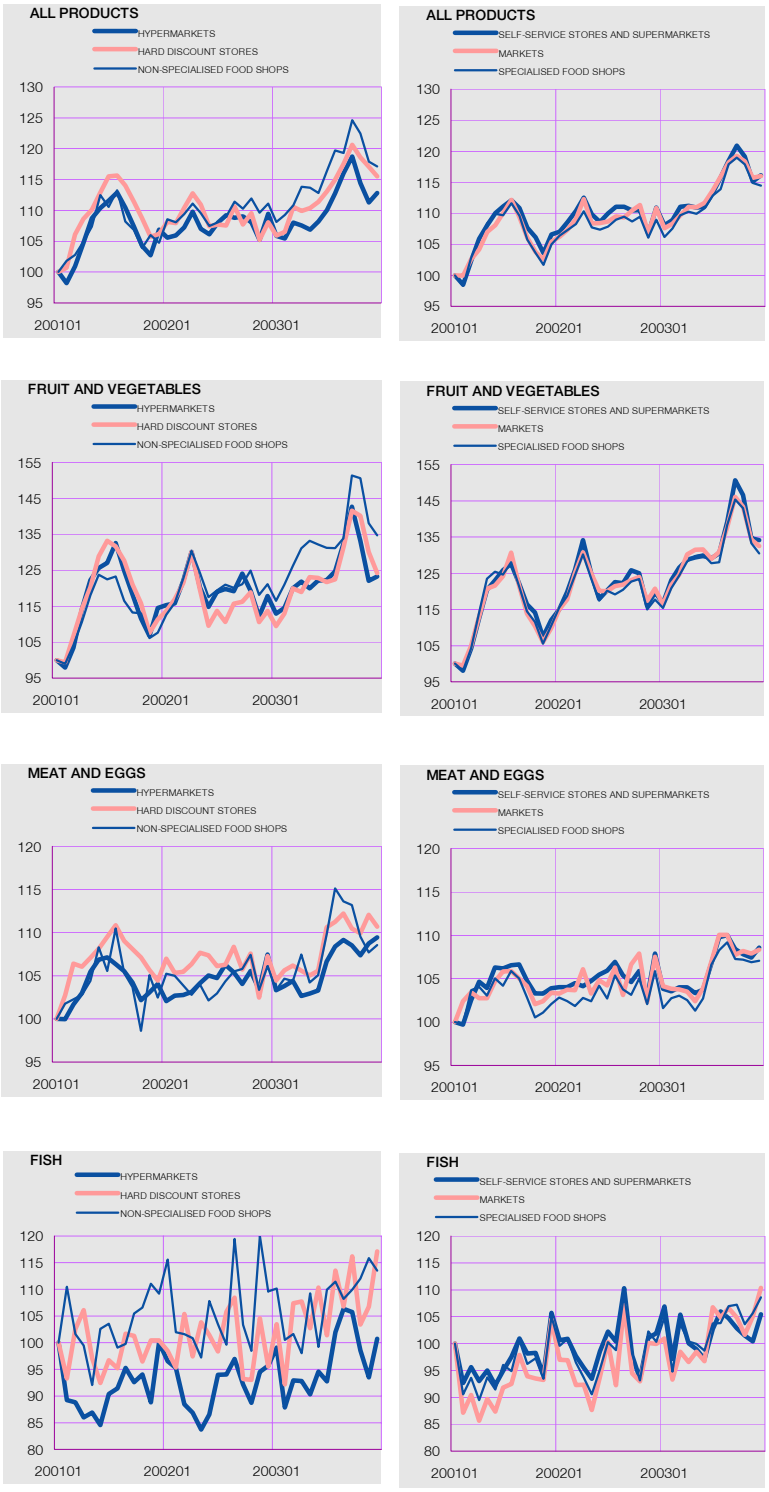
PERIOD	Hypermarkets			Self-service stores and supermarkets		
	Unadjusted (1)	Adjusted (2)	Difference (1) - (2)	Unadjusted (1)	Adjusted (2)	Difference (1) - (2)
2002/2001	2.4	1.5	0.9	4.0	3.2	0.8
2003/2002	2.4	2.8	-0.4	3.4	3.7	-0.2

PERIOD	Hard discount stores			Non-specialised food shops		
	Unadjusted (1)	Adjusted (2)	Difference (1) - (2)	Unadjusted (1)	Adjusted (2)	Difference (1) - (2)
2002/2001	0.5	-0.1	0.6	2.6	3.1	-0.5
2003/2002	4.2	4.1	0.1	5.0	5.6	-0.7

PERIOD	Specialised food shops			Markets		
	Unadjusted (1)	Adjusted (2)	Difference (1) - (2)	Unadjusted (1)	Adjusted (2)	Difference (1) - (2)
2002/2001	2.7	2.5	0.2	3.2	3.5	-0.2
2003/2002	3.2	4.2	-1.0	3.2	4.1	-0.9

SOURCE: Banco de España.

QUALITY-ADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT (a) CHART 2



SOURCE: Banco de España.

a. The prices of the various products in the indices have been weighted according to the percentage of household spending on such products in the whole sample.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT
GROWTH RATES (a)

TABLE 3

Period	PRODUCTS: ALL					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Unspecialised food shops	Specialised food shops	Markets
Cum. 01	6.9	6.6	6.2	4.8	5.0	5.4
Cum. 02	9.4	10.9	8.1	11.1	9.0	10.8
Cum. 03	12.8	16.1	15.5	17.1	14.4	16.0
2002/2001	1.5	3.2	-0.1	3.1	2.5	3.5
2003/2002	2.8	3.7	4.1	5.6	4.2	4.1

Period	PRODUCTS: FRUIT AND VEGETABLES					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Unspecialised food shops	Specialised food shops	Markets
Cum. 01	14.5	12.0	11.4	7.7	10.4	9.7
Cum. 02	17.8	19.7	13.7	21.1	17.8	20.8
Cum. 03	23.3	34.1	24.2	34.7	30.5	32.5
2002/2001	3.4	7.1	-0.5	7.6	5.9	7.2
2003/2002	4.0	8.2	7.2	10.4	8.1	8.1

Period	PRODUCTS: MEAT AND EGGS					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Unspecialised food shops	Specialised food shops	Markets
Cum. 01	4.1	3.9	4.4	2.5	2.1	3.4
Cum. 02	7.5	7.9	7.3	6.1	5.8	7.5
Cum. 03	9.5	8.6	10.7	8.5	7.0	8.4
2002/2001	0.5	1.1	-0.2	0.6	0.5	1.3
2003/2002	1.6	1.1	1.9	3.5	1.6	1.3

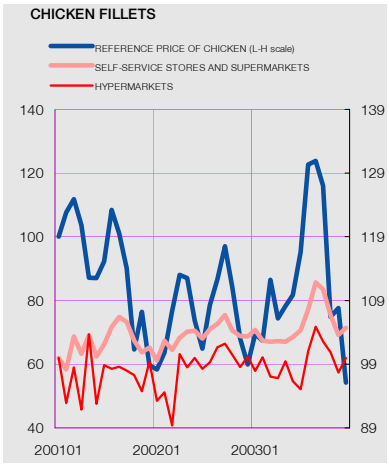
Period	PRODUCTS: FISH					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Unspecialised food shops	Specialised food shops	Markets
Cum. 01	0.0	5.7	0.4	9.2	5.1	4.5
Cum. 02	-4.3	1.9	-4.5	9.6	0.3	0.0
Cum. 03	0.7	5.4	17.1	13.5	8.6	10.3
2002/2001	0.5	2.8	1.3	2.8	2.9	3.3
2003/2002	5.3	2.7	6.8	1.5	4.9	6.2

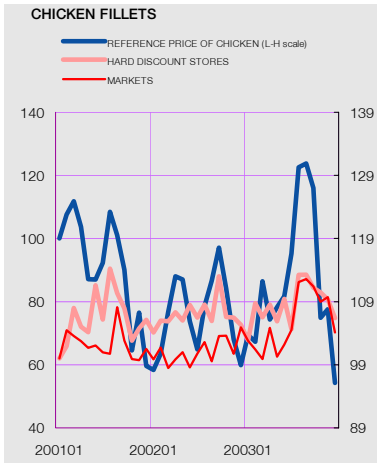
SOURCE: Banco de España.

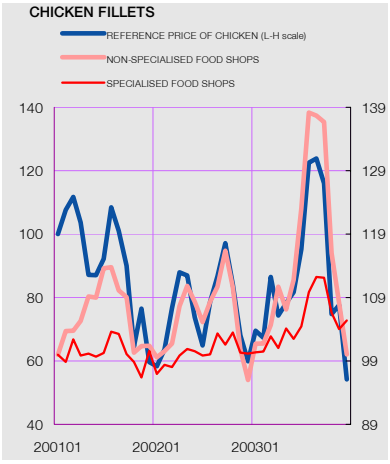
a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

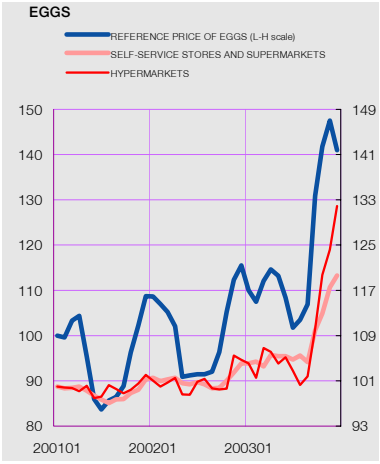
QUALITY-ADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT AND REFERENCE PRICE INDICES (a)

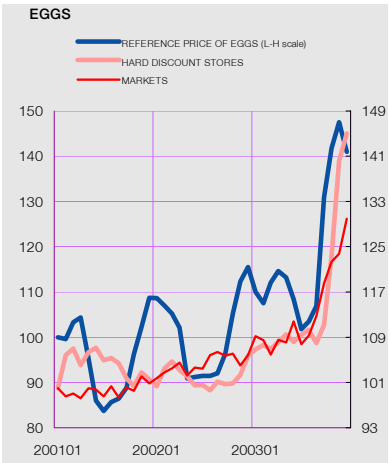
CHART 3

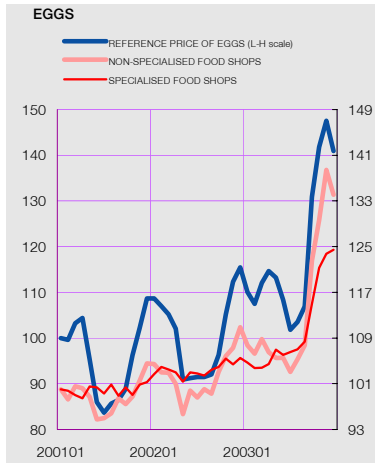












SOURCES: Banco de España and Ministry of Agriculture, Fisheries and Food.

a. In the indices, first observation = 100.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT AND REGION GROWTH RATES (a)

TABLE 4

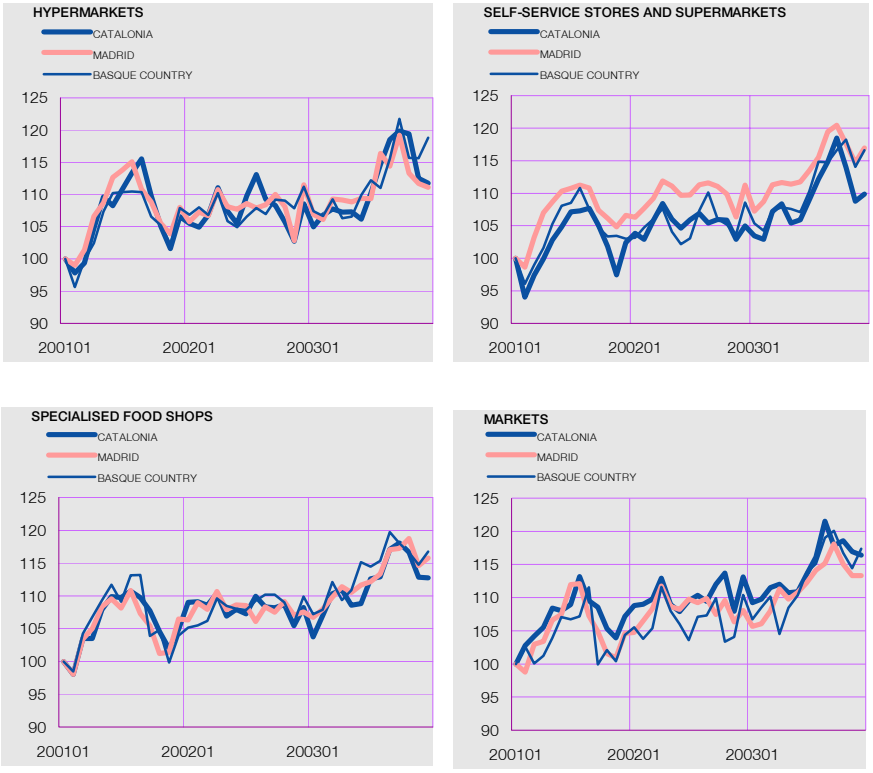
Period	PRODUCT: ALL											
	Hypermarkets			Self-service stores and supermarkets			Specialised food shops			Markets		
	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country
Cum. 01	6.6	8.0	7.9	2.4	6.6	3.0	4.9	6.5	3.9	7.2	4.6	4.4
Cum. 02	8.6	11.5	11.2	5.0	11.2	8.5	8.2	7.6	9.9	13.1	8.1	10.4
Cum. 03	11.8	11.1	18.8	9.9	16.9	16.6	12.7	15.8	16.8	16.4	13.3	17.4
2002/2001	1.2	0.7	2.4	3.1	3.0	1.5	2.6	2.9	1.9	3.5	3.4	2.9
2003/2002	3.5	3.0	3.9	3.7	3.7	5.3	3.2	4.5	5.2	3.6	3.2	5.7

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

QUALITY-ADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT AND REGION. ALL PRODUCTS (a)

CHART 4



SOURCE: Banco de España.

a. The prices of the various products in the indices have been weighted according to the percentage of household spending on such products in the whole sample.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT AND REGION. GROWTH RATES (a) TABLE 5

	PRODUCT: FRUIT AND VEGETABLES								
	Hypermarkets								
Period	Andalusia	Aragón	C. la Mancha	Castilla León	Catalonia	Galicia	Madrid	Basque Country	Valencia
Cum. 01	17.3	17.8	15.1	11.6	18.9	10.5	17.4	13.5	21.9
Cum. 02	27.3	19.0	18.1	21.3	16.9	6.3	19.4	23.0	25.8
Cum. 03	26.1	16.6	29.3	21.1	28.3	17.8	21.6	34.8	20.1
2002/2001	5.7	3.2	4.8	5.4	3.0	-0.3	3.3	5.2	0.9
2003/2002	0.9	5.0	8.2	3.8	5.4	3.9	3.2	8.1	2.2

	PRODUCT: FRUIT AND VEGETABLES								
	Self-service stores and supermarkets								
Period	Andalusia	Aragón	C. la Mancha	Castilla León	Catalonia	Galicia	Madrid	Basque Country	Valencia
Cum. 01	13.1	10.1	18.2	5.9	4.0	6.1	13.7	7.3	12.0
Cum. 02	21.5	19.7	27.0	20.1	6.6	17.4	21.4	16.7	17.6
Cum. 03	37.9	35.0	42.5	29.6	17.6	35.2	35.6	31.4	36.4
2002/2001	8.3	10.2	10.6	7.0	8.5	2.8	6.5	5.0	11.3
2003/2002	10.0	8.9	7.7	7.4	6.8	10.8	7.4	10.7	5.4

	PRODUCT: FRUIT AND VEGETABLES								
	Hard discount stores								
Period	Andalusia	Aragón	C. la Mancha	Castilla León	Catalonia	Galicia	Madrid	Basque Country	Valencia
Cum. 01	18.6	16.9	22.8	11.8	5.0	10.2	13.3	8.3	14.8
Cum. 02	19.6	13.2	19.7	14.7	13.3	19.4	9.3	13.2	25.8
Cum. 03	26.6	18.7	32.1	20.7	19.8	35.2	17.0	23.3	31.0
2002/2001	1.5	1.0	3.4	1.5	-2.7	-0.4	-0.8	-3.7	-1.3
2003/2002	3.0	9.2	9.2	4.8	6.2	14.8	2.9	7.2	12.1

	PRODUCT: FRUIT AND VEGETABLES								
	Specialised food shops								
Period	Andalusia	Aragón	C. la Mancha	Castilla León	Catalonia	Galicia	Madrid	Basque Country	Valencia
Cum. 01	11.5	10.1	11.4	6.0	13.4	2.0	13.0	6.8	12.7
Cum. 02	17.2	17.1	19.9	12.1	19.9	14.8	18.9	19.4	17.9
Cum. 03	33.9	23.3	46.6	28.4	28.6	20.6	31.9	33.1	32.3
2002/2001	4.1	7.9	6.0	4.4	6.8	4.4	6.1	4.3	7.4
2003/2002	8.9	4.9	10.9	8.8	6.4	8.1	8.4	10.6	7.3

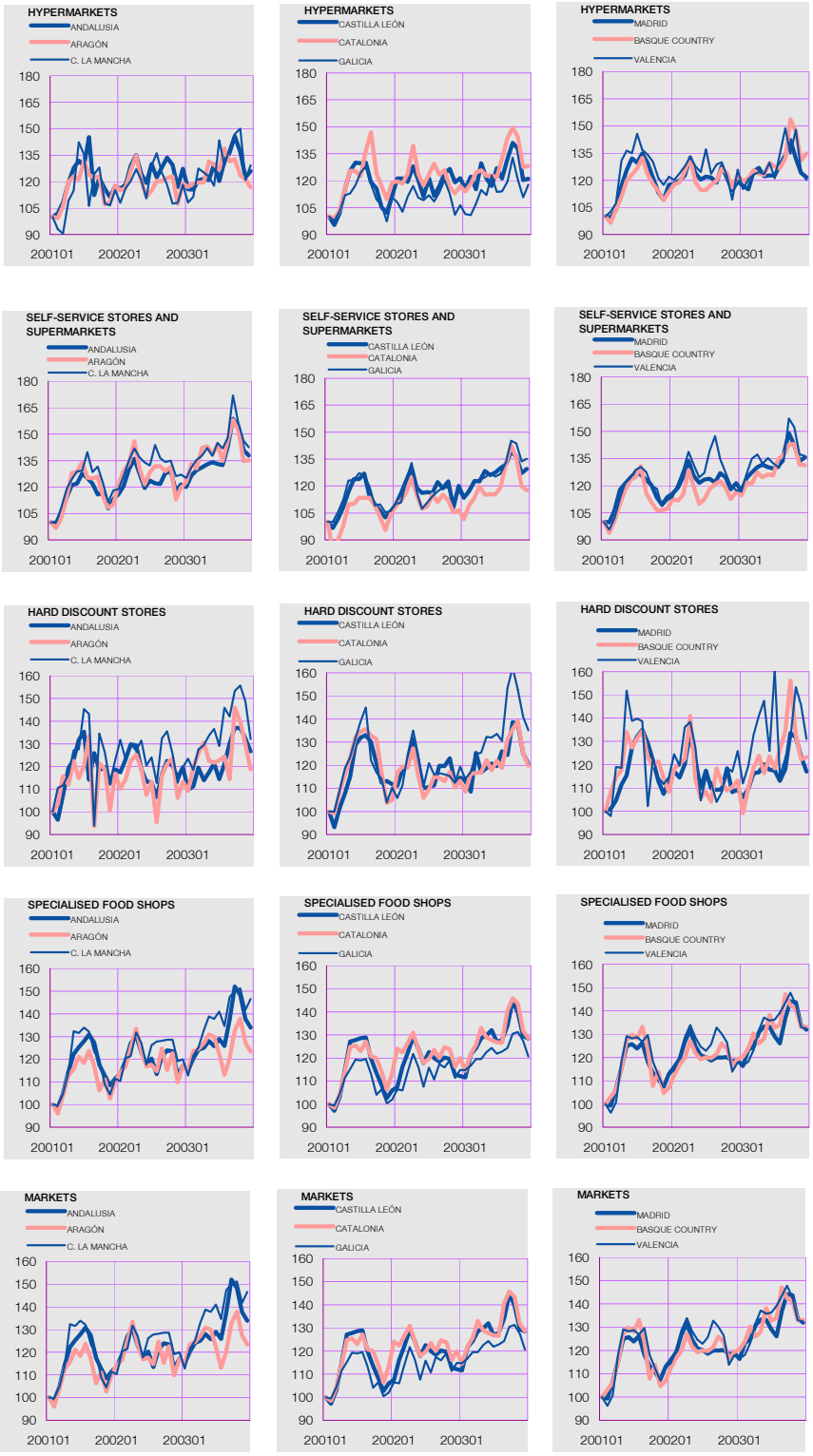
	PRODUCT: FRUIT AND VEGETABLES								
	Markets								
Period	Andalusia	Aragón	C. la Mancha	Castilla León	Catalonia	Galicia	Madrid	Basque Country	Valencia
Cum. 01	9.4	15.6	8.0	8.4	11.9	1.3	10.0	11.1	10.6
Cum. 02	26.6	25.2	22.9	19.3	18.3	16.3	18.0	21.8	23.8
Cum. 03	36.5	33.1	38.0	33.5	31.3	36.4	28.4	34.3	36.6
2002/2001	5.0	11.2	8.2	6.2	7.5	9.2	6.1	6.2	6.7
2003/2002	9.9	9.9	11.8	7.4	7.5	5.3	7.1	11.3	9.2

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

QUALITY-ADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT AND REGION. FRUIT AND VEGETABLES (a)

CHART 5



SOURCE: Banco de España.

a. The prices of the various products in the indices have been weighted according to the percentage of household spending on such products in the whole sample.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT AND REGION. GROWTH RATES (a) TABLE 6

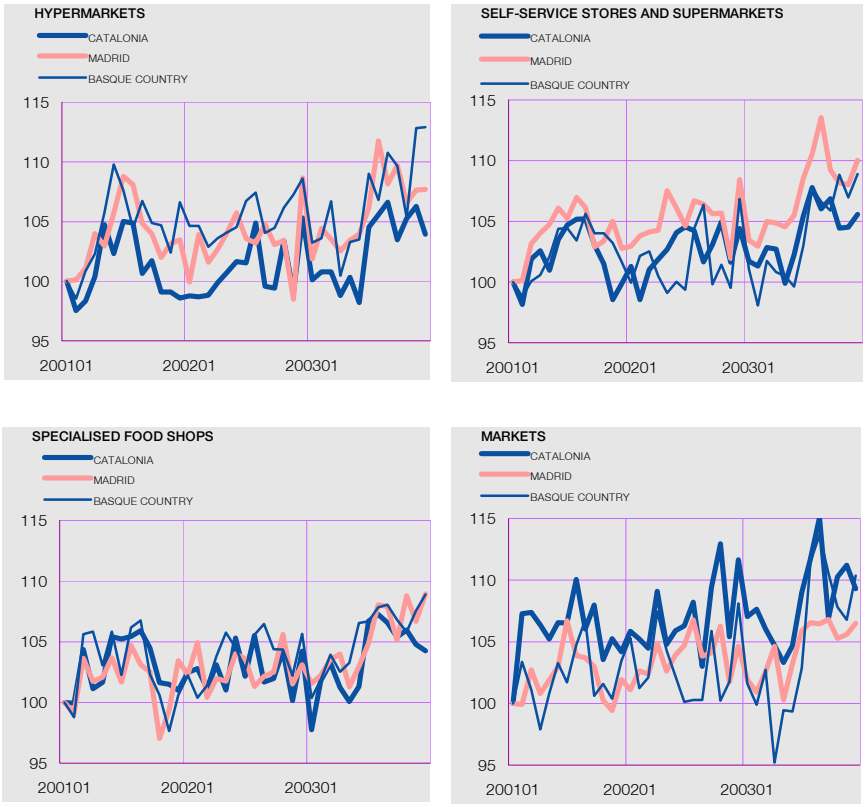
	PRODUCT: MEAT AND EGGS											
	Hypermarkets			Self-service stores and supermarkets			Specialised food shops			Markets		
Period	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country
Cum. 01	-1.4	3.5	6.6	-0.1	2.8	1.7	1.0	3.5	0.6	4.2	1.9	3.4
Cum. 02	5.3	8.7	8.6	4.4	8.4	6.8	4.2	3.1	5.7	11.6	4.7	8.1
Cum. 03	3.9	7.7	12.9	5.6	10.0	8.9	4.3	8.9	8.9	9.3	6.5	10.4
2002/2001	0.0	-0.4	1.1	0.7	1.3	-0.8	-0.1	1.0	1.0	1.2	1.7	1.0
2003/2002	1.7	2.5	1.4	1.3	1.9	2.1	0.8	2.3	1.5	1.1	0.5	1.7

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

QUALITY-ADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT AND REGION. MEAT AND EGGS (a)

CHART 6



SOURCE: Banco de España.

a. The prices of the various products in the indices have been weighted according to the percentage of household spending on such products in the whole sample.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT AND REGION. GROWTH RATES (a) TABLE 7

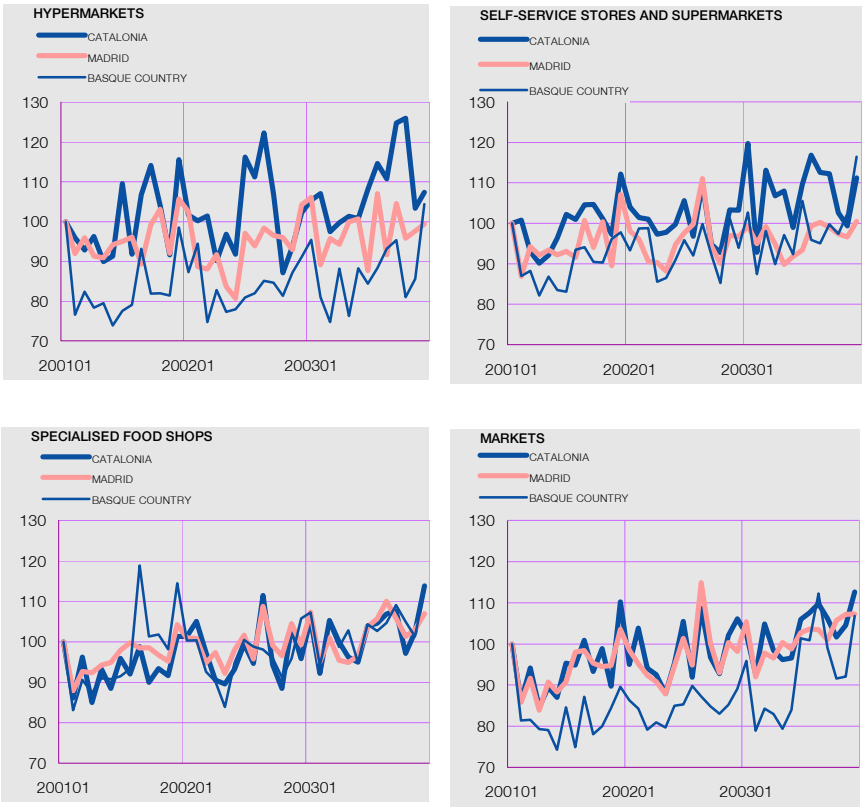
	PRODUCT: FISH											
	Hypermarkets			Self-service stores and supermarkets			Specialised food shops			Markets		
Period	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country	Catalonia	Madrid	Basque Country
Cum. 01	15.5	5.7	-1.5	12.1	7.1	-2.2	1.3	4.3	14.5	10.2	3.5	-10.4
Cum. 02	2.2	4.2	-9.0	3.3	-3.3	-6.1	-4.2	-0.7	5.8	6.1	-1.8	-10.9
Cum. 03	7.4	-0.6	4.3	11.2	0.5	16.4	13.8	6.9	12.7	12.6	7.3	6.8
2002/2001	1.7	-2.5	0.2	0.9	0.7	3.5	4.4	3.0	-1.1	3.9	3.8	2.4
2003/2002	6.4	4.6	4.5	7.4	1.0	5.5	5.2	2.8	7.5	5.3	4.7	10.0

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

QUALITY-ADJUSTED PRICE INDICES BY TYPE OF ESTABLISHMENT AND REGION. FISH (a)

CHART 7



SOURCE: Banco de España.

a. The prices of the various products in the indices have been weighted according to the percentage of household spending on such products in the whole sample.

ANNEX A: HEDONIC METHODOLOGY AND THE CONSTRUCTION OF PRICE INDICES

A.1. Hedonic method for time dummy variables

Hedonic methodology assumes that the observed price of a product is a function of its characteristics. This function may take different forms, but if the specification is double logarithmic[33], then the relationship between the prices and their characteristics is as follows:

$$\ln P_{it} = a + \sum_{t=1}^{T} b_t D_t + \sum_{k=1}^{m} \beta_k \ln C_{ikt} + \varepsilon_{it} \qquad t = 1, \cdots T$$

where P_{it} is the price paid by household i in period t, a is a constant, D_t is a time dummy variable that takes the value one in period t and zero in other periods, C_{ikt} is the level of characteristic k acquired by household i in the period t, β_k is the "implicit" price of characteristic k and ε_{it} is an error term.

To avoid collinearity between the constant and the time dummy variables, the above equation is redefined to eliminate the dummy variable corresponding to the first period:

$$\ln P_{it} = \alpha + \sum_{t=2}^{T} \delta_t D_t + \sum_{k=1}^{m} \beta_k \ln C_{ikt} + \varepsilon_{it} \qquad t = 1, \cdots T$$

where $\alpha = a + b_1 \qquad y \quad \delta_t = b_t - b_1 \qquad \forall t \succ 1$.

In other words, the δ_t are expressed in relative terms at the first period, and, therefore, provide the change, between period t and the initial period of the estimated price when controlled for changes in characteristics.

There are various procedures to calculate quality-adjusted price indices using hedonic regressions. The simplest of them is the so-called time dummy variables method[34]. In this case, the quality-adjusted price index in period t based on the initial period and in basis points will be:

$$I_{t1} = \frac{\left[\exp\left(\ln P_t - \sum_{k=1}^{m} \beta_k \ln C_{kt}\right)\right]}{\left[\exp\left(\ln P_1 - \sum_{k=1}^{m} \beta_k \ln C_{k1}\right)\right]} = \frac{\exp[a + b_t + \varepsilon_t]}{\exp[a + b_1 + \varepsilon_1]} = \exp[b_t - b_1]\exp[\varepsilon_t - \varepsilon_1] =$$

$$\exp[\delta_t]\exp[\varepsilon_t - \varepsilon_1]$$

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33. For other types of functional form see Izquierdo and Matea (2001).

34. For other methods of constructing hedonic price indices see, for example, Triplett (2004).

In the literature, if the hedonic equation has been estimated using all the information of the whole sample, the index is approximated by the sequence of $\exp(\hat{\delta}_1)$, $\exp(\hat{\delta}_2)$, etc.[35] Note that although $\exp(\hat{\delta}_t)$ is a biased estimator of the estimator of $\exp(\delta_t)$, this bias can be corrected by using

$$\exp\left(\hat{\delta}_t + \frac{1}{2}\hat{\sigma}_t^2\right)$$

where $\hat{\sigma}_t^2$ is the variance of $\hat{\delta}_t$. In practice, this correction is usually not made, given its small value.

A.2. Construction of price indices unadjusted for changes in quality and aggregate indices

The price of a particular product without adjusting for changes in quality in a particular type of establishment and in a specific period has been defined as the simple mean of all the prices paid in that period by households of the sample for that product in such retail distribution format, that is to say:

$$P_{rt}^e = \frac{1}{n_{rt}^e}\sum_{i=1}^{l} P_{rit}^e$$

where n_{rt}^e is the number of transactions carried out at establishment e by the l households in period t and in product r. In consequence, the unadjusted price index of product r for establishment e in basis points and based on the initial period $\left(\tilde{I}_{rt}^e\right)$ is defined as:

$$\tilde{I}_{rt}^e = \frac{P_{rt}^e}{P_{r1}^e}$$

When constructing aggregate product indices, whether or nor quality-adjusted, a weighted average of the indices for each of the products considered is applied, in which the weights correspond to the percentage, that the spending of households on each product represents, in all household spending on all the products included in the aggregation, and all this, for the whole of the sample period and in all the establishments. That is to say:

$$w_r = \frac{\sum_{t=1}^{T}\sum_{i=1}^{l} P_{rit}Q_{rit}}{\sum_{r=1}^{h}\sum_{t=1}^{T}\sum_{i=1}^{l} P_{rit}Q_{rit}}$$

35. See Izquierdo and Matea (2001) for how to calculate the index if the estimation is carried out by sub-period or when a functional form other than the double logarithmic one is used.

where w_r is the weight of product r when the aggregate index includes h products and Q_{rit} is the quantity acquired in all the establishments of product r by household i in period t.

ANNEX B: DATABASE DESCRIPTION

HOUSEHOLDS IN THE SAMPLE TABLE B.1

PRODUCT	NUMBER OF HOUSEHOLDS	AVERAGE TIME IN SAMPLE (a)
Potatoes	7228	20.2
Tomatoes	8291	20.8
Onions	7252	20.6
Lettuces and endives	7841	20.7
Oranges	6791	20.7
Apples	7517	20.7
Bananas	7748	20.4
Eggs	7864	20.5
Whole chickens	4780	19.7
Chicken fillets	5928	19.7
Chicken pieces	7414	20.4
Pork	8484	20.7
Veal	7145	20.0
Yearling beef	3294	18.2
Mature beef	1247	15.6
Hake and whiting	4625	20.2
Sardines and fresh anchovies	5147	20.0
All productos	9980	20.9

SOURCE: Banco de España, based on Food Consumption Panel.
a. Number of four-week periods.

SAMPLE STRUCTURE BY TYPE OF ESTABLISHMENT AND PRODUCT

TABLE B.2

	NUMBER OF OBSERVATIONS								
TYPE OF ESTABLISHMENT / PRODUCT	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Fruiterers and greengrocers	Butchers and poulterers	Fishmongers	Markets	**All establishments**
Potatoes	12798	34140	8622	4708	24034			14785	**99087**
Tomatoes	16958	49441	10070	6480	36281			23123	**142353**
Onions	11168	32455	8056	4209	24266			14990	**95144**
Lettuces and endives	16266	45458	12154	5145	28816			18067	**125906**
Oranges	10012	29210	5753	5045	26474			15995	**92489**
Apples	12363	34380	7755	4992	29322			17559	**106371**
Bananas	15592	44849	9054	5883	30589			16898	**122865**
Eggs	18532	56475	25845	11025	3870	7063	192	7087	**130089**
Whole chickens	5464	19529	2595	3130		13265		4085	**48068**
Chicken fillets	5956	26718	2639	3001		18273		5543	**62130**
Chicken pieces	11535	41485	4899	5784		23118		7566	**94387**
Pork	20662	62558	6135	9252		38807		11940	**149354**
Veal	12735	38221	3489	3745		30886		9630	**98706**
Yearling Beef	3490	9858	942	935		10481		4245	**29951**
Mature Beef	1331	2006	125	77		2311		1061	**6911**
Hake and whiting	3927	15657	698	545			15357	8120	**44304**
Sardines and fresh anchovies	3682	18288	721	735			18771	9017	**51214**
All Products	**182471**	**560728**	**109552**	**74691**	**203652**	**144204**	**34320**	**189711**	**1499329**

	PERCENTAGE OF EACH TYPE OF ESTABLISHMENT IN THE SAMPLE OF EACH PRODUCT								
Potatoes	12.9	34.5	8.7	4.8	24.3			14.9	**100**
Tomatoes	11.9	34.7	7.1	4.6	25.5			16.2	**100**
Onions	11.7	34.1	8.5	4.4	25.5			15.8	**100**
Lettuces and endives	12.9	36.1	9.7	4.1	22.9			14.3	**100**
Oranges	10.8	31.6	6.2	5.5	28.6			17.3	**100**
Apples	11.6	32.3	7.3	4.7	27.6			16.5	**100**
Bananas	12.7	36.5	7.4	4.8	24.9			13.8	**100**
Eggs	14.2	43.4	19.9	8.5	3.0	5.4	0.1	5.4	**100**
Whole chickens	11.4	40.6	5.4	6.5		27.6		8.5	**100**
Chicken fillets	9.6	43.0	4.2	4.8		29.4		8.9	**100**
Chicken pieces	12.2	44.0	5.2	6.1		24.5		8.0	**100**
Pork	13.8	41.9	4.1	6.2		26.0		8.0	**100**
Veal	12.9	38.7	3.5	3.8		31.3		9.8	**100**
Yearling Beef	11.7	32.9	3.1	3.1		35.0		14.2	**100**
Mature Beef	19.3	29.0	1.8	1.1		33.4		15.4	**100**
Hake and whiting	8.9	35.3	1.6	1.2			34.7	18.3	**100**
Sardines and fresh anchovies	7.2	35.7	1.4	1.4			36.7	17.6	**100**

SOURCE: Banco de España, based on Food Consumption Panel.

SAMPLE STRUCTURE ACCORDING TO HOUSEHOLD CHARACTERISTICS TABLE B.3

	PERCENTAGE OF OBSERVATIONS IN THE SAMPLE OF EACH PRODUCT					
PRODUCT / CHARACTERISTIC	POTATOES	TOMATOES	ONIONS	LETTUCES AND ENDIVES	ORANGES	APPLES
REGION	**100**	**100**	**100**	**100**	**100**	**100**
ANDALUSIA	19.12	16.23	16.38	15.96	13.93	14.61
ARAGÓN	3.53	3.26	3.10	3.95	3.36	3.14
ASTURIAS	2.96	3.14	3.52	3.46	4.07	3.97
BALEARIC ISLANDS	1.85	1.91	2.08	1.89	1.29	1.82
CANARY ISLANDS	2.56	2.53	3.72	2.20	2.10	2.78
CANTABRIA	1.31	1.11	1.45	1.10	1.51	1.45
CASTILLA LA MANCHA	2.99	3.98	2.77	3.25	4.45	3.96
CASTILLA Y LEÓN	5.26	6.74	6.56	7.75	10.48	7.97
CATALONIA	18.17	19.26	19.16	18.54	16.46	16.01
EXTREMADURA	2.06	2.22	1.96	1.78	3.01	2.42
GALICIA	3.84	5.70	5.01	5.49	8.58	7.47
LA RIOJA	0.68	0.63	0.83	1.21	1.20	0.93
MADRID	15.65	14.59	13.18	12.64	15.19	14.07
MURCIA	2.30	2.20	2.08	1.94	1.16	2.00
NAVARRA	1.06	1.19	1.48	2.26	1.89	1.46
BASQUE COUNTRY	5.78	5.31	6.29	6.47	7.07	6.35
VALENCIA	10.88	10.00	10.45	10.12	4.26	9.60
SIZE OF COMMUNITY (no. of inhabitants)	**100**	**100**	**100**	**100**	**100**	**100**
LESS THAN 2,000	4.21	5.23	4.47	6.03	7.55	6.43
2,000 - 10,000	10.86	12.96	11.97	13.09	14.95	14.05
10,000 - 100,000	31.24	31.78	31.89	31.02	29.64	31.76
100,000 - 500,000	27.96	26.35	28.40	27.50	27.11	26.61
MORE THAN 500,000	25.72	23.68	23.26	22.36	20.76	21.15
AGE OF PERSON RESPONSIBLE FOR SHOPPING	**100**	**100**	**100**	**100**	**100**	**100**
0 - 34	13.66	14.53	12.73	12.19	12.34	13.32
35 - 49	45.03	45.28	43.07	44.31	42.71	43.71
50 - 64	28.66	28.08	30.51	30.41	30.28	29.60
65 AND OVER	12.65	12.11	13.69	13.09	14.67	13.37
HOUSEWIFE'S EMPLOYMENT SITUATION	**100**	**100**	**100**	**100**	**100**	**100**
EMPLOYED	35.70	37.75	34.75	34.87	35.35	35.55
NON-EMPLOYED	64.30	62.25	65.25	65.13	64.65	64.45
NUMBER OF HOUSEHOLD MEMBERS	**100**	**100**	**100**	**100**	**100**	**100**
ONE	5.00	5.82	5.24	5.51	5.99	5.66
TWO	19.52	20.68	20.18	20.46	20.73	19.66
THREE	25.48	26.27	26.50	25.78	26.70	26.14
FOUR	34.15	32.76	32.83	33.54	32.14	33.26
FIVE OR MORE	15.84	14.47	15.25	14.71	14.45	15.29
CHILDREN AND THEIR AGES	**100**	**100**	**100**	**100**	**100**	**100**
CHILDREN AGED 0 - 5	15.77	15.55	14.41	13.70	15.03	16.40
CHILDREN AGED 6 - 15	27.49	26.48	25.09	25.76	24.41	25.72
NO CHILDREN UNDER 16	56.74	57.97	60.49	60.54	60.56	57.88
SOCIO-ECONOMIC LEVEL	**100**	**100**	**100**	**100**	**100**	**100**
LOW	15.90	16.18	16.45	16.27	18.78	17.81
MEDIUM-LOW	25.50	25.66	25.77	25.76	25.32	25.75
MEDIUM	34.33	34.39	34.52	34.34	33.31	33.92
MEDIUM-HIGH AND HIGH	24.27	23.77	23.27	23.63	22.59	22.52

SOURCE: Banco de España, based on Food Consumption Panel.

SAMPLE STRUCTURE ACCORDING TO HOUSEHOLD CHARACTERISTICS TABLE B.3 continued (I)

	PERCENTAGE OF OBSERVATIONS IN THE SAMPLE OF EACH PRODUCT					
PRODUCT / CHARACTERISTIC	BANANAS	EGGS	WHOLE CHICKEN	CHICKEN FILETS	CHICKEN PIECES	PORK
REGION	**100**	**100**	**100**	**100**	**100**	**100**
ANDALUSIA	15.95	14.11	15.41	17.61	15.46	16.44
ARAGÓN	3.56	3.81	3.38	4.61	3.93	3.97
ASTURIAS	3.30	3.53	2.84	3.86	3.05	3.18
BALEARIC ISLANDS	1.95	1.75	1.33	1.97	1.91	1.76
CANARY ISLANDS	2.32	2.47	0.84	1.41	1.25	1.48
CANTABRIA	1.27	1.33	0.78	1.12	1.27	1.17
CASTILLA LA MANCHA	4.35	3.59	5.78	4.49	4.87	4.86
CASTILLA Y LEÓN	8.28	7.10	9.62	7.14	6.99	7.97
CATALONIA	15.70	18.03	14.24	14.90	17.41	16.73
EXTREMADURA	2.55	1.88	3.09	2.29	2.48	2.71
GALICIA	7.01	4.34	6.53	4.63	4.87	5.90
LA RIOJA	0.99	0.94	1.31	1.30	1.29	1.31
MADRID	13.25	15.70	11.00	15.32	15.01	12.25
MURCIA	2.24	2.17	2.39	2.33	2.19	2.35
NAVARRA	1.49	1.82	1.76	1.42	1.49	1.61
BASQUE COUNTRY	5.53	6.49	6.38	5.07	5.18	5.41
VALENCIA	10.26	10.95	13.32	10.53	11.36	10.89
SIZE OF COMMUNITY (no. of inhabitants)	**100**	**100**	**100**	**100**	**100**	**100**
LESS THAN 2,000	7.13	5.47	9.48	5.33	6.37	32.54
2,000 - 10,000	14.89	11.93	16.70	14.79	14.56	24.82
10,000 - 100,000	31.30	32.01	32.73	32.00	31.68	15.85
100,000 - 500,000	25.93	26.86	23.37	25.56	25.33	19.54
MORE THAN 500,000	20.75	23.73	17.73	22.31	22.06	7.24
AGE OF PERSON RESPONSIBLE FOR SHOPPING	**100**	**100**	**100**	**100**	**100**	**100**
0 - 34	14.80	15.62	10.57	16.09	15.43	15.29
35 - 49	45.74	46.50	44.65	51.43	47.70	48.39
50 - 64	27.74	26.75	32.15	24.26	25.75	26.50
65 AND OVER	11.72	11.12	12.63	8.23	11.12	9.82
HOUSEWIFE'S EMPLOYMENT SITUATION	**100**	**100**	**100**	**100**	**100**	**100**
EMPLOYED	35.92	38.46	30.06	37.52	36.06	36.11
NON-EMPLOYED	64.08	61.54	69.94	62.48	63.94	63.89
NUMBER OF HOUSEHOLD MEMBERS	**100**	**100**	**100**	**100**	**100**	**100**
ONE	4.58	5.22	2.73	3.44	4.12	3.07
TWO	17.60	19.38	16.04	14.85	17.70	16.55
THREE	26.08	25.83	24.87	25.73	26.00	26.15
FOUR	35.46	34.26	36.77	39.04	36.53	37.25
FIVE OR MORE	16.28	15.30	19.59	16.94	15.65	16.98
CHILDREN AND THEIR AGES	**100**	**100**	**100**	**100**	**100**	**100**
CHILDREN AGED 0 - 5	18.71	16.93	14.66	18.87	18.10	17.61
CHILDREN AGED 6 - 15	27.62	27.95	28.79	32.77	29.40	30.52
NO CHILDREN UNDER 16	53.67	55.12	56.54	48.37	52.51	51.87
SOCIO-ECONOMIC LEVEL	**100**	**100**	**100**	**100**	**100**	**100**
LOW	16.66	15.09	20.15	13.76	16.21	15.98
MEDIUM-LOW	26.19	25.37	28.12	27.94	26.41	27.05
MEDIUM	34.48	35.27	33.58	34.94	34.15	34.79
MEDIUM-HIGH AND HIGH	22.67	24.27	18.15	23.36	23.24	22.18

SOURCE: Banco de España, based on Food Consumption Panel.

SAMPLE STRUCTURE ACCORDING TO HOUSEHOLD CHARACTERISTICS

TABLE B.3 continued (II)

	PERCENTAGE OF OBSERVATIONS IN THE SAMPLE OF EACH PRODUCT				
PRODUCT / CHARACTERISTIC	VEAL	YEARLING BEEF	MATURE BEEF	HAKE AND WHITING	SARDINES AND ANCHOVIES
REGION	**100**	**100**	**100**	**100**	**100**
ANDALUSIA	10.18	3.32	2.55	15.15	21.67
ARAGON	4.21	1.72	2.07	4.50	3.75
ASTURIAS	4.52	3.76	1.78	3.66	3.19
BALEARIC ISLANDS	1.52	0.91	1.16	0.49	1.08
CANARY ISLANDS	1.35	3.69	4.38	0.17	0.57
CANTABRIA	1.20	3.19	3.72	1.24	1.41
CASTILLA LA MANCHA	3.42	2.04	1.30	5.81	5.89
CASTILLA Y LEON	9.12	13.26	9.46	9.71	8.74
CATALONIA	18.58	13.90	16.94	14.58	13.86
EXTREMADURA	1.23	0.69	0.12	2.86	3.25
GALICIA	8.56	3.78	1.79	6.24	2.57
LA RIOJA	1.29	0.52	1.29	1.32	1.09
MADRID	14.28	33.41	17.05	16.57	13.48
MURCIA	1.56	0.61	0.36	1.91	2.66
NAVARRA	1.86	1.12	2.66	2.08	1.61
BASQUE COUNTRY	7.14	9.45	26.65	6.39	6.01
VALENCIA	9.97	4.64	6.71	7.30	9.18
SIZE OF COMMUNITY (no. of inhabitants)	**100**	**100**	**100**	**100**	**100**
LESS THAN 2,000	6.09	4.69	4.01	6.99	8.64
2,000 - 10,000	13.69	10.33	10.27	15.30	15.91
10,000 - 100,000	31.12	27.65	31.78	29.63	30.36
100,000 - 500,000	27.00	26.33	29.14	25.66	25.07
MORE THAN 500,000	22.09	31.00	24.80	22.42	20.01
AGE OF PERSON RESPONSIBLE FOR SHOPPING	**100**	**100**	**100**	**100**	**100**
0 - 34	14.19	11.78	10.33	8.97	9.52
34 - 49	46.83	48.14	41.02	38.48	41.64
50 - 64	28.02	29.85	34.16	34.94	33.90
65 AND OVER	10.96	10.24	14.48	17.60	14.94
HOUSEWIFE'S EMPLOYMENT SITUATION	**100**	**100**	**100**	**100**	**100**
EMPLOYED	37.29	36.73	38.10	28.72	27.00
NON-EMPLOYED	62.71	63.27	61.90	71.28	73.00
NUMBER OF HOUSEHOLD MEMBERS	**100**	**100**	**100**	**100**	**100**
ONE	4.41	3.76	6.21	4.21	3.43
TWO	18.52	16.91	20.98	21.04	19.05
THREE	27.78	26.30	27.38	26.63	25.60
FOUR	34.42	36.76	32.54	32.64	35.21
FIVE OR MORE	14.86	16.27	12.89	15.47	16.71
CHILDREN AND THEIR AGES	**100**	**100**	**100**	**100**	**100**
CHILDREN AGED 0 - 5	16.44	15.24	11.85	13.66	13.31
CHILDREN AGED 6 - 15	28.00	29.85	22.30	23.21	25.78
NO CHILDREN UNDER 16	55.56	54.91	65.85	63.13	60.91
SOCIO-ECONOMIC LEVEL	**100**	**100**	**100**	**100**	**100**
LOW	14.62	27.65	14.21	19.61	20.55
MEDIUM-LOW	25.34	12.51	27.03	26.42	27.53
MEDIUM	35.73	35.19	31.04	33.41	33.43
MEDIUM-HIGH AND HIGH	24.31	24.65	27.72	20.56	18.49

SOURCE: Banco de España, based on Food Consumption Panel.

ANNEX C: CHANGES IN QUALITY-ADJUSTED PRICES

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT
GROWTH RATES (a)

TABLE C

Period	PRODUCT: POTATOES					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Cum. 01	13.1	9.2	9.0	13.3	7.5	7.7
Cum. 02	1.8	-0.9	-5.2	13.9	0.9	5.6
Cum. 03	32.3	35.7	39.7	40.1	36.8	39.0
2002/2001	0.2	-0.5	-4.8	2.2	0.5	1.9
2003/2002	-4.9	2.2	-2.6	2.6	2.8	1.7

Period	PRODUCT: TOMATOES					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Cum. 01	25.6	23.0	22.2	9.6	17.5	15.8
Cum. 02	27.0	30.0	27.0	27.4	27.5	29.4
Cum. 03	20.9	30.6	11.5	29.1	26.2	31.5
2002/2001	17.1	25.3	18.5	27.1	25.8	23.9
2003/2002	2.7	6.3	7.0	11.2	5.4	7.3

Period	PRODUCT: ONIONS					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Acum. 01	30.4	21.5	15.8	5.6	17.8	20.2
Acum. 02	14.9	9.8	6.8	24.3	19.1	29.3
Acum. 03	36.6	41.7	37.9	30.9	38.0	34.7
2002/2001	7.6	11.1	13.3	9.7	13.1	13.6
2003/2002	-10.1	-5.0	-12.1	-1.5	-4.9	-5.3

Period	PRODUCT: LETTUCES AND ENDIVES					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Cum. 01	16.5	16.3	14.4	12.8	17.8	17.8
Cum. 02	18.3	22.6	2.2	15.7	18.1	19.0
Cum. 03	37.1	54.8	22.7	46.5	39.7	45.0
2002/2001	6.4	10.6	-2.9	5.9	7.3	9.4
2003/2002	18.0	23.1	13.8	25.1	17.3	18.0

Period	PRODUCT: ORANGES					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Cum. 01	8.8	9.0	15.1	8.7	7.4	8.8
Cum. 02	14.3	19.7	23.9	25.7	13.2	21.9
Cum. 03	16.9	29.9	33.4	40.6	28.8	31.7
2002/2001	-10.3	-6.3	-12.4	-2.3	-9.4	-6.2
2003/2002	4.8	7.5	10.8	8.9	9.5	8.5

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT
GROWTH RATES (a)

TABLE C
continued (I)

Period	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
PRODUCT: APPLES						
Cum. 01	17.4	13.7	8.1	5.6	12.4	6.1
Cum. 02	28.4	29.6	21.6	26.0	27.0	24.2
Cum. 03	19.9	34.2	26.3	39.1	37.2	33.5
2002/2001	7.3	10.2	1.1	11.1	9.7	11.4
2003/2002	8.5	11.4	13.8	13.6	12.9	12.1
PRODUCT: BANANAS						
Cum. 01	-1.3	-3.9	-5.9	-2.1	-2.3	-1.5
Cum. 02	14.4	16.3	2.4	10.9	16.2	15.9
Cum. 03	15.0	24.3	7.4	17.0	15.7	18.0
2002/2001	9.0	11.2	-0.7	5.8	9.0	9.3
2003/2002	3.0	7.0	6.0	8.3	6.9	7.3
PRODUCT: WHOLE CHICKEN						
Cum. 01	-2.9	-7.0	-9.1	-17.9	-8.2	-5.7
Cum. 02	21.1	14.7	11.7	19.8	11.5	12.6
Cum. 03	1.8	1.1	3.6	-7.0	-0.9	4.8
2002/2001	-0.6	-1.2	-0.7	-1.8	-2.0	-0.6
2003/2002	-3.0	0.9	-1.2	0.4	3.9	5.8
PRODUCT: CHICKEN FILLETS						
Cum. 01	-0.6	1.6	6.1	1.4	0.6	1.5
Cum. 02	0.2	3.3	5.4	-4.0	0.2	4.9
Cum. 03	-0.1	4.7	6.4	0.0	5.4	4.1
2002/2001	0.9	1.2	0.5	-0.3	0.0	-1.0
2003/2002	1.0	1.6	1.5	8.8	4.8	4.5
PRODUCT: CHICKEN PIECES						
Cum. 01	-0.7	1.0	0.4	-30.8	-5.5	-8.3
Cum. 02	10.8	10.5	9.5	-18.7	5.8	1.8
Cum. 03	7.8	0.4	4.0	-25.1	-11.4	-8.6
2002/2001	3.0	2.0	-0.7	-8.0	-0.3	-1.0
2003/2002	0.7	-3.3	1.3	3.9	-4.9	-3.0

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT
GROWTH RATES (a)

TABLE C
continued (II)

Period	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
PRODUCT: PORK						
Cum. 01	8.0	6.0	7.9	2.1	6.3	7.3
Cum. 02	6.0	5.4	8.8	0.4	6.3	7.5
Cum. 03	10.6	10.4	11.1	6.4	11.5	10.1
2002/2001	-2.2	-2.4	-2.1	-4.9	-1.9	-0.8
2003/2002	3.0	2.9	2.3	3.7	2.1	1.6
PRODUCT: YEARLING BEEF						
Cum. 01	13.6	8.0	4.9	6.9	0.2	4.4
Cum. 02	17.8	10.0	7.0	12.0	2.2	6.5
Cum. 03	12.8	7.7	6.6	9.2	2.1	6.1
2002/2001	6.0	3.9	2.6	1.2	3.3	2.6
2003/2002	-3.4	-0.3	-5.9	4.3	-0.6	0.9
PRODUCT: MATURE BEEF						
Cum. 01	16.5	0.6	17.0	-17.1	-3.5	23.4
Cum. 02	16.2	-2.8	-13.4	-4.4	-4.5	22.2
Cum. 03	22.9	3.7	-20.0	-39.8	6.9	32.0
2002/2001	-1.4	-2.6	-3.2	3.1	-0.6	1.5
2003/2002	9.1	5.0	-3.7	4.8	7.0	2.1
PRODUCT: VEAL						
Cum. 01	2.4	6.3	4.7	24.0	4.2	5.9
Cum. 02	4.6	10.5	5.3	23.0	6.9	9.4
Cum. 03	7.4	11.2	11.6	30.9	9.6	10.4
2002/2001	2.3	5.4	3.0	10.6	4.1	5.6
2003/2002	0.8	-0.4	2.2	0.9	1.3	-1.0

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

CHANGES IN QUALITY-ADJUSTED PRICES BY TYPE OF ESTABLISHMENT
GROWTH RATES (a)

TABLE C
continued (III)

Period	PRODUCT: HAKE AND WHITING					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Cum. 01	1.2	10.3	3.1	17.1	7.3	6.2
Cum. 02	-2.1	8.0	-1.3	16.4	4.5	2.9
Cum. 03	1.8	9.7	17.8	20.5	9.3	10.4
2002/2001	1.3	2.8	1.4	4.8	3.2	3.4
2003/2002	2.5	1.1	4.9	0.2	2.0	3.5

Period	PRODUCT: SARDINES AND FRESH ANCHOVIES					
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets
Cum. 01	-2.9	-5.6	-6.2	-10.1	-0.3	0.3
Cum. 02	-9.6	-13.2	-12.4	-6.9	-9.8	-7.3
Cum. 03	-1.9	-5.1	15.6	-3.6	6.8	10.1
2002/2001	-1.8	2.8	1.2	-2.6	2.2	2.9
2003/2002	13.0	7.2	11.7	5.5	12.7	13.1

Period	PRODUCT: EGGS							
	Hypermarkets	Self-service stores and supermarkets	Hard discount stores	Non-specialised food shops	Specialised food shops	Markets	Specialised food shops: fruiterers	Specialised food shops: fishmongers
Cum. 01	2.1	1.3	1.5	4.6	1.0	0.8	1.8	-0.1
Cum. 02	4.7	4.1	5.8	10.9	4.7	5.8	7.0	7.8
Cum. 03	31.9	19.6	45.0	34.1	23.8	29.9	25.6	27.6
2002/2001	1.2	2.1	-1.9	3.7	3.0	4.7	4.8	1.5
2003/2002	8.2	6.7	12.8	11.2	6.8	8.9	6.6	7.9

SOURCE: Banco de España.

a. The table shows the growth rate between the first period of 2001 and the final period of the year indicated (Cum. 01, 02 and 03) and the average growth rate in 2002 and in 2003.

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