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**METHODOLOGICAL DEVELOPMENTS IN THE 2005 REVISION  
OF THE CPI IN JAPAN\***

Submitted by Statistics Bureau of Japan

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## **Abstract**

The base year of the CPI in Japan is supposed to be changed from the year 2000 to 2005 on the 2005 revision. The CPI on the 2005 base is supposed to be released on August 2006. The CPI will have been improved through changes of items and calculation of their weights on the bases of consumption pattern, considering appearance of new products and services and price diversification by deregulation, technological breakthrough, global competition, etc.

Further, alternative indices such as the general excluding food and energy, indices for total households and chaining indexes will be arranged monthly on the 2005 revision.

Because absolute values of monthly changes over the year for the general excluding fresh food have been less than 1% for about five years, a lot of people have great concerns to the time when they are regarded to stay above zero. Thus it is necessary to divide elements of changes into those depending on the revision and those by real price-changes. Changes with the revision are divided into the factors; resetting indices, renewal of weights and revision of items.

## **I. OUTLINES OF THE CPI ON THE 2000 BASE IN JAPAN**

### Characteristics

1. The Consumer Price Index in Japan is calculated to measure the average price movements of goods and services purchased by households throughout the country. It reflects changes of the cost of purchasing goods and services in a fixed “market basket”, but is not designed to measure changes of the cost of living attributed to changes in the consumption structure of households.
2. The CPI is a significant indicator to promote economic and financial policies adequately, used for deflators of the GDP and revisions of public charges and rents as well as pensions. As for expenditures in the budget the CPI has connections with pensions and benefits for children, but has little to do with medical insurance benefits, benefits for the elderly, or those receiving social welfare.

### Items

3. Items are selected in consideration of their relative importance to the total living expenditures, with expenditures more than one ten-thousandth as a standard, representing typical price movements in the upper group and feasibility of price data collection, in order to represent the price movements of all the goods and services purchased by households.

### Prices

4. For computation of the CPI, prices are normal retail prices or service charges at which the items are actually sold at the outlets or establishments, obtained mainly from the Retail Price Survey of 598 items in about 30 thousand outlets in 167 municipalities. About 250 thousand price quotations including 23 thousand house rents are collected every month through the survey.

Excluded from the price collection are temporary bargain prices, abnormal prices due to disasters, prices for installment sales, prices of second-hand articles.

5. Shops are selected, in principle, by following the arrangements in accordance with sales for each item by Price Survey Districts, divided into survey municipalities of the RPS. All households living in rented houses or rooms in Rent Survey Districts are investigated.

6. Prices are surveyed, in principle, once a month on Wednesday, Thursday or Friday of the week including the 12th of each month. As for 40 items in fresh food (fresh fish and shellfish, fresh vegetables, fresh fruits)<sup>1</sup> and cut flowers, price data are collected three times a month; Wednesday, Thursday or Friday of the week including the 5th, 12th or 22nd of each month. The middle prices during the three consecutive days ending on the survey dates are selected each time.

#### Specifications

7. For each item surveyed, the exact description of the relevant goods and services (basic specifications) are detailed with such characteristics as brand, size, quality, etc. so that the equivalent goods and services can be constantly priced every month. In case a product of basic specification is no longer commonly found in the market and does not represent the price of that item, a new representative specification replaces the old specification (specification change).

#### Weights

8. Weights are calculated on the basis of household expenditures of the Family Income Expenditure Survey for about eight thousand multi-person households, and are based on consumer expenditures in the base year which has been renewed every five years since 1955. Now both the base period and the reference period for weights are 2000. As the CPI is designed to measure changes in prices of goods and services consumed by households throughout the country, the scope of the FIES items used for the calculation of weights is limited to the household consumption expenditures. Therefore, the CPI does not cover non-consumption expenditures (such as income taxes and social security payments) and outgoings other than expenditures (such as savings including deposits, security purchases, and property purchases). Furthermore, among the consumption expenditures, remittances, money gifts, religious contributions (donations and offerings to temples, churches, offertory) and obligation fees (fees paid to neighborhood association, alumni and union due) are also excluded because no market exist, the relationship between costs and benefits is not clear, or they are income transfer among households.

#### Calculation

9. Generally, prices are averaged for each municipality every month. Average price in the base period and in the observation period for each item is calculated, in principle, as a simple arithmetic mean of collecting prices. As for prices of fresh food and cut flowers collected three times a month, the average prices, which are calculated as simple arithmetic means of those middle prices for each time, are then aggregated into the monthly average price on the basis of the simple arithmetic mean of the average prices. Prices and weights for items are used for index aggregation for groups as well as the general index with the Laspeyres formula.

10. The annual average indices for all items other than fresh food, sub-indices and the general index are calculated as simple averages of monthly indices from January to December, while for fresh food, annual indices are calculated as weighted arithmetic means by using monthly weights which were made by expenditures in 2000 and monthly quantities in 1999 and 2000. Quarterly and semi-annual indices are also calculated in the same way.

11. In order to analyze effects of changing consumption pattern on the CPI, year-to-year chaining of Laspeyres indices based on the preceding year, is compiled for reference. In addition, another index using a formula named “midpoint-year basket method” is compiled based on the basket in the middle year between the weight reference year and the observation year from the 2000 revision for reference.

#### Quality adjustment

12. The CPI is compiled to measure “pure price change” unaffected by changes in quality of goods and services purchased by households. In the case of a specification change, difference in prices of the new specification needs to be adjusted in order to exclude price difference that is attributable to quality difference between the old specification and the new specification. Methods of quality adjustment changes are overlap, quantity ratio, regression, option cost, imputation and direct comparison. The main method to adjust quality change in the index calculation is the overlap method. Both prices of the old and new specifications can be gained simultaneously since specifications are changed in the whole country before the survey under directions of the Statistics Bureau.

#### Publication

13. The monthly consumer price index is released, in principle, at 8:30 a.m. on Friday of the week including the 26th of each month. The index figures of the preceding month for the whole country, and the preliminary figures of the current month for Ku-area of Tokyo are released. The average index figures for the calendar year and the fiscal year are released when the monthly figures for December and March are released respectively.

14. The CPI is one of the key indicators of current economic conditions, and is reported monthly at the Cabinet Meeting.

## **II. MAIN FOCUS OF THE 2005 REVISION**

15. The base year is supposed to be changed from the year 2000 to 2005 on the 2005 revision. The CPI on the 2005 base is supposed to be released on August 2006. The CPI will be improved through changes of items and calculation of their weights on the bases of consumption pattern, considering appearance of new products and services and price diversification by deregulation, technological breakthrough, global competition, etc.

16. In order to reflect user’s requests, comments were assembled from the public about the basic policy of the 2005 revision and answers to them were released for the first time in history.

17. An item is supposed to be included to the CPI items with the new base if the consumption for it would be larger than ten-thousandth of total consumption. Thirty four items such as curry buns, liquor with soda and fruit, locks, supplements (for nutrition), automobile navigation, cellular phones, flat TV and DVD recorder will be newly included, and forty eight items will be consolidated or excluded such as sewing machines, video tape recorders, electronic organs, pencils and game charges for mahjong. Some consolidated items are imported items which were involved on the 1995 base to specify differences between prices for domestic products and imported products. However, those for some products have moved almost in parallel and have little significance to distinguish imported items recently.

18. The weights will be also renewed. For example, weights for telephone charges (for fixed phone) will decrease while those for mobile telephone charges will increase with the revision. Weights for plumbing, package tour to overseas, personal computers will decrease while those for internet connection charges and low-molt beer will increase.

19. On the 2005 base, following alternative monthly indices are supposed to be released.

#### General excluding food and energy

20. The general index excluding fresh food is used as, what we call, a core index; representing trend of price movements to establish economic or financial policies in Japan<sup>2</sup> since prices for fresh food fluctuate with weathers in short periods. For example, prices of green fresh vegetables; cabbage and lettuce increased more than three times from September to November 2004 due to hurricane and long-term rains. In addition, the share of fresh food to all consumption is larger in Japan than in Australia, Canada, the United Kingdom, the United States, and so forth.

21. Prices for rice also changed dynamically. Especially they rose for almost a year from October 2003 with cool summers and dropped for a year from October 2004 aftermath. On the other hand, prices for energy<sup>3</sup> also fluctuate with irregular components such as wars, hurricane or some other incidents. Indeed, prices for oil-related items such as gasoline and kerosene rose from June 2004. Thus, needs to watch indices to exclude such irregular components have been strengthened.

22. Among standard deviations of monthly indices by goods and service group from January 2001 to December 2005, the largest is for other agricultural & aquatic products which include rice, the second largest is for petroleum products and the third is for fresh agricultural & aquatic products. As to changes over the year, the three groups gained the largest three as well. (Table 1) This means that other agricultural & aquatic products and petroleum products as well as fresh agricultural & aquatic products fluctuated dynamically in Japan recently.

Table 1. Standard Deviations of Monthly Indices (2001-2005) (2000 base)

Groups			Weights (per 10000)	Standard deviations (%)		
				Indices	Changes from the previous month	Changes over the year
Goods	Agricultural & aquatic products	Fresh agricultural & aquatic products	671	3.4	2.8	5.1
		Other agricultural & aquatic products	104	6.9	1.8	10.5
	Industrial products	Food products	1373	1.1	0.1	0.4
		Textiles	564	3.3	3.3	1.4
		Petroleum products	301	6.5	1.0	4.8
		Other industrial products	1414	2.7	0.1	0.8
		Electricity, gas & water charges	482	1.6	0.3	1.2
		Publications	169	0.4	0.2	0.2
Services	Public services	House rent, public & public corporation	48	0.6	0.2	0.6
		Services related to domestic duties	301	1.2	0.4	1.9
		Services related to medical care & welfare	203	4.1	1.1	3.8
		Services related to forwarding & communication	565	1.6	0.7	1.5
		Services related to education	60	2.1	0.4	0.2
		Services related to reading & recreation	118	0.8	0.4	0.9
		Eating out	620	0.5	0.2	0.6
	General services	Private house rent	300	0.4	0.0	0.1
		Imputed rent	1360	0.2	0.1	0.3
		Services related to domestic duties	482	0.3	0.1	0.1
		Services related to medical care & welfare	32	1.2	0.2	0.8
		Services related to education	328	1.0	0.2	0.3
		Services related to reading & recreation	506	2.3	2.1	0.6

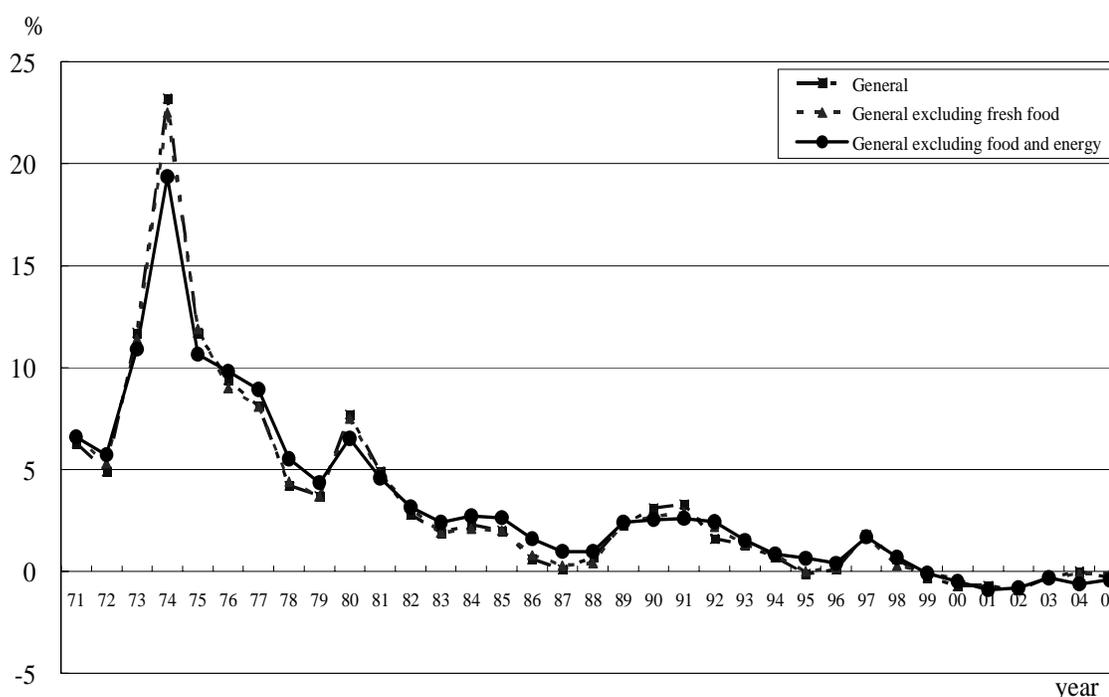
Note. Dark columns include items which were excluded from the general excluding food and energy.

23. In other countries, many authorities of the CPI release total excluding food and energy or a similar one as one of alternative indices. In addition, many central financial banks choose and call it as the core index to clarify trend of prices. The OECD compares the CPI excluding food and energy as a standard measure of a core index, calculating and including one of Japan. Thus, it is important to arrange an option for core movement of prices which can be compatible internationally in released indices of the CPI in Japan as well.

24. In the end, was provisionally released the index; the general excluding food and energy monthly from December 2005 even on the 2000 base before the revision so as to broad options as soon as possible for users who want to watch core movement of prices which can be compatible internationally. Excluded food does not include alcoholic drinks following to cases in most of other countries. It will be released on larger scale with variations such as seasonally adjusted indices and those by region on the 2005 base after the revision.

25. In the Figure, changes over the year for the general, the general excluding fresh food as well as the general excluding food and energy<sup>4</sup> are shown from 1971. Both of the general and the general excluding fresh food have moved almost equally. In the first oil shock period, 1974, even the general excluding food and energy rose 19%, though the level was lower compared with 23% for the general and the general excluding fresh food. In the second oil shock period, 1980, the general excluding food and energy moved with 7% changes over the year while the general and the general excluding fresh food rose 8%. Even so, all of the three indices have moved in the similar way especially after 1997. However, as the prices for energy increased except for electricity according to the oil price hikes, the general excluding food and energy dropped down more than the other two indices from 2004.

**Figure Changes over the Year of the CPI in Japan**



### Index for total households

26. The scope of the CPI is limited to multi-person households. This means that items and weights have been decided with data of multi-person households. However, it is rational to include one-person households into the scope while the number and the share of expenditures for one-person households have increased recently. Further, composites of expenditures for one-person households are a little different from multi-person households. For example, one-person households are apt to spend more for housing and recreation, and less for education.

27. From those standpoints, the index based on the basket of total households, including one-person households, is also compiled annually from the 2000 revision for reference. The official index of the general is only 0.1 point higher than the index for total households in 2005.

28. In addition, to meet various requests of users, a monthly index for total households is scheduled to be released as an index for reference on the 2005 revision.

29. In order to compile the index for total households monthly, quantities for one-person households which cannot be gained through the FIES<sup>5</sup> are necessary every month for the purpose of calculation of weights for items in fresh food. It is assumed that quantities for one-person households are proportional to those for multi-person households.

30. Further, it will be reviewed to include one-person households in the scope of the CPI in the future. However, it is necessary to communicate enough with users before since the CPI is used in significant matters.

### Chaining index

31. The chaining index with annually updated weights has been in effect as an alternative index since 1975. Changing the consumption pattern does not require much, since the difference between the official CPI and the chaining index is only 0.4 in 2005 based on the 2000 bases. Also, the absolute values of differences between the official index and the chaining index have shown to be less than 0.5 in the next base year, five years after the current base year. This means that consumption pattern in total has not changed dynamically at least within five years after the base year in Japan.

32. In addition, in order to meet various user requests to release chaining indices every month as indices based on real consumption, the monthly chaining indices for the general excluding fresh food and for all medium classifications except for fresh food<sup>6</sup> will be released on the 2005 revision. If weights are compiled monthly, drifts will emerge for items with strong seasonal movements. Thus, yearly weights averaged for 12 months in a year and revised on January every year will be adopted. Another issue is compilation of weights. As it takes some months after release of the results of expenditures in the previous year to compile weights, indices with weights two years before will be released provisionally for some months at the beginning of the year, and they will be revised with weights in the previous year later every year. However, the degrees of the revision will to be small, based on past experiences.

33. On the other hand, chaining indices have some shortcomings, such as inconsistency in aggregation. As for the CPI, the lack of consistency in aggregation of the chaining index is serious since the elements of changes must be clarified every month. Many users watch changes by category as well as in general in Japan.

#### Improvements of calculations

34. Prices for some items such as electricity, gas, transportations and tobacco, decided in a large area by regulations or rules, are calculated with some equations following to the regulations or the rules, instead of collecting and averaging prices from outlets. Such items are fifty six on the 2000 base, but will be increased to fifty nine on the 2005 base.

#### Including prices by direct marketing

35. Basically prices from outlets are collected through the RPS. However, people sometimes buy goods or services through visitors, vending machines or direct marketing. Especially purchase by direct marketing is increasing rapidly. From the National Survey of Family Income and Expenditure, though only 1.7% for multi-person households and 2.1% for one-person households of all goods (except for electricity, gas & water charges) had been purchased by direct marketing at 1999, 2.8% for multi-person households and 4.0% for one-person households was purchased by direct marketing at 2004.

36. Some items in food, health related materials and cosmetics are or will be purchased more through direct marketing than at outlets. More than 80% supplements for nutrition are purchased through direct marketing. Thus, prices through direct marketing will be consolidated with those from outlets on the 2005 base.

### **III. EVALUATION OF INFLUENCES BY THE REVISION**

37. Because absolute values of monthly changes over the year for the general excluding fresh food have been less than 1% for about five years, a lot of people have great concerns to the time when they are regarded to stay above zero. Some people predict that the time will come near when the first result of the 2005 revision is scheduled to be released, on August 2006. Changes over the year may shift indices downward with the revision, for instance, by including IT materials whose prices decrease rapidly. Thus it is necessary to divide elements of changes into those depending on the revision and those by real price-changes.

38. Changes with the revision are divided into the following three factors.

#### Resetting indices

39. The first element is the reset of the indices to 100. This would tend to make changes of indices downwards since indices of items with increases are apt to decrease and, to the contrary, those with decreases are apt to increase. Indices for most of items are less than 100 during the recent deflation period. The lower the index is, the larger is the scale of the shift with the reset of the index. For example, since the indices for the personal computers have dropped down rapidly

and are less than 20 compared with 100 in 2000, contribution of the change over the year for personal computers would be more than  $100/20=5$  times at the beginning of the 2005 base, if weights for personal computers were equal between the bases. This means the change over the year of the general will drop influenced with resetting indices.

#### Renewal of weights

40. The second is the changes of weights during five years. In the past, it was regarded to shift indices upward and be source of substitution bias, and tend to move indices downward by renewal. However, owing to telephone charges (for fixed phone) whose price declined on November 2004 and January 2005, and whose consumption has also declined, the bias by Laspeyres arithmetic formula became downward in total deleting substitution bias in 2005. Thus, the change over the year of the general will rise influenced with renewal of weights.

#### Revision of items

41. The last factor is the revision of items. New items include IT related materials whose prices are apt to drop dynamically compared with other materials. Thus, the revision of items will force the change over the year of the general downward.

#### Past experiences

42. Calculated and released are differences between the new base indices and the old base indices by revision of the basement just on August 2006, at the release of the new base indices from January 2005 to June 2006 and the changes over the year from January 2006 to June 2006 to clarify influences with the 2005 revision.

43. In the past revisions from 1985, the differences have been 0.3 or less between averaged indices from January to June in the next year of the base year for the change over the year of the general excluding fresh food that is focused as the significant indicator to decide whether the quantitative monetary easing policy should be continued. (Table 2)

Table 2. Difference between the New Base Index and the Old Base Index  
Change over the Year of the General Excluding Fresh Food (%)  
(Average from January to June)

Revised Year	New base		Old base		Difference
1986	1985 base	1.3	1980 base	1.3	0.0
1991	1990 base	3.1	1985 base	3.3	-0.2
1996	1995 base	0.1	1990 base	0.2	-0.1
2001	2000 base	-0.9	1995 base	-0.6	-0.3

#### Estimation of influence by the 2005 revision

44. The change over the year of the general excluding fresh food has continued in plus two months seriously from November 2005 but only 0.1%. If the change over the year of the general

excluding fresh food continues to stay just on the surface over zero in 2006, the real changes based on the 2005 base may have been minus. Thus the difference is one of main concerns of financial policy makers.

45. However, the influence on the 2005 revision cannot be estimated at present because prices in 2006 have not been collected and new weights based on expenditures in 2005 have not been compiled yet.

46. The change over the year for the general excluding fresh food is  $-0.13^7$  in 2005 if it is calculated by aggregating contributions for all items within the category. If all the indices of the items in the previous year; in 2004 were 100, it became  $-0.36$ . This means that, the change would shift about  $-0.23$  which is nearly to the influence by resetting indices to 100 in 2004.

47. If weights in 2000 are changed to those in 2004, it became  $-0.05$ . By changing weights, the change would increase about  $0.08$ . The consumption pattern seems to have not changed following to normal substitutions excessively, but by demands indifferent to price changes. Main source is telephone charges for fixed phone whose change would increase  $0.05$  from  $-0.19$  to  $-0.14$  by changing weights<sup>8</sup>. The change for gasoline (regular) would also increase  $0.02$  from  $0.18$  to  $0.20$ .

48. If these two influences are consolidated; if both of indices and weights were reset, the change became  $-0.23$ , shifted  $-0.10$  from the calculated change. The  $-0.23^9$  equals the change over the year of the chaining index with annually updated weights in 2005. This means the consolidated influence can be estimated to some extent by differences between the official index and the chaining index.

49. In 2000 in the 1995 base, the change over the year for the general excluding fresh food was  $-0.34^{10}$ , change with resetting indices was  $-0.41$  ( $-0.07$  from the change), the change with resetting weights was  $-0.34$  (the same as the change), and the change considering both effects was  $-0.41$  ( $-0.07$  from the change).

50. Comparing cases in 2005 with those in 2000, the scale of influences with resetting indices was larger in 2005 than in 2000 since IT related items like personal computers with lowering prices are included more on the 2000 base than on the 1995 base. As for one with resetting weights, no influence existed as the whole in 2000 while the downward bias caused by demands surpassed the upward bias by substitution in 2005. As the result, the scale of influences with both of resetting indices and weights were almost the same in 2005 as one in 2000. (Table 3) If consumption pattern would change in the same trend in 2006 with what happened in these five years, the influences with resetting indices and weights on the 2005 revision would be the same as on the 2000 revision.

Table 3. Influence to the Change over the Year for the General Excluding Fresh Food

Year	Base year	Contribution	Change of the base year to the previous year	Change of weights to the previous year	Change of the base year and weights to the previous year
2000	1995	-0.34	-0.41	-0.34	-0.41
2005	2000	-0.13	-0.36	-0.05	-0.23

51. However, the influences with revision of items cannot be estimated easily because prices in 2006 which are necessary to calculate changes over the year will be captured from now on.

52. On the 2000 revision, the inclusion of personal computers alone shifted the change 0.19 downward<sup>11</sup>. Presuming that consumption pattern would change on the recent trend, based on the market information before, no newly included item will cause such dynamic shift to the change on the 2005 revision.

#### NOTES

<sup>1</sup> Fresh meat is dealt differently from fresh fish and shellfish, fresh vegetables and fresh fruits because animals can be brought up, not being influenced by weather.

<sup>2</sup> Seasonally adjusted indices of the general and the general excluding fresh food are often used to watch trend of the CPI, too.

<sup>3</sup> Electricity, Gas, Liquefied propane, Kerosene, Gasoline (regular) and Gasoline (premium)

<sup>4</sup> The weight is 9,550 for the general excluding fresh food, 6,730 for the general excluding food and energy, as 10,000 for the general on the 2000 base.

<sup>5</sup> The FIES is surveyed every month not only for multi-person households but also one-person households, however, to the latter lack inquiries about quantities from the standpoint of reducing burdens and are compiled quarterly to ensure stabilities of their results under small size of samples.

<sup>6</sup> As prices for some items in fresh food are not collected in all months and weights for items in fresh food are decided monthly based on its quantity, items in fresh food have to be excluded in calculation for month-to-month chaining indices.

<sup>7</sup> The result can be gained with aggregation of contributions by item. The direct calculation by official indices for the general excluding fresh food equals -0.10. In these ways, as contributions depend on dealing with decimal points, they should be observed with some range.

<sup>8</sup> Weights for telephone charges (for fixed phone) became 69% while those for mobile telephone charges became 2.55 times in 2004 compared with in 2000.

<sup>9</sup> The result can be gained with aggregation of results by item. The direct calculation by chaining indices for the general excluding fresh food equals -0.21.

<sup>10</sup> The result can be gained with aggregation of contributions by item. The direct calculation by official indices for the general excluding fresh food equals -0.39.

<sup>11</sup> Two items; personal computers (desktop) and personal computers (notes) were newly included by cutting off weights for word processor on the 2000 revision. Contributions for personal computers were -0.24 (-0.12 for desktop and -0.12 for notes) in 2000. If weights for personal computers were given to word processors, the contributions had been -0.05.

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