

**The 2005 Base Corporate Goods Price Index
Hedonic Regression Model for Quality Adjustment¹
– Personal Computers –**

The Bank of Japan (BOJ) compiles the Corporate Goods Price Index (CGPI) which focuses on the prices of goods traded among corporations. BOJ surveys the prices of the representative products in each commodity category and when they lose their representativeness in the market, they are replaced accordingly. To account for price changes with the quality being constant, quality adjustments between old and new products need to be done. BOJ employs various quality adjustment methods and hedonic regression method is one of them. BOJ has updated the regression models² for “personal computers.” See the appendix 1 and 2 for the results.

The details of samples for the estimation are as follows.

- I. The price data for PCs are taken from “BCN Ranking,” the BCN Inc. database. The price data for PCs are retail prices at the large-size electrical appliance retailers, unlike sample prices of CGPI, which are transaction prices among corporations.
- II. Specifications for each product are taken from the “BCN Ranking” and brochures of the products.
- III. The numbers of the observations for desktop PCs and notebook PCs are 156 and 382 respectively. The data from 2011/Q1 to 2011/Q4 are used to estimate the hedonic regression models, which are adopted from February 2012 for the quality adjustment. When the observations include the data of the same products as shipped in several quarters, the first data are used for the estimation³.

¹ For more details, see the [Outline of “Corporate Goods Price Index \(CGPI, 2005 base\)”](#) on BOJ website.

² BOJ adopts two hedonic regression models, one for desktop PCs and one for notebook PCs.

³ Sample prices of CGPI are usually replaced by the prices of corresponding new products soon after the release. Therefore, the use of the first observation to estimate may be the best corresponding to quality adjustment of sample prices.

Estimation Result for Desktop Personal Computers

Estimated Model	2011/Q1~2011/Q4	(Ref.)2010/Q3~2011/Q2
	Box-Cox Model	Box-Cox Model
Box-Cox Parameter of Dependent Variable	0.449	0.112
Intercept	-377.302 ***	10.380 ***
Cache (L2+L3) (MB)	13.118 ***	0.145 ***
Box-Cox Parameter	0.586	1.173
Main Memory (MB)	1.07E-14 ***	2.12E-17 ***
Box-Cox Parameter	4.047	4.287
Hard Drive (GB)	225.058 ***	3.107 ***
Box-Cox Parameter	-0.304	-0.217
Display Size (pixels)	4.33E-05 ***	0.005 ***
Box-Cox Parameter	0.955	0.233
Dummy Variables		
CPU		
Core i5	12.281 ***	0.254 ***
Core i7	18.504 ***	0.327 **
Graphics		
Graphics Memory	19.339 ***	0.360 **
Display Type		
3D	32.850 ***	--
Optical Drives		
Blu-ray Disc Drive	23.142 ***	0.309 ***
Interfaces		
USB3.0	13.899 ***	0.310 **
Wireless Communication		
Bluetooth	9.009 *	0.254 **
Wireless LAN	--	0.288 ***
Pre-installed Application		
Microsoft Office Personal 2010	24.395 ***	0.773 ***
Microsoft Office Home and Business 2010	32.211 ***	1.024 ***
Producer		
Producer A	36.169 ***	0.935 ***
Producer B	22.743 ***	1.214 ***
Producer C	22.102 ***	0.631 ***
Producer D	36.232 ***	1.959 ***
Producer E	26.529 ***	0.475 **
Producer F	10.616 *	0.374 ***
Producer G	--	0.516 ***
Period		
2010/Q4	--	-0.538 ***
2011/Q1	--	-0.774 ***
2011/Q2	-14.691 ***	-1.090 ***
2011/Q3	-25.414 ***	--
2011/Q4	-43.178 ***	--
R ²	0.973	0.953
Adjusted R ²	0.969	0.947
Standard Error of Regression	15.710	0.421
Mean of Dependent Variable	395.691	23.700
Number of Observations	156	191

Estimation Result for Notebook Personal Computers

Estimated Model Box-Cox Parameter of Dependent Variable	2011/Q1~2011/Q4	(Ref.) 2010/Q3~2011/Q2
	Box-Cox Model	Box-Cox Model
Intercept	-1,285.127 ***	-837.370 ***
Cache (L2+L3) (MB)	33.413 ***	2.621 ***
Box-Cox Parameter	-1.024	0.537
Main Memory (MB)	557.791 ***	468.158 ***
Box-Cox Parameter	-0.397	-0.511
Secondary Storage (GB)	27.598 ***	6.815 ***
Box-Cox Parameter	-0.087	-0.047
Display size (pixels)	3.047E-12 ***	1.089E-22 ***
Box-Cox Parameter	2.106	3.706
Battery Life (minutes)	3.360E-06 ***	5.446E-03 ***
Box-Cox Parameter	2.480	1.182
Dummy Variables		
CPU		
Core i-7	18.765 ***	4.161 ***
Secondary Storage		
SSD (Solid State Drive)	41.507 ***	8.283 ***
Graphic Accerlater		
Local Graphics Memory	7.523 **	3.167 ***
Display Type		
3D	22.164 ***	7.699 ***
Touch Panel	45.333 ***	16.786 ***
Optical Drives		
Super Multi-Drive or Super Multi Double Layer Drive	--	2.296 **
Blu-ray Disc Drive	8.612 ***	2.901 ***
Interfaces		
Bluetooth	8.877 ***	4.314 ***
USB3.0	7.722 ***	4.415 ***
Fingerprint authentication	21.646 ***	--
Wireless Communication		
WiMAX	12.990 ***	3.648 ***
TV Tuner		
Digital Terrestrial Broadcasting	20.998 ***	4.431 ***
Operating System		
Windows 7 Professional	9.379 **	2.817 **
Pre-installed Application		
Microsoft Office Personal 2010	22.133 ***	6.768 ***
Microsoft OfficeHome and Business 2010	28.801 ***	8.679 ***
Producer		
Producer A	--	7.925 ***
Producer B	15.404 ***	7.942 ***
Producer C	16.852 ***	8.147 ***
Producer D	--	5.247 ***
Producer E	63.478 ***	24.675 ***
Producer F	55.123 ***	19.059 ***
Period		
2010/Q4	--	-4.046 ***
2011/Q1	--	-6.925 ***
2011/Q2	-4.212	-8.916 ***
2011/Q3	-10.078 ***	--
2011/Q4	-18.408 ***	--
R ²	0.907	0.926
Adjusted R ²	0.900	0.921
Standard Error of Regression	18.333	5.546
Mean of Dependent Variable	274.504	120.935
Number of Observations	382	387

Notes:

1. *, ** and *** denote significance at the 10%, 5% and 1% level, respectively.
2. "Secondary Storage" is the sum of Hard Drive and Solid State Drive.