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"Price index in France in service sector"

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The paper provides methods of share between price and volume in France in national accounts especially in service that represent more than 75 % of GDP. There are two sections.

Section 1 of this report gives a short overview of the system of price and volume measurement in France. The assessment is based on the information provided in the Inventory of price and volume measures that was submitted by INSEE in February 2003 and on additional information that since has become available. In the Inventory, INSEE provides a self-assessment of methods into A, B and C methods [1]. It should be noted that the improvement of price and volume measures is a process that has continued after the writing of this Inventory.

In section 2, we will focus on service sector where this breakdown is very important because it can influence the growth in volume of GDP and because it could have some influence on calculation on productivity (value added divided by hours employment) in the whole economy but also in manufactured goods and service sector. This is conceptual issue that is debated all over the word by the economist.

Five conceptual issue questions are specially important:

- Which is the share in the tertiary sector in France which one measures share between price and volume "more badly" or by opposite "more correctly"?

- Which are international methods of share between price and volume in service sector?

- Does the extrapolation from base year 2000 of time series in service sector (1978 -1999) revealed it fragile evolutions?

- Can one introduce new indices of price or volumes in the course of base or shall we wait the new base to introduce them?

- What to choose when one has several methods that lead to different results?

[1] The Handbook on price and volume measures in national accounts, was published in 2001 by EUROSTAT. Following Decision 98/715, methods are classified as follows:

– A methods: most appropriate methods,
– B methods: those methods which can be used in case an A method cannot be applied,
– C methods: those methods which shall not be used.

According to Decision 2002/990, C methods for all products and categories have to be removed by 2006 at the latest. Therefore, this assessment report concentrates on the C methods still in use in France.

1 – BASIC METHOD OF CALCULATION PRICE AND VOLUME INDEX

1 - Accounts at previous year prices

1.1 - The development in volume within the annual national accounts of France is measured by drawing up complete and detailed accounts of goods and services at previous year prices and at current prices. The volume indices of the various aggregates which this method gives are thus, formally speaking, base n-1 Laspeyres indices, and are paralleled by price indices which are base n-1 Paasche indices.

1.2 - Additionally, annual series of aggregates **"at previous year prices, chained, base 1995"** are drawn up and published.

In order for the users also to be aware of the level of the aggregate, these series are standardised such that their 1995 value corresponds to the value at current prices of the aggregate in 1995, which is why the series are known as “at previous year prices, chained, base 1995.”

Owing to the price distortions which are inherent in chaining, these series are not additive. As a result, on the one hand the accounting equations are not strictly observed by these data, and on the other the series corresponding to more highly aggregated levels are not equal to the sum of the series for the more detailed levels making them up.

The problems that are specific to chaining of variations in inventories have made it necessary to construct a specific method (see Annex 2 for a detailed description).

1.3 - On the other hand, the **quarterly accounts**, as well as certain users of the national accounting data, need data at constant prices forming part of a supply/use balance. For this reason, alongside the accounts “at previous year prices, chained, base 1995,” accounts are drawn up which are categorised as “**at 1995 prices**” and which do observe the accounting equations. The quarterly accounts at constant prices are drawn up within this framework.

2 - A calculation based on a complete IOT

2.1 - Volumes and prices are measured in the annual national accounts of France by drawing up, for each year, complete IOTs at current prices and at previous year prices, at a detailed level (118 industries and the same number of products, known as “level G”) for the final and semi-final accounts[2], at a less detailed level (36 industries and products) for the quarterly accounts and the provisional accounts).

This method ensures that the “output” approach and the “final use” approach are made consistent with one another at the level of each industry and product:

- Volume and price indices for the various supply and use categories of each product are also determined;

[2] April of year n sees the publication of:

- the provisional accounts for year n-1
- the semi-final accounts for year n-2
- the final accounts for year n-3

• At the same time volume and price indices for output and intermediate consumption of the corresponding industry are determined, as is the value added of that industry, the latter by double deflation.

2.2 - Implementing this method entails a stage of **balancing** the IOT and more specifically the table of intermediate consumption, by an iterative method which attempts to observe not only the accounting equations described above but also a number of conditions:

- Plausibility of the volume and price indices, and in particular of the implicit indices resulting from balancing the IOT;
- A degree of stability in the technical coefficients at constant prices;
- Consistency of the prices of intermediate consumption (the same price for all industries consuming a given product, unless other information is given);
- Agreement with sources of accounting information on companies, for the accounts at current prices, and in particular with sources on the variations in inventories and the development of value added by industry.

2.3 - This method thus corresponds closely to an **integrated system** of price and volume indices, as described in the ESA (Chapter 10, Section 08). It may be considered that the two approaches, “output” and “final use,” are of equal importance and that the balancing takes place at the level of detail of the IOT, i.e. 118 products for the final and semi-final accounts.

3 - Supply/use balances at a detailed level

3.1 - In fact, while it is true that the IOTs are drawn up in values and in volumes at the level of the 118 industries, this process actually makes use of product-related data at a more detailed level, the level of the **436 industries and products** comprising the fundamental level at which national accountants work **(level H).** This is the level at which the principal use and supply categories are estimated, product by product, at previous year prices and at current prices, in particular output (or sales), external trade, final consumption and GFCF by product, both at current prices (value) and at previous year prices (volume). This is also the level at which trade margins are estimated, and certain taxes and subsidies specific to particular products are processed.

3.2 - The first stage in drawing up national accounts with a “product” approach is thus to determine a detailed “supply/use balance” on a per-product basis.

However, certain elements, which vary from product to product, are estimated only at a more highly aggregated level, namely the **118** products of the IOT **(level G)**: this generally applies to variations in inventories, non-deductible VAT and transport margins. In consequence, complete supply/use balances are available only at level G. The balances at this level are more than a simple aggregation of the level H balances.

3.3 - The more highly aggregated nomenclature levels (F and E) are drawn up simply by aggregating the data from level G.

4 - Building and balancing the supply/use balances

The methods by which the supply/use balances are drawn up are described in detail in Annex 1. At this point, just an outline will be given, in order to show the principle underlying their creation and balancing.

At level H the following data are available for determining the volume/price apportionment:

- For output, either volume indices (from data expressed in physical quantities), or, more often, value indices and producer price indices, generally *Industrial and Service Selling Price Indices* (known in French as IPVIS);

- For external trade, unit value indices (UVIs) as well as a number of IPVISs relating to exports and imports;

- For uses, the consumer price index (CPI) covering a large number of products, as well as some specific indices, such as the cost-of-construction index (CCI) for housing.

4.1 - Building

4.1.1 - Determination of output in value (current prices), or in volume (previous year's prices), is the first phase in drawing up a supply/use balance. For the final accounts, use is generally made of sales by product at level H, from sources on companies (the SIE system - *Système Intermédiaire d'Entreprises* - Intermediate Companies System), deflated by producer price indices (IPVIS in the majority of cases).

But for a large number of products, use is also made of direct sources on development in volume, from surveys on output expressed in physical quantities ("industry surveys") at a very detailed level (several thousand products). This information is used in particular for the provisional and semi-final accounts, but is also used in the case of certain products for the preparation of the final accounts.

The information drawn from industry surveys may either be used directly in order to estimate output in the two price systems (for example in the case of agriculture), or alternatively be used by way of certain constructed indices (IIP - indices of industrial production, published every month or every quarter; see Chapter 2).

4.1.2 - Thus level H is not always the most detailed level at which output at constant prices is estimated: at this level the volume of output is a synthesis of information gathered at a much more detailed level. Even when the value of output is established on the basis of sales from the SIE system, available at this level only, the price indices generally come from information at a much more detailed level (see Chapter 2 on the IPVISs).

4.2 - Balancing

4.2.1 - On the other hand, level H is the level at which the information is initially synthesised in the context of a supply/use balance. However, this synthesis cannot generally be carried out in the conceptual context of national accounts, because certain elements are not available at this level, both with regard to the pricing system (taxes, transport margins, etc.) and to matters of detail in the items (inventories most often not made distinct). In fact, the definitions which differ from one product to another make it impossible to publish any data at this level.

4.2.2 - It is possible to summarise the description of the methods described in Annex 1 by considering a chart of a "standardised" simplified supply/use balance at the most detailed level (level H). This chart is standardised in the sense that it can be applied, at least approximately, to most products, and it is simplified because the items of secondary importance, and those not recorded at the most detailed level, (such as variations in inventories, for example) have been excluded from it.

It can clearly be seen in this chart that examination of the price index of the domestic market excluding final consumption (known in French as IPMI), derived implicitly through the ratio of value and volume residuals, will be an essential element in balancing the supply/use balance, because an abnormal value for this index will reveal inconsistencies between the factors determining it. The same applies to the corresponding volume index, which has to be examined, in particular for the index of intermediate consumption within the context of balancing the IOT.

Typical Simplified Supply/Use Balance

	Supplies			**Uses**	
		Deflator			***Deflator***
	Output not placed into inventory	IPVIS (1)		Exports	UVI * (IPVIS)
	+ Imports	UVI * (IPVIS)		+ Intermediate purchases	*IPMI* *
	+ Margins	*fixed rates**		+ GFCF	*IPMI * (CCI)*
	+ Taxes	*fixed rates(2)*		+ Final consumption	CPI
	= Total supplies			= Total uses	
	(1) Or index resulting from a direct measure of volume *(2) Unless a change in the rates is known*				

Notes: IPMI: domestic market price index, excluding final consumption (implicit index).

Brackets indicate a method used for a limited number of products.

An asterisk (*) indicates that the price index may need to be rectified for balancing purposes.

For margins and taxes, the assumption of fixed rates relates to balance at current prices.

(at constant prices, the rates are always fixed at the most detailed level).

4.2.3 - Two cases may be considered:

- Either final consumption is zero or insignificant for the product in question; in which case, the IPMI is practically the product's price on the domestic market, net of margins[3]; any anomaly relative to the price or volume index will make it necessary to re-examine the volume/price apportionment of the supplies and exports. In practice it is most likely that the UVIs will be rectified, in particular for finished products.

- Or, alternatively, final consumption is a significant use, and an anomaly relative to the price or the volume of the other domestic uses will generally correspond to a significant divergence in development between the consumer price index and the price on the domestic market as initially established. Balancing of the supply/use balance will need then either to reduce this difference, or to explain it by specific mechanisms contained within the supply/use balance. Except in unusual circumstances, preference will be given to maintaining the CPI.

For certain products there may be a need to modify the rates of the margins: this applies in particular to foodstuffs; but in general there is a tendency not to tamper with the margin rates, unless specific information is available. For some products the change in inventories may give a partial explanation for the time shifts in development that these movements may well introduce (in the case of oil products, for example). Finally, the UVIs may also be rectified, in particular if the price development of imported products consumed by households differs from that of the CPI, without this being explainable by effects related to margins or inventories.

[3] Margins, defined by fixed rates, have virtually no impact on prices in this case

2 –PRICE AND VOLUME INDEX IN SERVICE

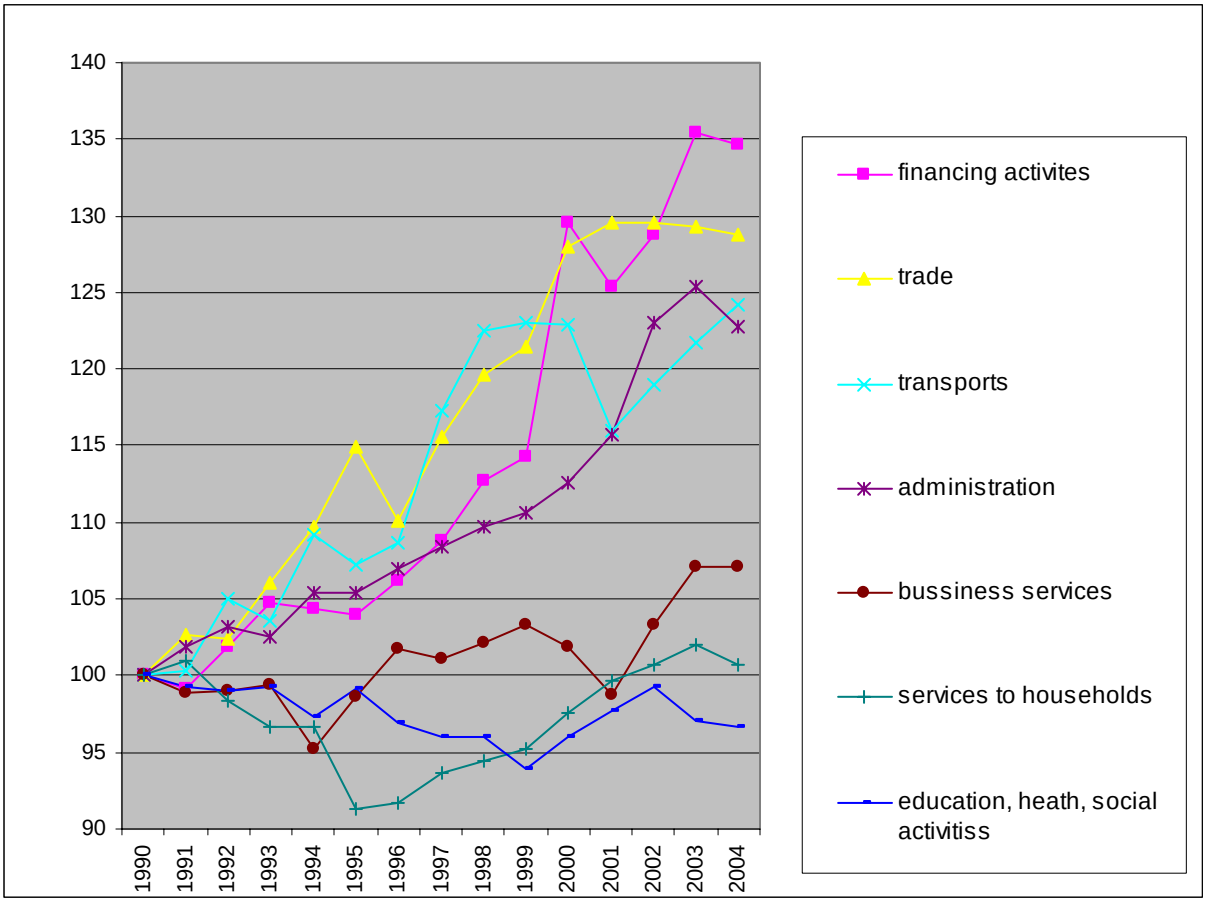
We will study trade, non-market education, business services, etc. Some services are very difficult to make share between price and volume. If we look to time series of productivity of labors, we are very doubtful about some series. And we can see in graphic 2, which services are difficult to estimate price and volume (total with problems which means not only “C” methods which have almost disappeared in France except some activities but different methods, for example “A” or “B” which lead to different results.

Results are Surprised : productivity in non market education and health drops instead of increasing in base year 1995. The reason is a change in method i.e. output method instead of input method

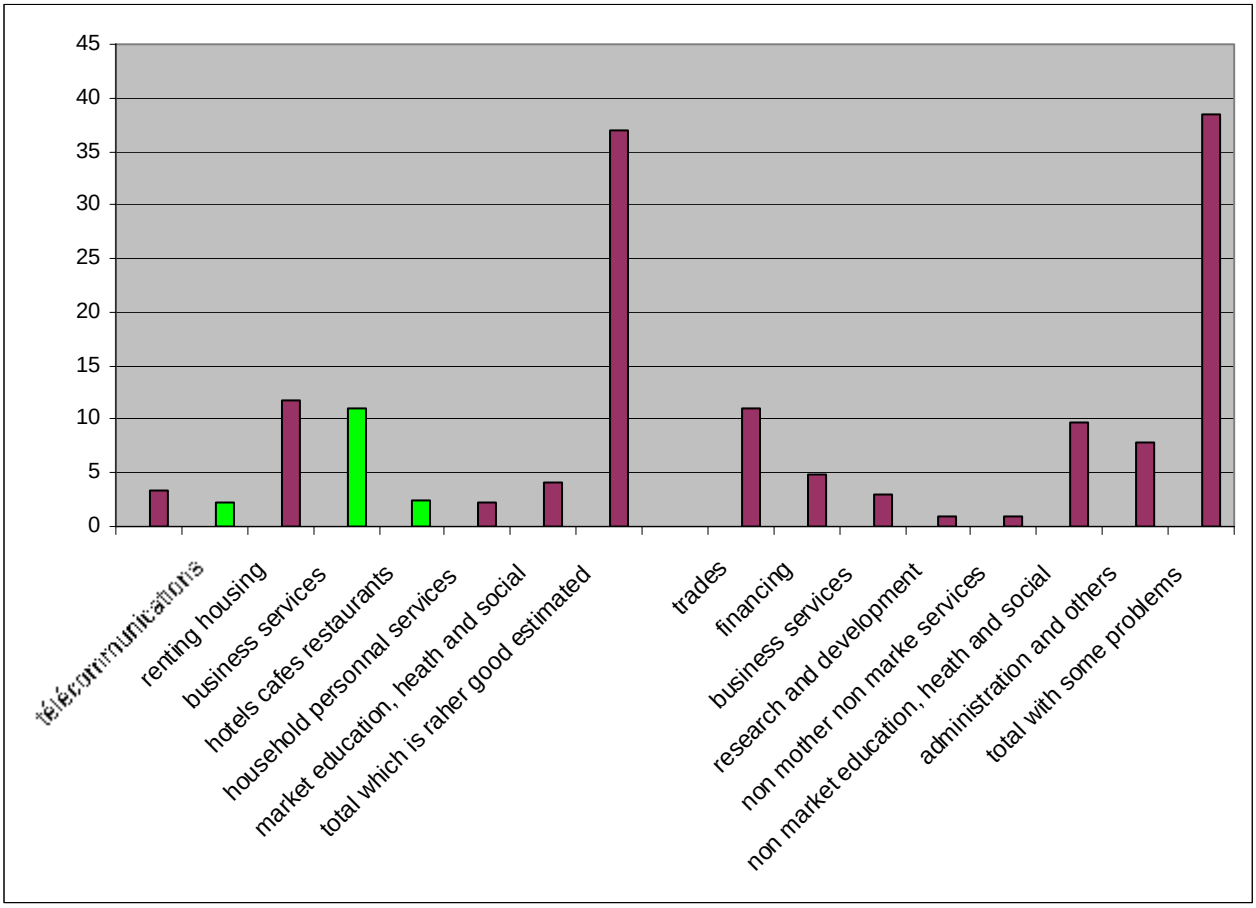
Two groups (financial activities, trade and transport, administration consist of one : productivity increase about 1,8 % by year . The other one consist of business services, household services and non market education and health whose productivity is almost stable, just a little increase except non market education and health

But why ? Does it correspond to something right on the economic point of view or does it reflects some mistakes in the constant price methods ?

Graphic 1
Productivity growth base year 1990 (in percentage in different activities of services)



Graphic 2
% of the tertiary sector in GDP from the products whose prices are rather well known or to problem: different results



1 - Trades

5.1 - Theoretical Principles

For an elementary product, the value of the trade margin is the product of the margin rate x price net of margin x quantity. It is assumed that the product of the first two factors constitutes the price of the margin, and that the quantity constitutes its volume.

At an aggregated level, the volume of the margin on an aggregate (a use) is defined as the value which it would have adopted with the price and margin rate system which had been in force the previous year.

The value index is thus the product of two indices:

- A volume index which reflects not only the variations in volume of the products included in the aggregate but also the variations in the make-up of the aggregate, in terms of products which had different prices and margin rates in the previous year. This volume index is the average of the volume indices of the products weighted by the shares of the respective products in the value of the margin of the previous year. Thus it is generally different from the volume index of the assessment base unless the taxation rates are the same for all the products making it up. It incorporates the effects of a change in the distribution of the products in line with the distribution circuits having different margin rates.

- A price index which reflects on the one hand the variations in price of the products of the aggregate, and on the other hand the changes in the margin rates of the distribution circuits. In particular, a change in taxation rate, a change in the legally established assessment base, or the creation of a new tax or elimination of an existing one, are price effects

In considering the breakdown of the products in line with the different distribution circuits, a clear distinction has to be made between the following two cases:

- development of the margin rate of each circuit which has an impact on the price index of the margin;
- development of the distribution of the products in the aggregate in line with different distribution circuits applying different margin rates, which has an impact on the volume index of the margin.

.2 - *Practical Implementation*

At level H, the volume/price apportionment of the margins is carried out for each use. The nature of the use is one of the factors leading to disparity in the margin because it has an effect upon the length of the distribution circuit (since retailers are involved in final consumption but not generally in intermediate consumption).

For a given use, it is generally assumed that at level H, one at least of the sufficient conditions is met to ensure that the volume index of the margins and the volume index of the corresponding use are equal (uniform margin rate or uniform growth within the aggregate). The volume index of the margin is assumed to be equal to that of the use, from which the volume and the price index are derived.

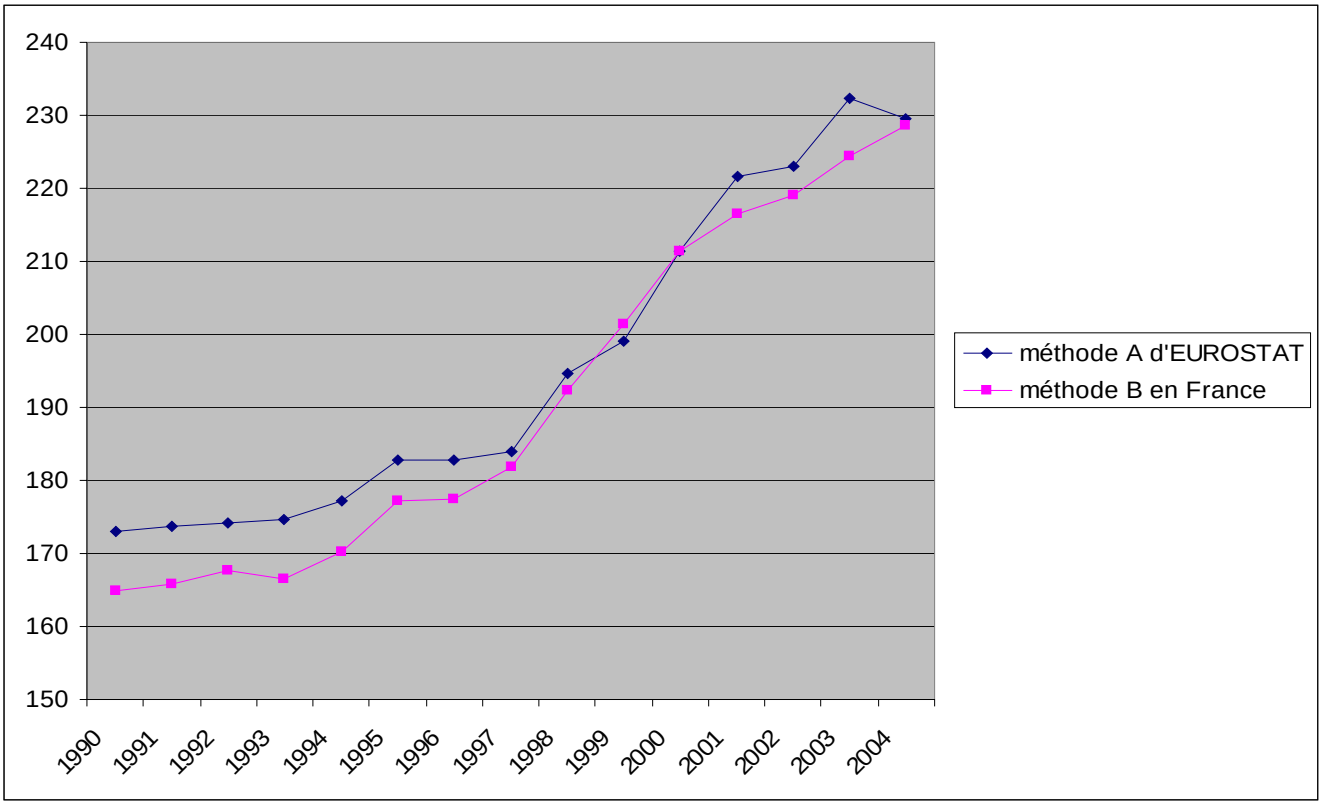
The overall volume of the margin applying on the supply side is obtained by adding the volumes of the margins on the different uses. Its volume index thus does incorporate the variations in the structure of the uses.

The volumes of margins at the more highly aggregated levels are obtained by aggregation of the volumes at level H and thus do incorporate the structural variations between the different products and the different uses (for the total of the margins).

Table 1
Trade margins example price and volume index: Eurosta method and French one's

	Eurostat first method (a)			**other method (French one's) (method b)**		
	Purchases of goods for resale	Retail trade margin	Sales of goods for resale	Purchases of goods for resale	Retail trade margin	Sales of goods for resale
value t	214	47	261	214	47	261
price index	**1,019**	1,053	**1,025**		**1,107**	**1,025**
volume	210,0	44,6	254,6	212,2	42,4	254,6
volume index		1,116	1,061		**1,061**	**1,061**
value t-1	200	40	240	200	40	240
	Index of price of production					
				Index of price of consumption		

Graphic 2
Comparison of two methods in retropolation of time series in France
(+ 8 Mds between 1990 et 2004)



2 - Business services

1 - introduction

The compilation of price indices should be based on clearly specified, representative products whose prices are followed over time with due attention to quality change. For services, this principle is often difficult to follow due to the following reasons:
Services are typically produced and delivered in direct contact with the customer, there is a more frequent occurrence of ***unique service products*** than in the case of goods. A unique service product is one that is only provided once to the specifications of an individual customer, and prices cannot be observed over multiple periods. Various consultancy services fall into this category, making price measurement a daunting task. Explicit or implicit assumptions on quality changes have to be made (typically, constant quality is assumed) that are mostly based on convention rather than reflecting "reality".
Charging arrangements or mechanisms for the sale of services are often such that it is ***difficult for the statistician to observe prices*** for a repeated service transaction. Complex and changing bundles of telecommunication services that are on offer are a case in point. Invoicing systems applied by service providers can be very different depending on the industries concerned and may also vary between different service providers within the same industry. Moreover, the same service provider might change the invoicing basis from one period to another.

• Even for simple services with readily available observations on transactions and prices, ***controlling for quality change*** is particularly difficult in the services area and can give rise to fundamental issues such as whether a more rapid delivery of the same service constitutes a quality change or not.

Because of the frequent occurrence of unique products, standard price measurement methods designed for repeated products cannot generally be applied for services. Nor is it possible to provide strict guidelines on how SPPI for particular services should be compiled. Decisions on pricing methods depend largely on circumstances, for which flexible solutions should be found to capture the development of prices. It is also obvious that new methods evolve as more experience is gained on the compilation of prices indices for existing and new services.

This section discusses pricing methods with an emphasis on unique services, and on prices and transactions that are ill-specified and difficult to observe. Before doing so, three observations are made for clarity of exposition.

First, ***pricing mechanisms*** are charging arrangements put in place by economic operators, and they have to be distinguished from ***pricing methods*** employed by statisticians. In the simplest case of a repeated, well-identified service with observable transactions, the pricing mechanisms and pricing methods largely coincide. Observed prices can be directly used in an index and a statistician will encounter only "normal" compilation problems such as controlling the quality and representativeness of service products contained in an index. For unique service products, however, this coincidence does not hold and the statistician has to decide how best to use information from pricing mechanisms to devise a pricing method. Sometimes proper price data might be found in the market but are inappropriate for use due to rapid changes in the market. In addition equivalent service products may not be transacted in consecutive periods and therefore prices are not available.

Three examples further clarify both concepts and their difference:

• Car rental. The pricing mechanism is that a commercial (market) list price is charged by the producer. The pricing method is, for instance, the survey of some of these list prices. For this standard service, the mechanism and method "coincide".

• For some legal services, the pricing mechanism is a percentage fee of the assets that the service pertains to. The pricing method could be, for instance, a unit value of (realised) hourly rates for the lawyer's activity, dividing total income by worked hours.

• In a regulated market for postal services, the pricing mechanism is a government regulation specifying prices. The pricing method could then consist of accessing the legal documents with the regulated tariff information.

Pricing methods are those that apply to the process before (elementary) index compilation; they are solely concerned with data that are used as prices in an index. Put differently, pricing methods are procedures applied to make price data (that are mostly based on price mechanisms) eligible to be entered in an index. The index formulae and aggregation methods needed to bring together these basic elements are not discussed in this chapter, and reference is made to section 3.7 and the International PPI Manual.

Second, pricing mechanisms and pricing methods have to be distinguished from the ***nature of services***. Services can be unique by their nature like legal advice. For unique services, transaction prices of comparable service products are not available, and a host of pricing methods are therefore used to circumvent this problem. Other aspects of the nature of a service are the length of provision with its implication for pricing methods. Notice that often there is a direct link between the type of service, the pricing mechanism, and the pricing method. The nature of a

service determines (restricts) what price mechanisms and methods are possible and a price mechanism determines (restricts) what price methods are possible.

2 Specification of service output

A Fundamental principle underlying price indices is to follow prices of products with comparable quality in consecutive periods. This requires that products, whose prices are used in an index, be well-specified. In the case of identical, repeated services the requirement means that price-determining factors of services are identified. For unique services the situation is different, because price-determining factors cannot be expected to be known and the characteristics of service products have to be identified instead. A proper specification is also a precondition for the ability to track changes in the quality of products over time. As already explained, this requirement is particularly difficult to meet for service products.

Pricing methods are processes applied to price data – possibly based on various pricing mechanisms – to make them suitable for use in an index. Price observations that refer directly to specified service outputs are an important ingredient in developing conceptually satisfactory SPPI. On the other hand, if, due to uniqueness of services, specified service outputs cannot be priced in successive periods, this gives rise to time-based pricing methods. These methods are based on the time used for the provision of the service rather than on the service itself. While such pricing methods are common in the service area, they imply that the impact of labour productivity change on price changes may be disregarded. This is a serious deficiency because only prices that are compatible with services finally provided may result in an SPPI that is closely comparable with PPIs for goods, and in comparable volumes for goods when used for deflation.

Generally, a rise in productivity means that a larger volume of services can be produced with a given input. The change in volume may be a consequence of a change in quantity or quality of the services. (Alternatively, a rise in productivity means that output prices fall even though input prices remain unchanged.) When the item is a clearly specified finalised service and prices of this service can be matched exactly over time, there is no need to consider productivity or more generally, to inquire about the reasons for price changes. The delivery of a letter could be an example of such a well-specified and observable service. If the price of sending the same letter under the same conditions falls, this is all the price statistician has to know in order to measure a price change. It is irrelevant whether the fall in prices reflects productivity gains or some other cost change.

When pricing is not based on prices of final services and time-based pricing methods are applied, the implicit assumption is made that the time a service provider of a given qualification and experience spends with a client is the best approximation for the unobserved service flow. Possible change in productivity, implying that a larger volume of services per hour might have been delivered, is disregarded because only hours are observed.

The pricing methods discussed in this guide are briefly introduced in section 2.3. In light of the above discussion, the aim is to distinguish pricing methods that result in prices of final services from those that result in time-based prices.

3 Classification of pricing methods

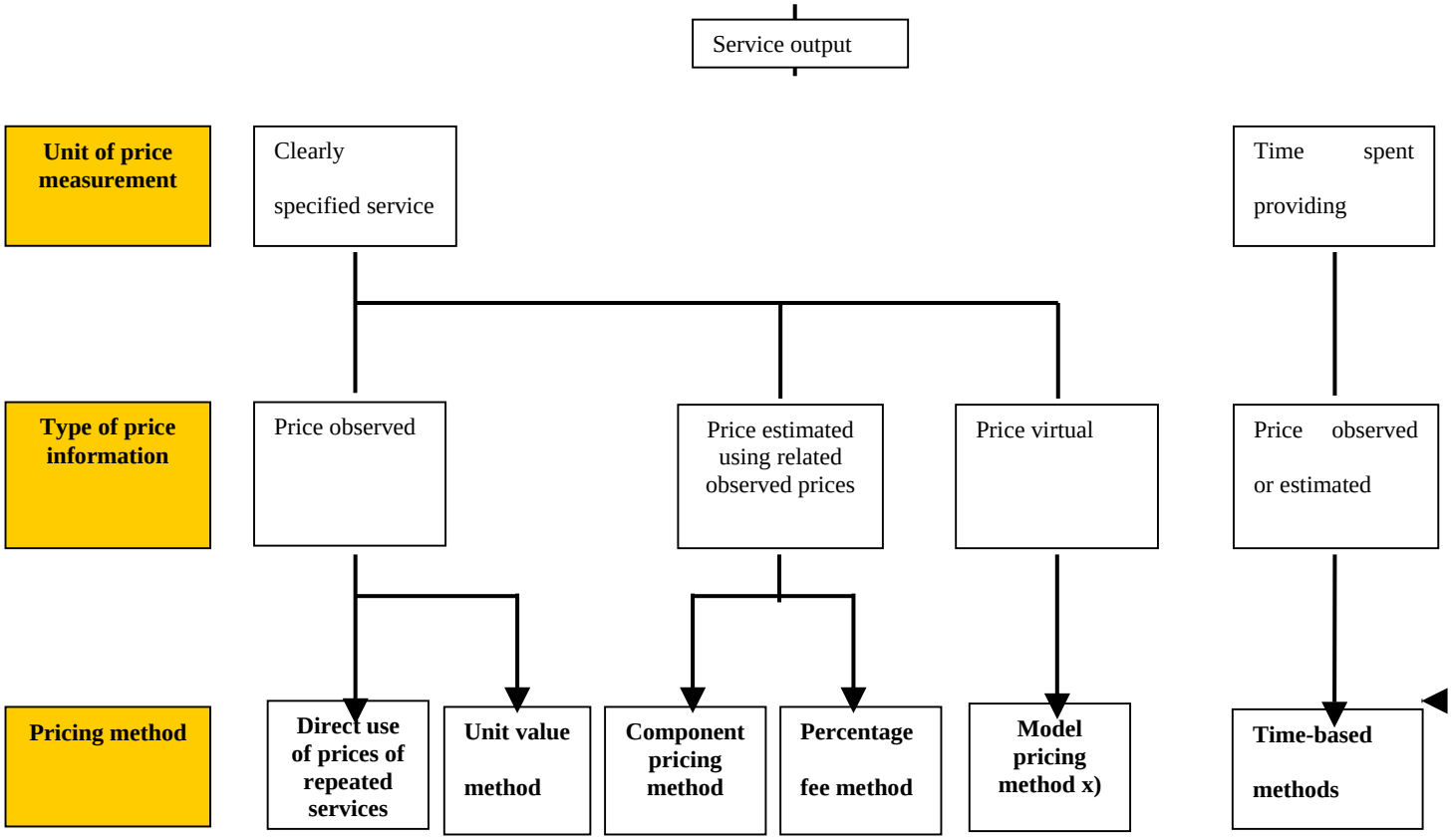
There is ***no unique classification*** of pricing methods. There are many criteria along which pricing methods can be defined and contrasted with each other. Any classification system that tries to bring together all pricing methods is almost certainly deficient because methods are difficult to classify into mutually exclusive categories. The approach adopted here starts out by using as a criterion the *outcome* of pricing methods and looks at the extent to which a price finally entering an index is based on specified final services or is time-based. Secondly, pricing methods are sub-divided based on *techniques* employed by statisticians in pricing.

Obviously, if techniques had been chosen as the main criterion in the classification, a different definition of methods would have resulted. For instance, unit values are used not only in the unit value method but also in pricing based on working time (section 2.9). Limiting the unit value method to pricing of well-specified services highlights the fundamental difference between the two types of pricing methods. In the former, the principle of tracking the development of output prices of equal products is at least attempted whereas in the latter the target measure is price development of working hours (by categories of employees) rather than price development of service products themselves.

The reason for putting so much emphasis on outcomes rather than on technical compilation procedures is that ensuring the international comparability of SPPI is an important long-term aim of this guide. This might not be achieved in near future, but a classification based on outcomes of the approach taken is important in monitoring country practices and in using the information for analysing price and volume developments in countries. Focusing primarily on compilation techniques does not ensure that these aims are met because technically similar compilation procedures may give very different results depending on whether prices underlying SPPI are prices of actual service outputs or prices of working time in the provision of services.

Figure 1 shows the pricing methods as defined in this guide. They are either based on specified final services or are time-based. The left-hand column describes an ideal situation where service output is specified in terms of final services although not necessarily perfectly. The right-hand column illustrates the other extreme, where a service is specified in terms of contents of service provision rather than in terms of the service ultimately provided. The measurement unit in the former case is the service provided and in the latter it is time spent in service provision. When price indices based on these two types of methods are used in deflation, results have different interpretation. In the first case, volume of output is in principle correctly measured (although the result depends how well price-determining factors are specified) whereas in time-based methods the resulting volume can be interpreted as time spent in the service provision. The validity of prices based on working time used in an SPPI depends very much on the services concerned. Issues of this nature pertinent to specific industries are covered in Chapter 4.

Figure 1: Main pricing methods



Note that model pricing is classified entirely to the group of clearly specified services. However, if the number of working hours is used as the major part of a pricing model and these are assumed to remain the same as in the previous period in all cases, then this would be classified as a time based method.

The first of the methods, the **direct use of prices of repeated services,** represents the ideal of using real transaction prices of the same service products in successive survey periods. A special case, contract pricing, is the use of prices in long-term contracts for the repeated delivery of the same or a very similar service in many survey periods.

In the **unit value method**, prices entering an index are estimated via aggregate value and quantity figures. In principle, the method is only appropriate in cases where services are sufficiently homogeneous. Sometimes, however, it can be regarded as the best option also in cases where the homogeneity requirement is less perfectly met. For example, changes in the market might be very strong and/or prices excessively volatile in which situation any other pricing method is difficult or too costly to implement. Note that the unit value method as defined here is limited to cases where price observations refer directly to service output. Cases where unit values are applied in the estimation of hourly rates are covered in the method 'pricing based on working time'. In addition, for the component pricing method some sub-components might be based on unit values.

The **component pricing method** is characterised by the use of a number of independent observed prices of output components. The price to be entered into a price index is the sum (weighted or unweighted) of prices of the components.

Pricing based on **percentage fees** is only applicable if the pricing mechanism bases the price on a percentage of asset value (or price of some other goods or services) that the service is connected with. In this method the price development is based on changes in both the percentage rate and the price (or price index) of the associated product.

The main characteristic of **model pricing** is that the survey asks for an expert estimate of a price. The data for index calculation are compiled solely for the survey. Any existing enterprise data are used in the estimation but the resulting price itself is fully fictitious. In principle, a basic requirement of the method is that service products are specified and, thus, changes in productivity are expected to be taken into account. This means that efforts are made to estimate changes in required working time rather than assuming it will always be the same as in the previous period.

Pricing based on working time is often applied for business services where hourly charge-out rates are typically used as a pricing mechanism. Therefore this method measures the price development of working time spent in service provision rather than the price development of the service itself. Pricing may come in different forms. For instance, the pricing mechanism can be based on charge-out rates by type of staff or prices may be built up from costs of service provision.

Some comments

A divergence of evolution has appearing since 2002. :
In 2003 IPVIS (production prices) = - 4,5%, SYNTEC +1,2% (wages cost index)
In 2004 IPVIS (production prices) = - 2 %, SYNTEC +1,2% (wages cost index)
Since 2000, index price - 1%, SYNTEC +8,4%
Was it necessary to take into account the new index?

There was a debate in INSEE :
Some people said we must wait for an new base year (2005) in order to do not disturb continuity of time series
Some others said it was necessary to take in into accounts because it reflects the reality.

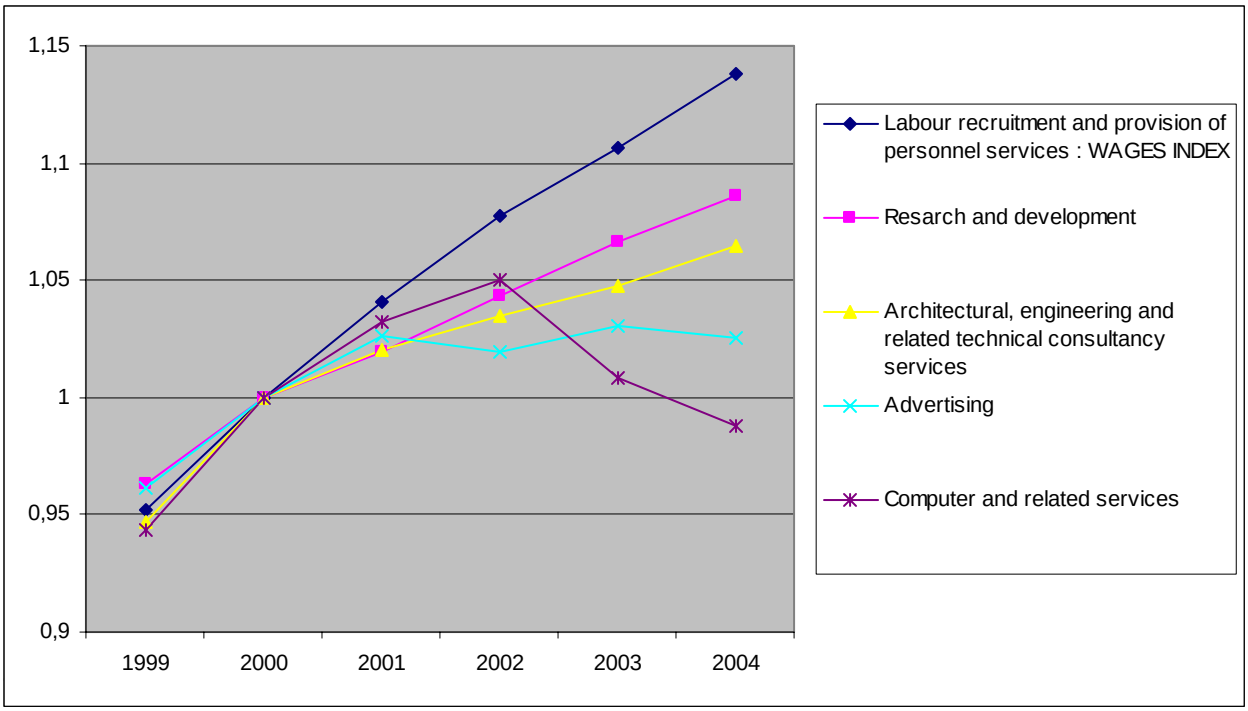
- Advantage : nearer to reality, reveals profits of productivity.
- disadvantage: rupture of method. - rather a good idea but could have been discussed.

A GDP in volume recorded of more than 2 billion? in 2003-2004 compared to the old method.

Some of these services are for business use only, others can be purchased by both consumers and businesses. ESA95 recognises computer software as an intangible fixed asset, and as such expenditure on software should be recorded as gross fixed capital formation. This includes a significant share of software produced on own account (to be valued at basic prices). Hence, expenditure on software - which is ever increasing - adds directly to GDP, and the choice of deflator for software has a direct effect on the volume growth of GDP. This can be compensated however if a large share of the software is imported and the same deflators are used for those imports.

An increasingly important phenomenon is that of bundling computer services with hardware. The most evident example is the bundled sale of PC and operating system, but also in the business market software is increasingly incorporated into industrial machinery or maintenance contracts are part of the package. The present product classification does not recognize this bundling problem, which may create problems in measurement.

Graphic 4
Index of price of business service (base year 2000).



3 - Non-market education services

The education classification category contains a wide diversity of types of institutional units (schools, universities, further education colleges, vocational institutes, private driving schools, etc), across a number of sectors (various levels of government, non-profit institutions and non-financial corporations), and can be delivered as a market or a non-market output. Whilst the market output is delivered at a price which can be straightforwardly measured, the issues of quality measurement described below are equally important for market as for non-market output. Two key features common to almost all education services are:

Education output can be defined as followed:

"…the quantity of teaching received by the students, adjusted to allow for the qualities of the services provided, for each type of education."

The quantity of teaching received by students can be measured by the number of hours they spent at being taught. This measure is referred to as the number of "student-hours" (or "pupil-hours"). Where this measure is not available, the simple number of students or pupils can be an alternative, provided that the hours of tuition that an average student receives remain broadly stable over time. For some levels of education (for example tertiary education and distance-learning) the number of students may in fact be a better indicator of the education service delivered, since formally taught hours may comprise a variable and even small part of the education service (which may be more in the form of written material or informal teaching).

Quality of output is a very important issue for education. There are a number of possible indicators for quality adjustment, depending on the education system in place, based on both outcome measures and direct measurement of output quality (school inspections). For examples of outcome-based indicators it may be appropriate to consider whether examination data (perhaps with a "value added" approach, where pupil abilities are measured before and after a period of schooling) or "moving up" data (that is the proportion of pupils who pass through to the higher year) can be used to adjust for changes in quality. Another option may be to collect data from standardised assessment tests, if these are widely used in schools, since they may overcome the problems of different examination standards in different regions or schools. Sometimes pupil/teacher ratios are proposed as indicators of quality. However, it is recommended that this is based on a sound analysis of the relationship between the ratio and the quality of classroom teaching.

Quality adjustment is unlikely to be straightforward in practice, given the general lack of data on quality of teaching, and it is recommended that countries undertake experimental calculations before introducing new quality measures. It will also be necessary to explain to users the methods being applied and to explain how the data might be appropriately used for productivity analysis. Nevertheless, this should not prevent the introduction of non-quality-adjusted output-based methods for education as a first step.

It is also important that any output indicator chosen is composed of cost-weighted data at the level of education delivered and the method of delivery (for example, part-time or home-study courses should be considered separately). At a minimum the data should be broken down into the internationally-accepted broad levels of education (see A, B and C methods section below for more details). This is because the cost per pupil is known to vary significantly between, and even within, these levels.

Certain education services require a more detailed approach. In the case of higher education, there can be a large variation in the complexity (and therefore cost) of particular courses. For example, medical training is much more resource-intensive than an arts course. Therefore, higher education student numbers should be stratified by type of course, to reflect the different education products which are being offered.

In the case of vocational training (including apprenticeships) the education output to be measured is that for teaching, not 'on the job' training. So if an apprentice receives 10 hours per week of teaching at a college, and works productively for 20 hours under the supervision of a work colleague, the 10 hours is measured as education output whilst the 20 hours is an input to the production process.

Where education is delivered as a non-market output, the current price value of output is determined by reference to the inputs (compensation of employees, intermediate consumption). However the measurement of constant price output should not be calculated by simply deflating inputs because this will not capture changes in productivity. Furthermore, the use of output-based methods is more comparable to the methods used for market providers of education service, which is an important consideration for comparing different countries. Research carried out in some countries suggests that changes in productivity could have a significant effect over the medium term on the volume of education services, and in turn influence the overall GDP growth rate.

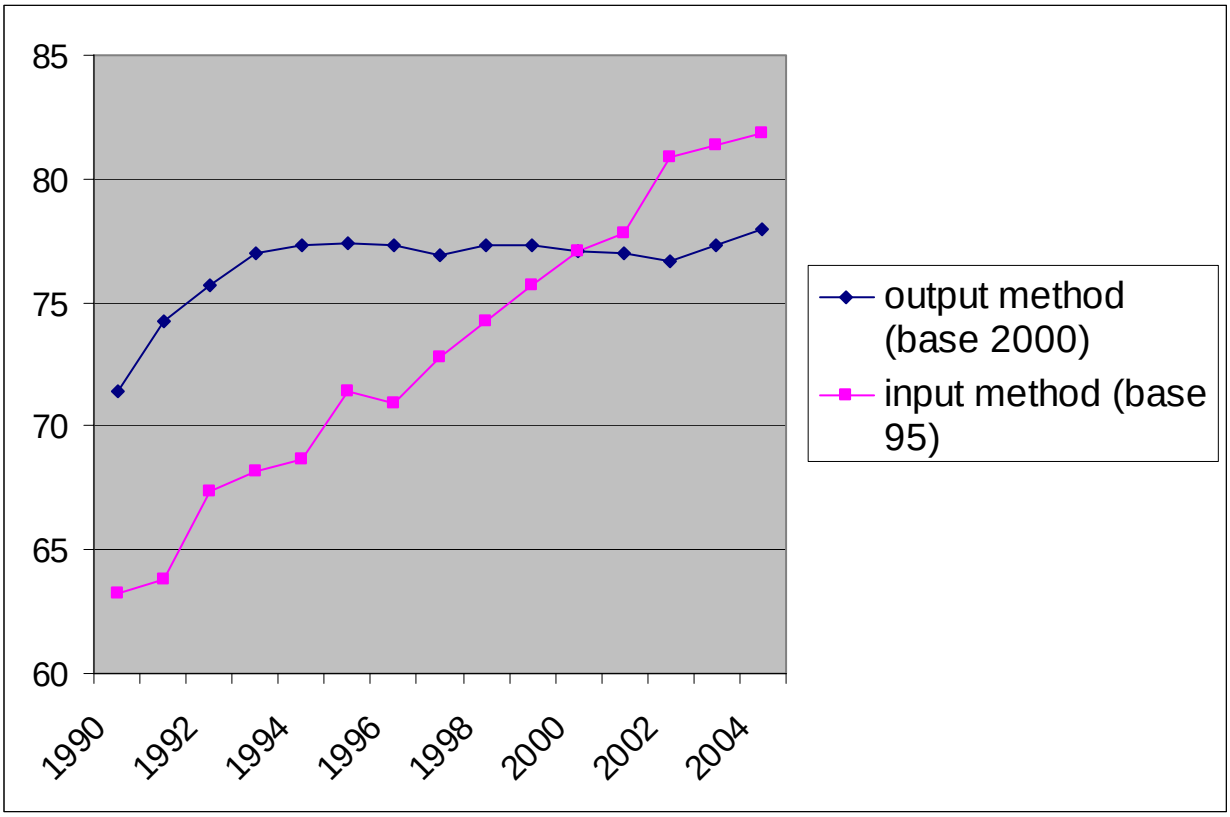
For the purposes of comparability, it is important that any non-education services provided alongside educational services (for example school meals, transport and research in universities) are separately identified and deflated using appropriate price indices where these are available, or using the methods described in other chapters of this handbook. For example, research is discussed in paragraph 4.

Since prices are not available, the only A method for non-market output is to use "pupil hours" adjusted for quality as appropriate, with the stratification breakdown as above. The B method is to use pupil hours in the required level of detail without an adjustment for quality.

Use of numbers of pupils as a proxy for pupil hours is acceptable for these methods if it can be shown that the amount of hours that pupils spent in being taught is sufficiently stable. It is encouraged for tertiary education and distance-learning.

Any input-based method is a C method, as is any method which does not use the minimum stratification breakdown, or which has incomplete coverage of the sector. Use of numbers of teacher hours would also be a C method.

Graphic 3
Comparison of two methods in retropolation of time series in France
(- 10 Mds between 1990 et 2004)



4 - Research and development (R&D)

The activity of R&D is by nature a unique activity that only takes place once. For the large part, the next time the activity takes place it is by definition no longer R&D. In most cases this makes ordinary price comparisons over time impossible.
The output of the production process is correspondingly difficult to identify in advance. Some research projects end up giving the result that one had hoped for or had expected, others seem to be a dead end or end up giving a very different result than expected: one that might be useless to the original customer but turns out to be very useful in another research project taking place later on. It should be noted though that even projects that end up with no useful result (i.e. negative outcome) have produced output.
The problem with R&D is different from the pricing problem involved in connection with e.g. large equipment. In that case the problem with collecting an actual output price index is that the item in question is actually only produced once. However 'model prices' can be collected since it does make sense to ask e.g. shipyards to price a similar ship in successive periods because it is conceptually possible to build this ship in each of all the periods in question. This does however not make sense in connection with R&D projects. An R&D product is a product of knowledge and once this knowledge has been achieved the price of achieving it again in the next period is nought. It is therefore not conceptually possible to construct a model of an R&D project that can be used for collecting 'model prices'.
It can be expected though that the prevailing pricing mechanism for market R&D is to price the hours worked by the researchers, i.e. a charge-out rate approach. That means that data on charge-out rates or hourly fees can in principle be collected.

Data availability
It is clear that actual output price data on R&D do not exist. It can be expected though that charge-out rates will exist for certain types of market research. As far as volume indicators are concerned, data on **patents** applied for and/or obtained are usually available. Often also data can be found on numbers of publications of researchers, numbers of Ph.Ds completed, citations, etc. These are crude measures, but they are often used to evaluate the performance of universities.
The use of e.g. patents or patent applications as an output indicator might be useful for some R&D areas but will not cover all types of research partly because it would only refer to 'successful' research.
A, B and C methods
In the main an A method in this case does - by the definition of R&D - not exist. Neither collection of actual output prices from e.g. the research institutes nor 'model prices' makes sense since you cannot meaningfully price the same R&D output in two periods in succession.
For market output, charge-out rates or hourly fees should be collected as much as possible. These would be B methods.
Currently, it does not seem likely that a method based on volume indicators could provide a reasonable B method. Each possible indicator has certain drawbacks that precludes it from being used. However, little research in this area has actually been carried out. A detailed analysis of the data available and the consequences of using different indicators would be welcome.
The non-market part of R&D is production of collective services (see ESA95, par. 3.85)

Table 2
Comparison in two methods of constant price estimates in R-D

	COST method				PATENTS	
	VALUE	VOLUME	CONSTANT PRICE	**INDEX**		**INDEX**
1999	19 509		20281		13518	
2000	20 722	20 841	20722	**1,02**	13790	**1,02**
2001	21 930	22 378	22378	**1,10**	13504	**1,00**
2002	22 827	23 225	21855	**1,08**	13559	**1,00**
2003	22 777	23 157	21326	**1,05**	13517	**1,00**
2004	23 230	22 720	21273	**1,05**	14230	**1,05**