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Cross-cutting issues part 2 "Quality change and quality adjustment - consumer approach for PPI"

Alain Gallais, Insee, France

Introduction

In many sessions of the Voorburg group, for several years, a debate has occurred on the relevance of a user-value approach for quality adjustment of SPPI for several activities/products (advertising, rental services, distributive trade…) in regard to the resource-cost criterion "imposed" by the fixed-input output price index theory (notably exposed by Fisher and Shell (1972) and fixed as a doctrine by Triplett for American Bureau of Labor Statistics (1983)).
André Loranger, of Statistics Canada, presented a contribution to the Voorburg Group in 2012, where he reaffirmed his support for the resource-cost approach as founded by Triplett, although exposing some arguments from National Accounts in favour of a kind of compromise between the two approaches, and asking for a debate with the Ottawa group on price indices. Mary-Beth Garneau, who succeeded him, discussed his paper with the Ottawa group this year, and tells us, in her document for this session, the comments she gathered.
The current paper pleads for an extension of the user-value criterion to "output" PPI and SPPI, valuated at basic prices, in a National Accounts consistency perspective.
Also, it tries to demonstrate that Jack Triplett's concepts are very much data-consuming, and can be misleading in absence of knowledge on the production function in current period and/or without the help of hedonics technique.
More than in any other contribution, this paper expresses only the author's view, and is not an official Insee position.

1 Is the fixed-input output price index theory universally admitted and introduced as a "law" in international manuals?

1.1 Brief history of the user-value resource-cost debate

Table 1: brief history of the user-value resource-cost debate

Year	Event
1957	Edward Denison sets out the "*production-cost criterion*" for B.L.S. PPI
1972	Fisher and Shell write "*the economic theory of price indices*" where they distinguish the concepts of "output prices" and "input prices"
1983	Publication of "*The U.S. National Income and Product Accounts – selected topics*", where Jack Triplett writes "*Concepts of quality in input and output price measures: a resolution to the user-value resource-cost debate*". In same time he founds the new doctrine of B.L.S. PPI, he moves the reasoning from "goods space" to "characteristics space". Output prices should be based on resource-cost, input prices on user-value.
1990	Robert J. Gordon, of the American National Bureau of Economic Research, publishes "*the measurement of durable goods prices*" in a user value view
2004	Jack Triplett publishes for OECD a "*handbook on hedonic indexes and quality adjustments in price indexes: special application to information technology products*"
2012	André Loranger presents his contribution on this debate to the Voorburg Group.
2013	Mary-Beth Garneau discusses André Loranger's paper with the Ottawa group.

The user-value resource-cost debate, although universal in its ground, has opposed only American experts…

1.2 The non consensual opinions of Jack Triplett's colleagues at the time of his article in 1983

In the same edition of "*The U.S. National Income and Product Accounts – selected topics*" (1983), John F. Early and James H. Sinclair have written an article called "*Quality Adjustment in the Producer Price Indexes*". In their first section, they explain the current practice of the American Bureau of Labor Statistics without necessarily endorsing it, leaving Jack Triplett in his own article building the conceptual background of PPI, therefore founding a new practice:
"Since there are different implications for quality adjustment in these two concepts [output price and input price], the result has been a hybridized methodology for handling quality adjustment. In general, quality adjustment consists of three steps. The first is identifying the physical changes in the item being priced. The second is characterizing each change as an improvement, deterioration, or no change in quality. The third is evaluating each change in dollar terms. In the second step, each change is characterized according to its impact on consumer utility (for consumer goods) or producer productivity (for capital equipment). In the third, the differences in cost of production are used to value the changes. It is then argued that in equilibrium the change in the production costs and the change in user utility will be equal."

Zvi Griliches says in his comment on this article:
"The current practice is based on the assumption that quality change is to be valued by the difference in the cost of production that it induces. I have both conceptual and practical objections to this procedure. First, I believe this to be an inappropriate definition of quality change. The appropriate measure is one based on the utility to the purchaser of the item. I understand that one may use producer cost for lack of anything better or because of the unwillingness to enter the treacherous waters of utility estimation, but I do not understand its elevation to dogma, to the status of a "desirable" definition of such indexes. […]"
It is clear that Zvi Griliches has an opposite view of Jack Triplett!

Robert J. Gordon, in his article "*Energy efficiency, user-cost change, durable goods prices*", shows that he has read Triplett (1972), studies "characteristics", and exposes a technique for durable goods more energy efficient. In his comment, Jack Triplett denies that Robert J. Gordon has understood him and is right to quality-adjust an input price on the consumption of another input. Gordon publishes a reply after the comment of Triplett. What he exposes is "*a hybrid concept for input cost measurement*":
"*Here the quality criterion is user value (e.g., the characteristic valued by the computer user is its calculations rather than dimensions of the computer box); the estimator used to adjust computer price indexes for differences across models is based on the seller's marginal cost*."
Hence, he has no conflict with what was the current practice of B.L.S., but rather some difficulties with the new concepts founded by Jack Triplett.

1.3 Examination of what the current international manuals say exactly about FIOPI: an advice in IMF manual on PPI, no reference at all in European manuals

In defining output prices and input prices, the manual on PPI coordinated by IMF (2004) insists on the difference of valuation (basic prices vs. purchaser prices):
"*2.37 - […] Thus, producer price indices fall into two clear categories: input prices (that is, at purchaser prices) and output prices (that is, at basic or producer prices). […]"*

Further, it admits the use of one for the other, making again explicit the hypothesis on the valuation, not on the concept:

"*2.43 - […] Output proxies are often used to avoid having to collect input prices for manufacturers' purchases from other parts of manufacturing—the assumption being that there is a stable profit margin. […]"*

When exposing the methods of quality adjustment, the PPI manual says "often-favored", which I assimilate to "generally accepted" expression that Jack Triplett himself uses for his FIOPI theory:
"*7.43 - […] Changes over time in the prices of inputs are an indicator of potential inflation, which will, to some degree, feed through to output prices as output inflation. Section B.2.1 discusses the output price index. It focuses on the general quality adjustment problem for output price indices and the restrictive assumptions that have to be maintained to use the often-favored resource-cost approach to quality adjustment. The principles relating to an input price index follow in Section B.2.2. It outlines the quality adjustment problem for input price indices and the restrictive assumptions that have to be maintained to use the often-favored user-value approach to quality adjustment. […]"*

At last, as it has seen the difficulty for National Accounts to receive two different kinds of quality adjusted price indices, it advises an assessment of product quality at supply rather than use values, but still with arguments on the difference of valuation:
"7.69 - […] Thus, basic price valuations should be used both for supply and use quality adjustments if the supply and use accounts are to balance in both value and volume terms."
"*7.70 - […] (vi) The Manual advises that quality adjustment methods should use basic price valuations, rather than a mixture of basic prices for supply aggregates (output PPIs) and purchasers' prices for uses aggregates (input PPIs and the CPI) to maintain consistency between supply and use volume measures."*

It seems it is therefore indirectly that the PPI manual suggests the resource-cost quality as main criterion for producer price indices (and then the fixed-input output price index theory as main conceptual basis): it recommends basic prices valuation, hence direct output prices rather than input prices, therefore resource-cost quality-adjustment.

At this stage, we can oppose two objections:

- for services, the difference of valuation between the output price and the input price is not a practical argument (for final consumption, the change of VAT rate is to consider, but for Intermediate Consumption of enterprises deducting VAT, the valuation is identical);
- to tell the truth, National Accounts balance value and volume at purchaser prices, and only in a second step at basic prices (in Input-Output Tables, as an analytic tool).

But we observe with satisfaction that, implicitly, the FIOPI theory, recognized indirectly as the main conceptual basis of the output prices, is only an advice from the PPI manual.

The IMF manual on XMPI (2009) is strictly consistent with the IMF manual on PPI (2004). It recommends to treat import prices as input prices, and export prices as output prices. It develops then a fixed-input output export price index theory (FIOXPI) and a fixed-output input import price index one (FOIMPI). This system is consistent with NA on a resident's point of view. Anyway, the manual suggests that the opposite would be true on the non-resident's point of view, and that SNA 93 presented imports and exports this way. A unique criterion of quality adjustment in both senses would of course be preferable for international trade statistics reconciliation.

The OECD-Eurostat manual "*Methodological guide for developing Producer Price Indices for services*" (2005) ignores the fixed-input output price index or fixed-output input price index theories, except in one case: architectural and engineering activities and related technical consultancy, for which there is no choice between them, and they are rather excluded from practice:

"*Model pricing attempts to price a constant quality output, but the aims of a Fixed Input/Output Price Index are hard to achieve as engineers change their work processes continuously and services are unique. A gradual increase in the overall technological level probably exists but is hard to quantify. As engineers' work is highly supported by automated systems, IT developments have potentially a strong effect on the industry. A problem arises in model pricing when an outdated service is replaced by a newer one; the choice for the method of quality adjustment procedure in linking to the new service can be decisive for how quality change is treated in the index*."

The Eurostat's handbook on PPI (2012) makes no reference to the fixed-input output price index. Instead, it quotes the IMF manual (paragraph 1.213) in a way that make the two criteria equivalent:
"*The evaluation of the quality change […] The value can either be estimated on the basis of the value to the user of the new quality, or the production costs from the producer*"
The former Eurostat's manual on "methodology of short-term statistics was also ignoring any reference to FIOPI theory.

This review of international manuals leads us to this first conclusion: the fixed-input output price index theory has been since 1983 the doctrine of the American Bureau of Labor Statistics in charge of PPI and SPPI; it is only an advice by an indirect reasoning in the IMF manuals on PPI (2004) and XMPI (2009); and it is totally ignored by Eurostat and OECD manuals on PPI and SPPI.

2 Why two of the three main purposes of PPI and SPPI should obviously be user-value oriented

2.1 Definition of the three main purposes of PPI and SPPI

The manual on PPI coordinated by IMF (2004) exposes the main purposes of PPI (and SPPI):

"*2.51 - Price instability introduces uncertainty into economic analysis and decision making, so the main uses of the PPI relate to efforts to minimize this uncertainty. The PPI therefore has the following main uses:*
• Short-term indicator of inflationary trends;
• National accounts deflators;
• Indexation in legal contracts in both the public and private sectors, particularly for more detailed PPI components;
• Required by international organizations such as Eurostat, the OECD, IMF, and European Central Bank (ECB) for economic monitoring and comparison;
• Current cost accounting;
• Compilation of other inflation measure such as the final expenditure price index (FEPI); and
• Analytical tool for businesses / researchers."

We can admit that the first three purposes exposed are the most important:

- the international organizations should compare national practices having the other purposes in view, and at first glance there is nothing specific for PPI to international comparisons. If a framework should be specifically designed, it would be certainly the National Accounts framework, for consistency with other macroeconomic indicators;
- the current cost accounting is important in periods of high inflation, which has not been the case for a long time in most countries. Anyway, its conceptual framework should be identical to this of indexation in legal contracts;
- the compilation of other inflation measures should share the same concepts as the short-term indicator of inflationary trends (i.e. the common perception of inflation);

- the analytical tool for business/researchers is a vague notion… I must confess however that microeconomic works on production functions could fit exactly with Jack Triplett's view.

2.2 Why the short term indicator of inflationary trends should be user-value oriented

The common sense and the common practices for the evaluation of inflation rely on CPI, then on the user-value for the final consumers. Even extended to other consumers, it is still expressed in terms of "purchasing power", hence of user-value:

Definition of inflation by Insee:
"*Inflation is the loss of purchasing power of currency, expressed through a general and lasting increase in prices. It must be distinguished from the increase in the cost of living. The loss of value of currency units is a phenomenon that affects the national economy, regardless of the different categories of agents. Most of the time, to evaluate the rate of inflation, we use the consumer price index. This measurement is not complete, the inflationary phenomenon covers a field wider than household consumption*."

Paragraph of PPI manual by IMF on the purpose of short term indicator:
"*2.52 - […] These users also need the data to build models to look at the price pressures that different sectors of the economy are facing […]"*
The price pressures faced by economic sectors are the prices of their inputs, in regard to their production function, hence the related PPI and SPPI should be user-value quality adjusted, according to the concepts stated by Jack Triplett for input prices.

It was already noticed in a former paragraph of the same manual:
"*2.42 - […] The essential difference between input and output PPIs is that an input PPI measures potential inflation, by indicating the price pressures that producers are facing. […]*"

2.3 Why the indexation of legal contracts should be user-value oriented

The PPI manual by IMF is less explicit on the concepts underlying indexation of legal contracts, but the reference to inflation suggests a user view:
"*2.53 - […] The purpose of the indexation is to take the inflationary risk out of the contract. […] Indexation is common in long-term contracts, where even relatively small levels of inflation can have a substantial effect on the real value of the revenue flows […]"*

In fact, there are two general ways of contract escalation:
- on the costs of the supplier, in order to maintain its margin, for a given technology;
- on the market price of the product sold, in order that the user does not lose by maintaining the contract on a long duration.

But in any case, these two techniques are user-value oriented, and the related PPI or SPPI are conceptually input prices, either for the supplier, either for the user.

2.4 Others?

My review has not been exhaustive. It is interesting to notice that Jack Triplett says (1983, page 272):
"*An input price index has many applications*"
While, for the output price index, he admits (page 288):
"*the approach [of an output price index for goods] requires motivation*", as it is only indirectly useful, in order to get a right volume index by deflation, in a productivity view.

3 Why National Accounts should privilege the user-value criterion for PPI and SPPI

3.1 General considerations on welfare and utility in National Accounts

In the neoclassical view, at the origin of National Accounts development (just after World War II), the notion of "real" national income (we would say now Gross Domestic Product or more accurately Net National Income or actual final consumption in volume) was an approximation for measuring the level and the change of welfare for the society as a whole.

More recently, the Stiglitz Committee has been a new attempt to improve the measure of GDP toward a notion of "well-being".

Nevertheless, SNA 2008 is very cautious on the link with utility:
"*3.118 - […] The SNA does not attempt to determine the utility of the flows and stocks that come within its scope. […]"*

SNA 93 was even more cautious and was warning against the confusion between the level of utility (for instance health, education) and the flow of output.

SNA 2008 quotes the COLI concept in the general theory of index numbers and it is in order to get closer to superlative indices that it recommends chain-linking. SNA does not quote the COGI concept, neither the fixed-input output price index theory.

Everywhere else, SNA 2008 speaks of "quality" with "price-determining characteristics" without defining quality.

In the most important paragraph devoted to its preference for deflation, SNA 2008 exposes the example of electricity, and it is striking to note that, in this case, the common and unique product considered from the producer side is to be deflated differently according to the kind of user and usage:
"*15.103 […] A change in the composition of the type of user leads to a change in the price and volume of electricity in the SNA even though the physical measure of electricity distributed may not have changed."*
From a production function point of view, one could have supposed a unique output price index in € or $ / MWh whatever the kind of user, with a typical case of discrimination price. It is not the vision of NA, and here the output price index (in the NA commodity flow) is to be adjusted on the user-value.

The Eurostat's handbook on price and volume measures in National Accounts (2001) is more straightforward in linking quality with consumer's utility: "*For a producer, quality change of an input will be related to its use in the production process and the profit that can be made, and it might be possible to more or less objectively put a value to the change. For a consumer, however, the quality of a product is essentially linked to the utility he or she gets out of it.*"

The handbook does not provide guidance on an intrinsic concept of quality related to output as a specific operation. On the opposite, it examines the intrinsic concepts of quality for each kind of product in particular, without distinguishing between the uses side and the resource side.

In general terms (even if the examples are only provided on non market services), it suggests a possible direct link between the output (here synonym of production) and outcome:

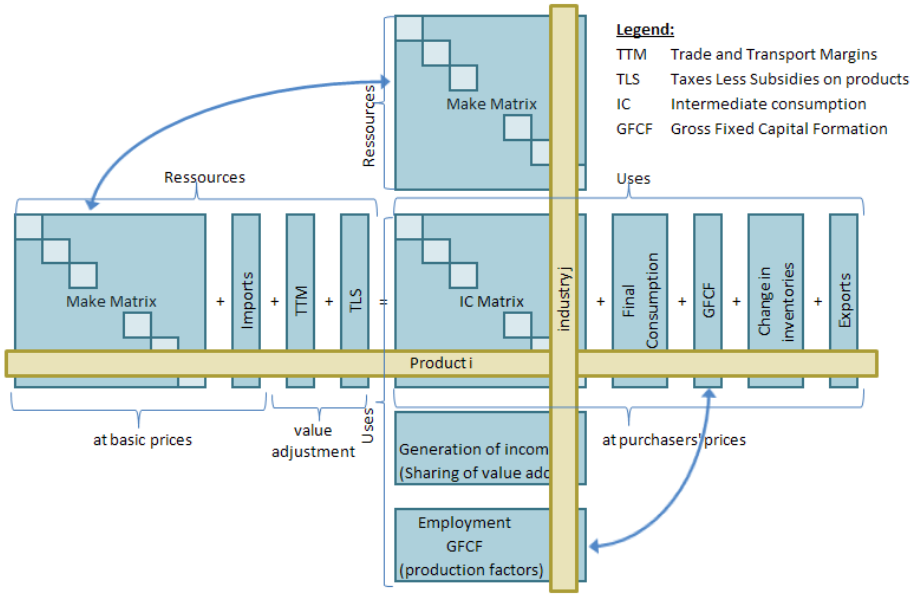
"*3.1.2.2 - […] The quality of the output lies in its results, i.e. in the outcome. […]*"
This approach, which has been discussed in depth later with the proposals of the Atkinson review (cf. infra), is as much user-value oriented as one can imagine, but the difficulty lies in the environmental factors also responsible of the outcome, outside the own contribution of the producer to the outcome.

3.2 "Horizontal" *vs.* "vertical" reading of a Supply and Use Table and predominance of the expenditures approach

A Supply and Use Table has two dimensions:

- a horizontal one, expressing the balance of the commodity flow for each product, simultaneously in value and in volume;
- a vertical one, expressing the production account and the generation of income account by industry, also in value and in volume.

Scheme 1: horizontal and vertical readings of a Supply and Use Tables



The analysis of the "output prices" and "input pices" in regard to production functions correspond of course to a vertical reading of the Supply and Use Table.

But it is important ton understand that, in practice, the balance of volume is made "in row" by product, under the form:

Basic prices					purchaser prices				
P	+ M	+ TTM	+ T-S	+ VAT =	IC	+ FC	+ GFCF	+ Δstocks	+ X
Output	Imports	Transport and trade margins	Taxes less subsidies on the product	VAT	intermediate consumption	final consumption	gross fixed capital formation	change in inventories	exports

in value of current year, in volume *i.e.* in previous year's prices as recommended practice, and in value of previous year, all globally at purchaser prices.

It is only in a second step that these volume and price measures are reported in the IC Matrix, where the equation does not result into a balance, but into the calculation of an aggregate of the kind B1 (Value Added) or B2 (gross or net operating surplus).

The global horizontal approach leads to the expenditures approach, while the global vertical one describes the production approach and the generation of income approach. It is to notice that the choice of the valuation at market prices makes the expenditures approach of GDP more relevant than the two other ones, where Value Added is to be adjusted with total taxes less subsidies on products, including VAT.

The "purchasing power" concept has sense both for the expenditures approach, where the (sustainable) final consumption in volume (per head or per consumption unit) should be the target of the economic policy, and for the generation of income accounts, where the Net National Income is the key aggregate, also evaluated and possibly deflated with its equivalent in final consumption. International comparisons rely on purchasing power parities.

The producing power would be the concept for the production approach. But if the output price index is correctly measured in this view with the fixed-input output price index theory, and if the commodity flow of each product is balanced with this indicator in priority as suggested by the IMF manual on PPI, then the input prices (intermediate consumption and gross fixed capital formation) will not be correctly measured. It is to notice that an international KLEMS project on comparisons of countries' production accounts by industry exists, but is quite less successful than the international system of purchasing power parities.

3.3 Review of NA concepts and practices, by kind of use or by kind of product

For final consumption, the CPI is always respected, unless in few cases (FISIM, insurances, gambling, non-market services…). When the commodity flow is summarized as P = FC, with two price indicators (PPI and CPI), the PPI takes always the adjustment from the CPI. This is so often the case in services that the first redaction of European STS regulation limited the calculation of SPPI to pure "BtoB" indicators, where no CPI was available, as SPPI "BtoC" where considered as equal to CPI by principle.

For GFCF, Gordon's view on durable goods has been accepted for a long time, *i.e.* the objective that the change in productivity of more fuel-efficient airplanes should better be attributed to the aircraft industry, where the R&D personnel and expenditures have taken place, than in the airlines services that benefit from this situation.

For non-market services, the SNA 93 has posed the superiority of "output methods" on "input methods" for individual services. Here, the terminology can be misleading in comparison with Jack Triplett's words:

- the output method for individual services is in fact user-value oriented (the link with the outcome), as for the input prices of Jack Triplett;
- the input method for individual services is in fact resource-cost oriented, as in the output prices of Jack Triplett.

The output method for non-market individual services is accepted by all National Accountants. The difficulty arose in their discussions on its quality adjustment. In order to improve the measurement of (British) government output in National Accounts, the Atkinson review had stated several principles, of which principle B provided a direct definition of output, directly linked with the user-value:
"*Principle B: the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome.*"
If the Atkinson review's ideas were not adopted at the time, it was more because of some other controversial principles (notably principle C) and by fear of some European countries to lose international comparability, because the outcome quality-adjustment was not easy to implement. However, such a shift toward the user-value orientation seems in the sense of the History of National Accounts.

4 Some inconveniences of the pure FIOPI theory in practice

4.1 Misunderstanding or sound practical restriction of the FIOPI theory by the PPI and XMPI manuals?

Jack Triplett never suggests that the technology (the production function curve) is fixed between two periods. All his schemes show two different production function curves. It is the way he refutes the never ending arguments against the existence of "costless" quality changes (with a lot of empirical evidences) and the "elimination of productivity change objection" (1983, page 304) "*If we only know inputs and outputs for two periods, and do not know the production function, then of course there is no way of partitioning the change between the contributions if increased characteristics (movement along a production function) and a shift in a production function. Attributing all the output change to input change would clearly eliminate measured productivity change.*"
It is obvious that, in the productivity view adopted by Jack Triplett (theory of the producer), such a consequence on the productivity measurement is highly undesirable.

But so much information on the production function is rarely available. It is the reason why the PPI and the XMPI manuals extend somewhat the hypothesis of fixed technology between the two periods, or at least between the two qualities in the same establishment:
"PPI manual *7.44 - […] The output PPI thus aims to measure an output price index constructed on the assumption that inputs and technology are fixed*."
"*XMPI manual 1.109 - When the technology changes, there is no comparable basis for comparing costs between the two qualities, and such procedures break down. An alternative approach would be to use hedonic regression techniques, which are also discussed below and in more detail in Section G of Chapter 8*."

4.2 The production cost quality adjustment technique is not advocated by Jack Triplett

In his "*handbook on hedonic indexes and quality adjustments in price indexes: special application to information technology products*" (OECD, 2004), he reviews all kinds of quality adjustments and he writes about "Production cost quality adjustments":
"*In this method, the agency seeks information from manufacturers on the cost of quality improvements made to their products. For computers, they might ask: What would it have cost to build the previous period's computer with an extra 100 MHz in its specification?*
In the United States and Canada, cost-based quality adjustments for automobiles have been routine for many years. Triplett (1990) presents a time series of quality adjustments made to US cars since 1967, and Schultz (2001) contains similar data for Canada. A number of countries have implemented some form of cost-based quality adjustments, usually on an "as available information" basis, for selected cases.
In my view, production cost adjustments usually overstate the value of quality changes. What is wanted, in principle, is the cost of making the change in the production conditions of period t: Scale of production, labour and input costs, and production technology should all be held constant. It is difficult to obtain such data from manufacturers, unless their own management information systems are set up this way, which sometimes is the case, but not universally. Since the question is a hypothetical one, it is often difficult even to convey what is wanted. Too frequently, what is provided instead is the actual change in cost from period t to period t+1 – the cost of going from one specification to the other, which includes, for example, re-design and set-up costs for the improved specification, as well as wage increases and so forth. A more extended discussion is in Triplett (1971) and Triplett (1990). Schultz (2001), who provides a recent analysis for Canadian autos, also suggests that the production cost method may have over-adjusted the Canadian automobile index for quality change.

Production cost adjustments are not very likely on electronic products. They were attempted by BLS in their first measures of computer prices in the PPI. My understanding is the manufacturers told BLS that the computer with new features usually cost less than the one it replaced (because of technological change), so they had no basis for valuing computer performance improvements by the production cost method."

In fact, the reasoning of Jack Triplett on an output price *vs.* an input price is not separable from his shift from a "goods space" to a "characteristics space", with an hedonic method revealing the "shadow" market prices of each characteristic (market prices balance, by hypothesis, the user-value with the resource-cost). The hedonic method is the one recommended and it is not clear for me why Jack Triplett maintains in this case the conceptual difference between resource-cost and user-value, even for each characteristic.

4.3 In Jack Triplett's view, the energy efficiency of durable goods is not to be considered as a user-value for an input price

In his same article of 1983, but above all in his comment on Gordon's about "energy efficiency", Jack Triplett reasons on quantities *vs.* prices and on separability of inputs in order to refute a quality adjustment of durable goods on fuel efficiency, even for an input price theoretically user-value oriented:
"*There is no question that fuel efficiency changes should be reflected in some way in a measure of the consumer's consumption costs. It is not true, however, that the fuel-efficiency effect must necessarily enter into the measurement in the form of an adjustment to the price of the durable good whose fuel efficiency changed. In fact, the theory of index numbers suggests just the opposite - that the theoretically appropriate method for incorporating fuel efficiency changes into the index normally involves an adjustment other than to the price of the durable good whose fuel efficiency changed. […]*
If the objective is to produce a subindex (such as a price index for airplanes), then one must deal with the question, What subindex is justifiable in theory? Pollak (1975) distinguishes several kinds of subindexes, but the kind most relevant to the present discussion depends for its justification on the theory of separability, as applied to production functions. […]
For that, one would have to be able to write the vector of x's separable from e - that is, to maintain that marginal rates of substitution between aircrafts characteristics (such as between speed and fuel economy) were independent of fuel usage. That is not a plausible specification at all. Gordon seems to have misunderstood what separability theory says about forming subindexes. […]
Treating fuel-efficiency changes in the airplane-fuel subindex gives a result similar to the one for the overall input index: because the input cost subindex is defined on airplanes combined with fuel, the effect of fuel efficiency improvement is again completely accounted for by the reduction in fuel quantities. No airplane price adjustment is called for."

Fortunately, Jack Triplett does not contest such an "empirical work" for fixed weight indices, where "the index numbers theory says nothing" (because supposing fixed quantities between the two periods):
"*Fuel-efficiency changes pose index number problems only when the objective is to compute fixed-weight approximations to input cost indexes, such as by use of Laspeyres or Paasche formulas. For these cases, fuel is entered with a fixed weight, and no quantity adjustments occur*".

These linear approximations with fixed quantities (maybe of the previous year) are exactly the typical framework of National Accounts and contract-escalation formulas!

More simply, in my view, such a quality adjustment on the fuel-efficiency should have been adopted on a "market price" reasoning (here driven by the user value). If an aircraft with fuel-efficiency and another one with the same characteristics except the fuel efficiency exist in

same time on the same market, and if all purchasers have all the information, including previsions of future fuel prices and interest rates, it is obvious that the two market prices will differ of about the amount of the fuel expenditures saved, conveniently discounted by the interest rates.

It seems to me that if Gordon (1990) expresses his debt to Jack Triplett theory, he has above all escaped to his fixed-input output price index and fixed-output input price index theories in conceiving a price index of durable goods relying on their "net value services" for the user, larger concept than the single output (here, the diminution of inputs can be taken into account). His concept is then of "fixed-net value for the user input price index theory", with in fact all flexibility desired for a user-value quality adjustment.

5 What about antipollution devices required by law?

Their individual user-value is null or quite null, but their collective user-value is supposed to be worth their costs, otherwise the government would have not taken this decision.
Their resource-cost is significant.

The consumers would like these kinds of obligations recognized as price increases.
The producers would not like to be considered as responsible for the inflation. But in kind of contract-escalation, they would like to have this cost increase taken into account in the formulas.

"Classic" National Accounts rely on market valuations and addition of individual transactions and final consumptions. It is only with the Stiglitz committee that this kind of externality and collective utility would rather be taken into account in GDP.

As this accounting of collective utility is a difficult issue for each indicator, French CPI and PPI have decided together with NA to take these costs for a half in prices and for another half in volume (will still be the case with upciming euro tax 6), while the B.L.S. has decided not to take them in producer prices, but totally in consumer prices.

My opinion, in a classical NA view, would be to fully take these costs as price increases in PPI, CPI and NA, on the basis of individual utility. The accounting of externalities would be the object of satellite accounts.

6 The French practice of output and input price indices for SPPI

As for industrial PPI, Insee has distinguished, mainly in dissemination, SPPI "output prices at basic prices" and SPPI "input prices at market prices for contract escalation".

Their revision policy is not the same: "input prices at market prices for contract escalation" are reputed definitive at M+120 or T+90, while "output prices at basic prices" can be revised with more flexibility.

The difference relies mainly on their valuation: exclusion or inclusion of other (than VAT) taxes less subsidies on products, and stage of process: the intra-group transactions are excluded from "input prices at market prices for contract escalation".

Conceptually, the SPPI at basic prices cover activities and net output, and SPPI at market prices products and gross sales. But French practice is to describe activities by "homogenous branches", *i.e.* as close to products as possible. The most practical consequence is the treatment of media space for advertising, included in the media activity for output prices, but connected with advertising products in input prices.

Document 1: dissemination of “output” and “input” price indices in French PPI and SPPI

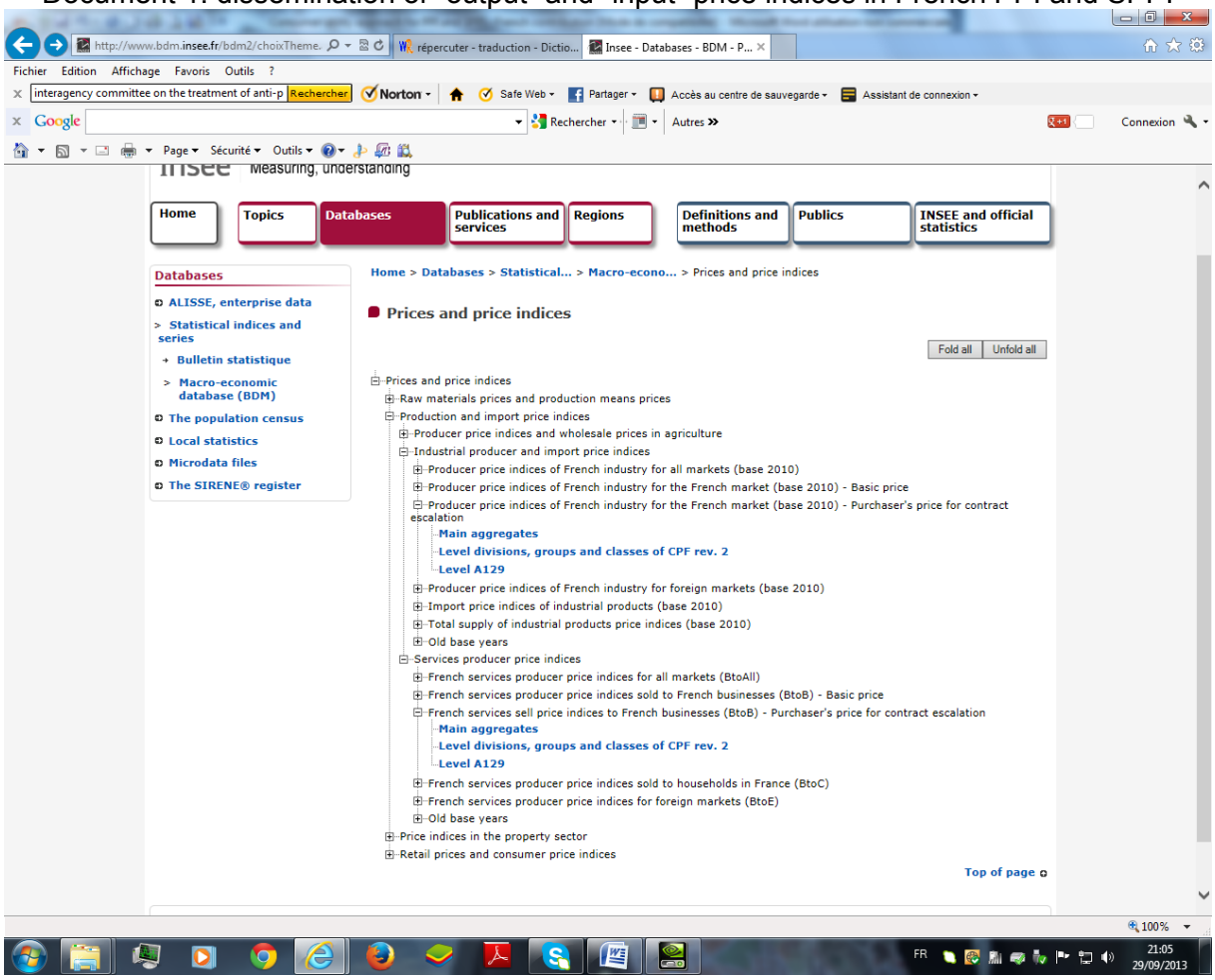


Table 2: differences of treatments between “output” and “input” French SPPI

At basic prices	**At market prices**
Output price of the activity (income of the producter) double net price concept, for turnover	Purchaser's price of the product cost of the first acquisition on the market) ideally measured according to triple net concept
Excluding taxes on products, excluding VAT	Including taxes on products, excluding VAT
Subsidies on products included	Subsidies on products deducted
Including intra-group transactions	Excluding intra-group transactions
Data revised if needed, until April of year n+1	Data definitive at T + 150 days or corrections mentioned in **BDM news**

Conclusion: tentative of a synthesis

Most purposes of PPI and SPPI use them as input prices. The consistency between the resource side and the uses side of volume and price indicators of a given product is desirable for National Accounts. The general philosophy of National Accounts is more focussed on the uses side, leading to a welfare and purchasing power view (expenditures approach and income approach), than on the resource side, leading incompletely to a producing power view (production approach). Hence, in order to reconcile all or most purposes, PPI and SPPI should be valuated at basic prices, but quality-adjusted with a user-value criterion. The fixed-input output price index theory is not the conceptual basis for output price indices. The right theory would rather be a “fixed-net value for the user input price index” theory, adjusted on the difference of valuation in order to be relevant at basic prices. However, the resource-cost technique is a possible estimator of the quality change, to restrict in practice to constant technologies, or industries with slow technological change, and in any case less accurate than a hedonic model catching the shadow market price of (goods or services) characteristics.