VOORBURG GROUP ON SERVICE STATISTICS

Sixth Meeting
Helsinki, 7-11 October 1991

# COMMENTS ON VOLUME MEASURES FOR SERVICES AND SERVICE INDUSTRIES DRAFT INTERNATIONAL GUIDELINES

Erling J. Flottum
Central Bureau of Statistics, Norway

Statistics Canada

**COMMENTS ON MR. FLOTTUM'S PAPER**
**"Volume measures of services and service industries: Draft international guidelines"**

Eleven members, including countries and international organizations, were asked to provide comments on Mr. Flottum's paper.

Four members provided no comments on the paper - Eurostat will be presenting a paper on the subject at the meeting. Of the seven responses received, some were short while others were relatively extensive and included notes of both a general and specific nature.

There does not seem to be a clear agreement on the general approach used in the guidelines. There were, as well, concerns with respect to the deflation of specific types of services and alternative approaches have been proposed.

Comments of a general nature include:

- Support for the paper as a good starting point for the development of international guidelines;
- Support for the methodologies proposed except for wholesale and retail trade;
- Support and reservations on the double deflation approach;
- Double deflation should typically be for benchmark estimates of GDP; for current estimates, countries should be more flexible in terms of approaches used;
- Concerns that the guidelines are too detailed and ambitious; they should rather focus on various methods of deflation, with detailed guidelines for exceptional cases such as banking and trade;
- The view that quality and international comparability should be achieved by allowing each country to produce its own best estimates;
- The need for greater clarity. What is being measured (product, production of industries, value added of industries)? The terminology was also found somewhat confusing (e.g. margins versus margin rates; gross output versus total sales), etc.

Comments of a specific nature include:

- Problems of both a conceptual and statistical nature in the approach proposed for wholesale and retail trade;

concern that the aggregation of wholesale and retail trade will result in substantial error;

- Problems with ton-miles for estimating output of freight transportation; weighted average of tons and average distances recommended;

- Concerns over the use of cost or input price indices as deflators when prices are not available; prices for closely related CPC groups would be better than input price indices such as wage rates;

- Rather than physical differences between services, differences in economic characteristics should be used for deflation (e.g. hotels and motels - distinction should focus on 2-star hotels/motels versus 3-star hotels/motels);

- The 4-digit categories for telecommunications services do not reflect the latest CPC breakdown;

- Why are different methods used for national accounts and satellite accounts to measure value added for the same industry (e.g. ISIC, division 50)?

- Other specific responses concerned transportation and related industries, postal services, and descriptions of country practices.

Attached are the responses received from members.

**AUSTRALIA**

While we support the endeavour to improve the international quality and comparability of these estimates, we believe that this is best achieved by each country trying to produce the best estimates it can, rather than rigidly following an international methodological standard. In particular, we are not convinced that double deflation is always the most appropriate method. Unlike a number of other OECD countries, Australia has never developed constant price estimates of its input-output tables. Maybe this is why the ABS is not so enthusiastic about the use of double deflation for service industries.

ABS constant price estimates of gross product by industry are derived using three different methods: the gross output method, double deflation and extrapolation using hours worked or deflated input cost data. The method selected to obtain constant price estimates for a particular industry depends on the data available in respect of that industry and an assessment of the relative merits of different options.

The gross output method is the one most commonly used by the ABS; it involves extrapolating base year gross product estimates by movements in constant price estimates of gross output or an indicator of gross output. Double deflation is used to derive estimates for the agriculture, mining and gas industries. The third and least satisfactory method uses hours worked or deflated input cost data to extrapolate base year gross product. Such indicators are used to derive gross product estimates for public administration and defence; finance, property and business services; and community services. There are two major reasons why double deflation is not used more extensively.

The first reason is that double deflation requires detailed and comprehensive data relating to gross output and intermediate input. Such data have only been collected frequently by the ABS for the goods-producing sector in the past. An apparent way round this obstacle would be to derive constant price estimates of commodity flow data from the input-output tables, and so provide estimates of gross product by double deflation for all industries. While such estimates would have the advantage of being derived within a consistent framework, some of the apparent advantage of double deflation with respect to the services sector would be illusory. This is because the RAS method has been used to derive the input-output table values for the (many) inter-censal years, with the result that there are discontinuities in the industry time series each year that benchmark data are introduced.

The second reason for using the gross output method is that, in practice, it is thought to be superior to double deflation in certain circumstances (for a detailed analysis see Peter Hill's

book, **The Measurement of Real Product**, Paris OECD, 1971). This is because of the compounding of statistical errors inherent in double deflation. For example, suppose both gross output and intermediate input are subject to an independent, identically distributed random error such that both have a relative standard error (RSE) of e per cent. In the case of Australian wholesale and retail trade, the value of intermediate input is equal to about 37 per cent of the value of gross output for the latest year for which these data have been estimated, 1986-87. If gross output is set equal to 100 then intermediate input equals 37 and the estimate of gross product using double deflation (pdd) is equal to 63. The variance of pdd is given by:

$$\text{Var (pdd)} = \text{Var (gross output)} + \text{Var (intermediate input)}$$

$$- c^2 \mid 0.14e^2$$

$$= 1.14e^2$$

The relative standard error of pdd is therefore,

$$\text{RSE (pdd)} = \frac{1.14^{\frac{1}{2}}c}{63}, \text{ or } 1.7c \text{ per cent}$$

The relative standard error of the estimate of growth of pdd from any year 1 to any year 2 is given by,

$$\text{RSE}\left(\frac{\text{pdd(2)}}{\text{pdd(1)}}\right) = (\text{RSE}^2\ (\text{pdd(2)}) \mid \text{RSE}^2\ (\text{pdd(1)}))^{\frac{1}{2}}$$

$$= 0.024e, \text{ or } 2.4c \text{ per cent.}$$

Constant price gross product derived using the gross output method (pgo) is equal to gross product in the base period multiplied by the growth in constant price gross output. The relative standard error of the estimate of growth of pgo from year 1 to year 2 is therefore equal to the relative standard error of the estimate of growth of constant price gross output from year 1 to year 2,

$$\text{RSE}\left(\frac{\text{pgo(2)}}{\text{pgo(1)}}\right) = \text{RSE}\left(\frac{\text{gross output for year 2}}{\text{gross output for year 1}}\right)$$

$$- \left(\begin{matrix}\text{RSE}^2\ (\text{gross output for year 2}) + \\ \text{RSE}^2\ (\text{gross output for year 1})\end{matrix}\right)^{\frac{1}{2}}$$

$$= \frac{2^{\frac{1}{2}}e}{100}$$

$$= 0.014e, \text{ or } 1.4e \text{ per cent.}$$

In this example, it has been assumed that the constant price estimates of gross output and intermediate input are subject to a relative standard error of the same size. Is this a realistic assumption? The answer is almost certainly not. While retail and wholesale sales data have been collected quarterly, intermediate input data have only been collected every six years or so, as part of the retail census and wholesale survey. Hence, for inter-censal years, intermediate input has had to be imputed using RAS in the input-output tables. Another serious concern has been the lack of suitable price indexes to deflate intermediate input. According to the most recent Australian input-output tables (1986-87), 39 per cent of the intermediate input comes from the finance, property and business services industries - most of it from business services. The ABS has no output price indexes for these industries, and the prospects for developing them do not appear to be very good (see the paper by G. Isacsson, **Extending Price Data Collection to Business Services**, Volume II of the October 1990 Voorburg Group papers). On the other hand, price indexes for wholesale and retail sales are considered adequate. It is, therefore, reasonable to assume that the difference between the relative standard errors of the pgo and pdd growth rates would, in practice, be bigger than what is indicated in the example.

Of course, to the pgo relative standard error must be added any error arising from a breach in the assumption that constant price estimates of gross output and intermediate input grow at the same rate. This, too, can be quite substantial. For example, suppose intermediate input's actual share of gross output changes from 37 in year 1 to 38 in year 2 and there is a corresponding doorcase in the share of gross product from 63 to 62. Then the gross output estimate (pgo) would have a positive bias of 1.6 per cent. On the other hand, estimates derived by double deflation could also be biased because of the infrequent conduct of service sector censuses and surveys and the failure of RAS to effect the changing structural relationships and efficiency with which intermediate inputs are used. A movement between a year shortly before and a year shortly after a census could be so seriously distorted that it would be entirely useless. The major redeeming feature of double deflation in those circumstances is that if the change in the input-output ratio were monotonic then it would give better estimates of long-term growth than the gross output method.

It is after considering such factors and the additional cost of double deflation that the ABS has chosen to use the gross output method for most industries.

With the recent introduction of the annual economic activity survey (EAS) which covers most of the economy, the situation has changed to some extent. The survey collects both output and input data, albeit to a coarser level of detail than the less frequent censuses and surveys and with larger sampling errors. The problem of bias

with double deflation estimates has disappeared, and the sole considerations are now cost and whether the relative standard error of double deflation estimates outweighs the relative standard error of gross output method estimates plus any bias.

As noted above, a significant obstacle in the way of developing satisfactory constant price estimates or intermediate input for wholesale and retail trade (as well as other industries) is the lack of output price indexes for finance, property and business services. While there is a desire to develop such indexes - if only to allow the constant price estimation of output indicators for business services - the ABS has no plans at present to undertake such a development. But even if they were available, the ABS would be likely to use double deflation for service industries only if it were thought that it provided superior estimates to the gross output method.

**CANADA**

We support the general thrust of the paper in its attempt to establish international guidelines for countries to follow. We have, however, some comments/suggestions.

In general, there is a need for greater clarity in the exposition of the paper. For example, the statement "Direct volume extrapolation is viewed as appropriate only in the case in which less complexity prevails" needs to be elaborated.

We support double deflation as a logical method in the Input-Output framework. The rationale for this approach should be elaborated.[1]

However, we feel that double deflation methodology should typically be used for benchmark estimates of GDP. For more current estimates, countries should be more flexible in terms of the approaches used. Double deflation, single indicators, etc. are all appropriate. In Canada, double deflation is used in the Input-Output Accounts produced with a lag of about three years. The more current estimates of constant price GDP are developed using a variety of procedures.

On a scale of preference, extrapolation is second best. We agree that employment measures (numbers employed, man-hours data, etc.)

---

[1]See Statistics Canada "Services Industries in the Business Sector of the Canadian Economy", Kirshori Lal, Third Meeting, Voorburg Group, Wiesbaden, October 1988. Published in Review of Income and Wealth Series, 36, Number 1, March 1990. This paper discusses the general methodological issues of deflation from the Canadian perspective.

should not be recommended as a projector because they miss productivity changes.

The guidelines are too detailed and rigid for a subject which is still in evolution statistically and conceptually. Even "better off" countries are at different stages of development as far as statistics on service industries are concerned. It would be more appropriate to provide general guidelines and also discuss country practices in different areas. As an example, the methodology suggested for Wholesale and Retail Trade has conceptual and statistical problems. In Canada, the trade sector has undergone significant changes: in the market share among store types, in product mix and in the nature of service provided (full service to self service, discount clubs)[2].

Since GDP estimates at 3 and 4 digit ISIC level are more volatile than estimates of Gross output of industries, we recommend that countries be encouraged to publish data for gross output as well as GDP for benchmark years.

**CZECHOSLOVAKIA**

We are just beginning with restructuring our statistics. We are preparing the transfer from MPS to SNA, considering to what extent we can replace our national product classification system by the CPC /which namely in service sector was not yet officially agreed?/, and taking other related first steps. In this situation, we feel it will be for us too early to have serious recommendations and comments and they probably may not be typical for other countries. We probably may have comments at later stages of work.

**EUROSTAT**

Eurostat is proposing a contribution for sessions 1-3 of the next Voorburg meeting. Our paper which will be based, among other things, on Mr. Flottum's, will propose "an annotated outline for a methodological manual on prices and quantities in services". We will also contribute a more sectoral paper on "prices and quantities in distributive trade". We are also considering the possibility to propose a paper on "prices and quantities in insurance". For the moment, we do not have any detailed comments on the subject.

---

[2]For discussion on trade margins, see K. Lal, op. cit.

**FINLAND**

It is proposed in the draft that the volume output of freight transportation by rail (CPC 7112) should be based on the number of ton-kilometres or ton-miles. This means that the transportation distance and amount of tons have equal weights in the volume indicator.

The method assumes implicitly that the transportation service consists only of the carriage of goods. In that ton-kilometre is an appropriate volume indicator. However, the transportation service consists also of loading and unloading and therefore the amount of tons should have bigger weight in the indicator.

(In Finland's) opinion, the best way to evaluate the volume output is to use deflation. If proper price information is not available (as it is often the case), the volume could perhaps be calculated as a weighted average of two series, tons and average distances. The weights depend on the size of the country.

(Finland) is preparing a paper for the Voorburg meeting where this problem will be dealt with more closely.

**FRANCE (INSEE)**

Comments expected but not received yet.

**GATT**

As we do not collect or compile statistics on services, we are not in a position to offer constructive comments on the guidelines.

**NETHERLANDS**

First, as stated at the previous Voorburg Group meeting, namely, that it is a courageous endeavour deserving full support. We have discussed the paper with several experts within the office. In general, we would compliment Mr. Flottum with these thorough papers, which, in spite of our comments, form good starting points for draft international guidelines.

1. The object of the papers is not very clear. Do they deal with the measurement of <u>products</u> (services), with the measurement of <u>production volume</u> of services industries or with the measurement of <u>value added</u> of service industries? It is not explicitly stated in the papers. We think it is the third, or at least, it should be. When the method of double deflation is applied, of course the production of service industries is

involved, no doubt mainly consisting of services. It is important though to put the objective in a clear way and to stick to it consistently.

2. The use of terminology in the papers is sometimes a bit confusing. Different terms suggest different definitions. However, at several locations in the papers different terms have seemingly (from the context) similar definitions (e.g. margins vs. margin rates, gross output vs. total sales). To avoid confusion, it is advised to be more strict in terminology and to add a glossary of terms and definitions to the papers.

3. "The draft guidelines are based on a relatively high ambition level" (p. 6). This is certainly true for The Netherlands. As it is clear that in many cases the aspired level will not be reached, it is useful to make a sharp distinction between theory and practice. We recommend to include in the guidelines a systematic and thorough description of the various methods available to estimate the value added. In fact, we think that this should be the core of the handbook and, when this would seem agreeable, would consider contributing to it. Moreover, the guidelines should indicate which method is (methods are) preferred and the reasons for that preference, and should discuss the advantages and disadvantages of the other methods. Finally, the guidelines should include arguments in support of the preferred type of index number.

4. In the annex sometimes different methods are advised to estimate the value added of the same activity (e.g. ISIC division 50) for the National Accounts and the Satellite Accounts respectively. If one method is to be preferred over the other, why this difference treatment?

5. "When it comes to methodology and the choice between direct and indirect volume measures, both the draft Blue book and previous Voorburg Group discussion strongly tend to favor indirect volume measurement" (p. 5). This statement should be argued.

6. In the classification of services and service industries, the physical difference between services is emphasized. For example, the classification distinguishes between hotels and motels. However, for price deflation, this distinction is not relevant. In that case, the economic aspect (e.g. 2-star hotels/motels versus 3-star hotels/motels) is important. Therefore, the ISIC and CPC should be adapted to take account of the economic aspects of the different services and service industries.

7. In section 4.3 on volume input measures, it is recommended to use uniform price indices and to not attempt to make direct volume estimations. A uniform price index, however, may sometimes be a bad indicator, especially if the inputs are obtained through different trade channels.

8. We recommend less detail in the annex and a separate treatment of ISIC and CPC. We prefer more general guidelines with, if necessary, only a detailed treatment of exceptions like banking and trade.

**OECD**

The document must have been drafted before the revised breakdown for telecommunications services was adopted for the CPC. The recommendations for the 4-digit categories therefore do not correspond to the latest breakdown.

However, this will probably not affect what seems to be the essence of the recommendations:

- Double deflation is favoured as the main method;
- Volume output: CPI whenever applicable (public telephone); relevant (special) price indices in most other cases and input proxies as a last resort;
- Volume input: deflation using relevant price indices by commodity.

Although the use of specific rather than general price indices are recommended for volume output, the CPI for public telephone could be used both for public telephone services and eventually for the overall telecommunications services group. In the unlikely event that 14 specific indices were to be developed (one for each class of telecommunications), this would, of course, not be necessary. However, the most likely to become available are for public telephone and for data and message transmission services. These two would probably constitute a more representative measure of price movements than wage rate indices for the industry.

**SWEDEN**

General comments

For some CPC groups, Mr. Flottum suggests cost or input price indices as deflators. We are not sure that this is the second best solution when prices are not available. In some cases, mentioned below, we think that other options really exist. Would it be

better to recommend that prices for close CPC groups should be utilized instead of wages?

Specific comments

ISIC 601
CPC 7112 Freight transportation by rail

We agree with the methods suggested, but we think that the product disaggregation should be more detailed, and if possible, the number of ton-kilometres should be weighted by base year's average prices, i.e. a weighted volume index should be compiled. It is important that the disaggregation also include distance classes, as is pointed out in Flottum's paper.

ISIC 602
CPC 7123 Freight transportation by road

We agree with the methods, but the products should be disaggregated further and the value should also be stratified according to distance classes.

ISIC 630
CPC 7443 Parking services

Input price indices are suggested to be replaced by output price indices.

ISIC 630
CPC 7461 Airport operation services

There are two options for deflation in Sweden, price indices and volumes of passengers and planes using base year's unit prices as weights. You do not have to rely on input price indices in this case.

ISIC 630
CPC 7462 Air traffic control services

Price indices instead of input prices.

ISIC 641
CPC 7512 Courier services

CPI indices for postal services may not be a relevant deflator for courier services. Price indices for courier services should be preferred and are possible to collect.

**UNITED STATES**

With the exception described below, we support the proposed guidelines for the methodologies used to estimate constant-dollar value-added, or gross product, for services.

The section of the paper that raises concerns to me is paragraph 3.2 of the issue paper, which discusses the level of aggregation for wholesale and retail trade. For volume measures, aggregating wholesale and retail trade will result in substantial error unless the deflation of gross output or the use of quantity indicators is carried out at more detailed commodity levels than outlined in the annex paper (Section G, Version I, ISIC 50). For example, motor vehicles and gasoline are not homogeneous products. Relative price levels and gross margin rates are substantially different by type of motor vehicles -- luxury and compact cars, domestic and imported cars, trucks sold to businesses and those sold to households -- and by types of gasoline -- purchases by business, government, and households. Furthermore, the prices and margins of these commodities do not change over time in the same proportion. On the other hand, Version II in the annex paper, which is for "satellite accounts", moves closer to the appropriate detail for volume measures of value added, but it still combines wholesale and retail trade for ISIC's 501, 503, and 504.

The guidelines for the estimation of constant-dollar gross product in wholesale and retail trade should call for the preparation of separate estimates for wholesale and for retail trade and measures of constant-dollar gross output based on detailed price indexes and current period weights for both sales and for cost of goods sold.

In January of this year, we released the first phase of a program to improve the U.S. estimates of gross product by industry.[3] In general, the methods used in these improved estimates are consistent with those proposed by Mr. Flottum.

---

[3]*See* De Leeuw, F., Mohr, M., and Parker, R. Gross Product by Industry, 1977-88: A Progress Report on Improving the Estimates, Survey of Current Business. January 1991, pages 23-37.