OUTLET SUBSTITUTION BIAS*

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This study uses microeconomic data to estimate the size of the CPI bias due to retail outlet substitution. The estimated value for the bias is slightly higher than what is reported in studies carried out in other countries, but it is declining. This difference is explained by the important changes in the selling circuits that occurred in Portugal over the last decade.

1. INTRODUCTION

The Consumer Price Index (CPI), as calculated by INE for Portugal, and by equivalent agencies in several other countries, measures the evolution of the price of a fixed basket of goods and services, in a pre-determined set of retail stores. This kind of index is extremely useful, not only due to its simple interpretation, but also because it is based on a set of fully objective procedures established according to internationally accepted methodologies.

Despite their advantages, indices of this kind do not accurately measure changes in the cost of living. In fact, they do not take into account, neither changes to the basket of goods purchased by the consumer, nor the changes in the quality of products and the entry into the market of new types of outlets (see Boskin et al., 1996, and the references therein).

In order to adapt the index to the market evolution, the agencies in charge of constructing price indices regularly update the contents of the basket of goods taken as representative and the set of stores where prices are collected. However, it is not feasible to carry out this update on a continuous basis. Therefore, it is interesting to study to what extent changes in the economy may imply that the CPI is a biased measure of the cost of living.

For the Portuguese case, Santos and Coimbra (1995) and Neves and Sarmento (1997) analyse possible bias resulting respectively from changes to the quality of products and to the representative basket of goods and services. However, up to now no research has been done on a possible bias due to outlet substitution.

The simple observation of reality suggests that the changes in the distribution circuits occurring in Portugal since the late 1980s may have implied a reasonable bias in the CPI. Indeed, the continuing opening of large hypermarkets, together with the constant expansion of supermarket chains (and more recently also of discount stores) led many consumers to switch from traditional stores to the new outlets. This trend is due not only to the low prices found in hypermarkets and supermarktes, but also to the wider range — and, sometimes, the higher quality — of products sold in the new stores.

If, for products with identical quality, prices in a new store are lower than those in traditional

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shops, then consumers may profit from a lower cost of living by transferring part of their purchases to the new outlet. As the CPI measures the evolution of prices in a fixed set of stores, not even the most careful construction of the index can convey this reduction in the cost of living, unless traditional shops react by lowering their prices to match those of the new competitor. Since, in general, this reaction does not occur, the entry into the market of new outlets with prices below those of traditional stores will indeed imply a bias of the CPI.

The analysis of the bias of the CPI due to outlet substitution can also encompass the appraisal of the effects of temporary and reversible trade shifts resulting from households taking advantage of better conditions offered by some stores during short periods.

This article analyses the outlet substitution bias of CPI, using two important microeconomic data sets. Specifically, we use the individual data supporting the calculation of the 1991=100 CPI (Instituto Nacional de Estatística, 1992), as well as the results of the 1989/1990 and the 1994/1995 Households Budget Survey(1).

It should be noted that the fact that the CPI may provide a biased idea of the evolution of the cost of living does not in any way imply that the methods INE uses in its construction are flawed or inaccurate. Indeed, in the construction of the CPI, INE follows internationally established standards, making the CPI a precise indicator of the changes in the price of the selected basket of goods and services, at the stores that were considered representative at the time the sample was defined. The problem with this kind of index — in Portugal and in any other country — is that it may provide a biased indicator of the evolution of the cost of living. Therefore, this problem is not specific to our economy, although this is the case studied here.

2. THE TRADITIONAL METHODOLOGY

Several methods can be used to assess the size of the CPI bias due to outlet substitution. However, the most commonly used methodology (see Moulton, 1996 and Diewert, 1998) is based on two values: \( \delta_t \), the average percentage difference between the prices in the new and in the traditional outlets in period \( t \); and \( \theta_t \), the market share of the new outlets in the same period.

If \( \delta_t \) and \( \theta_t - \theta_{t-1} \) are relatively small(2), and if \( \delta_t \) is constant in time, the bias of the rate of growth of the CPI is approximately given by the product \( \delta_t (\theta_t - \theta_{t-1}) \), which is the formula generally used in the literature on this issue.

With the available data, this methodology can be slightly improved since it is possible to calculate the bias due to the growth of the market shares of two kinds of new stores: hypermarkets and supermarkets. Therefore, the total bias can be obtained as the sum of the two estimated components. Moreover, these data enable us to calculate these figures yearly, so the formula used in calculating the bias must be adapted accordingly.

To calculate the bias when \( \delta_t \) varies over time, we assume that for the period \( t \), the price index adjusted for the bias caused by outlet substitution can be expressed as a weighted average of the non-adjusted price index, \( T_t \), and an index measuring price behaviour in the new stores, \( S_t \) (see Diewert, 1998, page 50). Taking \( I_t \) as the adjusted price index, we have

\[
I_t = \theta_t S_t + (1 - \theta_t)T_t = T_t (1 - \theta_t \delta_t)
\]

where \( \theta_t \) stands for the market share of the new stores in period \( t \), and \( \delta_t = 1 - \frac{\gamma_t}{\gamma_{t-1}} \) is the average percentage difference between prices in the new stores and in the traditional ones, in the same period. Using the usual logarithmic approximation, the rate of growth of the index can be written as follows:

\[
\ln\left(\frac{\gamma_t}{\gamma_{t-1}}\right) = \theta_t \delta_t + \theta_t (\delta_t - \delta_{t-1}).
\]

Hence, the bias of the rate of growth of the price index can be written as \( (\theta_t \delta_t - \theta_t \delta_{t-1}) \), where positive values indicate an overestimation of the inflation rate. It should be noted that this bias can be written as \( \delta_t (\theta_t - \theta_{t-1}) + \theta_t (\delta_t - \delta_{t-1}) \), showing that holding price differentials constant does not imply a systematic bias of the results. However, in periods where both market shares and price differ-

(1) We thank the collaboration of INE, who made available the microdata necessary for this research.

(2) To allow an approximation of the kind of \( \ln(1 + \epsilon) = \epsilon \).
entials can vary quickly, this assumption may have a substantial impact on the results.

Although this is the method generally used to measure the CPI bias due to outlet substitution, there are reasons to believe that the data available for calculating the price differentials — contained in the microeconomic database used in the calculation of the CPI — overestimate prices in the new outlets. Indeed, according to the methodology of calculation of the 1991=100 CPI (see Instituto Nacional de Estatística, 1992), these data do not take into account sales and other promotions. They also overlook the fact that in new stores larger packages can be bought, to which usually corresponds lower unit prices. Furthermore, in this kind of analysis average prices are calculated without weighting each item by the amount traded at the corresponding price. Even if it is not clear in which direction this simplification affects the estimated differential, this problem can be expected to worsen the underestimation of the bias.

Finally, this kind of analysis cannot account for temporary and reversible trade shifts resulting from households taking advantage of better conditions offered by some stores during short periods (due to sales, promotions, credit conditions, etc.).

Given these shortcomings, it is important to develop an alternative methodology to calculate the CPI bias due to outlet substitution.

3. AN ALTERNATIVE METHODOLOGY

To overcome some of the drawbacks of the traditional approach to the estimation of the CPI bias due to outlet substitution, a complementary analysis can be carried out using data from the Households Budget Surveys (IOF’s) for the years 1989/1990 and 1994/1995. This approach is an extension of the methodology used in Reinsdorf (1994), Saglio (1995) and MacDonald (1995).

For a representative sample comprising around 10,000 households, the IOF’s record the expenditure and the quantities purchased of a broad range of products, in addition to data on households’ social-demographic features and income sources. Using these data it is possible to estimate the average price at which a given product was purchased in 1989/1990 and in 1994/1995. Therefore, for the products included in both surveys, it is possible to calculate the growth rate of average prices in the period between surveys. Then, these elementary prices indices can be aggregated using as weights the share of each product in total expenditure in the first year, and the respective population coefficient. This yields a Laspeyres index of average prices which can be compared to the CPI. Obviously, the weights used in the construction of these indices are not exactly the same, and this can account for part — albeit a small one — of the difference between both indices.

At this point it is important to stress that there are two critical differences between a price index of the kind of the CPI and a price index like the one obtained from the Budget Surveys. The first is that the latter index follows the changes in the average of the prices actually paid, and not the evolution of the average of prices in a set of stores. Therefore, the price index based on the IOF’s takes into account outlet substitution and discounts and promotions consumers actually benefit from, and hence it is not biased by outlet substitution. The second difference is that the latter index shows much greater heterogeneity than the former, since the differences resulting from the existence of several varieties for each product cannot be controlled for. Obviously, this kind of index will be biased if, for a given kind of good, consumers replace top of the range products by less expensive ones, or vice-versa.

(3) “The prices supplied by the selected stores are retail prices, and do not reflect prices during sales, promotions, launchings or campaigns”. Instituto Nacional de Estatística (1999, pp 13). In January 1998, Instituto Nacional de Estatística began to publish the CPI base 1997=100, introducing important methodological changes — namely the consideration of price observations in periods of sales and promotions.

(4) Indeed, one only needs to admit that the correlation between price and quantities sold is stronger in the new outlets than in traditional ones, implying a smaller overestimation of average prices in this kind of store. This happens if, for example, clients of traditional stores choose their purchasing point basically according to the location of the store and the quality of service, but not according to the prices, while clients of new stores search for more favourable prices, buying large quantities of products on sale.

(5) It should be noted that this kind of data also permits the calculation of the Paasche index, hence also the Fisher index.

(6) See Saglio (1995) and Nakamura (1998) for excellent discussions on the interpretations of the behaviour of traditional price indices and indices based on average prices.
This range effect (see Saglio, 1995) cannot be measured using only data from the budget surveys, since these would have to include comprehensive information about the characteristics of the purchased products. In general, the continued quality improvements introduced in the products available in the market lead us to believe that this effect translates into an overestimation of the rate of growth of prices, since part of the price increases may be due to quality improvements. However, for the products sold by the new stores this effect is slightly more ambiguous, since in the period under scrutiny the consumption of own-label products (the so-called “white products”), usually considered to be near the bottom of the range, become widespread.

Given the way it is constructed, the CPI is much more robust to this kind of bias. Indeed, the CPI will be biased if improvements occur in the products it considers, but is totally insensitive to demand shifts towards upper or lower range products.

The impossibility of measuring the range effect makes it unattractive to construct a price index based upon the budget surveys data. However, to obtain an estimate for the outlet substitution this is not necessary. Indeed, sales of the new outlets are concentrated, to a large extent, in the class Food and Beverages, where the various kinds of products considered are substantially more homogeneous than, for instance, in the class Clothing and Footwear. Therefore, comparing the index of average prices of Food and Beverages (excluding Food not consumed at home) constructed from the IOF’s data to the price index for the same products published by INE, it is possible to obtain an estimate of the CPI bias due to outlet substitution.

To give an idea on how to calculate the CPI bias using this method, suppose that in a first moment price indices of foodstuff products and of the remaining products take the value 100, and let \( \alpha \) stand for the weight of Food and Beverages in total CPI. The price index increase from the base period to period 1 is given by

\[
1 + \pi = \frac{\alpha A + (1 - \alpha)R}{100},
\]

where \( A \) is the price index of foodstuff goods in period 1, \( R \) is the price index of the remaining products in the same period, and \( \pi \) is the inflation rate. Now suppose it is possible to know a new price index of foodstuff goods, adjusted for the bias resulting from outlet substitution. Denoting this index by \( B \), the overall price index bias due to using \( A \) instead of \( B \) is given by

\[
\left( \frac{\alpha A + (1 - \alpha)R}{\alpha B + (1 - \alpha)R} - 1 \right) \times 100.
\]

If the difference between \( A \) and \( B \) is small, this bias can be approximated by the expression

\[
\alpha (A - B) \left( \frac{100}{\alpha A + (1 - \alpha)R} \right),
\]

which has the advantage of not requiring the calculation of \( R \). In practice, the bias of the CPI growth rate due to outlet substitution can be approximated by the product of \( \alpha / (1 + \pi) \) by the difference between the annual average growth rates of the prices in class Food and Beverages given by the CPI and by the index calculated from the budget surveys.

It should be noted that although the inflation rate appears in the denominator of this expression we cannot conclude that the bias tends to decrease with inflation. In fact, there is some evidence (see Coimbra and Neves, 1997, and the references therein) that higher inflation levels are associated with greater price dispersion, which increases the potential for differences between the annual average growth rates of prices given by both indices.

4. RESULTS AND INTERNATIONAL COMPARISONS

a) Traditional methodology

The calculation of the CPI bias using the method described in section 2 requires data on the price differentials between the new outlets and traditional stores, as well as on the behaviour of market shares of hypermarkets and supermarkets.

To calculate \( \theta \), the turnover of hypermarkets and supermarkets must be known. We used data supplied by Associação Portuguesa de Empresas de Distribuição (APED) and by the market research company A. C. Nielsen to calculate this parameter.

APED has data on the turnover of its affiliated hypermarkets and supermarkets. Although these figures are only available from 1994 onwards, the
data for hypermarkets are quite useful, since all major hypermarket chains are affiliates of APED. However, to obtain the corresponding figures for years prior to 1994, other data sources must be used. Furthermore, some Portuguese supermarkets are not affiliated in APED. For this reason, other sources are also necessary to calculate the turnover of supermarkets. The estimates for the turnover of hypermarkets and supermarkets disclosed by A. C. Nielsen overcome this problem(7). With this information, the value of the market share for each kind of store can be calculated by dividing the respective turnovers by the value of households’ final consumption in the Portuguese territory(8), which is the relevant concept of consumption for the CPI calculation.

Table 1 displays the market shares of hypermarkets and supermarkets in the period under study. The figures show that the growth of the market share of hypermarkets is slowing down, but this is compensated by a quite substantial increase of the share of supermarkets(9).

As for the values of $\delta$, these can be obtained by using the microdata which supported the calculation of the 1991=100 CPI. This database covers around 570 products in almost 9,100 stores, between January 1992 and December 1997. Since the calculation of $\delta$, only requires the products traded in the new outlets, a sub-sample was selected, containing data on about 330 products grouped into 68 sub-groups. Thus the sub-sample used in this analysis contains about 2.4 million observations. Using this information, the differential at each moment is obtained by calculating the average of the prices for each product(10) in the different kinds of stores, aggregating the percentage difference between the average of prices in the new outlets and in traditional stores using weights that take into account the share of each product in total expenditure. It should be noted that for confidentiality reasons INE does not make available the fully disaggregated weights, nor does it indicate which specific product corresponds to each price. These limitations made it necessary to assume that the share of expenditure within each sub-group is evenly distributed by the various items included.

It is important to consider that in some cases — especially for fresh fruit and vegetables — there may be important quality differences between the products sold in the new and traditional stores. To neutralise (at least, partly) the effect of possible quality differences, price differentials were calculated excluding fresh products(11). This procedure is adequate if price differentials for fresh products, calculated after adjusting for quality differences, are identical to those recorded for the remaining products.

Using this methodology, we obtained the price differentials between new and traditional outlets, calculated excluding fresh products. The results are shown in table 2(12).

These differentials are always positive, indicating that on average new outlets charge lower prices than traditional stores. However, considering the various kinds of products separately, the differentials exhibit a great variability. This is evident through table 3, which displays the average

(7) Data for sales in hypermarkets before 1994 were obtained by retropolating the series given by APED using the sales growth rates for this kind of stores implicit in the data supplied by A. C. Nielsen.

(8) The value of households’ final consumption in the national territory was obtained by subtracting to residents’ consumption the value of tourism imports. Also the value of housing expenditure was excluded. Therefore, throughout the analysis only the bias of CPI excluding housing is considered.

(9) This development may be linked to the limitations introduced to the opening hours of the larger stores by Decree-law no. 48/96 of 15 May and Notice 153/96 of 15 May.

(10) More precisely, we considered that the products traded in the new stores belong to the following classes: Food and Beverages (except food consumed outside home); Housing Apparel (purchasing of durable domestic goods except furniture and current usage products); Education, Culture and Leisure (only the acquisition of radio and TV sets and others); and Other Goods and Services (personal care, durable articles, non-durable articles and other articles). Products of class Clothing and Footwear were excluded since it was considered that there are great qualitative differences between products traded in the new and traditional stores.

(11) Moreover, due to their seasonal nature, some fresh products exhibit quite significant price changes that might distort results. It should be noted that this kind of procedure is not innovative since the research of Direcção-Geral do Comércio e da Concorrência, comparing prices in hypermarkets and supermarkets, also excludes fresh products from the analysis (Direcção-Geral do Comércio e da Concorrência, 1998).

(12) A research conducted by Direcção-Geral do Comércio e da Concorrência comparing the prices of 205 products in 38 hypermarkets and supermarkets during October 1998 indicates that prices in supermarkets are about 6 per cent higher than in hypermarkets (Direcção-Geral da Concorrência, 1998). From the data contained in table 2 we infer that the difference is about 4 per cent in 1997. Given the different period and methodology, the results do not seem incoherent.
value of the differentials\(^{(13)}\) in the period 1992/1997, for hypermarkets and supermarkets, at
the level of product sub-groups. These results
show that, while some products are systematically
— and substantially — cheaper in the new stores,
in some cases differences are negligible or even negative. However, we must recall that prices supporting these calculations do not take into account promotions, hence results should be interpreted with caution.

Combining the information in tables 1 and 2, we can calculate the estimates for the CPI bias for each year. These are shown in table 4. The bias of the annual growth rate of the CPI due to outlet substitution is estimated to have stood below 0.20 percentage points in the period 1993/1997. How-

\(^{(13)}\)Calculated excluding fresh products.

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### Table 1

**VALUES OF \( q \), FOR HYPERMARKETS AND SUPERMARKETS (%)**

<table>
<thead>
<tr>
<th></th>
<th>Hypermarkets</th>
<th>Supermarkets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>4.14</td>
<td>2.75</td>
</tr>
<tr>
<td>1993</td>
<td>5.11</td>
<td>3.04</td>
</tr>
<tr>
<td>1994</td>
<td>5.48</td>
<td>3.27</td>
</tr>
<tr>
<td>1995</td>
<td>6.07</td>
<td>3.75</td>
</tr>
<tr>
<td>1996</td>
<td>6.48</td>
<td>4.74</td>
</tr>
<tr>
<td>1997</td>
<td>6.59</td>
<td>5.65</td>
</tr>
</tbody>
</table>

### Table 2

**VALUE OF \( d \), FOR HYPERMARKETS AND SUPERMARKETS (%)**

<table>
<thead>
<tr>
<th></th>
<th>Hypermarkets</th>
<th>Supermarkets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>4.4</td>
<td>1.1</td>
</tr>
<tr>
<td>1993</td>
<td>6.3</td>
<td>1.9</td>
</tr>
<tr>
<td>1994</td>
<td>5.9</td>
<td>2.1</td>
</tr>
<tr>
<td>1995</td>
<td>6.2</td>
<td>2.0</td>
</tr>
<tr>
<td>1996</td>
<td>7.3</td>
<td>3.6</td>
</tr>
<tr>
<td>1997</td>
<td>7.9</td>
<td>3.9</td>
</tr>
</tbody>
</table>

### Table 3

**MEAN VALUE OF \( \delta \) IN THE PERIOD 1992-1997, FOR HYPERMARKETS AND SUPERMARKETS, ACCORDING TO PRODUCTS SUB-GROUPS (%)**

<table>
<thead>
<tr>
<th>Classes and sub-groups</th>
<th>Hypermarkets</th>
<th>Supermarkets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereals and derivatives</td>
<td>9.18</td>
<td>3.08</td>
</tr>
<tr>
<td>Starch</td>
<td>-0.72</td>
<td>0.18</td>
</tr>
<tr>
<td>Leguminous</td>
<td>9.03</td>
<td>6.62</td>
</tr>
<tr>
<td>Eggs</td>
<td>-0.60</td>
<td>-2.50</td>
</tr>
<tr>
<td>Milk and dairies excluding butter</td>
<td>6.82</td>
<td>1.82</td>
</tr>
<tr>
<td>Dietetic products</td>
<td>5.55</td>
<td>1.43</td>
</tr>
<tr>
<td>Oil and fat</td>
<td>9.48</td>
<td>4.20</td>
</tr>
<tr>
<td>Sugar, derivatives and past</td>
<td>10.20</td>
<td>4.38</td>
</tr>
<tr>
<td>Cocoa, coffee, tea</td>
<td>13.98</td>
<td>2.58</td>
</tr>
<tr>
<td>Sundry: seasonings, etc</td>
<td>5.63</td>
<td>-0.65</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td>1.07</td>
<td>0.77</td>
</tr>
<tr>
<td>Non-alcoholic beverages</td>
<td>15.87</td>
<td>8.40</td>
</tr>
<tr>
<td>Housing apparel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durable domestic goods</td>
<td>6.88</td>
<td>-5.42</td>
</tr>
<tr>
<td>Current usage products</td>
<td>7.17</td>
<td>1.45</td>
</tr>
<tr>
<td>Other goods and services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal care</td>
<td>5.72</td>
<td>2.88</td>
</tr>
<tr>
<td>Durable goods</td>
<td>19.80</td>
<td>13.68</td>
</tr>
</tbody>
</table>

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\(^{(13)}\)Calculated excluding fresh products.

however, as mentioned above, this result may be underestimated given the kind of data used in calculating the price differentials.

**b) An alternative methodology**

To estimate the outlet substitution bias by comparing the behaviour of the CPI and of the average prices implicit in the Households Budget Surveys, the first step consists in defining how much the CPI grew in the period running between the budget surveys. The adopted method is based upon the assumption that the budget survey data were collected by distributing the interviews to the households evenly by the twelve months of the inquiries. Therefore, the price increase in the period between surveys can be calculated by comparing the averages of the CPI values for the periods March 1989 - February 1990 and October 1994 -
September 1995\(^{(14)}\). According to this procedure, prices for the class Food and Beverages (excluding meals taken outside home) grew about 6.8 per cent in annual average terms.

Meanwhile, for the 230 kinds of goods in this group appearing in both surveys\(^{(15)}\), the average prices grew 5.4 per cent in annual average terms. This gives a 1.4 p.p. differential between these indices, which mostly results from the fact that the CPI does not reflect the effects of outlet substitution on the cost of living\(^{(16)}\). Bearing in mind that in 1989/1990 expenditure on goods in class Food and Beverages accounted for around 38 per cent of total expenditure, and that average inflation in this period reached 8.05 per cent, we conclude that the average outlet substitution bias of the CPI between 1989 and 1995 was around 0.49 percentage points.

The CPI bias estimate calculated according to this methodology is substantially larger than that found through the traditional approach. This fact is not surprising since, as seen above, we believe that the first result was underestimated. Nevertheless, it should be noted that the second result refers to a quantitatively and qualitatively different period, and is based on a set of weights for the various prices that does not match exactly those used in the calculation of the CPI.

To give a more accurate idea of the factors underlying this result, it is interesting to analyse the differences between the annual average growth rates of the prices of products in some sub-groups of the class Food and Beverages, calculated using the CPI and the IOF’s. These are shown in table 5.

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\(^{(14)}\)Although reasonable, this assumption is not innocuous. Indeed, since prices underwent a sharp slowdown in the 79 months period between the beginning of IOF 1989/1990 and the conclusion of IOF 1994/1995, if the IOF data collection is not evenly distributed over time, this value may be distorted. For instance, if the data had been collected only in the last month of the survey, the rate would have been 5.66%. Conversely, if collection was concentrated in the first month of each survey, the rate would rise to 7.27%. Naturally, these are extreme and implausible figures, but they give an idea of the sensitivity of the result to this kind of assumption.

\(^{(15)}\)Excluded from this comparison were products for which less than 50 observations are available for the calculation of one of the two average prices required. Also, the inclusion of some products in the analysis is doubtful since they present such sizeable average price increases that can only be explained by changes in the units in which the respective quantities are measured. However, no product was excluded from the calculation of the price index on this basis, since this criterion would always be somewhat subjective. Nonetheless, expenditure weights of these products are in general quite small, and hence they do not influence results significantly.

\(^{(16)}\)This difference between the two price indices is compatible with the findings of Reinsdorf (1994) and MacDonald (1995) for the USA.
In general, the rates calculated using the budget surveys are lower or approximately equal to those calculated according to the CPI. As a curiosity, it should be noted that the annual average growth rate of the prices of all products common to both budget surveys is 7.98 per cent when calculated using the Laspeyres average prices index, and 7.76 per cent using the Paasche index of the same average prices. These results can be used to estimate the bias due to the substitution effect as the difference between the values obtained according to the Laspeyres index and the geometric mean of the Laspeyres and Paasche index (i.e., the Fisher index). The estimate for this kind of bias is 0.11 p.p., which is coherent with the results of Neves and Sarmento (1997). For further details on the methods of calculation of this kind of bias, and comprehensive results for the Portuguese case, see Diewert (1998) and Neves and Sarmento (1997).

c) International comparisons

Finally, we compare the results obtained for the Portuguese economy with those reported in similar studies, which are summarised in table 6. These studies can be divided into two groups, according to the methodologies used. Some of these studies follow exactly the methodology exposed in section 2, and are based on estimates of $\delta$ (which is assumed to be constant over time) and of the change in $\theta$. The remaining analyses, though implicitly using the same methodology, do not use direct information on the values for $\delta$ and $\theta$, being based upon more or less arbitrary estimates for these parameters.

The results obtained in European countries for the value of the CPI outlet substitution bias range from 0.1 p.p. to 0.20 p.p. (Saglio, 1995; Cunningham, 1996; Lequiller, 1997; and Hoffman, 1998). The figures for North America stand close to 0.1 p.p. (Crawford, 1993; Boskin et al., 1996; Moulton, 1996; and Shapiro and Wilcox, 1996). Since over the course of the periods to which these studies refer to the distribution circuits in North America underwent less changes than in European economies, it comes as no surprise that the results for the outlet substitution bias are larger in the latter case. Taking into account the vast changes retail trade underwent in Portugal over the last decade, it also seems natural that the results for our country are somewhat higher than those obtained for the remaining European economies.

5. CONCLUSIONS

This work uses microdata to study the existence and size of the CPI outlet substitution bias. The first part of this analysis used the methodology traditionally adopted in this kind of research, adjusted to the type of data available. The results obtained according to this approach cannot be very satisfactory since price differentials are calculated using the data on which the CPI is based. Hence the data shares some drawbacks inherent to this price index. The second part of this article ex-
explored an alternative method using data on the average prices implicit in the Household Budget Surveys carried out by INE. The two methodologies lead to results that, despite quantitatively different, are not in disagreement.

According to the results, the CPI growth rate bias due to outlet substitution averaged 0.5 percentage points per year early in the 1990s, and is estimated to have decreased to about one half of this value more recently. It is believed that the major cause of this bias was the fast expansion of hypermarkets and supermarkets during the period considered here. Naturally, the expansion of this kind of stores will eventually slowdown, hence decreasing the potential of this kind of bias. However, it should be noted that this analysis did not take into account sectors where distribution circuits have undergone important changes recently, and which may bring persistence to this kind of phenomenon. These include, for instance, the growing presence in the Portuguese market of discount stores, stores linked to large international chains trading several kinds of products (clothing, foodstuffs, audio and video, etc.), the introduction of generic drugs, the forthcoming deregulation of the telecommunications sector, and even electronic commerce.

REFERENCES


