Empirical Study of Midpoint-Year Basket Index

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According to Hill (1999), both the objective of measuring inflation and measuring the changes in the cost of living lead to the same kind of index formula – i.e. superlative indexes - in practice. However, it is difficult and/or not the best practice to compile monthly CPI using a superlative index formula because of difficulty in measuring weights in the observation month on real time basis and/or existence of seasonality in prices and quantities. He proposed a fixed basket index formula which uses the quantities in the third year intermediate between the base year and the observation year as the basket instead of superlative index formulas.

Following his idea, we are examining the following 'midpoint-year basket' index, which has good properties such as definability of sub-index, and possibility of compiling monthly index averages to the (annual) 'midpoint-year basket' index on real time basis in countries compiling CPI using chained Laspeyres formula (See Okamoto (2001)). Shultz (1998) applied actually the identical formula to price and volume indices for final domestic demand and price index series of industrial production.

$$\text{Midpoint-year basket index} = \frac{\sum q_{t/2}\, p_t}{\sum q_{t/2}\, p_0} = \frac{\sum \frac{w_{t/2}}{I_{t/2}} I_t}{\sum \frac{w_{t/2}}{I_{t/2}}}$$

where $w_{t/2} = p_{t/2}\, q_{t/2}$, $I_{t/2} = \dfrac{p_{t/2}}{p_0}$, $I_t = \dfrac{p_t}{p_0}$

0 : the base year, t : the observation year,

$t/2$: the year corresponds to the midpoint between the base year and the observation year

$\left(\begin{array}{l}\text{In the case that the base year is 1995 and the observation year is 2000,}\\ \text{a (geometric) mean of the baskets in 1997 and 1998 is taken.}\end{array}\right)$

Table 1. Sub-indexes compiled by different index formulas (2000, 1995=100)

	% in 1995 weight	Laspeyres	chained Laspeyres	midpoint-year basket	Walsh	chained Walsh
Overall	100.0	101.503	101.362	101.094	101.087	101.160
Food	28.5	100.621	100.765	100.499	100.437	100.438
Housing	19.8	103.716	103.699	103.667	103.687	103.702
Fuel, light & water charges	5.9	102.936	102.875	102.773	102.750	102.833
Furniture & household utensils	4.1	91.676	90.993	90.773	90.617	90.730
Clothes & footwear	6.8	103.492	103.577	103.519	103.517	103.521
Medical care	3.3	111.142	111.278	110.609	110.389	110.846
Transportation & communication	12.2	97.801	97.556	97.416	97.308	97.408
Education	4.6	109.294	109.299	109.347	109.342	109.302
Reading & recreation	10.9	98.761	97.890	97.257	97.435	97.551
Miscellaneous	4.0	103.361	103.278	103.230	103.212	103.196
(weighted) standard deviation from chained Walsh		0.479	0.235	0.114	0.103	0.000

Theoretically, the 'midpoint-year basket' index can be regarded as an accurate approximation

to Divisia index and superlative indexes such as Fisher index and Walsh index – i.e. index using a geometric-mean of baskets in the base year and the observation year - around the base year supposing prices and quantities change smoothly (See Okamoto (2001)). A test calculation using Japanese CPI dataset also shows this formula yields an accurate approximation to Walsh index and chained Walsh index in terms of sub-indexes as well as the overall index in comparison to chained Laspeyres index as shown in Table1. One possible disadvantage of the 'midpoint-year basket' index is gaps in monthly series of sub-indexes for some categories, which may be observed when the 'midpoint-year basket' is renewed in January of the new observation year.
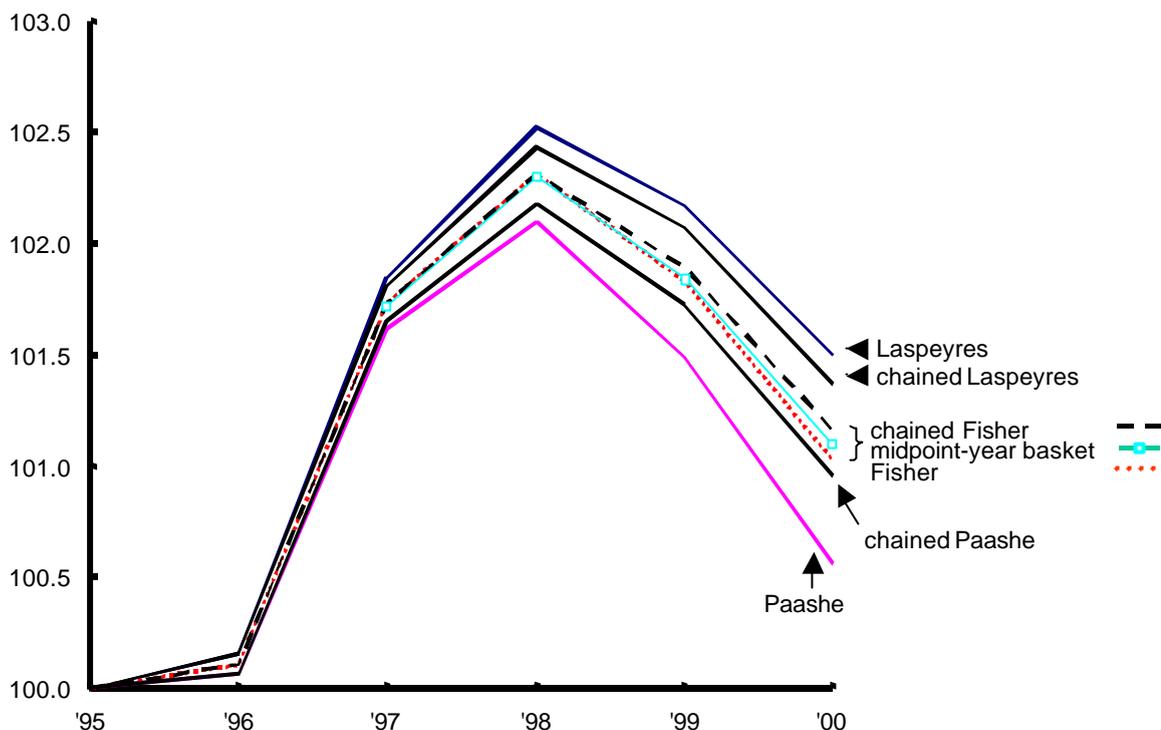

Figure 1. Consumer price changes measured by different index formulas (the overall index)

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RESUME

L'indice de panier de la mi-chemin année représente une valeur approximative exacte des indices suprêmes. En outre, ce nouvel indice a de bonnes propriétés pour l'usage pratique telles que la possibilité de compiler l'indice mensuel en temps réel et celle de définir le sous-indice.