



BANK OF JAPAN

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The Theory and Practice of Quality Adjustment for SPPI - Examples of Bank of Japan -



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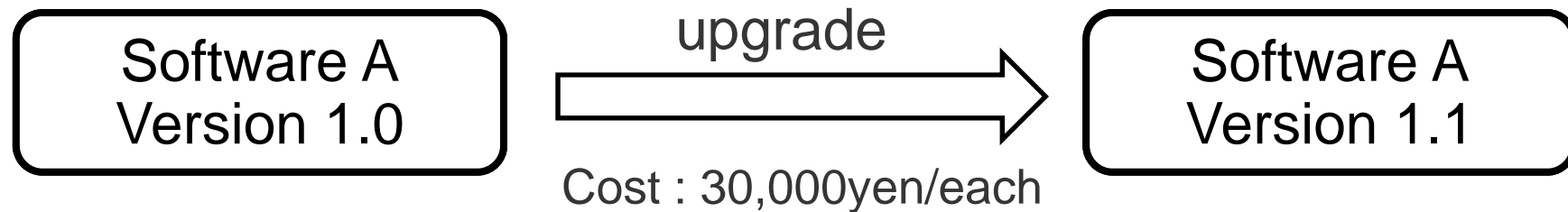
From a Practical Point of View on QA

- ✓ BOJ employs production cost method on quality adjustments for SPPI/PPI in most cases.
- ✓ In practice, it becomes more difficult to obtain information about production cost from service providers/manufactures year by year.
- ✓ In this circumstance, it is important to take consider the operability in choosing QA methods.
- ✓ So, It is very useful to share knowledge and discuss about examples of QA in the VG meeting.



Example1: QA for Software Services

- ✓ Production cost method is employed for QA in the software services
- Development cost of upgrading software
= the valuation of quality improvements



	Observed Price	Quality Adjustment	Quality Adjusted Price	Price Index
Version 1.0	300,000	-	300,000	100
Version 1.1	320,000	30,000	290,000	96.7



Example 1: QA for Software Services (cont.)

- ✓ Typical problem is whether we should recognize “fixing bugs” as increase of qualities or not.
 - Consumers may not evaluate “fixing bugs” as increases of qualities.
 - However, under complete information, the price must be determined with implicit consideration of bugs in the software under complete information in principle. Then, we should recognize “fixing bugs” as increases of qualities.
 - Under incomplete information, how should we treat “fixing bugs ” in QA for software?



Example2: QA for Advertising

- ✓ In QA for advertising, the number of viewers could be used as an quality measure.

<Assumption>

Advertising effectiveness increases in proportion to the number of achieved viewers.

$$\text{Advertising Effectiveness} = \text{Achieved Viewers} * \text{Buyers / Viewers}$$

assuming this rate is stable

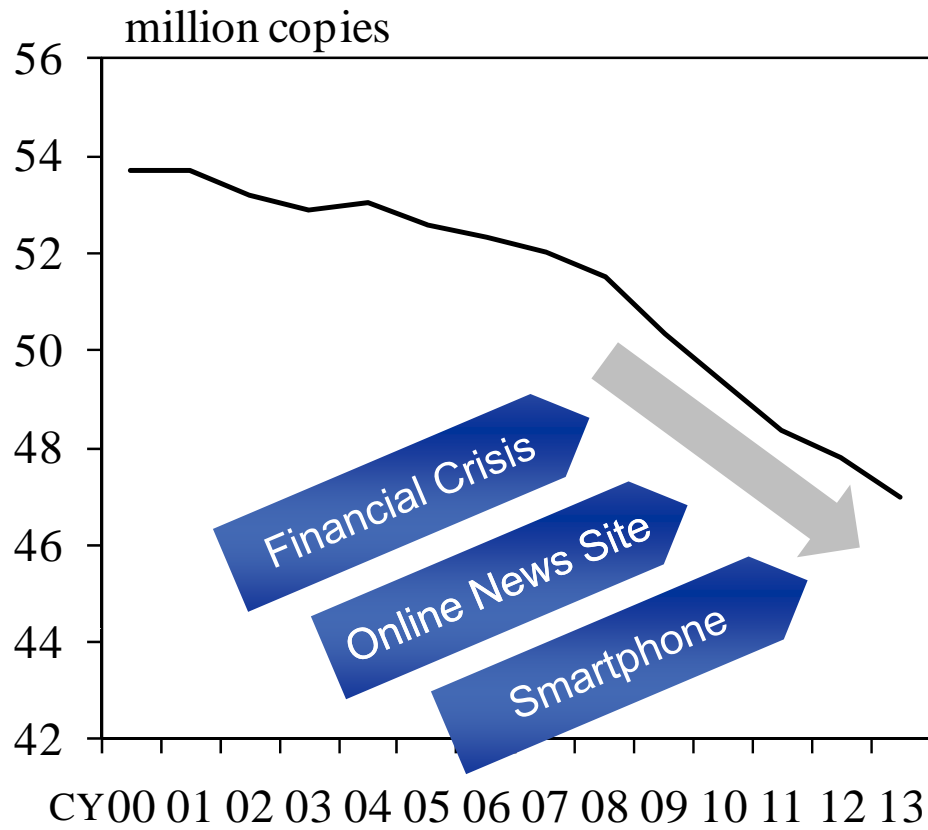
- ✓ BOJ employs this method for Advertising.



Example2: QA for Advertising (cont.)

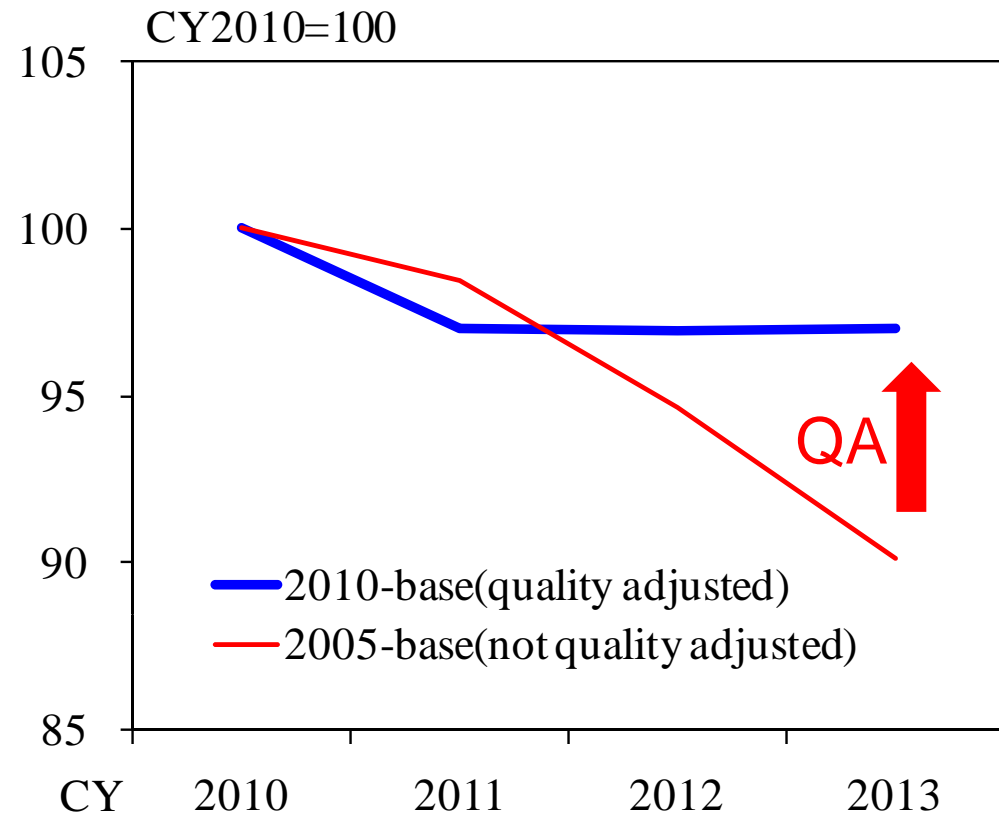
Ex. Newspaper Advertising

(i) Newspaper Circulation



(Source)Nihon Shinbun Kyokai

(ii) Indexes for Newspaper Advertising



Example2: QA for Advertising (cont.)

- ✓ QA based on number of viewers is not always reliable.
- In actually, various factors define advertising effectiveness.
- For example, if an advertiser is deeply involved in the design of TV program, the advertising effectiveness will increase more than usual.

$$\text{Advertising Effectiveness} = \text{Achieved Viewers} * \text{Buyers / Viewers}$$

this rate is variable

→ After all, how to define and measure “quality” is a critical issue.



Example3: QA for Aging-Bias of Office

<Quality of Office Space>



1, 2, 3 : No changes of qualities when same offices are surveyed

4: Aging-bias in the price of office building



Example3: QA for Aging-Bias of Office (cont.)

- ✓ BOJ has adjusted aging-bias of office building since CY2010.
- ✓ Based on average data of office buildings:
 - (a) Pattern of decline in value of building and facilities
 - (b) Pattern of investment for renovation
 - (c) Value of property
 - (d) Age composition
 - BLS employs hedonic approach for adjustment of rent. However, hedonic approach is too much cost for our operation.
- ✓ Estimated aging-bias rate: 0.5%-1.0% / year

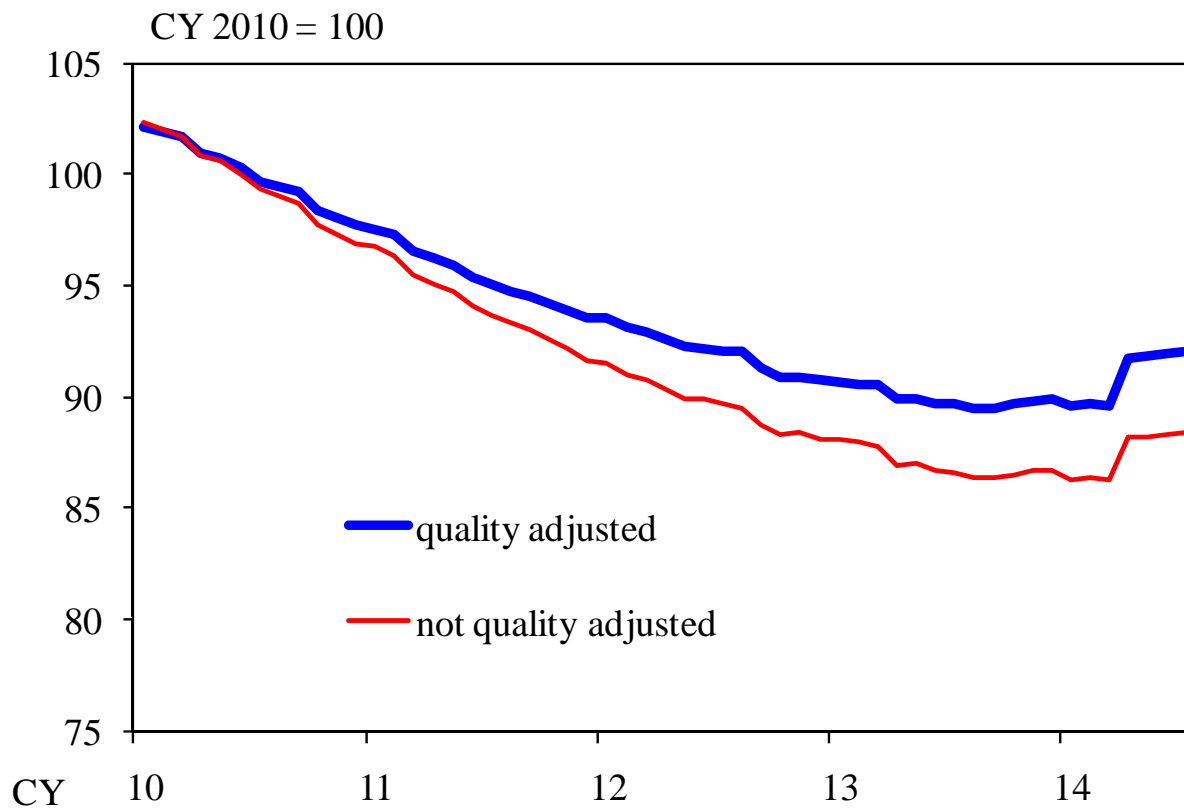


Example3: QA for Aging-Bias of Office (cont.)

(Example) Price Index of Office Rental for Tokyo Area

(i) Price Indexes before/after QA

(ii) QA rate for Aging-Bias



	Annual rate, %
	Tokyo
2010	0.55
2011	0.60
2012	0.61
2013	0.61
2014	0.64

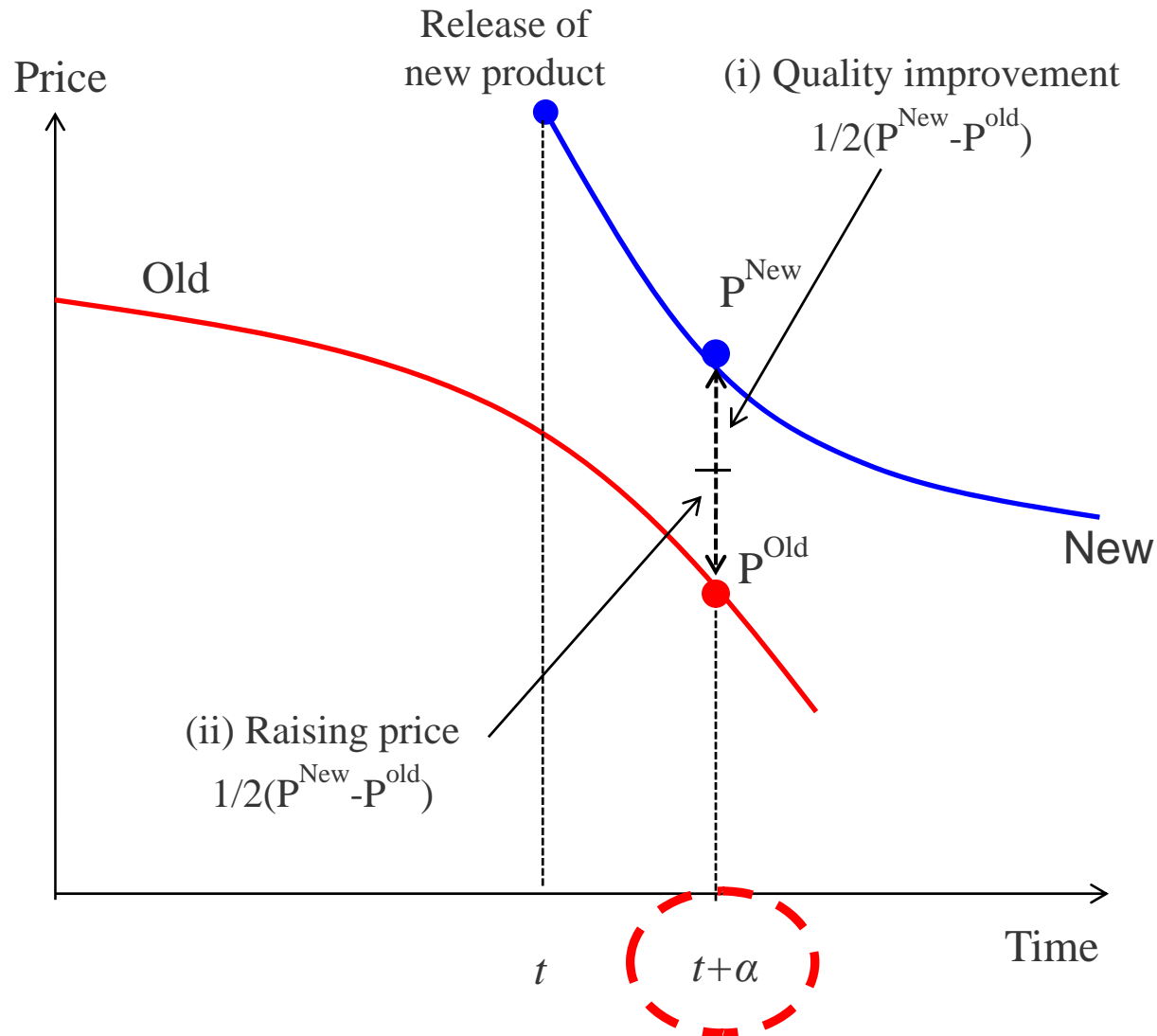


Future Steps: QA based on Market Price

- ✓ In practice, it becomes more difficult to obtain information for production cost method from service providers/manufactures year by year.
- ✓ In this circumstance, we try to employ QA methods based on market information for more goods/services.
 - More employment of hedonic method
 - Study of QA and pricing method based on data from price comparison sites.



QA based on Market Price



✓ Quality adjustments based on market price data under the assumption as detailed below;

$$\frac{1}{2}(P^{\text{New}} - P^{\text{Old}}) \text{ at time } t+\alpha =$$

- (i) quality improvement
- (ii) price raised at releasing new product

- ✓ "α" differs due to each product cycle and sector-specific tendency of pricing.
- ✓ Each "α" should be empirically estimated.



Closing

- ✓ Under complete market, no discrepancy between production function approach and consumer utility approach in general equilibrium
→ *More importance on consideration for the operability of QA*
- ✓ Of course, under incomplete market, need to be more careful about QA
→ *Very useful to share information and discuss about examples of QA in the VG meeting.*
- ✓ More study on QA method under the practical constraint

