

# Simple Methods of Explicit QA for Services in Complex Pricing Schemes<sup>1</sup>

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**Abstract:** The paper addresses cases where more or less complex pricing schemes for services are normally applied. A number of case studies for Austria for different areas are presented. According to EU Regulations it was tried to use explicit methods for quality adjustment, i.e. explicitly estimating the amount of the difference in quality. It was also tried to use relatively simple methods which can be applied without comprehensive additional surveys and without the use of econometric or hedonic methods.

The cases studied relate to:

- QA for cars – in order to explain the principle
- Package tours – changes of the hotel services and of the duration of the tour
- Hotels – in comparison to package tours
- Driving schools – changes in the legal situation
- Hospital fees vs. Parking fees– raises from a zero price to a positive price
- Telephone charges – changes in the structure of the market suppliers and in the consumption habits of the consumers
- Banking fees – changes in the packages and in the consumption habits of the consumers

The paper might be seen as a contribution to increase the number and the range of explicit QA procedures in an area where up to now only few studies have been made available.

## 1. Introduction

Statistik Austria is a Central Office of medium size. In addition it was not possible to recruit many staff for academic research. Therefore we focused on relatively simple QA methodology which use much of the available information and comply with EU legislation. It was important to develop QA methods which are not too expensive and which can be applied relatively quickly in order to maintain the monthly publication. Discussion of hedonic

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<sup>1</sup> The paper is also part of a research project (Lot 1) of Statistik Austria. It will be further elaborated and be part of the reports to Eurostat.

<sup>2</sup> The paper reflects the views of the author only and not necessarily those of the federal institution Statistik Österreich.

methods often mention the potential high costs (e.g. Schultze, C. and Mackie, C. (2001) and Koskimäki and Vartia (2001)). The aim was also not only to be cost efficient but also to be significantly above minimum standards for QA, although the perhaps highest and most perfect standard might not be reached. The principle to be applied might be abbreviated as: **Preferably be approximately right than perfectly wrong.**

The Austrian system for the treatment of prices includes the quality adjustment procedures for the Austrian CPI as well as for the HICP. For methodological, technical, organisational and practical reasons the price collection and all validation refers to the same set of prices for CPI and HICP. Therefore all improvements that have been made for QA apply for both indices. Such improvements result from the implementation of new EU-Regulations and from improvements for national uses. The latter are only a tiny minority because of the innovative speed derived from the EU-Regulations.

In EU-Regulation Nr. 1749/96 Article 5 minimum standards for procedures of quality adjustment for the HICP are laid down as follows (from HICP Compendium, Eurostat 2002a):

1. HICPs for which appropriate quality adjustments are made shall be deemed to be comparable. Where quality changes occur, Member States shall construct price indices by making appropriate quality adjustments based on explicit estimates of the value of the quality change. In the absence of national estimates, Member States shall use estimates based on information provided by the Commission (Eurostat) where these are available and relevant.

2. Where no estimates are available, price changes shall be estimated as the difference between the price of the selected substitute and that of the item it has replaced. In no case should a quality change be estimated as the whole of the difference in price between the two items, unless this can be justified as an appropriate estimate. Where replacements have to be made after goods or services have been offered at reduced prices, those replacements should be selected according to their similarity of utility to the consumer and not according to similarity of price.

Except for cases with really very small changes it was tried to follow the procedure mentioned in paragraph 1. Paragraph 2 procedures (quality change as the whole of the price change with justification) is only applied for really big changes.

## **2. Overview: quality adjustment in selected COICOP classes in the Austrian HICP in 2002**

Table 1 below is derived from the Austrian CPI/HICP. The distinction is made between operational procedures rather than between major and minor changes in product specification.

### **3. The principle of supported judgemental QA (example: cars)**

#### **3.1 *Minor changes (options, small improvements of the machine)***

The principle can be illustrated with the well known option price method for cars: In case of a former option becoming standard now in a certain kind of car models several countries in the EU ask for the price of the former option. The approach is then that for some of the consumers the improvement is so big that they are in a position to pay more for it (namely the former price of the option) while for others the improvement was not worth the price. But still it should be noticed that the additional extra is a priori seen as an improvement or at least as equal to the predecessor.

**Table 1**

<b>Price collection and QA statistics and kind of QA procedure</b>		<b>07.1.1 Cars</b>	<b>09.6.0 Package tours</b>	<b>11.2.0 Hotels</b>	<b>CPI/HICP Overall Index</b>
12N	Number of price observations per year	1501	1068	4788	481.220
12#	Number of changes per year	81	35	23	14.162
N	Number of price series per month	125	89	399	40.102
#	Average number of changes per month	7	3	2	1.180
%	<i>Percent changes = replacement rate</i>	<i>5,4</i>	<i>3,3</i>	<i>0,5</i>	<i>2,9</i>
<b>of which (% of all changes):</b>		<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Q4	Full price change is deemed as quality change	12	6	30	12
Qx	Part of the price change is due to quality change	54	49	13	18
QZ					
Q0	Price and quality move in different directions	4	11	0	3
S	Essentially equivalent, no quality change, full price change	26	14	17	54
W4	Major outlet change, price difference is equal to quality change	0	6	39	6
W0	Small outlet change, essentially equivalent	4	14	0	6

Most of the EU-countries who practice option pricing use the share of 50% of the former option price for quality adjustment (Final report from Task Force QAS, Eurostat 2002c). This takes into account that not all of the consumers appreciate the option by being prepared to pay a higher price for it.

A similar calculation is performed for changes in the power of the machine which is also assumed to be seen as important for half of the consumers and negligible for the other half.

Moreover an informal tentative survey has been performed among Austrian car dealers about the share of their customers being willing to pay higher price for additional options. The popularity of options ranged typically between 20% and 70%, extreme shares like 5% or 95% did not occur. This again is an argument to approximate quality of the option by 50% of its former price.

For changes in fuel consumption the assumption is slightly different: All (100%) consumers will perceive a lower fuel consumption as better quality which can be translated into real money. In such cases the difference in operation costs for three years is calculated based on average car use and average fuel costs. The full result is taken as quality improvement because it is assumed to relate to all consumers.

If the result is an improvement but the price change is a decrease – price and quality move in different directions – the price change is increased by the amount of the quality change.

### **3.2 Major changes (mainly size)**

In a new approach Eurostat tried to elaborate the conceptual frame of the HICP as being an index of fixed basic purposes (Eurostat 2003). The purpose (related to use) of the car in Austria is seen as having three dimensions of roughly the same importance. These three dimensions are:

- Size of the vehicle (perhaps the most important, but difficult to measure e.g. by length, height, weight, luggage space.....)
- Power for transportation (variables like motor power, maximum speed, torque etc., changes can be treated as mentioned above)
- Luxury (represented by the extras, changes can be treated with as above).

Major changes have an impact on one or more of the size variables. In that case the numeric difference of the variable is calculated and one third of it (according to the three dimensions) is compared with the price difference. If these are of the same size or if the quality change is bigger, then link-to-show-no-price-change is applied, otherwise the share of the quality change is rounded to (normally) 75% or (in some cases) 50% or 25% of the price change.

If the result is an improvement but the price change is a decrease – price and quality move in different directions – only the direct price change is taken into account because the calculation of the value of the quality difference is not as precise as above.

## **4. Package tours – changes of the hotel services and of the duration of the tour**

In this area changes of the following type occurred:

- Changes from Bed&Breakfast to Half board and vice versa
- Changes from three meals per day to ‘all inclusive’ and vice versa
- Additional extra (a concert was included)
- Changes in the duration of the trip (one day difference for bus travels)
- Changes of the hotel and of the location

The first four types of changes were deemed to be smaller, i.e. explicit QA was tried. In the fifth case the overlap linking procedure was used. The underlying assumption was that the first four types of changes reflected typical consumer trends. Also the QA was easier because the type of the hotel and the location remained fixed. The last type of replacement, when it was not possible to find a similar hotel in the same region (without actually going there).

### **4.1 Minor changes (extras in the service)**

Where an additional meal was provided the quality difference was estimated with respect to previous price differences or with price differences of similar providers. A source which is very often available for package tours is the information about an additional day or week to stay.

In case where a ticket for a concert or the like is included in the price of the package tour this price was estimated with the help of the provider.

Where small changes in the duration of the bus trip occurred the length of the trip was used in the QA procedure. The observed cases did not involve the bus to stay or drive longer the only difference were the duration and the hotels and meals provided.

In all cases above it was assumed that the range of available services is so large that for those consumers who purchased a package tour the full option price was treated as quality change.

#### **4.2 Major changes**

Changes in the region and location of the hotel (e.g. the other side of the island) occurred in combination with change of the producer. In such situations explicit QA was not applied but rather implicit methods (overlap, as described in Eurostat 2001).

The seasonal impact of the price movement is quite strong in the area of package tours, so the overlap took into account the respective month in the last year. As an improvement a 12 month average or another average might be used.

### **5. Hotels – only few changes in the services**

The price collection of hotels refers to locations all over Austria according to the importance of tourism. It is rather focused on rural areas in the Alps.

As can be seen in the table above, for hotels changes occurred much less frequent than in the average of the CPI/HICP and also less frequent than e.g. for package tours. This might be an indication for perhaps either a steady market or an impact of the price collection. In the first case the Austrian hotels would change slower than in the other major holiday regions, in the second case this could result in a problem of Representativity in the longer term. It also has to be mentioned that the difference in the price collection (catalogues for package tours, direct price collection by mail for Austrian hotels) might have an impact on the replacement rate.

In the few cases mentioned QA was applied for improvements of the room (e.g. TV) or for changes in the kind of service provided (with/without breakfast). However, the QA procedure used is the overlap procedure, but the length of the overlap period is normally 6 months or 12 months. This rather long period compared with other areas of the CPI might improve the robustness of the overlap procedure.

As only few changes occurred it did not seem necessary to develop sophisticated QA procedures (and perhaps vice versa: as no sophisticated QA procedures existed, the replacement rate was tried to be kept rather low). But the simple number of cases – far below average – can indicate the necessity of a review of the sample or the review of replacement procedures. In any case the simple recording of the replacement rate gives an indication of potential differences which are perhaps not intended.

### **6. Driving school – changes in the legal situation**

#### **6.1 The situation**

According to the HICP principle that the product definition should be according to the purpose of consumption the price collection for driving schools is related to the legal requirements to getting a driving license. Up to December 2002 that included:

- Theoretical lessons (including papers for that and including first aid)
- 20 practical driving lessons
- preparatory exam and exam in theory and practice, exam fees are normally collected by the driving school

From beginning of 2003 this was changed into:

- Theoretical lessons (including papers for that and including first aid)
- 18 practical driving lessons
- preparatory exam and exam in theory and practice, exam fees
- 2 follow-up lessons 3 and 9 months after the exam, respectively
- 2 lessons of group discussion after the follow-up lessons
- additional driving security training 6 months after the exam

The follow-up lessons can be paid within the package and will in almost all of the cases be provided by the same driving school. The driving security training is at the moment paid separately and not provided by the driving school but by the driving association clubs.

### **6.2 *The principle of the replacement and QA procedure***

The replacement takes into account that a majority (all) consumers will purchase the new variety of the service (because it is a law) and therefore the change is implemented in the first month the new service is available. It takes also into account that the two items differ in functionality and in the extent to which the purpose is fulfilled. This is done in the following way:

- The reduction of the required practical lessons is a quality decrease, but
- This decrease is fully compensated by the two follow-up lessons despite they take place at a later stage
- The two lessons of group discussions are worth significantly less than the driving lessons because they take place in a group and do not require a car, as perhaps half of the consumers prefer the change only 25% of the price is taken into account
- The additional driving security training is treated as quality improvement according to the 50% option principle

### **6.3 *The practical implementation***

The price change from the (virtual) old price to the new price was calculated in the following way:

package of the previous month (20 driving lessons deemed to include the 2 follow-up lessons)  
 +  $\frac{1}{4}$  price of the two follow-up group discussion lessons  
 +  $\frac{1}{2}$  price of the driving security training  
 = virtual old price

new price = package including all follow-up and security training

The above mentioned methods and principles were developed in January 2003 within one month. The price collectors got little initial information and the method was fully developed at the end of the month. The implementation of the QA method requires two additional price observations. For both information was available from the providers. For the follow-up lessons a range was specified (70.- to 90.- €). In case of the absence of an observed price for the former option the price validation team should estimate the price with respect to the general price level of the driving school. For the security training the price happened to be uniform for all Austria and the price collectors and the validation team were provided with that information (135,40€).

The implementation resulted in an 11% price increase of driving schools, overlap linking or link-to-show-no-price-change or bridged overlap would have resulted in an almost zero price change.

## **7. Parking fees vs. Hospital fees (out-patient treatment) – raising from a zero price to a positive price**

In both cases the price of a good which was free of charge before had a positive price because of new legal acts. The guiding principle was based on EU-Regulation 1687/98 Article 1 (3) which states (HICP Compendium, Eurostat 2002a)

- (a)(3) Prices used in the HICP are the purchase prices paid by households to purchase individual goods and services in monetary transactions. Where goods and services have been available to consumers free of charge, and subsequently an actual price is charged, then the change from a zero price to the actual price, and vice versa, should be taken into account in the HICP.

This might actually be a new situation for CPI statisticians as it does not occur very often. The reason for this paragraph was the idea that price changes from e.g. 0,01 € to 15.-€ should be treated in the same way and with a similar result as changes from 0.-€ to 15.-€. Such changes are particularly important in the area of publicly administered prices.

According to the tariff Regulation 2646/98 Art. 5 only the consumption pattern before the tariff change is relevant and not the resulting pattern after the change. However this regulation leaves open the possibility for QA procedures. If the change in the tariff system goes along with a change in the quality of the service provided then QA procedures should be applied.

### **7.1 Parking fees**

In the city centres usually the public space is short and expensive. Therefore an increasing number of cities introduce parking fees in an increasing part of their area. On the one hand the parking time is limited to 1-2 hours with typical prices of 1.-€ per hour(during daytime). On the other hand the people who live in the area can buy an annual resident parking permission (at approx. 150.-€ per year) which allows them to use public parking space.

Both kinds of parking fees are of course included in the HICP, so the price development of the existing parking tickets is observed. But in case of an enlargement of the area where parking is charged or of the new introduction of annual resident parking tickets the CPI/HICP did not show this as a price increase but as a quality increase. The new fees were brought into the index by linking.

The reason for this treatment was that the more efficient management of public space increased in fact the availability of parking space for non-residents and also the general availability of space for residents. The view is supported that often a majority of the population is in favour of such measures.

## **7.2 Hospital fees for out-patient treatment**

A somewhat different situation occurred when the government introduced a new fee for out-patient treatment in hospitals – a service which is very common in Austria. The new fee was 11.-€ in a standard situation where the local doctor sends a patient to the hospital. The service at the hospital itself was not changed after the introduction of the fee.

Therefore the change in the charging system did not involve any quality adjustment. The introduction of a new fee was treated as price increase.

The calculation procedure for the CPI/HICP used of the consumption structure of out-patient treatment before the introduction of the new fee. A weighted average price was calculated for those consumers who visited the hospital being sent there by a local doctor (11.-€), coming there on their own (more expensive), coming there very often (maximum fee is 72.-€ per year) or with a child (free of charge). The resulting price change was a monthly change of +3% in the division 06. Health in May 2001 and an impact on the overall HICP of 0,12 percentage points on the overall inflation rate. As a matter of fact an eventual shift in the consumption pattern could not be measures until now.

Retrospectively, it has to be said that the administration was not successful in collecting fees from all patients and the gains from this measure are well below expectation. However the CPI/HICP did not (and could not) take these administrative shortcomings into account but regarded them as individual discounts. Consistently, when at the moment it is planned to abolish this fee the inflation rate can be expected to drop by 0,12 percentage points.

## **8. Telephone charges – changes in the structure of the market suppliers and in the consumption habits of the consumers**

For telephone charges a national average price is calculated, for which weights are used according to the kind of tariff and the consumption habits. (New suppliers are included for mobile phones if their market share exceeds 10% and will be included for fixed network telephone as soon as their market share is more than 10%.)

### **8.1 Suppliers**

All telephone suppliers provide high quality services, every point in Austria can be reached all have help desks and all are controlled by a central governmental institution. Once they have reached a market share of 10% their services are considered as essentially equivalent to each other. Therefore the market share is taken as weight for the average price of the respective supplier. The weighted national average price is calculated without further quality adjustment.

### **8.2 Changes in the tariff structure**

The price is calculated as weighted average for one hour telephone use. Changes in the tariff structure occur from time to time, e.g. special prices are charged if people wish to make more calls on the weekend or wish to select friends where calls are available at a reduced charge.

In the CPI/HCIP it is assumed that the people have selected that kind of tariff that fits them best from the given total list. All changes in that list of available tariffs of all suppliers are treated as essentially equivalent. If a new and cheaper option comes on the market this will show up as a price decrease, if a cheap option vanishes this will be reflected as a price increase.

### **8.3 Changes in the consumption pattern**

The price is calculated as weighted average for the average consumption pattern (of timing: peak and off-peak calls) for each supplier and for each kind of tariff on the base of one hour telephone use. Changes in the consumption pattern of timing are deemed to have no impact on the measured inflation. Changes from a peak call to an off-peak call are therefore treated as having fully different quality (price difference=quality difference).

The reasoning for this last point seems perhaps weak at the moment. One point might be that for the issues mentioned before (changes in suppliers and tariff structure) no functional or objective difference could be detected. For the above mentioned timing consumption pattern the restriction of the time for the call and availability of telephone partners might be considered as quality issue. However it remains open whether the full price difference should be counted as quality difference.

## **9. Banking fees – changes in packages and in consumption habits of the consumers**

For banking fees the price collection observes the prices of several standard packages of services in combination with account management. When the cheques were not available any more no QA was applied because the population had already ceased to use cheques long before. This was therefore deemed as a minor change, the replacement product was essentially equivalent, the fact that the cheques were not available had an impact of 0.-€.

Contrary to that the new possibility of internet banking is seen differently. According to Eurostat 2003 (and the earlier Eurostat 2002b) internet banking is seen as a new basic purpose. It is made from home and a PC equipment and internet access is needed. Therefore internet banking is seen as a major change to traditional banking and the introduction will not change the index level.

It might also be seen as a change of the basic purpose itself but there is no common general definition up to now.

## **10. Conclusions**

For goods several approaches for explicit QA methods exist and numerous studies contain proposals for QA procedures including hedonics. For services the range is much smaller.

The paper describes a simplified method for QA for cars (which can of course also be used for other consumer durables) and provides proposals to apply the same principles for some areas of services and to extend the range of QA procedures also in these areas.

If explicit QA procedures are seen as generally superior to implicit ones the underlying principles might be accepted and applied in an even broader context. The implementation of

these principles in official price statistics will perhaps be guided by conventions and agreements.

It might also be interesting to test hedonic models on services like hotels or package tours and to compare QA procedures based on option prices with the results from regression calculations.

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