PRICE INDEXES

FOR COMMERCIAL SERVICES

The French experience

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Distributive trade provides the service of putting goods at the customers'disposal in the very manner and at the very place they want or need it.

Commercial services include the following component, in proportions which vary from one shop to another and according to the product sold, to the type of customer and to the form of selling:

- **accessibility to the product** which may be physical (purchases from the producers, bulk purchases, splitting in smaller quantities or into containers), spatial (self-service, possibility of car parking, home delivery), temporal (opening period, days of opening, delivery delays) and, eventually, economic (e.g. low priced products);

- **non material services** like providing advices, guaranteeing the quality of the goods and their appropriateness to the the final users'tastes;

- **financial services** like credit opening for the customers, assuming currency risks on imports or exports, assuming the risk of the purchasers'insolvability.

The **production of commercial services**, defined as above, is measured, at current prices, by the difference between the value of the sales and of the cost of acquisition of the products sold. The margin ratio (value of the production divided by the value of the sales) varies according to the nature and the extent of the commercial service.

Like most of the economic aggregates, the production of commercial services is analysed by separating price and volume changes. The present paper describes and discusses the methods used in France to achieve this operation.

CONCEPTUAL DIFFICULTIES

The main difficulty comes from the impossibility of making a precise definition of the unit of commercial service, regardless of the good it refers to and of the purchaser. For example, the non-material services of providing advices and of guaranteeing the quality are actually co-produced by the shopkeeper and his customer and may depend as to whether the latter is curious, in a hurry or indecisive. To some extent, the logistic service produced by a self-service shop or by a very large parking lot depends upon the ability of the clients to use them: all things being equal, the logistic service effectively produced increases with the motorisation rate.

Besides the problem of definition, lies a problem of observation. Unlike the goods it "accompanies", the commercial service is, most of the time, entirely consumed at the very moment it is purchased; subsequently, the statistical assesment of its price and of its actual content is rather difficult to make. The classic theory of price does not therefore apply to the commercial service: the buyers do not know its exact price (but they know its quantity) since they obtain only a global information on the price of the set "good+commercial service".

In fact, the only data which is available in any case is the payment the shopkeepers "succeeded" to obtain from the customers, but without any information on its actual content, on the goods to which it refered or on the way it has been obtained (sales for example).

THE BASIC HYPOTHESIS

The impossibility of achieving a direct observation of prices and of volumes of commercial margins has to be overcomed by setting down some operating hypothesis. These focus on the time-to-time changes of the volume of commercial services. The resulting price index can therefore be called implicit.

The basic hypothesis can be presented as follows:

- for a given form of selling,

- for a given good,

- for a given use of this good,

the volume of commercial services produced varies like the volume of the good it refers to.

In other words: **for each form of selling and each use of a given good, the volume of commercial services per unit of good is constant over time.**

FIRST COMMENTS

1. The hypothesis refers to time-to-time movements but does not say anything about the differences in quantity of commercial services when the good or its use or the form of selling are changed. In particular, it is not assumed that differences in margins reflect differences in the actual quantity of commercial services. A fortiori, there is no evidence of a correspondence between the hierarchy of margin ratios and the volumes of commercial services.

2. The reference to time is imprecise: is the stability of the volume of commercial services per unit of good valid in the short, medium or long run, or in any case?

3. There is no geographical reference; yet, all things being equal, commercial services are not the same whether delivered in a small town, in a very large one or in a mountain village. This remark meets, partly, a former one which dealt with the logistic service produced by a car parking.

4. The necessary consequence of the hypothesis is that commercial services are not consumed for themself; in particular, they cannot be explicit arguments in the consumer's utility function, while they only weaken his economic and time constraints.

5. The robustness of the hypothesis and its acceptability depend fundamentally upon the homogeneity of the three classifications at the intersection of wich the volume of commercial service is assumed to be constant over time - i.e form of selling, elementary good, use of the good.

CALCULATION ACTUALLY MADE

The respect of the basic hypothesis requires the knowledge of:

- the commercial margins for the base year;

- the movements, in quantity and price, of the sales for each cell of a classification crossing forms of selling, goods and uses of the goods.

The French statistical system does not permit to obtain all the necessary information. Some methodological simplifications are therefore required:

- the forms of selling are considered to be the same as the elementary levels of the French classification of activities;

- the structure by goods and uses is taken into account when computing the turnover price index for each commercial sector, but the calculation is not actually made for each couple "good*use". Since the margins of the base year are not known for each form of selling, such a calculation is useless anyhow.

When these simplifications are adopted, their application needs some elementary calculations which are presented in Annex 1. The principal results can be expressed as follows:

- the volume index of production of commercial services between periods 0 and 1 is the Laspeyres index, weighted arithmetic average of the elementary turnover volume indexes, the weights being proportional to the margins at period 0;

- the price index of the production of commercial services between periods 0 and 1 is the Paasche index, weighted harmonic average of the elementary turnover price indexes, the weights being proportional to the margins at period 1.

The margin ratio of each elementary sector plays obviously an important role in the previous calculations. This concept is somewhat different from the one refering to the products, i.e. mark-up, which is obtained by dividing sale price by purchase price. The margin ratio is, in a way, the "ex-post" average over the whole year and the whole range of products of the different mark-up ratios.

The margin incorporates also other particular elements that one cannot directly link to the sales: rebates, reductions and discounts the shopkeepers obtain from their suppliers and that constitute the "back-margins". At this point of the analysis, it should be recalled that a certain quantity of commercial services (transportation to the shop, installation on the counters, advertised promotion...) is, in fact, made by the producers, free of charge for the traders. Since there is no information on how this reduction of costs of production of commercial services is taken into account in the margins, the "volume-price" repartition of the margins changes remain rather imprecise.

At last, an other element interferes in the calculation of the commercial margin: **inventory re-evaluation**. It is defined by the difference between the value of stock variations as incorporated in the enterprise balance-sheet and what would be these stock variations if opening and closing inventories were estimated at the annual average purchase price. For example, when prices increase within the year the

inventory re-evaluation is positive; on the opposite, when prices decrease,it is negative.

As it is considered that the evolutions of the price index of commercial services should not be "polluted" by this accounting effect, the margins used in the previous calculations are taken free of inventory re-evalution

However , since inventory re-evaluation increases when the annual price index increases, its elimination from the value of the production of commercial services has different consequences if the economy faces increasing or decreasing prices (a numerical example is provided in Annex 2).

DISCUSSION OF THE ACTUAL METHOD

The main problems of the method described above concern the viability of the approximations with regard to the general method. The focus will now be put on:

- the absence of a reference to the products sold beyond the calculation of the turnover price index for each elementary sector;

- the heterogeneity of the elementary sectors when the services provided and the products sold are considered.

Absence of reference to the products

The variations of margin ratios for each elementary activity sector are looked at without taking into account the divergent developments of the sales on products very different in terms of mark-up ratios. This results in the inclusion in the increase of the commercial service price of what should normally be considered as an increase in volume. The following example will demonstrate this remark:

one sector (or one enterprise) sells two goods at two differnt prices, the mark-up ratio of the first one being higher than that of the second one. Both prices are assumed to be constant over time, but the demand for good 2 is increasing quicker than for good 1.

Using the present French method, the increase of the sectoral margin ratio which will be recorded will be entirely attributed to the commercial service price, whatever the relative importance of the markup assessed on both goods might be. In particular, if it is assumed that a higher markup reflects a higher commercial service volume, the preliminary assumptions should lead to attribute at least a part of the margin ratio increase to the volume index.

Moreover, if the commercial service price index is calculated while assuming that this service has no link with the product sold, the result obtained is rather paradoxal. Given two different goods supporting the same markup, all other things being equal, the replacement of every unit of good 1 by a corresponding unit of good 2 results in an overestimation of the volume of commercial services produced and thus, in an underestimation of its price movement. This paradox illustrates the fundamental role played by the products in the general method.

Heterogeneity of the elementary sectors

The precedent critics would have smaller significance if the elementary sectors for which calculations are performed were very homogeneous. It is unfortunately not the case.

The French activity classification integrates all the hypermarkets in a unique category though their sales are distributed around a very large range of products (food, household equipment, clothing, gasoline ...) which support very contrasting mark-ups and mark-up ratios. Even within apparently homogeneous categories there exist various types of products; for example, butchers sell more or less elaborated products (from meat already cut by the producer to high-quality catering, from eggs to canned raviolis); these products do not, of course, support the same mark-up ratios. The increase of the margin ratio in the butcher's shops category is, of course, explained by the butchers'price comportment, but, as well and to a comparable extent, by the increasing importance of the sales of high mark-up products.

Besides the range of products sold, to one trade sector may correspond various forms of selling. For example, the supermarket category mixes stores where the commercial service remains still important and other where it is drastically reduced (hard-discounters). The increasing importance of this latter category results in a price index reduction although it is more relevant to consider that it is a decrease of the volume. Similarly, the non food specialized sectors mix very large self-service stores with reduced commercial services and small shops with large commercial services.

At last, it should be recalled that sales at reduced prices have a downward effect on the retailers'margin ratios and, consequently, on the commercial service price index. Yet, common sense would assume that, most of the time, reduced price sales are linked to a reduced commercial service.

COMPARISON WHITH CALCULATIONS IN NATIONAL ACCOUNTS

The basic principle is the same but the operating approximations are different: the "form of selling" dimension is not at all taken into account, but, on the other hand, the "product" dimension is explicitely considered.

National Accountants assume that, within every couple "good*use of the good" the commercial service volume and the sale volume vary according to the same trend.

Thus, the quicker development of the uses of high mark-up ratio products results in a more rapid increase of the commercial margin volume than that of the volume of uses; but this has no effect on the movement of the price of commercial services. On the opposite and at the difference with what is done in the specialised commercial accounts, the development of low-margin traders has no effect on the volume of commercial margins. If, once again, it is assumed that smaller mark-ups whithin a group of goods reflects smaller commercial services accompanying these products, the volume increase of commercial services is over-estimated in National Accounts.

Another important difference arises from the fact that, in National Accounts, margin price indexes result from the uneasy application of commodity flow procedures for each product, at current prices and at previous year prices.

The margin price indexes depend much upon the consistency of the various price indexes for the operations included in the ressources/uses balances. For example, a difference in the changes of these prices may often be wrongly

interpreted as a change of the margin ratios. Yet, the approximation consisting in disregarding the structural changes in the distributive trade industry (e.g. development of low margin stores), sets the National Accountant in front of a double difficulty:

- this approximation is consistent with the use of average market
prices for every operations of the commodity flow balance;

- the conceptual construction of National Accounts makes the
use of pure price indexes compulsory.

Moreover, any method whose results would be more consistent with reality at the cost of an inconsistency in the ways price indexes for each operations are calculated, should be banished. However, such a method is used in practice although it makes the exact measurement of the modifications of the distributive system impossible.

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ANNEX 1

CALCULATION OF COMMERCIAL SERVICE PRICE INDEX

Notations:

$V(1,0)$: turnover of elementary activity sector 1 at time 0
$V(1,1)$: turnover of elementary activity sector 1 at time 1
$M(1,0)$: margin in elementary activity sector 1 at time 0
$M(1,1)$: margin in elementary activity sector 1 at time 1
$m(1.0)$ and $m(1.1)$: corresponding margin ratios
$IpV(1)$: turnover price index for elementary activity sector 1

FIRST RESULTS

The turnover volume index is obtained by:

$$IvV(1) = (V(1,1)/V(1,0))/Ipv(1)$$

In accordance with the basic hypothesis, the production volume index is equal to the turnover volume index :

$$IvM(1) = IvV(1)$$

The production price index is obtained by dividing the margin value index by the volume index:

$$IpM(1) = (M(1,1)/M(1,0))/IvM(1)$$

or:

$$IpM(1) = (m(1,1)/m(1,0))*IpV(1)$$

this is the result of the multiplication of the variation of the margin ratio by the turnover price index.

AGGREGATION AND SYNTHETIC INDEXES

N elementary sectors are now considered for wich synthetic indexes will be calculated.

At time 0, the production of commercial services is:

$$sum(of (M(i,0))) = sum(of(m(i,0)*V(i,0)))$$

At time 1, the production of commercial services is:

$$sum(of(M(i,1))) = sum(of(m(i,1)*V(i,1)))$$

Its volume is:

$$sum(of(M(i,0)*IvM(i)))$$
$$= sum(of(m(i,0)*V(i,0)*IvM(i)))$$
$$= sum(of(m(i,0)*V(i,0)*IvV(i)))$$
$$= sum(of(m(i,0)*V(i,1))/IpV(i))$$

Thus, the **production volume index** is:

$$\text{sum(of(m(i,0)*V(i,0)*IvV(i)))/sum(of(m(i,0)*V(i,0)))}$$

and defining:

$$W(i,0) = (m(i,0)*V(i,0))/\text{sum(of(m(i,0)*V(i,0)))}$$

this is a **Laspeyres index, weighted arithmetic average of the elementary turnover volume indexes, the weights W(i,0) being proportionnal to the margins at time 0.**

The **production price index** is:

$$\text{sum(of(m(i,1)*V(i,1)))/sum(of(m(i,0)*V(i,0)/IpV(i)))}$$

and, defining:

$$W(i,1) = (m(i,1)*V(i,1))/\text{sum(of(m(i,1)*V(i,1)))}$$

this is a **Paasche index, weighted harmonic average of the elementary turnover price indexes, the weights W(i,1) being proportionnal to the margins at time1.**

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ANNEX 2

TAKING INTO ACCOUNT INVENTORY RE-EVALUATION

Notations:

$M(t)$: margin in period t
$So(t)$:opening inventory of period t
$I(t)$: price index at the end of period t, on the basis 1 at
   the beginning of the period
$a(t) = So(t)*(I(t) - 1)$: inventory re-evaluation

Hypothesis:

In order to simplify the demonstration, the inventory is assumed to be constant over time. The calculation of the commercial service price index is performed with a modified value of the commercial service production, that is $M(t) - a(t)$.

The basic hypothesis on the volume of the margins is also valid for the modified margins; thus, the commercial service price index is:

$$IpM = (M(t)-a(t))/(M(t-1)-a(t-1))/IvV$$

instead of:

$$(M(t)/M(t-1))/IvV$$

if the inventory re-evaluation is not taken into account.

The effect on the price index can be measured by:

$$e = (1-(a(t)/M(t))/(1-(a(t-1)/M(t-1))$$

Assuming that

$z(t) = So(t)/M(t)$ and $z(t)*(I(t)-1) => 0$ for all t

then

$$e > 1 <====> z(t)*(I(t)-1) < z(t-1)*(I(t-1)-1)$$

So,
if the economy faces slowing prices, the inventory re-evaluation correction has an upward effect on the commercial service price increase. On the opposite, the effect is downwards when inflation is increasing.

Moreover, the effect is more important when the ratio $z(t)$ is higher.

Numerical example:
assuming that

$$I(t-1) = 1.14 \text{ and } I(t) = 1.097 \text{ then:}$$

$e = 0.9903/0.9860 = 1.0044$ if $z(t) = 0.1$ (food retailing sector)

$e = 0.9515/0.9300 = 1.0231$ if $z(t) = 0.5$ (industrial wholesalers)

In that example, the price index goes from 13% before the inventory correction to 13.5% after the correction in the first case, and jumps from 13% to 15.6% in the second case.

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ANNEX 3

ANNUAL GROWTH RATES OF
PRICE INDEXES OF COMMERCIAL SERVICES

in %

Year	Wholes. trade	Retail trade	Distrib. trade	Tradable consump.
1981	13.0	11.7	12.4	12.8
1982	15.9	11.0	13.4	11.6
1983	9.8	7.5	8.7	8.9
1984	9.6	8.2	8.9	7.5
1985	9.5	6.7	8.1	6.0
1986	5.0	4.6	4.8	1.6
1987	0.0	4.5	2.1	2.4
1988	1.6	2.7	2.1	1.7
1989	4.6	3.1	3.9	3.3