

ANALYSIS ON THE IMPACT OF THE CONVERSION OF ESCUDOS INTO EUROS*

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1. INTRODUCTION

The conversion of national currencies into euros, which occurred at the beginning of 2002, gave origin to some fears of its effect on inflation in the public opinion of the participating countries. With information already available for that period, it is now possible to assess the extent to which these fears were justified.

Following a preliminary work of simulation conducted in the second half of 2001,⁽¹⁾ the aim of this study is to analyse the effects of the introduction of the euro on the behaviour of consumer prices in Portugal. The information available in the meanwhile confirmed the idea that the changeover will have had a relatively reduced effect on the Consumer Price Index (CPI), merely causing a slight increase of the global index. However, looking in greater detail at the different components of this index, some meaningful effects of the changeover were detected. Indeed, in the present study a quantitative indication of the impact of the changeover on the evolution of the Consumer Price Index, both national and harmonised, was obtained, pointing to values around 0.2 percentage

points (p.p.) in the first three months of 2002 taken as a whole. Similar studies have been conducted by several Central Banks of the Eurosystem, similarly concluding that the impact of the changeover from the respective national currencies into euros will have been relatively small. Eurostat attributed to the introduction of the euro 0.0-0.16 p.p. of the overall increase of the 0.8 per cent increase in the Harmonised Consumer Price Index, registered between the fourth quarter of 2001 and the first quarter of 2002.⁽²⁾

In November 2001, the *Instituto Nacional de Estatística (INE)* began the collection of prices in euros with the purpose of preparing the system of the CPI calculation in the new monetary unit, maintaining, however, the collection of prices in escudos until February 2002. This information made it also possible to evaluate the practice of dual display, the respect for the conversion rules and also to detect significant growth prices during the changeover period. Confirming qualitative information, obtained namely through consumer organizations, the Directorate General of Trade and Competition and the media, the monitoring of prices during the changeover period showed that, in general, no significant irregularities were observed. Only quite a small number of occasional cases were detected, mainly concentrated in the sector of "restaurants and cafés". The new and higher prices for some products of this sector, such as "expresso" coffee, seem to have corresponded

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(1) See Santos, Evagelista, Nascimento and Coimbra, "Conversion of prices from escudos into euros: quantitative estimate of its effect on the CPI", *Economic Bulletin*, Volume 7, Number 3, September 2001.

(2) Eurostat, "April 2002 Euro-indicators News Release no. 58/2002 - 16 May 2002".

to prices set to ease the payments in the new currency. In other particular cases, namely those of the prices of entertainment, tolls and games of chance, the adjustment of the prices from escudos into euros also seems to have occurred upwards.

In spite of not being representative of the overall behaviour of consumer prices, these occasional cases, as they correspond to often bought products, might have caused a feeling of suspicion among the consumers that abnormal high price increases were registered due to the conversion. In any case, the existence of some effects associated with the process of conversion from escudos into euros should not be excluded, namely those related with rounding and with additional costs implied in the preparation of trade in the new currency. The change of catalogue prices into euros may have provided a “natural” opportunity to increase some prices. However, as mentioned before, the analysis of the evolution of the elementary indices of the CPI until March 2002, which will be presented in this article, did not allow for the inference of a significant effect of the changeover on the overall behaviour of prices.

In the next section of this article the results of the double collection are displayed. It should be stressed that the compliance of the compulsory dual display and the respect for the conversion rules have been, in general, observed, allowing the transition to have occurred without any noteworthy incidents. In the third section, taking into account the preliminary work done in the previous year centred on the possible behaviour of the so-called “attractive” prices, some indications regarding the behaviour during the changeover can be pointed out, resorting to a set of charts, that illustrate characteristics such as the persistence and volatility of these prices. In this section charts concerning the evolution of prices of several products are also displayed, where clear signs of the impact of the introduction of the euro notes and coins can be observed. The fourth section presents the general model used to obtain the quantitative reference of the impact of the changeover on the general growth of the consumer prices in the first three months of 2002 and the results obtained. In the last section, the conclusions are presented.

2. DOUBLE PRICING

From November 2001 to February 2002, the *INE* collected prices in escudos and euros with two purposes: on the one hand, to prepare the system for the CPI computation in the new currency and, on the other hand, to obtain data to allow for the evaluation of practices adopted by economic agents regarding the dual display and the respect for the conversion rules.

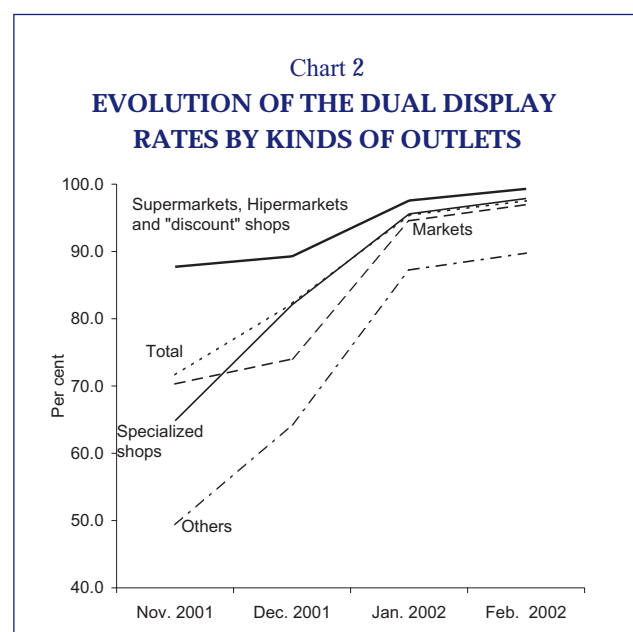
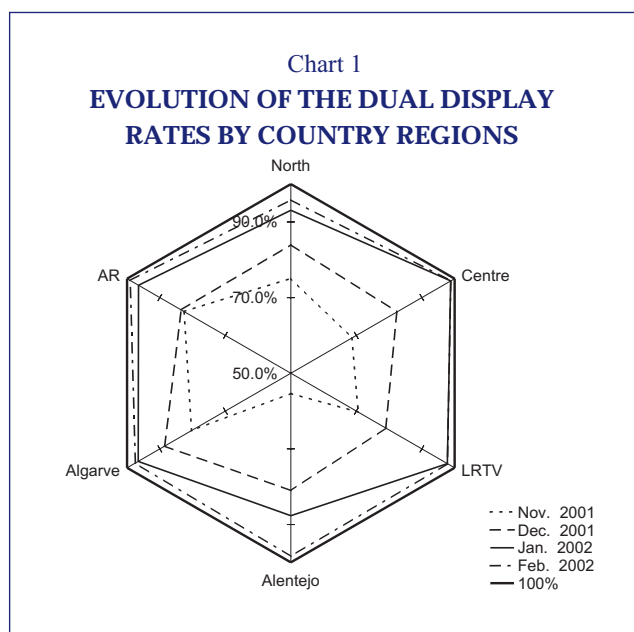
This exercise of double collection was based on the price collection structure used in the monthly compilation of the CPI, enabling us to obtain data discriminated by statistical region, product type and outlet type regarding the practices of dual display and the existence of conversion errors and respective intensity, associated with incidence according to the form of trade and product category. The conclusions on these practices were based on a sample of 79122 prices, covering about $\frac{3}{4}$ of the total observations used in the compilation of the monthly index.⁽³⁾

In this sample one can observe the progressive implementation of dual display. Indeed, in November 2001 the prices expressed simultaneously in escudos and in euros corresponded to 72 per cent of the sample. In spite of this already being a high percentage, this value increased to 82.3, 95.4 e 97.3 per cent in the three following months.

In Chart 1, where each axis represents a statistical region considered for the CPI computation, one can observe the evolution of the use of dual display (in percentage of the sample) over the four periods, represented by changes in the border. Although initially there was some geographical differentiation in the practice of dual display, this differentiation disappeared. Values higher than 95 per cent were reached in all regions in the last month during which the two currencies circulated simultaneously.

The evolution of the dual display of price was also analyzed by product category. Table 1 shows the evolution of the dual display rate discriminated by the twelve classes of products that constitute the CPI. Values lower than 90 per cent at the

(3) The characteristics of some prices (central collection, complex prices, consumer prices directly observed as is the case of housing rents) justify this difference when compared with the total CPI sample (104 thousand prices).



end of the period are only observed in some service classes. The case of education stands out among them, which can be to a large extent linked to particularities in the way prices are set for these items, namely in their non public exhibition.

The evolution of the practice of dual display was also studied taking into account the type of outlet. In Chart 2 it can be observed that, for the four considered months, supermarkets, hypermarkets and "discount" shops are the kind of outlets where the practice of dual display was more generalized, although all kinds of outlets had evolved

to high rates in February 2002. The fact that outlets like markets, specialized shops and others⁽⁴⁾ registered lower values suggests that these outlets, mainly in traditional trade, felt a greater difficulty in adapting to the euro (e.g., dual labelling, intro-

(4) The category 'others' includes the rendering of public and private services (hairdressers, public and private services rendered in clinics and hospitals, education establishments and so on), which obviously cannot be categorized in a specific kind of establishment.

Table 1
RATES OF DUAL DISPLAY
Per cent

Expenditure classes	2001		2002	
	Nov.	Dec.	Jan.	Feb.
Food and non-alcoholic beverages.....	83.5	85.9	97.0	98.7
Alcoholic beverages and tobacco.....	83.7	88.4	98.3	99.6
Clothing and footwear.....	63.8	82.3	96.3	98.7
Housing, water, electricity, gas and other fuels.....	48.3	68.2	92.8	96.4
Accessories, housing equipment and current dwelling expenses.....	67.9	83.2	96.4	98.6
Health.....	60.3	79.2	97.2	96.5
Transports.....	57.6	71.1	84.5	87.9
Communications.....	77.2	76.7	86.6	86.6
Recreation and culture.....	62.4	80.6	93.8	97.3
Education.....	17.8	22.2	41.4	49.8
Hotels, cafés and restaurants.....	76.6	85.8	98.0	98.8
Miscellaneous goods and services.....	63.9	76.3	91.8	95.5
Total.....	71.7	82.3	95.4	97.5

Table 2

**PERCENTAGE OF PRICES WITH THE CORRECT
CONVERSION RATE (1€ = 200.482 PTE)**

Regions	2001		2002	
	Nov.	Dec.	Jan.	Feb.
North	94.0	93.2	95.5	94.0
Centre	95.8	96.3	95.3	95.8
Lisboa and River Tejo Valley	95.0	95.6	97.1	97.1
Alentejo	93.6	96.6	93.5	90.5
Algarve	96.9	97.3	95.7	95.7
Autonomous Regions. . .	97.1	97.8	95.9	96.5
Total	95.0	95.4	95.8	95.2

duction of software adapted to the transition period and so on).

Besides dual display, another question that deserved analysis was that of the evaluation of the respect for the conversion rules from prices in PTE into euros.

Table 2 displays the evolution of the percentage of products, the conversion of which was calculated in the correct manner. This table shows that the proportion of well converted prices remains above 95 per cent in any of the observed months.

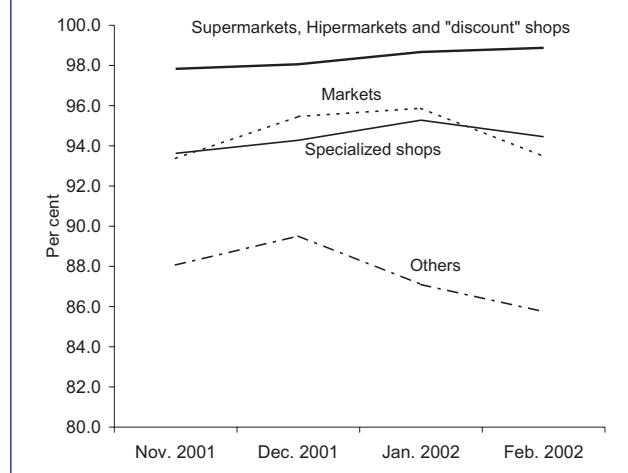
It is worth noting that, for around $\frac{1}{3}$ of the prices of the sample, the conversion of PTE into euros according to the official rate 1 euro = 200,482 or according to the "simplified" rate 1 euro = 200 PTE, determines exactly the same prices expressed in cents of the euro.

Concerning the incorrect conversions that reach almost 5 per cent, it should be pointed out that, to a large extent, they are associated with cases in which the use of the "simplified" rate has determined prices in euro cents, which are different and slightly higher⁽⁵⁾ than those that would be obtained if the official conversion rate was used.

In an analysis by kinds of outlets, Chart 3 shows that supermarkets, hypermarkets and "discount" shops present a distinct behaviour in relation to the other outlets, presenting higher percentage values, never lower than 98 per cent. On the other hand, the outlets linked to traditional trade show a different evolution. In one or in both

(5) The use of the "simplified" rate can determine a maximum price increase of 0.24 per cent ($=200.482/200*100$).

Chart 3
**PERCENTAGE OF CORRECTLY CONVERTED
PRICES ACCORDING TO THE TYPE OF OUTLET**



months of simultaneous circulation, a decrease of the percentage of correctly converted products can be observed, most likely due to the adoption of the "simplified" rate.

In terms of international comparison, the values settled for Portugal are in line with the results that have been disclosed on practices of dual display of prices and on the existence of conversion mistakes in the Euro Area (Eurostat, 2002)⁽⁶⁾. In a sample of 2605 firms surveyed in January 2002, the Central Bank of Belgium found that 56 per cent of all firms practiced dual display of prices. This value rises to 95 per cent for firms of retail trade. In France, the Ministry of the Economy, Finances and Industry has followed, in a monthly basis, the prices of about 20,000 products of great consumption in more than 2,900 sale locations. Between 7 and 10 January 2002 this organism found that 98,7 per cent of the prices were correctly converted. In April of this year, this percentage rose to 99,6 per cent. These values are slightly higher than those observed in the Portuguese case. On the other hand, the Statistical National Institute of the Netherlands reported that 84 per cent of the prices were correctly converted in December 2001

Summing up, the analysis of data shows that the compliance for the compulsory dual price display and the respect for the conversion rules were, in general, observed, which obviously limited po-

(6) Although the number of countries that displayed information on this subject has been relatively small.

tential impacts on prices that the introduction of the euro could have implied. However, although corresponding to minority practices, some incorrect conversions from PTE into euros were detected, to a large extent associated with the use of the conversion rate 1 euro = 200 PTE. These practices were more frequently observed in outlets of traditional trade and rendering of services. This phenomenon helps us to understand the results that are presented in the following sections, where it is shown that the impact of the cash changeover, although globally very small, was felt in a set of products that, because they are very frequently transacted, may have created the feeling of a more meaningful global impact in the public eye.

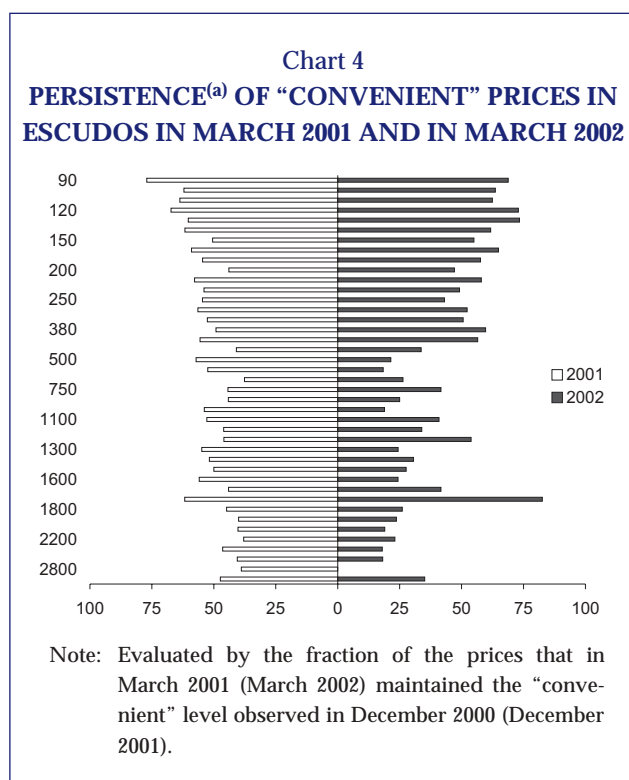
3. THE BEHAVIOUR OF ATTRACTIVE PRICES

In retail trade, to facilitate payments, taking into account the relative abundance and the nominal value of the various banknotes and coins in circulation, it is relatively common to set “convenient” prices. For this reason, many of the “convenient” prices correspond to prices in which the last digits are zero. Besides this practice, we can also distinguish another, also relatively usual, which aims at inducing the consumer to undervalue the cost of the products, setting the price just below a rounded value. This practice of setting prices corresponds to the so-called “psychological” prices, as is the case for prices with 9 or 90 as last digits. Examples of these prices are PTE 499 or PTE 4,990 instead of PTE 500 and PTE 5,000 respectively.

After the conversion of “psychological” and “convenient” prices, usually called “attractive”, using the official euro conversion rate, the prices obtained are often “not attractive” in euros. This fact gave origin to some fears of price increases to reach “attractive” levels also in euros, with an upward effect on inflation.

Therefore, to follow the evolution of “attractive” prices and supply information on how these prices were adopted during the conversion period, a monthly analysis of the micro information underlying the CPI of *INE* was done.

By comparison with the corresponding period of the previous year, Chart 4 allows the evaluation of the persistence of “convenient” prices after the end of the changeover period. Thus, for instance, on the left side of the chart, for a basket of prod-

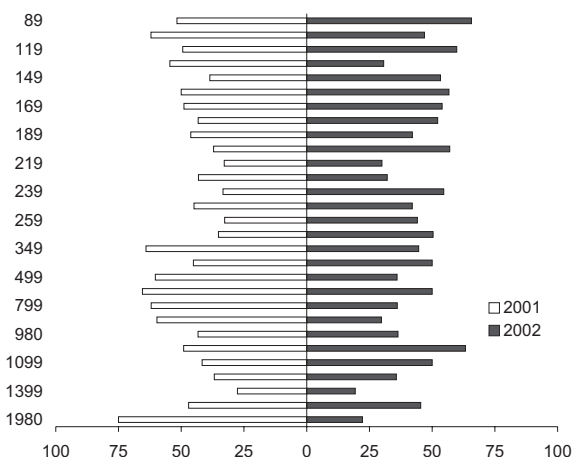


ucts that had prices with the “convenient” value of PTE 500 in December 2000, it may be seen the relative proportion of the prices that maintain this value three months later, i.e., in March 2001. Similarly, on the right side it is possible to observe that among the prices that had the value PTE 500 in December 2001, the proportion of those that maintain this value in March 2001 is below 25 per cent. Chart 4 suggests that the persistence of “convenient” prices has somewhat decreased with the introduction of the new coinage, particularly in prices higher than PTE 400.⁽⁷⁾ Chart 5 shows data for the same periods, concerning the persistence of “psychological” prices. In this case a change of the persistence is not so clear, probably because the adjustment to a “psychological” price in euros takes longer than the adjustment to a “convenient” price in euros. In any case, it should be mentioned that “psychological” prices have in the CPI basket a smaller weight than that of “convenient” prices.

The lower persistence of the “convenient” prices in escudos, in the period from December 2001 to March 2002, may have expressed the tran-

(7) It should be noted that, for values lower than PTE 400, the application either of the “simplified” rate (200 PTE a euro) or of the official rate, determines in almost all cases similar prices in euros.

Chart 5
PERSISTENCE^(a) OF “PSYCHOLOGICAL”
PRICES IN ESCUDOS IN MARCH 2001
AND IN MARCH 2002

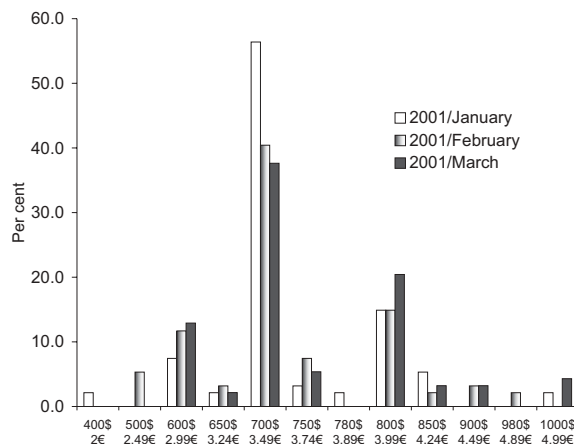


Note: Evaluated by the fraction of the prices that in March 2001 (March 2002) maintained the “psychological” level observed in December 2000 (December 2001).

sition towards “convenient” prices in euros. To illustrate this idea, a set of charts is presented, where this behaviour is evident. For example, Chart 6B shows, month to month in this period, the frequency of the prices of a basket of products, which had the value of PTE 700 in December 2001. Simultaneously, Chart 6A shows the same kind of evolution for the corresponding period of the previous year, that acts as the reference period, showing what would occur without the introduction of the euro. By comparison with the evolution in this reference period, it becomes possible to detect effects on prices associated with the introduction of the euro in the first months of 2002. Thus, it should be noticed that the frequency of the price of PTE 700 fell from 56 per cent in January 2001 to 38 per cent in March of 2001, while between the same months of 2002 the decrease was from 56 per cent to 26 per cent. This higher reduction of the frequency of the price of PTE 700 in 2002, may have been influenced by the fact that after conversion the price of PTE 700, corresponds to 3.49 euros, a value which is not a “convenient” price in euros. Therefore, in March 2002 the second more representative price becomes 3.50 euros (Chart 6B), while in March 2001 (Chart 6 A) the corresponding price in escudos (PTE 702) did no appear in the

Chart 6A
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 700\$
IN DECEMBER 2000

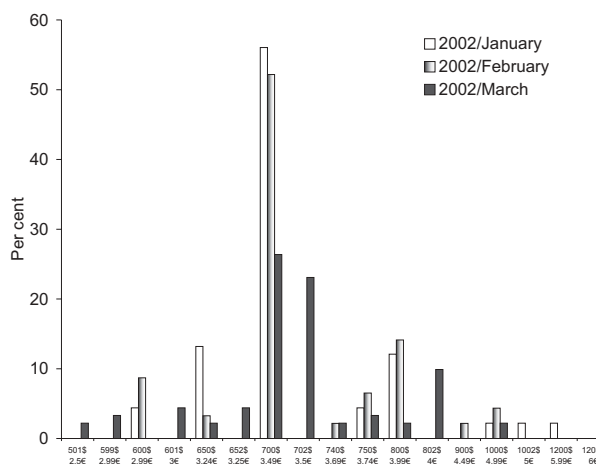
Period: Between December 2000 and March 2001
 (Frequency higher than 2.0%)



Most representative value in March 2001 700\$
 Second most representative value in March 2001 800\$

Chart 6B
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 700\$
IN DECEMBER 2001

Period: Between December 2001 and March 2002
 (Frequency higher than 2.0%)

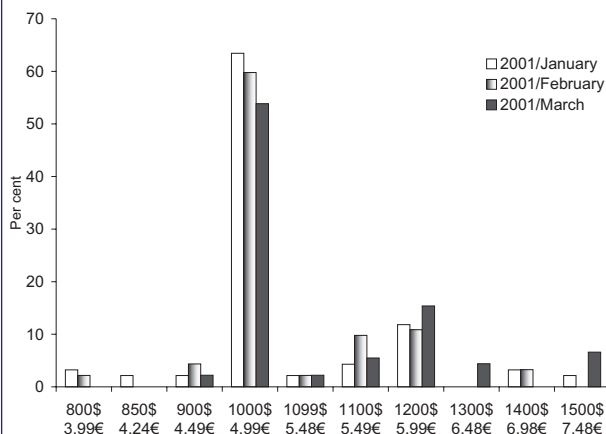


Most representative value in March 2002 700\$
 Second most representative value in March 2002 702\$

distribution. Thus we may conclude that there was a convergence to a new “convenient” price in euros. Other examples are the prices of PTE 1000 (Chart 7) and PTE 1600 (Chart 8), which when converted produce no “convenient” prices in euros (respectively 4.99 and 7.98 euros). Consequently, these prices were rounded upwards to reach a

Chart 7A
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 1000\$
IN DECEMBER 2000

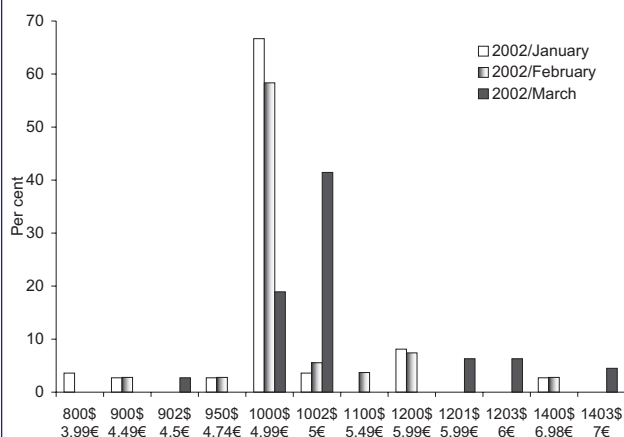
Period: Between December 2000 and March 2001
(Frequency higher than 2.0%)



Most representative value in March 2001 1000\$
Second most representative value in March 2001 1200\$

Chart 7B
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 1000\$
IN DECEMBER 2001

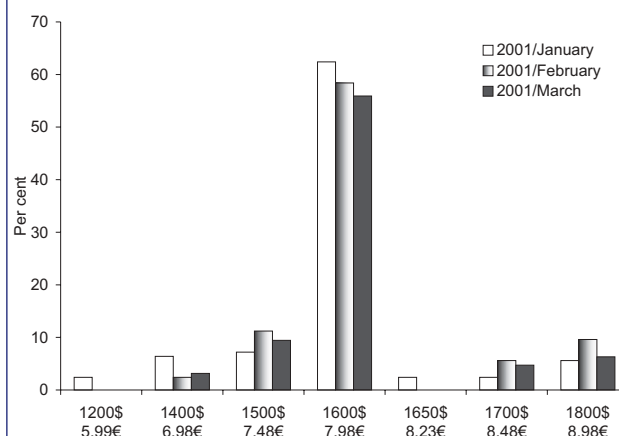
Period: Between December 2001 and March 2002
(Frequency higher than 2.0%)



Most representative value in March 2002 1002\$
Second most representative value in March 2002 1000\$

Chart 8A
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 1600\$
IN DECEMBER 2000

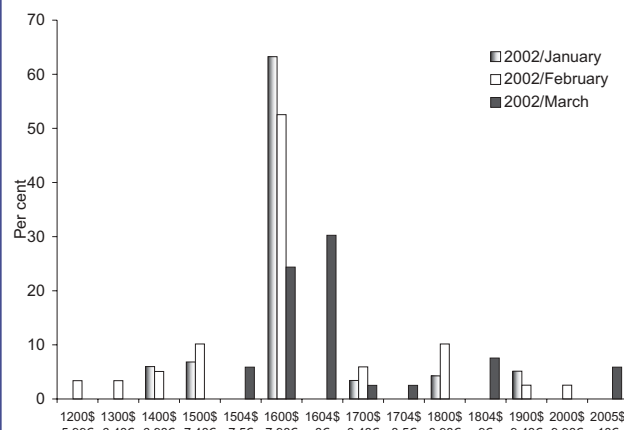
Period: Between December 2000 and March 2001
(Frequency higher than 2.0%)



Most representative value in March 2001 1600\$
Second most representative value in March 2001 1500\$

Chart 8B
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 1600\$
IN DECEMBER 2001

Period: Between December 2001 and March 2002
(Frequency higher than 2.0%)



Most representative value in March 2002 1604\$
Second most representative value in March 2002 1600\$

new “convenient” price in euros, respectively to 5.00 and e 8.00 in euros. Note that each of these values became the most representative value in March 2002.

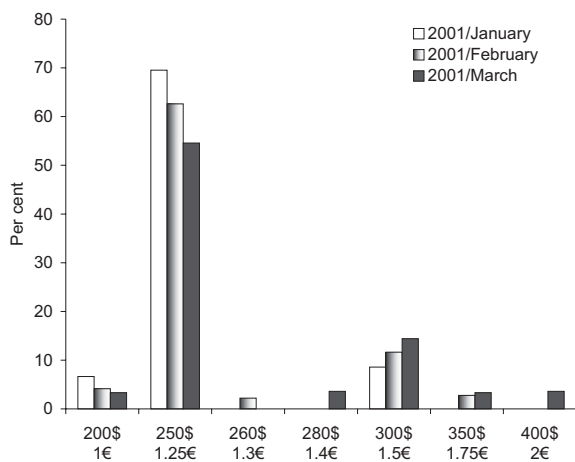
Charts 6 to 8 suggest that, in the period from December 2001 to March 2002, the price strategy was progressively changed towards “convenient”

prices in euros, while in the corresponding period of the previous year the price strategy clearly was much more stable. Indeed, as mentioned before, in many cases former “convenient” prices in escudos did not turn out “convenient” in euros and a convergence to new “convenient” prices in euros took place.

Chart 9A

PRICE FREQUENCY OF A SET OF PRODUCTS WITH PRICES EQUAL TO 250\$ IN DECEMBER 2000

Period: Between December 2000 and March 2001
(Frequency higher than 2.0%)

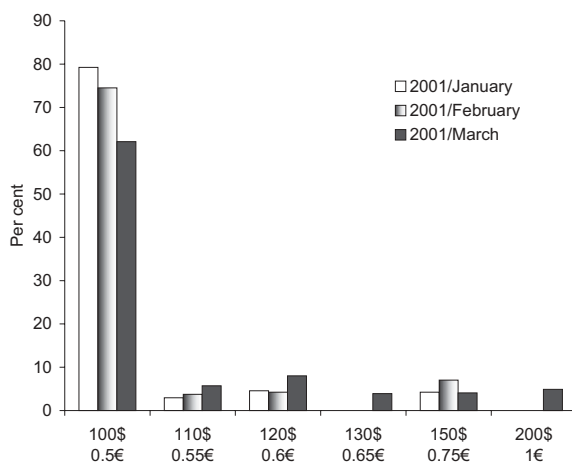


Most representative value in March 2001: 250\$
Second most representative value in March 2001: 300\$

Chart 10A

PRICE FREQUENCY OF A SET OF PRODUCTS WITH PRICES EQUAL TO 100\$ IN DECEMBER 2000

Period: Between December 2000 and March 2001
(Frequency higher than 2.0%)

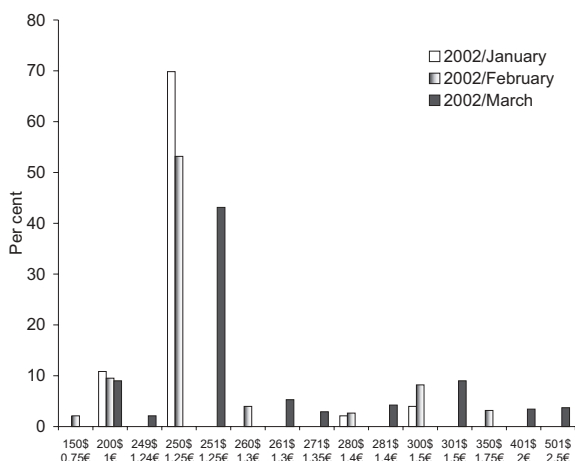


Most representative value in March 2001: 100\$
Second most representative value in March 2001: 120\$

Chart 9B

PRICE FREQUENCY OF A SET OF PRODUCTS WITH PRICES EQUAL TO 250\$ IN DECEMBER 2001

Period: Between December 2001 and March 2002
(Frequency higher than 2.0%)

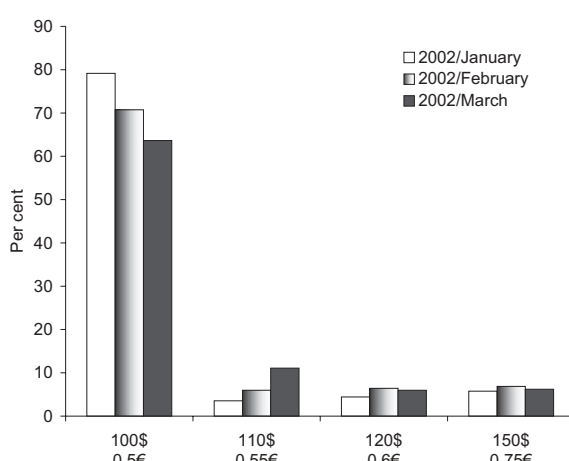


Most representative value in March 2002: 251\$
Second most representative value in March 2002: 200\$

Chart 10B

PRICE FREQUENCY OF A SET OF PRODUCTS WITH PRICES EQUAL TO 100\$ IN DECEMBER 2001

Period: Between December 2001 and March 2002
(Frequency higher than 2.0%)



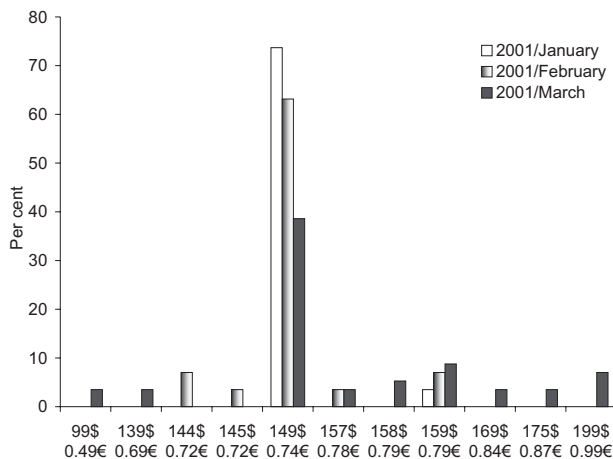
Most representative value in March 2002: 100\$
Second most representative value in March 2002: 110\$

However, it should be pointed out that the adjustment to new “convenient” prices in euros may have not resulted in higher values in all cases. Look, for example, at Chart 9 referring to the price PTE 250, which after conversion is 1.25 euros. In this case there appears 1 euro as the second more representative value in March 2002. At last, it

should be mentioned that when a “convenient” price in escudos converts into a price that is also convenient in euros, this value as a rule remained as the most frequent value in March 2002. The price of PTE 100 can be presented as an example (Chart 10).

Chart 11A
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 149\$
IN DECEMBER 2000

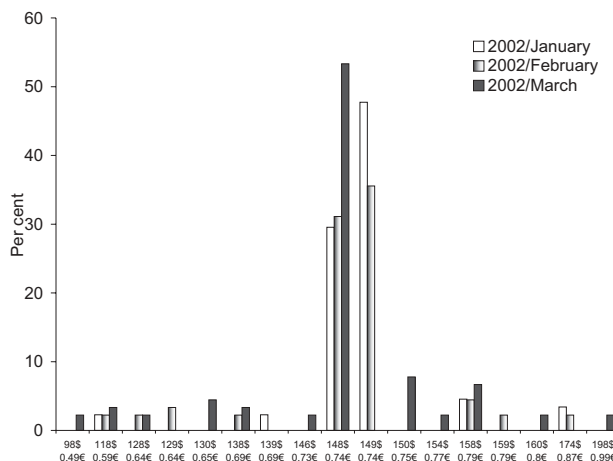
Period: Between December 2000 and March 2001
 (Frequency higher than 2.0%)



Most representative value in March 2001: 149\$
 Second most representative value in March 2001: 159\$

Chart 11B
PRICE FREQUENCY OF A SET OF PRODUCTS
WITH PRICES EQUAL TO 149\$
IN DECEMBER 2001

Period: Between December 2001 and March 2002
 (Frequency higher than 2.0%)



Most representative value in March 2002: 148\$
 Second most representative value in March 2002: 150\$

Chart 12
DISTRIBUTION OF COFFEE PRICES
AT THE COUNTER
 (Frequency higher than 2.0%)

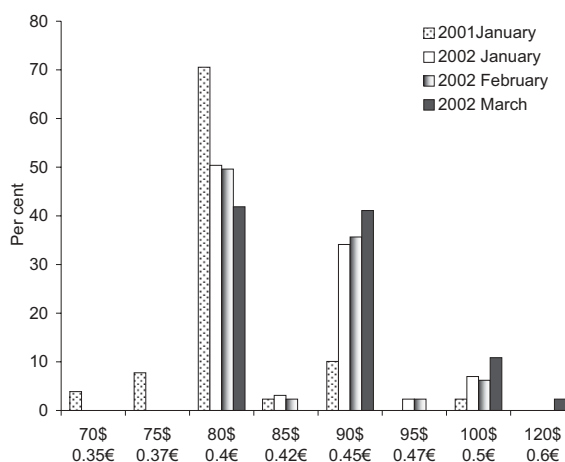
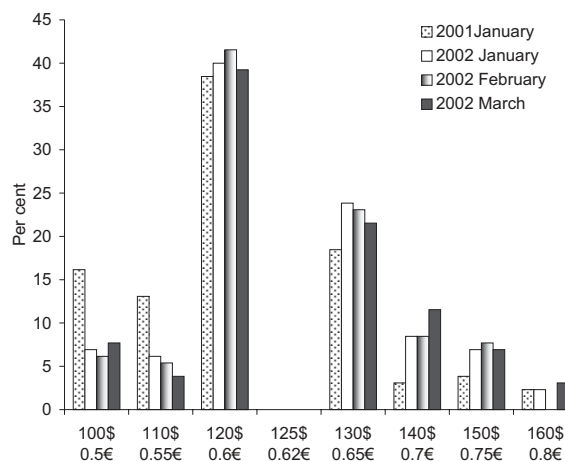


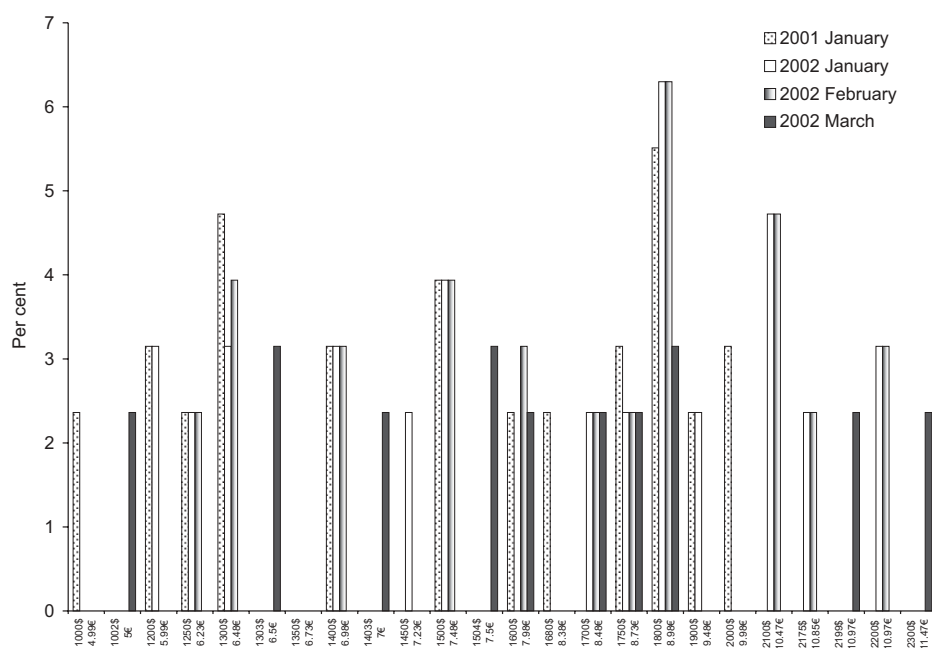
Chart 13
DISTRIBUTION OF DRAUGHT BEER PRICES
AT THE COUNTER
 (Frequency higher than 2.0%)



PTE 149, which after conversion corresponds to 0.74 euros. The price 0.75 euros appears as the second most frequent value in March 2002 (Chart 11), which is a “convenient” price in euros and not a “psychological” price in euros, and which corresponds to a value in escudos that appeared neither in the preceding months of 2002, nor in the first months of 2001.

The convergence to “convenient” prices in euros, detected observing the dynamic of a basket of prices with a given “attractive” price in December 2001, is confirmed by the study of the price distribution of a set of specific products where the im-

Chart 14
**DISTRIBUTION OF THE PRICES OF A COMPLETE MEAL IN RESTAURANTS
 OF 2nd AND 3rd CATEGORY**



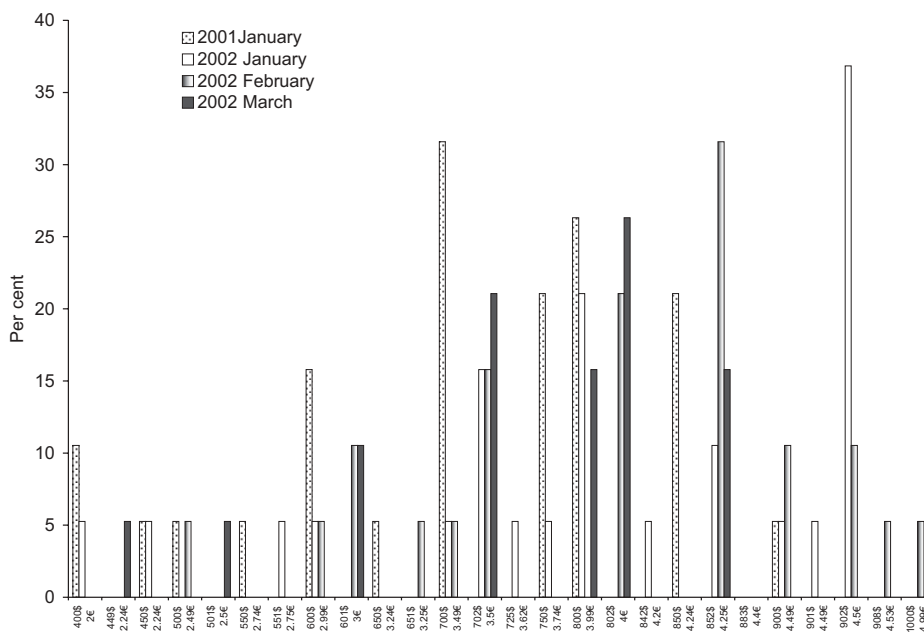
part of the introduction of the euro notes and coins was clear, taking into account the fact they had registered average growths clearly higher to that observed for the CPI as a whole. Thus, Charts from 12 to 15 present for four products — (i) coffee at the counter; (ii) draught beer at the counter; (iii) a complete meal in restaurants of 2nd or 3rd category and (iv) cinema tickets — the distribution of their respective prices in escudos in January 2001 and in the months of January and February 2002 and still the distribution of their prices in euros in March 2002.

From the observation of these Charts we can conclude, firstly, that, for any of these four products, “convenient” prices in escudos were prevalent in the distribution in January 2001. Indeed, the modes of the distribution of the prices of these products corresponded then to the prices PTE 80, PTE 120, PTE 1800 and PTE 700, respectively for the coffee at the counter, draught beer at the counter, a complete meal in restaurants of 2nd or 3rd category and cinema tickets. Secondly, it is visible that the frequency of “convenient” prices in escudos decreased during the study period, while that of “convenient” prices in euros increased. Look, for example, at the case of coffee at the counter:

the price of PTE 90 became frequent since January 2002, inclusively being the mode in March 2002 (Chart 12). In this last month, also the PTE 100 price starts showing a meaningful representativity. The price of PTE 100 corresponds to 0.50 euros, that is an eventually more “convenient” price than 0.45 euros. A similar behaviour to the one of the coffee at the counter can be observed in the case of draught beer at the counter (Chart 13).

As regards the prices of a complete meal in restaurants of 2nd or 3rd category (Chart 14) and of cinema tickets (Chart 15), the convergence to “convenient” (higher) prices in euros is very clear. Indeed, for each of these products, the trend towards the convergence to “convenient” prices in euros increased in March, as it can be observed in the presented Charts by the shift of price distribution towards the right.

Chart 15
DISTRIBUTION OF CINEMA TICKET PRICES



4. QUANTITATIVE INDICATIONS FOR THE IMPACT OF THE CONVERSION OF ESCUDOS INTO EUROS ON THE EVOLUTION OF THE CONSUMER PRICE INDEX IN THE FIRST QUARTER OF 2002

The precise identification of the quantitative impact of the conversion is not possible to ascertain, as it is not possible to reconstitute what would have been the evolution of the CPI in case it had not occurred. In other words, it is not possible to establish a contrafactual, which would allow us to clearly evaluate the impact of the conversion. The acknowledgement of this impossibility does not however prevent us from trying to obtain some quantitative indications about this impact, that obviously should be regarded with some caution taking into account the methodological limitations that necessary affect them.

The central idea behind the elaboration of the estimate here presented was to detect in the first three months of the year any sign of abnormal behaviour in the price series, although these same signs might eventually reflect other phenomena besides the conversion from escudos into euros. Thus, for each of the 189 elementary indices into

which the consumer price index can be disaggregated (series base: 1997), a linear regression was made using as reference the following generic model:

$$y_{nt} = c_n + \sum_{i=1}^6 \alpha_{n,j} y_{nt-i} + \sum_{j=1}^{11} \beta_{n,j} z_j + \gamma_n t + \partial_{1,n} J + \partial_{2,n} F + \partial_{3,n} M + \varepsilon_{nt}$$

With $n = 1, 2, \dots, 189$ and $t = 1, 2, \dots, 65$. In this expression, y_{nt} corresponds to the monthly rate of change (expressed in percentage) of the price index n in month t , c_n corresponds to a constant, z_j corresponds to a seasonal dummy variable for month j , J corresponds to a dummy variable which assumes the value 1 in January 2002, being null in all the other months of the monthly series starting in February 1997 until June 2002, F and M correspond to dummies similar to the former, which, in the series, assume the value 1 respectively in February and in March of 2002, ε_{nt} represents a random residual variable.

As it was found out when we include, besides the constant and the seasonal dummies, an autoregressive component considering lags of 1 and 6 months⁽⁸⁾ and a linear trend, the model has a relatively general specification. This procedure is ap-

Table 3

GLOBAL RESULTS OBTAINED WITH THE ECONOMETRIC MODEL

	Peso	2002	2002	2002	2002
	(%)	Jan /Dec	Feb/Jan	Mar/Feb	Accumulated
Consumer Price Index – Total	100.0	0.07	0.06	-0.05	0.08
Goods	68.9	-0.07	0.07	-0.14	-0.14
Food	25.8	0.39	0.18	-0.32	0.25
Unprocessed	13.0	0.61	0.19	-0.54	0.26
Processed	12.8	0.14	0.18	-0.08	0.24
Industrial	43.1	-0.36	0.00	-0.02	-0.38
Energy	8.8	-2.11	0.00	0.00	-2.11
Non-energy	34.3	0.10	-0.01	-0.03	0.06
Services	31.1	0.37	0.03	0.14	0.54

propriate to test, through the dummies referring to January, February and March 2002, if there might be signs of abnormal variations in these months.⁽⁹⁾

The estimated value for each of the coefficients, associated with these variables, when statistically meaningful, can be interpreted as an increase (or decrease) in percentage points, in the monthly change rate. It is worth noting that significant values of the coefficients might be associated with other phenomena, besides the effect of the conversion of escudos into euros, that might also have occurred in the considered months, as well as reflect insufficiencies of the very specification of the model. However, as a first quantitative reference,

(8) The number of lags considered was based on a previous study done on 20 elementary indices, randomly chosen using the Breusch-Godfrey test.

(9) Additional dummies referring to November and December 2001 could be considered, accepting that in the period of dual display there might have occurred strategies of relatively significant price increases, aiming at anticipating convenient prices in euros. In fact, a version of the broad model was tested considering also these dummies, but no significant effects were found in these two months. In terms of the detailed results, only one case should be emphasized when this version was tested, that of the monthly change of newspapers and magazines prices that may have been abnormally high not only in January 2002 but also in December 2001. In another version of the model, besides the ones considered for the first three months, dummies were also included for the months of April, May and June. In aggregate terms, the results obtained for the first three months did not change and those for April and May were not significant. In June, a slightly upward effect was probably related with the change of the standard VAT rate that occurred in the meanwhile.

the aggregation of the statistically significant impacts was calculated taking into account the specific weight of each elementary index in the consumer price index, both in the monthly change of the CPI and in the change of some of its main components.⁽¹⁰⁾

In Table 3, results of the aggregation of the estimated impacts are shown. Taking the three months as a whole, the estimated impact is relatively small, near one decimal of a percentage point. In January, the impact reached a higher value, reflecting namely the estimated positive impacts on the unprocessed foodstuffs and on services. In March, the negative value is mainly due to a negative impact detected in foodstuffs.

Taking into account that, as previously mentioned, the estimated impacts can reflect several factors, a new aggregation was obtained excluding indices whose abnormal changes in the considered months could be clearly due to specific factors that could not be in any way related with the change of coinage. In this manner, we excluded the effects detected in January 2002 in the price indices concerning electricity, housing rents and fuel. In the first case, the apparently abnormal positive variation, recorded in January, was due to an increase of

(10) For the seek of simplicity, the main components and not the 12 classes of the CPI were presented in this section, since the analysis by classes does not add anything qualitatively different to the analysis by main components. In any case, the results are also available by classes and, therefore, can be obtained if requested.

Table 4

**RESULTS OBTAINED WITH THE ECONOMETRIC MODEL, EXCLUDING EFFECTS NOT RELATED WITH
THE CONVERSION OF ESCUDOS INTO EUROS**

	Peso	2002	2002	2002	2002
	(%)	Jan /Dec	Feb/Jan	Mar/Feb	Accumulated
Consumer Price Index – Total	100.0	0.24	0.06	-0.05	0.24
Goods	68.9	0.19	0.07	-0.14	0.11
Food	25.8	0.39	0.18	-0.32	0.25
Unprocessed.....	13.0	0.61	0.19	-0.54	0.26
Processed	12.8	0.14	0.18	-0.08	0.24
Industrial.....	43.1	0.06	0.00	-0.02	0.03
Energy.....	8.8	-0.09	0.00	0.00	-0.09
Non-energy.....	34.3	0.10	-0.01	-0.03	0.06
Services.....	31.1	0.34	0.03	0.14	0.51

the consumer prices previously authorized by the *Entidade Reguladora do Sistema Eléctrico*, reflecting the impact of the deviations occurred in 2000 due to the higher than expected increase of fuel prices. In the second case, the apparently abnormal, and also positive, change at the beginning of 2002 was caused by the application of the legal regime of update of housing rents, which implies that the update of a large proportion of rents depends on the past behaviour of inflation. It should be noted that inflation in 2001 was higher than that registered in the preceding year. In the third case, the Government discretionarily determined a price decrease in January, breaking the former practice of stability in the fuel consumer prices. Taking into account the weight of the respective index in the CPI, the exclusion of the abnormal effect of the fall of consumer fuel prices more than compensates the other two effects mentioned as can be understood by the observation of the results presented in Table 4. In fact, the global effect in the quarter, after these exclusions, rises to 0.24 percentage points, the same value estimated for January, since the effects estimated for February and March are practically symmetrical.

As previously remarked, the price indices of unprocessed foodstuffs give a very significant contribution towards the positive effect observed in January and the negative effect in March. These indices typically show a much higher volatility than the indices of other CPI components. This high

volatility supports the fear that the abnormal effects detected can reflect very specific factors, eventually of relatively erratic occurrence (for example, the weather conditions some times affected in a significant manner the behaviour of these indices). For this reason, with the purpose of searching for a quantitative reference that may be nearer to the impact of the changeover in the period of analysis, we present our results in Table 3, still excluding the price indices of unprocessed foodstuffs. Comparing with the previous Table, although there is a reduction of the impact in January and an increase in March, the global impact remains practically unchanged, at around 2 decimals of a percentage point.

These results show that the global impact of the changeover on the evolution of the CPI has been relatively small, although at a more detailed level, it is correct to consider some significant effects, as pointed out in the previous section, particularly on the prices of some services. Comparing these results with the estimates presented in the article published in the *Economic Bulletin* of the Banco de Portugal of September 2001, they stand near the scenario of the highest impact of the changeover then presented.

5. CONCLUSIONS

The process of physical replacement of the escudo by the euro, which started on the 1st of Janu-

Table 5

RESULTS OBTAINED WITH THE ECONOMETRIC MODEL, EXCLUDING EFFECTS NOT RELATED WITH THE CONVERSION OF ESCUDOS INTO EUROS AND ALSO THE PRICE INDICES OF UNPROCESSED FOODSTUFFS: ESTIMATE OF THE IMPACT OF THE CONVERSION OF ESCUDOS INTO EUROS ON THE CONSUMER PRICE INDEX

	Peso	2002	2002	2002	2002
	(%)	Jan /Dec	Feb/Jan	Mar/Feb	Accumulated
Consumer Price Index - Total	100.0	0.15	0.03	0.03	0.21
Goods	68.9	0.06	0.03	-0.03	0.06
Food	25.8	0.07	0.08	-0.04	0.11
Unprocessed	13.0	0.00	0.00	0.00	0.00
Processed	12.8	0.14	0.18	-0.08	0.24
Industrial	43.1	0.06	0.00	-0.02	0.03
Energy	8.8	-0.09	0.00	0.00	-0.09
Non-energy	34.3	0.10	-0.01	-0.03	0.06
Services	31.1	0.34	0.03	0.14	0.51

ary in 2002, took place normally and gradually. The results of the double collection of prices during the period of compulsory display of prices showed that the rules of conversion were highly respected. However, some cases were detected in which the conversion did not obey the official rate, due, to a large extent, to the use of the simplified rate of 200 PTE a euro. The majority of these cases was detected in outlets of traditional trade and services. An analysis of the evolution of "convenient" prices in escudos at a very detailed level, from December 2001 until March 2002, taking as a reference the corresponding previous period, showed the convergence of prices previously expressed in escudos to "convenient" prices in euros. This convergence may have, in general, exerted a small upward effect on prices.

This exercise also confirms signs of price increase caused by the changeover in some specific products, since January 2002. Coincidentally, these occasional cases corresponded many times to often bought goods and services and usually paid in cash, hence leaving the consumers with the feeling that inflation was high due to the introduction of the euro. The prices of a cup of coffee, of a meal in a restaurant and of cinema tickets are examples that were presented by the media or by consumer organizations.

In order to get a quantitative reference on the global impact of the conversion from escudos into

euros on inflation, data on elementary indices of the CPI were explored. The results obtained suggest that the overall impact on the Consumer Price Index, both national and harmonised, may have been relatively small, around 0.2 percentage points in the first three months of 2002.

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