

**Value Added by Industry -  
A Problem of International Comparison**

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## **Value Added by Industry- A Problem of International Comparison**

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This paper deals with a problem in internationally comparable economic statistics, namely, the fact that countries measure value added by industry differently. The economic measure, value added, is important both in its own right and because it is a component of other economic measures such as productivity. Value added by industry measures the additional value created by a production process. This additional value, created by factors of production such as labour and capital, may be calculated either before or after deducting the consumption of fixed capital used in production. Thus, gross value added by industry is the value of its output of goods and services less the value of its intermediate consumption of goods and services and net value added as the value of output less the values of both intermediate consumption and consumption of fixed capital.

### **Different Ways of Measuring Value Added by Industry**

Although the above definition of value added by industry is unambiguous, expressing it in monetary terms is neither conceptually straightforward nor uniform among countries, as is indicated by the fact that three different ways of measuring value added by industry are currently prevalent among OECD member countries. Consequently, their respective measures of value added by industry are different and non-comparable. As or more importantly, the incorporation of these different measures into other economic measures renders them different and non-comparable as well. The 1997 edition of the OECD publication, **Services Statistics on Value Added and Employment** lists value added by industry in the services sector and reports that, in each of its member countries (except Poland and Korea), value added is measured in terms of basic prices, factor cost, or market prices. Canada, Denmark, Greece, Iceland, Ireland and the United Kingdom measure value added at factor cost; Finland, Hungary and Sweden measure it at basic prices, and the other 18 countries measure it at market prices.

### **The 1993 SNA's Treatment of Value Added by Industry**

Let us situate the present practices of the OECD countries in the context of the 1993 SNA. The 1993 SNA recognises three alternative measures of valuation of value added: gross value added at basic prices, gross value added at producer's prices and gross value added at factor cost, the last one derivable from either of the two former ones. These measures depend upon how the output is valued; the valuation of intermediate consumption is in all cases at purchasers' prices. Two methods of valuing output are specified: basic price and producer's price. These methods are defined as follows:

“The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale. It excludes any transport charges invoiced separately by the producer” (paragraph 6.205a). “The producer’s price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any VAT, or similar deductible tax, invoiced to the purchaser. It excludes any transport charges invoiced separately by the producer” (paragraph 6.205b). Output valued at producer’s price thus includes taxes like excise taxes and other non-deductible taxes on products. The concept of purchaser’s price is quite straight-forward and is defined as follows: “The purchaser’s price is the amount paid by the purchaser, excluding any deductible VAT or similar deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser. The purchaser’s price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place” (paragraph 6.215).

Although the 1993 SNA recognises two methods of valuation of output, its preference is clear: “The preferred method of valuation is at basic prices, especially when a system of VAT, or similar deductible tax, is in operation, although producer’s prices may be used when valuation at basic prices is not feasible” (paragraph 6.218). Valuation at basic prices may not be feasible if a country’s establishment surveys do not separate the excise and sales taxes on products in the revenues earned from the sale of products. In that case, valuation at producers’ prices is the only alternative.

Some comments on these alternative valuation methods, using Canadian statistics, are in order. Typically, Canada’s establishment surveys report the value of production or sales at the boundary of the producing units, an approach that excludes taxes on products at time of sale as well as separately invoiced transport charges. Canada’s valuation of output is at **modified basic prices**; the main difference between it and the 1993 SNA definition of valuation at basic prices relates to subsidies on products. Canada’s output is valued at the subsidised prices, the prices actually paid by purchasers, while the 1993 SNA recommends valuing output at actual prices plus subsidies. The latter approach results in purchasers reporting payments for products at values higher than their actual prices, counterbalanced by their assumed receipt of subsidies, as subsidies in the 1993 SNA are allocated to users of products. The 1993 SNA’s approach distorts the records of the reporting units, which is why Canada prefers actual prices appearing on invoices. This is not a major issue, as the volume of product subsidization is quite small in Canada. In effect, Canada uses approximate basic prices.

As mentioned earlier, the 1993 SNA recognises three alternative measures of value added by industry, derivable from two valuation measures of output and from the purchasers’ price valuation of intermediate consumption. These are: gross value added at basic prices, gross value added at producers’ prices and gross value added at factor cost. According to the 193 SNA:

- a. “Gross value added at basic prices is defined as output valued at basic prices less intermediate consumption valued at purchasers’ prices” (paragraph 6.226).
- b. “Gross value added at producers’ prices is defined as output valued at producers’ prices less intermediate

consumption valued at purchasers' prices" (paragraph 6.227). In the absence of VAT or similar deductible tax, this is equivalent to the "measure of gross value added at market prices" (paragraph 6.227).

c. "Gross value added at factor cost can ... be derived from gross value added at basic prices by subtracting other taxes less subsidies on production" (paragraph 6.229).

The 1993 SNA prefers gross value added by industry at basic prices and accepts value added by industry at producers' prices when valuation at basic prices is not feasible.

Statistics Canada publishes gross value added at factor cost by industry. In its surveys, revenues from output or sales are typically recorded at modified basic prices and purchases of goods and services to be used for intermediate consumption are typically reported at purchasers' prices. The Canadian value of output at modified basic prices minus intermediate consumption at purchasers' prices approximates the 1993 SNA's value added at basic prices. However, Statistics Canada publishes value added by industry at factor cost, by subtracting from the modified basic price calculation of value added "other taxes less subsidies" on production. In terms of magnitude, the most important other taxes on production are real estate and payroll taxes and other subsidies on production are subsidies for manpower training. Note that most subsidies paid in Canada are subsidies on products such as wheat and other grains, subsidies on intra-urban local bus passenger fares, subsidies on the movement of grains by railways etc. Statistics Canada prefers to measure value added by industry at factor cost, as this measure, in its judgement, better reflects the intuitive meaning of the concept. As indicated, this concept has been extensively used both for productivity analysis and, more generally, in the economic literature for a long time.

It was noted above that many OECD countries measure value added by industry at market prices, with the result that, in their statistics, excise and other sales taxes on products levied at point of sale are added to revenues of producing units. In other words, both the values of output and of value added, of a given industry, are increased by the amount of sales taxes collected by that industry, although they are transmitted to the government which levied them. For example, in the cases of trading enterprises and hotels and restaurants, all collected sales taxes increase their respective value added, even though they do not retain these funds. Although recognised in the 1993 SNA, this approach is counter-intuitive. In addition to its other consequences, the higher the sales taxes levied by the government, the higher are the corresponding amounts of value added of trade, in spite of the fact that the enterprises have not used their own factors of production to generate the increase in value added.

To summarise, all three concepts of value added by industry: at factor cost, at basic prices, and at market prices are prevalent in OECD member countries. Of these, value added by industry at factor cost produces the lowest total. Value added by industry at basic prices raises the measure of value added by industry, principally of real estate and owner-occupied dwellings, although the value of output is unchanged. On the other hand, measuring value added by industry at market prices further raises the values of both output and of value added by industry, principally of trade and hotels and restaurants. In the presence of VAT or similar deductible taxes, the very meaning of value added by industry at market prices is questionable. As the 1993 SNA puts it: "in the presence of VAT, the producer's price excludes invoiced VAT, and it would be inappropriate to describe this measure as being

at market prices" (paragraph 6.227). Since value added by industry, measured by one or another of these three valuations, is published by the OECD, the unwary user is apt to consider the series comparable when, in fact, they are far from comparable. The differences serve to render problematic, if not distinctly misleading, measures which incorporate them, such as measures of industry shares and productivity.

### **Some Statistical Evidence**

The magnitude of differences between the three concepts may be illustrated by statistics pertaining to the United States and Canada. GDP at market prices for the United States in 1992 was US\$6,234 billion, as reported in its 1992 input-output tables (summary Table 2.2, page 20). In terms of value added by industry, the shares of the components were as follows: \$3,645 billion for labour compensation, \$506 billion for indirect business tax and non tax liability (equivalent to the 1993 SNA's taxes on production less subsidies on production) and \$2,083 billion for other value added (equivalent to the 1993 SNA's mixed income of unincorporated business enterprises and other operating surplus). As GDP at factor cost removes all net taxes on production, it would equal \$6,234 billion less \$506 billion or \$5,728 billion. Indirect taxes contributed 8.1% of GDP at market prices at the total economy level. However, two thirds of the indirect taxes, \$328 billion, were levied just in two sectors, trade (wholesale and retail) and real estate (including owner occupied). These two sectors together contributed \$1571 billion or 25.2% of value added at market prices, but their contribution dropped to \$1244 billion, or 21.7% of value added at factor cost. This represents a huge drop in industrial share.

GDP at market prices for Canada in 1992 was Canadian \$698 billion-\$604 billion for value added at factor cost, \$57 billion for net taxes (taxes less subsidies) on products and \$37 billion for other net taxes (taxes less subsidies) on production. Other taxes on production refer, as noted above, to such taxes as real estate property taxes and payroll taxes. Net other taxes on production were allocated to industries paying such taxes, but \$22 billion of \$37 billion were paid by the finance insurance and real estate sector. Thus, if Statistics Canada published value added by industry at basic prices, total value added would increase to \$641 billion (604+37), and the share of the real estate sector would be much higher, as a disproportionate share of property taxes are paid by it. With our existing surveys, Statistics Canada cannot produce value added by industry at market prices, as respondents are asked to report value of sales of products excluding any taxes on products imposed at time of sale.

In the United States, the allocation of taxes on products by industry for the value added by industry calculation closely reflect the regulations and practices that determine which industry is liable for tax collection during the periods the taxes were imposed. (Additional details may be found in a paper by Robert E. Yuskavage, "Improved Estimates of Gross Product by Industry" published in the August 1996 issue of Survey of Current Business (page 140), the monthly publication of the US Bureau of Economic Analysis). There is no generally accepted economic theory behind this allocation of taxes on products. If the regulations change, the industrial allocation of taxes changes, hence the value added also changes.

## **Different Tax Regimes**

In many other OECD countries which also publish value added by industry at market prices, the tax regime is quite different from that of the United States. VAT is quite prevalent in these countries, thus industries do not pay taxes on products and per the 1993 SNA guidelines (or per general economic reasoning) their producer prices should not include taxes on products. Many of these countries are members of the European Community and have now implemented the 1993 SNA in their accounts. Will they continue to publish value added by industry at market prices? If yes, will their statistics on value added by industry at market prices include VAT? If they do, what is the rationale? If they do not, where are such taxes allocated?

## **Value Added by Industry at Constant Prices**

We have seen how different and non-comparable are the different methods at current prices. The differences are exacerbated at constant prices. Even with the same current price values of output and of value added by industry, constant price measures and growth rates of value added by industry will differ for many reasons. Some of them are noted here. Constant price measures may be calculated with reference to a fixed base year or an annually changing base year and the results are different. Constant price value added by industry may be calculated residually using a double deflation method or the base year values may be projected using such measures as constant price gross output, employment by industry or any other proxy. Again, the results are different. Constant price calculations are very sensitive to the choice of index number formulas, base year, method of derivation, etc. Thus, one needs to be doubly cautious in the analysis of such an important constant price series as value added by industry.

## **Concluding Remarks**

It has been shown that the measures of value added by industry published by the OECD countries using three different methods of calculation are non-comparable. As or more importantly, the incorporation of these different measures into other economic measures, such as productivity, renders them different and non-comparable as well. But data users do not necessarily know this. They generally expect such measures to be comparable because they are published under one title and without caveats; consequently, their analysis could and would be unsound.

Therefore, I appeal to the OECD and other international organisations to start adding bold faced caveats on non-comparable data published in their name. Of course, it would be better to encourage member countries to provide data using internationally recommended guidelines and conventions. However, given their unique statistical structures and statistical data sources, it may not be possible for some countries to completely follow the international guidelines. In such circumstances, and for such an important series as value added by industry, it is incumbent upon all of us to develop macro adjustments, by industry, to “correct” these country series before they

are reported in international publications. Such macro adjustments can never be perfect, but their inclusion will vastly improve the international comparison of value added by industry and the analyses following from it.

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