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**EXPERIMENTAL CPI FOR THE ELDERLY POPULATION**

Supporting paper submitted by Central Bureau of Statistics of Israël<sup>1</sup>

\* Due to late submission, the paper could not be posted on Internet.

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The authors would appreciate input from statistical offices, which have compiled indices for the elderly. Any errors are responsibility of the authors.

## A. Introduction

1. The Consumer Price Index (CPI) in Israel measures the average change in prices over time for a fixed market basket of goods and services. The total item CPI (1,325 items) is a national economic indicator, covering over 90% of the non-institutionalized household population and computed on a monthly basis.
2. The most important uses of the CPI in Israel are index linking of wages, pensions, social security benefits, savings & loans and an estimator of general inflation in the economy.
3. While the Israeli CPI is broadly defined, covering the goods and services consumed by almost all households, a family of CPI's, covering particular sets of goods and services or population groups, should be defined, which would be more useful for particular purposes.
4. In the framework of the Israeli CPI, sub-indices such as the CPI *excluding housing* and CPI *excluding fruits and vegetables* are computed. In addition a *seasonally adjusted* CPI and *trend* CPI are published monthly. While the former may be used for contractual index linking, the latter (due to monthly retrospective adjustments) are used solely for analytical purposes. In the monthly CPI detailed press release, issued on every 15<sup>th</sup> of the month especially for the media, indices for average price change by household income quintiles are also included.
5. User groups representing the elderly population, have approached the Central Bureau of Statistics in Israel (ICBS) and requested that a CPI for the elderly be computed. Their assumption being those prices of goods and services for the elderly have escalated at a faster pace than the average CPI for the total population.
6. In this paper we present the first results of an experimental CPI for the elderly population. The document has five short sections: the brief (i) introduction is followed by an analysis of (ii) consumption of the elderly population, (iii) estimation of price changes, (iv) limitations of the experimental CPI and (v) summary.

## B. Consumption of the Elderly Population

7. The first step in devising a special index for the elderly population was analysis of the consumption habits in order to decide which elderly households should be included in the experimental CPI. ICBS conducts an annual survey of *Household Expenditure and Income*; data were extracted from this survey on the elderly population. For the purpose of this experiment, the elderly were defined as men of 65 years of age and above and women 60 years of age (and above). This is the legal retirement age in Israel.
8. The elderly households were divided into three groups: (a) single person elderly households (whether male or female), (b) two person households where at least one of the couple is an elder and (c) larger households in which at least one of the inhabitants is elderly by definition (par. 7). We analyzed the results of household income and expenditure for these groups (see appendix for results) and concluded that large households with at least one elderly person (class c) have similar income

patterns and consumption habits to the population average. Therefore, these households were excluded from the elderly household definition.

9. Consumption expenditure for the remaining elderly households was compiled for two years (1998-1999) in order to increase observations and reduce the variance of the results. In Table 1 below a comparison of the elderly consumption basket and the average basket for the total population is presented:

**Table 1: Average expenditure for elderly households and all households 1998-1999 (percents)**

<b>Consumption Group</b>	<b>Elderly Households</b>	<b>General Population</b>
Food (exc. Fruits & vegetables)	13.52	14.61
Fruits & vegetables	4.49	3.06
Housing	31.12	20.64
Household maintenance	11.07	9.64
Furniture and household equipment	4.83	5.36
Clothing and Footwear	1.84	3.38
Health	7.12	4.28
Education, culture and entertainment	7.83	13.59
Transportation and communications	15.08	21.11
Other goods and services	3.10	4.33
<b>Total</b>	<b>100.00</b>	<b>100.00</b>

10. From the results above we detect significant differences between the relative consumption habits of the elderly and the general population, already at the major consumption group level. 45% of the elderly consumption is on housing related expenditures (35% for the population average); only a quarter of the expenditure is on services like education, culture, transportation, communication and other miscellaneous services (40% for the population average); relative expenditure on health is naturally higher than the population average (7% vs. 4%); only relative expenditure on food (inc. fruits and vegetables) is almost identical (18%).

11. Many intuitive explanations for these differences may be presented, however comparison of relative expenditure at more detailed level expenditure groups can give insight to the above phenomena. In table 2 below, data for relative expenditure weights of selected sub-groups, comprising above *half* of the consumption basket, are presented:

**Table 2: Average expenditure for selected expenditure sub-groups, elderly households and all households 1998-1999 (percents)**

<b>Consumption Group</b>	<b>Elderly Households</b>	<b>General Population</b>
Fresh vegetables	1.97	1.22
Owner occupied housing	26.36	16.07
Housekeeping	2.02	1.47
Clothing	1.35	2.59
Medical services	3.34	1.60
Pharmaceuticals	1.35	0.74
Education services	0.58	5.06
Television, radio, internet, cable TV, etc.	3.17	2.50
Travel abroad	4.83	3.86
Private vehicles and maintenance	6.60	11.96
Telephone services	2.30	3.55
Tobacco	0.40	0.98
<b>Total</b>	<b>54.27</b>	<b>51.60</b>

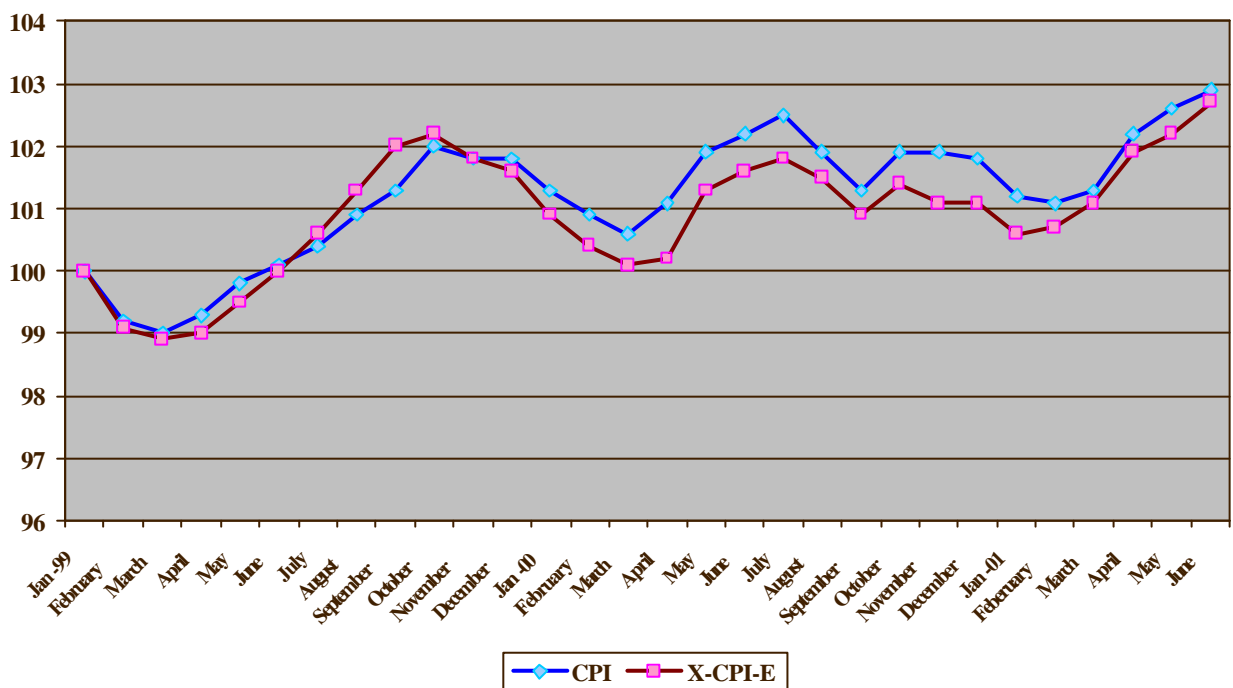
12. The results above are basis for an interesting analysis of relative consumption differentials between the elderly population and the general population. Elderly spend more (have relatively more time and disposable income) on travel, cable TV, theatre and other forms of recreation (there is a future after all...). As they are more health conscience and in greater need of medical services, elderly will spend more on fresh vegetables, rarely smoke and consume a large chunk of medical services, pharmaceuticals, etc. They are owner-occupiers at large and in need of additional domestic services, consume less transportation services (especially private vehicles), need relatively less clothing and consumed the major portion of their education at a much younger age.

13. After establishing that the consumption expenditure of the elderly is significantly different from the average expenditure of the general population, we advanced to the second stage of the experiment: estimation of price changes for the elderly population.

## Estimation of Price Changes

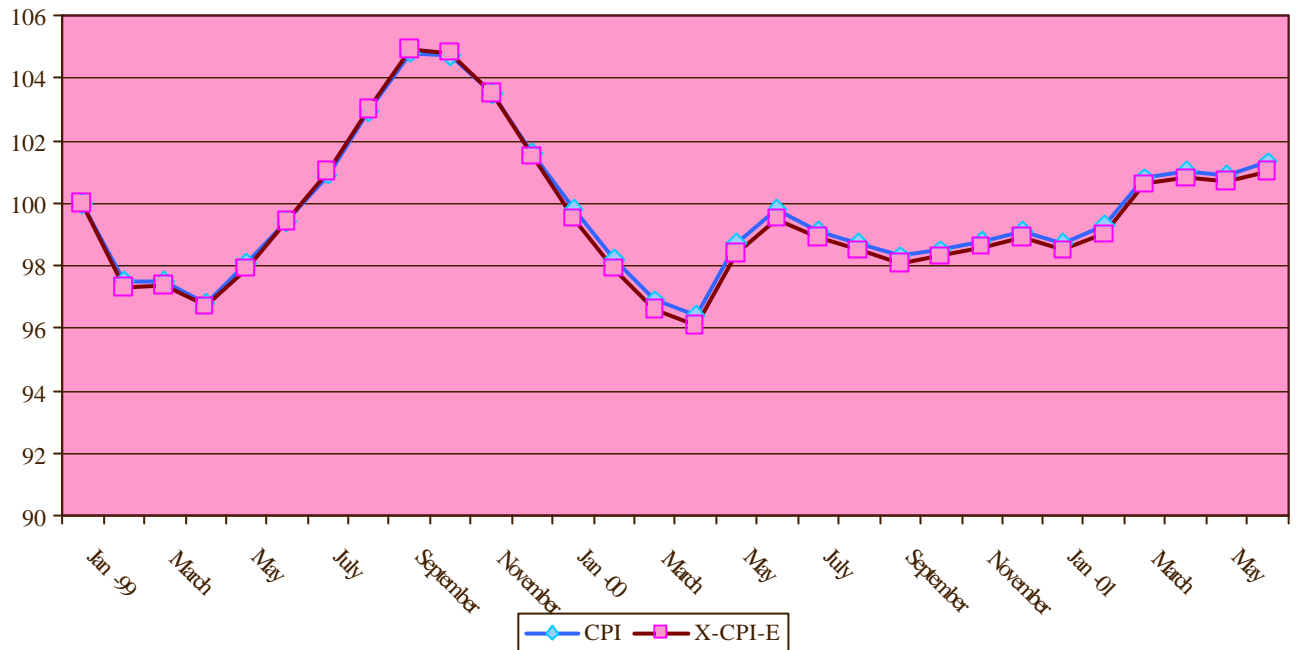
14. Consumption weights for each of the 1,325 items in the all-item CPI were derived for the elderly population, based on the expenditure date from the Household Expenditure and Income surveys in 1998-1999. Using the expenditure weights of the elderly, we aggregated the average price changes for each of these items, excluding those with zero expenditure. The price changes for each item were obtained from the monthly CPI. This exercise was carried out for the period of February 1999 – June 2001 (January 1999 = 100.0 points). Comparison of results for the CPI and experimental CPI for the elderly (X-CPI-E) are presented in graph 1 below:

**Graph 1: Total CPI and X-CPI-E, February 1999 – June 2001, base period January 1999 = 100.0 points**



15. The CPI level is *above* the X-CPI-E for almost all of the two and a half year period, excluding the months July-October 1999. For most of the year 2000, there is about a half percentage point difference between the two indices. At the end of the period (June 2001), the CPI stood at 102.9 and the X-CPI-E at 102.7. These results seem to contradict the assumptions of the users that the X-CPI-E would escalate at a faster pace than the CPI. As will be presented below, **the CPI seems to have escalated at a faster rate than the X-CPI-E for nearly all-main consumption groups**. Comparisons of price changes at more detailed expenditure levels may clarify some of the differences in the index levels. Graph 2 below looks at the housing expenditures:

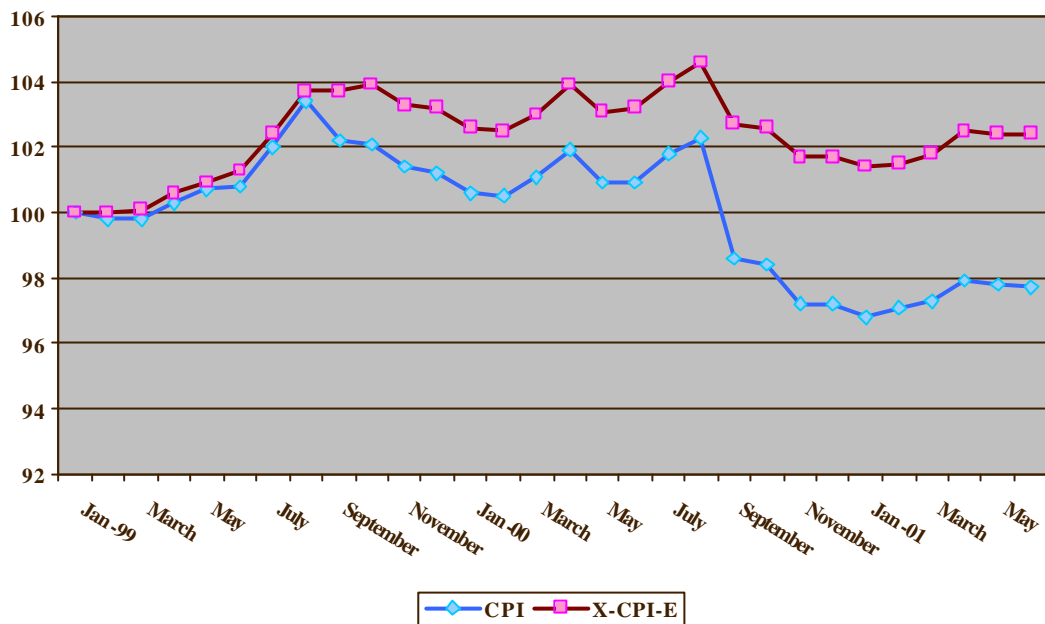
**Graph 2: CPI and X-CPI-E on Housing, February 1999 – June 2001, base period January 1999 = 100.0 points**



16. The weight for *owner-occupied housing* is the largest single expenditure weight (26.36%) for an item in the elderly consumption basket. It has a significant weight also for the general population (16.07%). Therefore, the *trend* of the CPI and X-CPI-E are similar for the 2.5-year period. This also explains the close proximity of the two indices in the experimental period. The estimated price change on *Housing* in the CPI was 1.3% compared to 1% for the X-CPI-E. This explains a large portion of the 0.2% differential between the total CPI and total X-CPI-E at the end of the period (June 2001).

17. In the main consumption group of *Education, culture and recreation*, even a wider differential is found between the two indices. The CPI for this group increased by 2.4% (102.4 points) and the X-CPI-E decreased by 2.3% (97.7 points). Many items in this consumption group are of seasonal nature and the volatility of the index may be seen in graph 3 below:

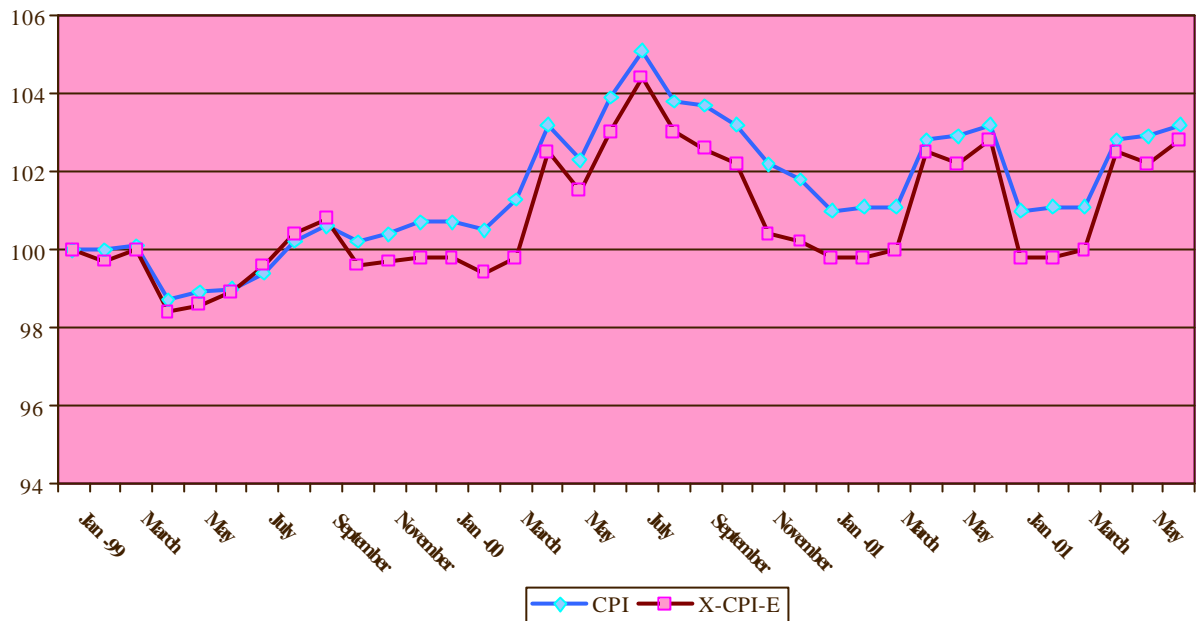
**Graph 3: CPI and X-CPI-E on Education, culture and recreation, February 1999 – June 2001, base period January 1999 = 100.0 points**



18. Education services include expenditure for nurseries, primary schools, high schools, etc. which are non-existent for the elderly population. Therefore, in September 1999 there was a price increase in this group for the CPI (beginning of school year) but with no bearing on the X-CPI-E. Price reductions for cultural activities and Internet services had a stronger downward influence on the X-CPI-E than the CPI. In September 2000 there was another large differential between the two indices. A decrease in purchase tax on home entertainment equipment, competition in the cable TV and Internet surfing markets, items with a relatively large consumption weight for the elderly (see table 2 above) – had greater downward influence on the X-CPI-E. These caused the 5% differential in the indices at the end of the period.

19. In the main group *Transportation and communications* the elderly spend 15.1% of their consumption expenditures compared to 21% for the general population (see table 1 above). In this group the CPI increased by 3.2% and the X-CPI-E by 2.8%, contributing to the higher escalation of the total CPI vs. total X-CPI-E as presented in graph 4 below:

**Graph 4: CPI and X-CPI-E on Transportation and communication, February 1999 – June 2001, base period January 1999 = 100.0 points**

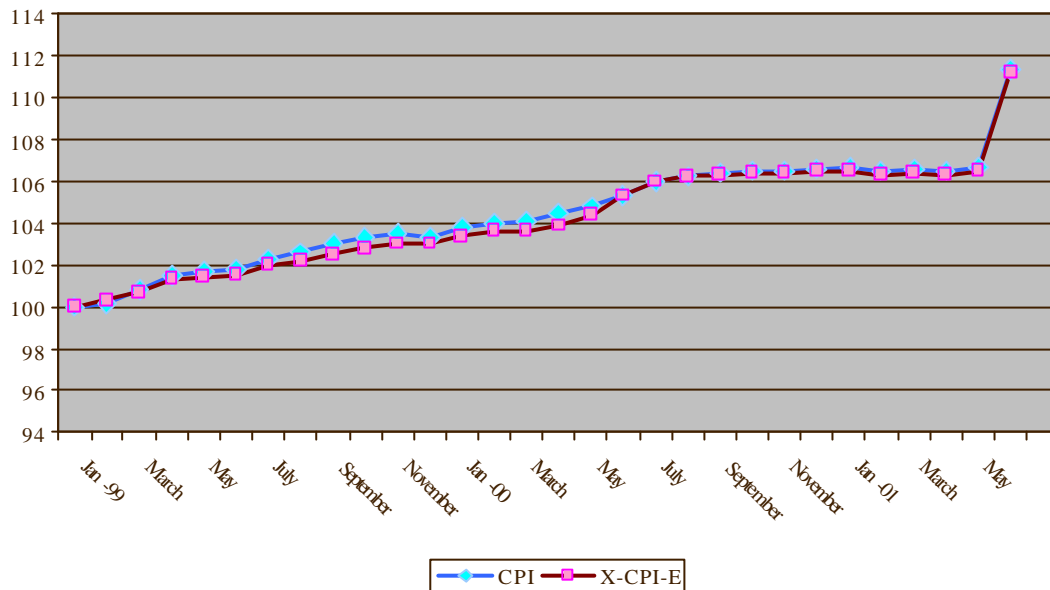


20. Many turning points can be observed in this index over the 2.5-year period. The volatility during this period is caused mainly by the sub-index of *travel abroad*, which has a relatively larger expenditure weight for the elderly population. The international and local political climate, beginning in the last quarter of 2000, lead to smaller price increases in this component during the holiday seasons. It should be stated that cab fees, which rose in March 2000, contributed to the higher price increase for the X-CPI-E in that month.



21. 7.1% of the elderly consumption expenditure is on *health services* (4.3% for the general population). The prices of *pharmaceuticals* rose by 30% in June 2001, bringing the health CPI to 111.3 points and the health X-CPI-E to 111.2. In other words, even the consumption group, with relatively dominant expenditure for the elderly (compared to the population average), registered a higher price increase over time for the CPI, presented in Graph 5 below:

**Graph 5: CPI and X-CPI-E on Health Services, February 1999 – June 2001, base period January 1999 = 100.0 points**



22. In this section we presented a “light” analysis of the differential contributions to the CPI and X-CPI-E for the 2.5-year period. In most of the main consumption groups and sub-groups, the index for the general population rose at a faster pace than the index for the elderly. Therefore the total CPI for this period increased by 2.9% compared to the X-CPI-E which increased by 2.7%. We stress that these are tentative results and should be read with caution, especially due to methodological limitations presented in the section below.

### C. Limitations of the X-CPI-E

23. The data for consumption expenditure weights for the elderly were extracted from the *Household Expenditure and Income Survey*, conducted annually by ICBS. Firstly, every survey is sensitive to sampling and response errors. Secondly, the amount of sample units used in determining the weights was significantly reduced, as only elderly households (par. 8 above) were included. Therefore, only two-thirds of the households with elderly individuals participated in the experiment. An attempt to reduce the sampling error was conducted by combining two years of data.

24. Retail outlets and services selected for the experiment were the identical ones used in the CPI. These do not necessarily reflect the consumption habits of the elderly

who may purchase relatively more goods at outlets near their place of residence. They also may use more “home delivery” services than the general population.

25. The basket of goods and services is the one consumed by the general population. While items with zero expenditure were removed from the elderly consumption basket, items that may specifically represent the consumption of the elderly (like specialized medical goods and services) were not added on for price collection.

26. The prices (and therefore price changes) used in the experiment were identical to the prices for the general population. In many services, elderly receive special price reductions i.e. on public transportation, municipal taxes, subscriptions to magazines, tickets for sport outings and other recreational and cultural activities. As the CPI estimates price changes and not price levels, this deficiency will disrupt the experiment *only* if price changes for the elderly differ from the general population.

#### **D. Summary**

27. Consumer Price Indices have many uses in a national statistical framework. The more important uses in Israel are index linking and estimation of inflation. When index linking is the main reason for compiling a CPI, it may suggest restricting the coverage of the index to certain types of households and goods and services. Compiling and publishing a “family” of indices may be the appropriate solution when the CPI has many different uses.

28. On request by user groups, representing the elderly population in Israel, ICBS launched an experimental CPI for the elderly. Their assumption being that price escalation for the elderly would be at a higher rate than price change for the general population. If so, monetary values of pensions and social security benefits, linked to the CPI, have been biased downward in the process.

29. The results of the experiment, for the 2.5-year period of January 1999 – June 2001, seem to have shown the opposite. The general population CPI rose at a higher rate (by 0.2 percent) over this period. The CPI showed higher rates of price change for nearly all-main consumption groups than the experimental CPI for the elderly.

30. The tentative results should be examined cautiously as methodological limitations of the experiment may introduce bias into the index for the elderly. Additional work needs to be conducted in order to determine whether the CPI for the elderly will remain lower in the long run. It should be stated that when pensions and benefits are index-linked on a monthly basis, there is importance in the monthly results. In this case it was shown that over several months in 1999, the index for the elderly was above the official CPI.

**Appendix 1: Average Income Composition for Elderly and General Population in 1998**

	All Households	Single Person Households with elder	Two Person Household with at least one elder	Other households with at least one elder
Elderly Household Distribution (percents)		32.1	34.4	33.5
Total Gross Monetary Income	100	100	100	100
<b>Employment</b>	<b>76.6</b>	<b>7.1</b>	<b>20.7</b>	<b>62.1</b>
<i>Wages</i>	<i>84.3</i>	<i>75.7</i>	<i>66.0</i>	<i>88.9</i>
<i>Self-Employed</i>	<i>15.7</i>	<i>24.3</i>	<i>34.0</i>	<i>11.1</i>
<b>Capital</b>	<b>2.2</b>	<b>5.5</b>	<b>4.7</b>	<b>1.7</b>
<b>Pensions</b>	<b>5.8</b>	<b>33.1</b>	<b>33.4</b>	<b>9.4</b>
<b>Social Benefits</b>	<b>15.5</b>	<b>54.3</b>	<b>41.2</b>	<b>26.8</b>
Avg. Standard Persons	2.8	1.25	2.0	3.0

**Appendix 2: Average Expenditure Weights for Elderly and General Population in 1998**

	All Households	Single Person Households with elder	Two Person Household with at least one elder	Other households with at least one elder
Elderly Household Distribution (percents)		32.1	34.4	33.5
Total Consumption Expenditure	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>
Food inc. Fruits and vegetables	18.0	15.8	19.2	21.5
Housing	<i>22.7</i>	38.4	<i>27.3</i>	24.6
Household Maintenance	9.0	11.3	10.7	8.8
Furniture and household equipment	5.3	5.1	4.2	5.4
Clothing and Footwear	3.7	1.6	2.1	3.0
Health	4.0	7.5	6.7	4.6
Education, culture and recreation	13.8	7.6	9.3	11.3
Transport and communications	18.8	9.0	16.7	16.8
Other goods and services	4.7	3.7	3.7	4.0