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1 Introduction

The objective of the Voorburg Group is to establish an internationally comparable methodology for measuring the constant dollar outputs of the service industries¹. The focus of the VG is to develop concepts, methods, and best practices in the area of services. Following discussions at meetings of the 20th (Helsinki) and 21st (Wiesbaden) Voorburg Groups, it emerged that many of the issues being discussed with regards to classifications, and the measurement of both turnover and prices, for Service Industries required input or guidance from national accountants. As national accountants are ultimately responsible for the measurement of output volume of service industries, decisions regarding turnover, price index and classification methodologies need to be made such that they are not only comparable between national statistical offices, but both comparable and coherent with the methodologies applied within the national accounts of the respective countries.

With this viewpoint duly considered, the 22nd meeting of the Voorburg Group in Seoul included national accounts papers from four agencies, with presentations from three national accountants².

This paper describes the measurement of service industry output to constant price, draws together the key themes from the national accounts material presented at the Seoul meeting, and presents issues covered in the subsequent discussion sessions.

2 Measuring output of the service industries to constant price

The production³ approach uses the output of industries to estimate gross domestic product (GDP) as follows:

Gross output at basic prices
less intermediate inputs at purchasers' prices
equals gross value added at basic prices
plus taxes on subsidies
less subsidies on products
equals Gross Domestic Product (P)

1 This is the terminology used on the Voorburg Group website; it could equally be replaced by equivalent terms such as “constant Euro”, “constant Pound”, “constant Kroner”, “constant Yen”, “constant Won”, “constant Peso” etc.

2 Presentations were made by Clint McCully (US Bureau of Economic Analysis), Kil-Hyo Ahn (Bank of Korea), and Michael Smedes (Australian Bureau of Statistics). Vera Norrman (Statistics Sweden) also provided a paper covering an extract of the inventory of price and volume measures from the Swedish national accounts.

3 The expression “from the production side” is used in the paragraph 2.222 1993 System of National Accounts (UN *et al* 1993), or SNA93. Other agencies have referred to this approach as “value added” or “output”.

This expression for GDP can be realised in current prices (measuring values). However, SNA93 emphasises calculation at constant prices. “Flows or stocks at constant prices take into account the changes in price of each item covered. They are said to be in *volume* terms”⁴.

2.1 Output

The objective of the Voorburg Group, as noted in the Introduction, is to establish comparable methodologies for the measurement of service industry output at constant prices – that is, for service industries, the first component in the expression for GDP(P) at constant prices. Expressing the objective of the Group in this form allows clarification of scope:

- 1) output of service industries includes all domestic outputs, not just outputs used elsewhere as intermediate inputs;
- 2) similarly, the outputs of interest are consumed by both domestic and rest-of-the-world customers;
- 3) the focus on service industry outputs means that measures of inputs to service industries are not directly of interest, except insofar as they might allow better measurement of outputs;
- 4) the output of service industries includes all outputs, not simply the output of those services primary to the particular industries of interest; outputs of services as secondary production should also be measured, meaning that the interests of service industry output are best measured by focusing on the delivery of service products, regardless of the industrial classification of the establishments that provide them.

2.2 Constant price

Constant pricing is an expression usually taken to mean values expressed in prices of some agreed prior (base) period – in other words, the output values are re-expressed such that the underlying quantities (or volumes) relate to the current period and any price change between the earlier period and the current period are removed from the valuation. This revaluation may also be stated as “express the current period (t) quantities in base period prices (0)”. In the production of national accounts this is typically achieved in one of two preferred ways:

1. Quantity revaluation

For strictly homogeneous products where the units of quantity can be directly measured, expression of the volumes in prices from a base period can be achieved (simply) by multiplying the observed current period quantities Q^t by the unit prices P^0 from that base period.

$$V(0,t) = P^0 \times Q^t \quad (1)$$

For example, this approach might be used for revaluing tonnage of a specific grade of coal by the price of that grade of coal from the base period. This type of revaluation is generally only possible for products from agricultural or mining industries, where the prices are readily observable, the products themselves are typically transacted in standard quantity terms (per litre, per tonne etc.), and the products are homogeneous. Given that these conditions (direct observations and homogeneity) do not typically hold for any service industry, quantity revaluation is seldom used for measuring the output of service industries to constant prices.

4 Paragraph 2.77 SNA93

2. Price deflation

The use of price indices to re-express an observed value in a current period in prices from a base period is called price deflation. However, when considering measures of price change it is necessary to consider how the accounts treat price and volume change; specifically, the SNA93 states⁵ “different qualities have to be treated the same way as different kinds of goods and services” - that is, as different economic activity. Therefore a change in quality must flow through the accounts as a change in volume, and consequently any price index used for deflation must price products to constant quality. More explicitly, when constructing a price index any change in quality between the product measured in period 0 and the product measured in period t must not appear as price change.

When price indices can be so constructed (I^t/I^0), a measure of output at constant price $V(0,t)$ is then determined as:

$$\begin{aligned} V(0,t) &= V(t,t) \div \frac{I^t}{I^0} \\ &= P^t \times Q^t \div \frac{I^t}{I^0} \\ &= P^0 \times Q^t \end{aligned} \tag{2}$$

where

$$\begin{aligned} P^0 &= P^t \div \frac{I^t}{I^0} \\ &= P^t \times \frac{I^0}{I^t} \end{aligned}$$

A third mechanism for producing measures of output is also worth mentioning. For some detailed products a volume indicator series may also be developed (that is, a direct measurement of volume change for a particular product line). For these measures to be included in the aggregate accounts, the resulting volume measures are then effectively “reflated”, determining the current price of the outputs. Subsequently these components are included in broader current price measures of output, which are then in turn deflated.

3 Summaries of the national accounts papers from Seoul 2007

3.1 Statistics Sweden

The paper submitted by Statistics Sweden (Norrman 2007) notes that constant-price calculation is carried out by way of supply and use tables. Swedish measures of services constant price output are generally determined through deflation by producer price indices (PPIs), although use is sometimes made of proxy measures of price change such as consumer price indices (CPI) or wage indices. PPIs, CPIs and wage indices are used for constant price valuation of foreign trade in services. The paper also mentions the “reflating” approach, although notes its application is generally limited to energy measurement.

Norrman notes that a key feature of the Swedish national accounts is the focus on the expenditure approach to GDP. The paper describes how an index of domestic supply is produced (with “domestic” in this context taken to mean all supply for domestic use, rather than supply by domestic providers alone – a naming convention which reflects the greater focus on expenditure measures rather than production measures, and as such that the index adds imports and subtracts exports). Norrman also describes the annual balancing approach, and the construction of chain price indices,

5 SNA93 Paragraph 16.106

including the rationale for choice of base period.

3.2 Bank of Korea

The paper presented by the Bank of Korea (Anh 2007) comments on constant-price calculation through both deflation and quantity revaluation, and stresses foremost the importance of services producer price indices (SPPI's). Anh notes "SPPI's used for the estimation of constant output are relatively insufficient in Korea"; although services cover 57.2% of Korean GDP, (2005 basic prices) SPPI's comprise only 8.3% of all commodity price indices, covering only 35.7% of the service sector (contrasting with 93.6% coverage for goods). Anh attributes this to the extent of non-market prices for services, and the difficulties with the output of certain large industries, notably wholesale and retail trade, finance, research and development, and broadcasting.

With respect to non-market activities, Anh notes that price indices are used for relevant input cost items (such as intermediate consumption, fixed capital consumption and so forth). For wholesale and retail trade, and for financial intermediation Anh notes the lack of explicit prices, with nominal and real values of output instead used as deflators.

Anh provides a comprehensive stock take of the deflators currently used for other market activities in the Korean national accounts. This overview indicates that in some circumstances CPIs are used as proxies for SPPI's, but in doing so Anh notes

"But this application needs to be improved. If corporations and households have considerable weight in the use of services, CPI and PPI should be applied to the usages by corporations and by households respectively."

Anh also notes the use of manufacturing PPIs as proxies for leasing and rental services, and the use of input-costs methods for architectural and other engineering services.

Anh stresses the need "to newly compile price indexes for services which don't have appropriate price indexes".

3.3 Australian Bureau of Statistics

The paper (Smedes 2007) presented by the Australian Bureau of Statistics (ABS) comments on the need for price indices, quoting⁶ SNA93 on both the requirement for an integrated set of price and volume measures, and the need to decompose a change in value into both a change in price and a change in volume. In considering the production approach to GDP, Smedes describes quantity revaluation and price deflation, and the double deflation method applied at the product level through supply-use framework adopted by the ABS. Smedes emphasises that

"The ABS has a clear preference to use price indexes based on market prices to derive volume estimates. It is these indexes which most appropriately distinguish the price and volume components in GDP movements and contribute to the production of high quality national accounts statistics,. Ideally these indexes would be available for all components of the accounts."

Smedes describes the expenditure approach to GDP, noting the separate measurement of household and government components of final consumption expenditure. Smedes also notes that whereas household expenditure is generally deflated using components of the ABS CPI, volume estimates of government final consumption expenditure are obtained either through quantity revaluation, or through the use of proxy measuring by deflating inputs (either wage price indexes or input PPIs).

6 SNA93 Paragraph 16.1

With regards to the export of services Smedes notes that a variety of different approaches are used, including the use of the CPI.

Smedes notes that the largest gaps for SPPI's from the perspective of the ABS national accountants are for finance and insurance services, wholesale and retail trade, international trade in services, and intangibles such as software. Smedes notes that health and education services are not a current priority for ABS SPPI's, since the domination of these sectors by non-market providers means that services are not transacted at economically significant prices (and as such price deflation is not seen as a feasible mechanism for constructing volume estimates). Smedes highlights specific difficulties with the services listed above.

Smedes paper discusses in some detail the “nature” of SPPI's desired by Australian national accountants. He emphasises the importance of coherence and consistency, stressing measurement of prices and values from a consistent population, with price and value measurement adopting common classifications. He also emphasises the need for price change to be measured to constant quality, indicating that *defining the nature of the volume of services output* is a key step, and necessarily a collaborative process between national accountants, turnover statisticians and price index specialists. Smedes includes a lengthy discussion on the resource cost versus user value debate for determining the correct perspective for quality change.

3.4 Bureau of Economic Analysis

The presentation by McCully (2007) includes an overview of the three methods of GDP compilation (which he terms output, final demand and income). McCully points out the importance of differentiating between output and revenue, noting that for many service industries revenue does not equate with gross output. He emphasises that industry data alone are not sufficient to measure GDP and that commodity-specific output data are required for both the product and expenditure approaches to GDP, plus highlights the importance of commodity level deflators.

With respect to coverage of SPPI's as used in the production account, McCully shows that of the 1900 PPIs used in the production approach to GDP, only 75 come from service industries. Where SPPI's are not available the BEA adopt CPIs or implied price deflators from private consumption expenditure (PCE). McCully highlights that wholesale trade is an area of specific concern, since PPIs for goods are used as proxies in the absence of SPPI's.

McCully details the use of SPPI's in the expenditure account, indicating usage for some PCE's, for private investment, some government consumption expenditure, and for the transport component of net exports. He points out that PPI scope in some instances is a close match to the scope of PCE; whereas PCE is expenditure made on or behalf of households, the SPPI scope is output of a particular industry, and therefore includes purchases by households or when supplied by other sectors such as government or non-profit institutions serving households (NPISH). McCully also notes that that PCE for medical care includes input cost proxies.

McCully discusses at some length the appropriateness of quality adjustment for price indexes, noting acute problems with price indexes for medical care *as used for deflating expenditures*. The presentation contrasts the output of the medical care industry with substitution that occurs at the individual consumer level (for example – switching from hospital to outpatient setting for some surgeries). McCully notes that to correctly account for this behaviour in the measurement of expenditure on medical care would require disease based indexes.

McCully further discusses the use of SPPI's in the expenditure approach where equivalent

components of the CPI do not exist (e.g. security industries), or where the BEA has judged the CPI measurement to be unsatisfactory (e.g. SPPI for airlines uses transaction prices whereas the CPI for airlines uses list prices). He contrasts this with a review of SPPI's which are not used for PCE deflation, citing availability of a more preferred CPI, where the household expenditure is almost nil, where conceptual differences exist, or where expenditure is undertaken though non-market activities (in which case input costs are used as proxies).

4 Issues raised during discussion sessions

In addition to the themes raised by the presenters, the accompanying discussion and summary sessions also covered a range of recurring issues. In order to develop a better understanding of these issues, these will be grouped according to common themes and discussed in greater detail.

4.1 What are retail and wholesale trade?

Output of the retail trade and wholesale trade industries, as services, were not universally understood, with confusion between the revenue generated by the industry and the output of the industry⁷. The chief misunderstanding seems to be that the sale of, say, a can of soft drink by a supermarket to consumer is not only the provision of good to the consumer, but also a service provided to the consumer. That is, purchase of a good at a retail outlet by a consumer is actually the purchase of "the good plus the retail service provided by that particular retail outlet". Within the national accounts framework, the soft drink manufacturer is attributed with the production of the can of soft drink, and the supermarket provides a service, typically consisting of but not limited to:

- a) weatherproof premises with ease of access, suitable lighting, air-conditioning, and general levels of security and personal safety;
- b) access to the store at a range of convenient times;
- c) availability of a range of products in convenient-to-access displays, accompanied by pricing and other information, with stores laid out in familiar and constant patterns;
- d) for a given product, choice between different varieties (sizes, brands, flavours);
- e) car parking;
- f) options for methods of payment (cash, debit card, credit card);
- g) a range of sales points and sales assistants to provide advice or to enable payment to be made;
- h) home delivery;
- i) trolleys to enable better cartage of goods both within the premises and between the premises and transportation.

More explicitly⁸, the term *trade margin* is used to refer to the value of the service provided by institutional units when they engage in the activity of purchasing goods for resale (retailing or wholesaling). The conceptual basis for the measurement of the output of wholesale and retail distribution is as follows:

"Although retailers actually buy and sell goods, the goods purchased are not treated as part of their intermediate consumption when they are resold with only minimal processing such as grading, cleaning, packaging, etc. Wholesalers and retailers are treated as supplying services rather than goods to their customers by storing and displaying a selection of goods in convenient locations and making them easily available for customers to buy. Their output is measured by the total value of the trade margins realised on the goods they purchase for

7 McCully (2007) noted this general issue in his presentation

8 This section borrows heavily from Chapter 2 of *ABS Experimental Price Index for Retail Trade Margins 2003 to 2006* (ABS cat. no. 6420.0). Another explanation of the features of retail trade margins, from the perspective of the US Bureau of Labor Statistics, is provided in the PPI Manual (IMF 2004), Chapter 10, Section J, paragraphs 10.167 – 10.181

resale. A trade margin is defined as the difference between the actual or imputed price realised on a good purchased for resale and the price that would have to be paid by the distributor to replace the good at the time it is sold or otherwise disposed of. The margins realised on some goods may be negative if their prices have to be marked down. They must be negative on goods that are never sold because they go to waste or are stolen."⁹

In practice, the value of the output (trade margin) of wholesaling or retailing activity equals:

the value of sales, including sales at reduced prices
plus the value of other uses of goods purchased for resale
minus the value of goods purchased for resale
plus the value of additions to inventories of goods for resale
minus the value of goods withdrawn from inventories of goods for resale
minus the value of recurrent losses due to normal rates of wastage, theft or accidental damage.²

Or put more simply, Output = Sales – Cost of goods sold.

As Anh (2007) noted, this output is never directly measured¹⁰, introducing complexities for the measurement of both prices and volumes

4.2 International Trade in Services

International trade in services was raised in many of the sessions of the meeting of the 22nd Voorburg Group, and was a recurring theme in previous meetings. Trade in services arises as a discussion issue because:

- a) international trade in services, particularly exports, forms a key subset of the outputs of service industries;
- b) unlike international trade in goods, measurement of most trade in services cannot be enhanced through use of customs data or other administrative data sources;
- c) the increasing trend to offshoring results in an increase in both the import and export of services;
- d) popular tools used as pricing mechanisms in the construction of price indexes may fail in the presence of offshoring;
- e) measurement of statistics for trade in services is a dynamic and evolving branch of official statistics, and ensuring coherence across different national and international frameworks (such as the System of National Accounts and Balance of Payments Manual (BPM)) forms a substantial component of the development activities of national and international statistical agencies.

The assurance of coherence and comparability of statistics on international trade in services is beyond the scope of the Voorburg Group, and is better addressed in other forums. This paper will not attempt to address these issues. Instead, two specific and recurring themes will be addressed: first, the definition of an export will be presented, with clarifications regarding the activities of foreign branches and subsidiaries. Second, offshoring will be described in the broader framework of subcontracting and outsourcing, with emphasis on the measurement issues for the output of service industries.

⁹ SNA93 Paragraph 6.110

¹⁰ Retail *output* is never measured directly, but retail *sales* are measured directly, and the price change of items typically sold by retailers form part of many national statistical offices' CPI measures. These direct measures associated with retail sales should not be confused with the output of the retail trade industry.

4.2.1 Exports (Credits)

The export of a product is the sale of a product from a resident to a non-resident. Exports form part of the output (credit) of the economy of the resident unit, and are an input (debit) for the economy of the purchasing non-resident unit. With respect to goods the situation is relatively straightforward, with goods usually¹¹ passing through the customs frontiers of the countries of the resident and non-resident units. With respect to services, delivery (and hence production) typically occurs within the geographical boundaries of the purchasing unit (or sometimes outside all geographical boundaries). On this matter, the SNA notes the following:

It should be noted, however, that GDP is not intended to measure the production taking place within the geographical boundary of the economic territory. Some of the production of a resident producer may take place abroad, while some of the production taking place within the geographical boundary of the economy may be carried out by non-resident producer units. For example, a resident producer may have teams of employees working abroad temporarily on the installation, repair or servicing of equipment. This output is an export of a resident producer and the productive activity does not contribute to the GDP of the country in which it takes place. Thus, the distinction between resident and non-resident institutional units is crucial to the definition and coverage of GDP. In practice, of course, most of the productive activity of resident producers takes place within the country in which they are resident. However, producers in service industries which typically have to deliver their outputs directly to their clients wherever they are located are increasingly tending to engage in production in more than one country, a practice which is encouraged by rapid transportation and instantaneous communication facilities. Geographical boundaries between adjacent countries are becoming less significant for mobile service producers, especially in small countries bordered by several other countries.¹²

The SNA notes the importance of the distinction between resident and non-resident units. This is not always clear, particularly when one or both of the parties involved in a transaction has exercised a form of Foreign Direct Investment (FDI). More clearly, the issue can be expressed as the question “how do we determine the residency of a unit?”

The definition of residency employed in SNA is identical to that provided in the BPM, and is based on the concept of *centre of economic interest*.

An institutional unit has a center of economic interest within a country when there exists, within the economic territory of the country, some location, dwelling, place of production, or other premises on which or from which the unit engages and intends to continue engaging, either indefinitely or over a finite but long period of time, in economic activities and transactions on a significant scale. The location need not be fixed so long as it remains within the economic territory.

In most cases, it is reasonable to assume that an institutional unit has a center of economic interest in a country if the unit has already engaged in economic activities and transactions on a significant scale in the country for one year or more, or if the unit intends to do so. The conduct of economic activities and transactions over a period of one year normally implies a center of interest, but the choice of any specific period of time is somewhat arbitrary. The

11 *Relatively* straight forward - this discussion acknowledges the difficulties surrounding measurement of the transactions of goods when *merchandising* is employed. Merchandising is the practice where a resident in country A sells a product to a resident in country B, but sub-contracts or otherwise purchases the product from a resident in country C (in essence the unit from country A acts as a wholesaler); measurement difficulties arise where shipment of a product occurs directly from country C to country B without ever crossing the customs frontier of country A – so although change of ownership occurs (C to A, A to B), the product never appears in merchandise trade statistics of country A, but flow of income does occur (A to C, B to A). This issue is a topic of much discussion amongst OECD, UNECE and Eurostat statisticians (et al), and aside from the existence of the issue, falls outside the scope of this paper.

12 SNA 93 Paragraph 6.239

one-year period is suggested only as a guideline and not as an inflexible rule.¹³

Further to this definition, the BPM goes on to specifically clarify the centre of economic interest for an enterprise:

An enterprise is said to have a center of economic interest and to be a resident unit of a country (economic territory) when the enterprise is engaged in a significant amount of production of goods and/or services there or when the enterprise owns land or buildings located there. The enterprise must maintain at least one production establishment in the country and must plan to operate the establishment indefinitely or over a long period of time. Together with other considerations [attribution of production], a guideline of one year or more, to be applied flexibly, is suggested.¹⁴

Attribution of production

Production undertaken outside the economic territory of a resident enterprise by the personnel, plant, and equipment of that resident enterprise is treated as part of host country production and the enterprise is treated as a resident unit (branch or subsidiary) of that country if the enterprise meets the conditions [noted above]. In addition, the enterprise must, among other considerations, maintain a complete and separate set of accounts of local activities (i.e., income statement, balance sheet, transactions with the parent enterprise), pay income taxes to the host country, have a substantial physical presence, receive funds for enterprise work for the enterprise account, etc. If these conditions are not met, the activity should be classified as an export of services by a resident enterprise. Production can generate such an export only if the production is classified as domestic production (undertaken by a resident even though the physical process takes place outside the economic territory). These considerations also apply to the particular case of construction activity carried out abroad by a resident producer. Special mention should be made of construction involving major specific projects (bridges, dams, power stations, etc.) that often take several years to complete and are carried out and managed by non-resident enterprises through unincorporated site offices. In most instances, site offices will meet the criteria that require site office production to be treated (as would that of a branch or affiliate) as the production of a resident unit and as part of the production of the host economy rather than as an export of services to that economy.¹⁵

Working with these definitions, it is possible to illustrate residency concepts by revisiting a frequently recurring type of example concerning road freight services.

Example

A German manufacturer produces high-end audio-visual (AV) equipment and sells these products to a wholesaler in France (with the German firm providing delivery to France using their own fleet of trucks, on their own account). The French wholesaler sells the AV-equipment to a retail chain in the United Kingdom. The UK retailer contacts a UK office of a French road freight company, and arranges freight of the AV-equipment to a Channel Port on the coast of France. The UK firm then ships the AV-equipment to the UK using previously arranged cross channel transport, whereupon they employ their own fleet of trucks to transport the equipment to their retail outlets.

How should the road freight service (from the warehouse in France to the Channel Port) be measured?

¹³ Balance of Payments Manual 5 (IMF (1993)), Paragraphs 62 & 63

¹⁴ *ibid*, Paragraph 73

¹⁵ *ibid*, Paragraph 78

The entire road freight service takes place within the geographic boundary of France. The purchaser is in the UK. The treatment of the transaction depends upon the activities of the “UK office of the French company”:

- if the office is merely an agent, effectively providing a freight forwarding type service by bringing UK resident customers into contact with the French haulage firm, then:
UK – exports freight forwarding service, imports road freight service; and
France – imports freight forwarding service, exports road freight service.
Note that even though the road freight service operates entirely within the geographic boundaries of France, the service is considered an export because the purchaser is a non-resident
- if, on the other hand, road freight services in France to the Channel Ports are entirely provided by the UK office, with commensurate remuneration of the road freight employees (based in France, regardless of their own residency) undertaking the haulage, maintenance of the truck fleet, and so forth – that is, the “UK office” is actually a subsidiary or affiliate of the French firm providing a road freight service, and a UK resident unit. In this case the entire road freight service is considered domestic production of the UK (even though it operates within the geographic boundaries of France), because the transactions occur between two UK resident units.

Note that agents, affiliates and subsidiaries are different types of arrangements that arise as a consequence of foreign direct investment. A fully comprehensive description of these concepts is beyond the scope of this paper, but a key factor arising in the measurement of transactions of non-independent entities is the issue of transfer pricing – pricing at non-market values between related enterprises.¹⁶

4.2.2 Sub-contracting, outsourcing and offshoring

The 22nd meeting of the Voorburg Group raised outsourcing as an issue during several sessions, notably the national accounts and general methodology sessions. The term outsourcing (and the related term offshoring) may be applied with different meanings in different contexts, which is one reason for its frequent recurrence in discussions. Within this paper, the following definitions¹⁷ will be applied:

Subcontracting: Subcontracting occurs when one firm, the prime contractor (“principal”), contracts with another firm, the subcontractor or “supplier”, for a given production cycle, one or more aspects of production design, processing or manufacture, or construction or maintenance work. *International subcontracting* occurs when the principal and supplier have different countries of residency.

Outsourcing: Outsourcing is the delegation of some or all parts of a production process to an outside contractor. Outsourcing differs from subcontracting as it initially involves a change to the production process – activities originally undertaken within an enterprise are moved outside the enterprise. The use of the term outsourcing is sometimes restricted to those instances where the jobs (but not necessarily individual employees) and capital are relocated to a different establishment.

¹⁶ The concepts of agents, affiliates, and subsidiaries and associated issues are given a complete treatment in the Balance of Payments Manual, and the OECD Benchmark Definition of Foreign Direct Investment (Third Edition), as well as the Manual on Statistics of International Trade in Services. Transfer pricing will be given additional specific treatment in the forthcoming IMF Export and Import Price Indexes Manual (XMPI)

¹⁷ Taken, with some services specific adaptation, from the OECD Glossary of Statistical Terms <http://stats.oecd.org/glossary/>

Offshoring: Offshoring is used to describe a business's (or a government's) decision to replace domestically supplied service functions with imported services produced offshore. This can be thought of "outsourcing over the customs frontier".

The key defining feature of these activities is that the completed product is still delivered from the principal to its final customers.

Considering these from the perspective of the production approach to GDP, we see the following

- a) for an individual establishment (the principal), sub-contracting appears as an intermediate input, with no conceptual change to gross output
- b) for an individual establishment (the principal), domestic outsourcing of a component of production means a shift from own account production to intermediate inputs; this would appear as a change in intermediate inputs (from compensation of employees to sub-contracted production), with no change to gross outputs for that establishment. For domestic outsourcing, this will be accompanied by an increase in gross outputs for the sub-contracting (supplier) establishment. This increase would appear as domestic output for the industry of the supplying establishment.
- c) for an individual establishment (the principal), offshoring of a component of production means a shift from own account production to intermediate inputs; this would appear as a change in intermediate inputs (from compensation of employees to imports of the sub-contracted production), with no change to gross outputs. For offshoring this will be accompanied by an increase in imported inputs. This increase would appear in import measures.

Note that these definitions, where the principal continues to deliver the complete product to its final customers, *exclude* other business activities such as the splitting and merging of enterprises such that they provide separate services to third party customers.

The conceptual allocation of activity to different components is again relatively straightforward. Additional complexities arise in measurement when the supplier is not legally independent¹⁸ of the principal (again, concerning the issue of transfer prices as previously mentioned, regardless of residency of the units involved). Note that with or without legal independence, this principal-supplier relationship does not prohibit the supplier interacting directly with the final customers of the principal (consider for example a call centre for a bank, which provides a service to the bank but interacts with the bank's customers directly).

The presence of sub-contracting, whether ongoing, domestically outsourced or arising from offshoring, prohibits certain approaches to the construction of price indexes. As the OECD Methodological Guide For Developing Producer Price Indices For Services notes

A case in point is the situation where observed prices are time-based (e.g. hourly rates) rather than prices of clearly specified services. In this situation it is important to ensure that there is a consistency between prices and labour input. To achieve this, prices of contracts that include subcontracts are not eligible to be used as such in a [time based methods] SPPI.¹⁹

4.3 Distinguishing between outputs and revenue

Using the production approach to GDP, value added is determined by considering gross output of

18 One typical instance arises where a unit resident in country A sets up a subsidiary in country B to provide services to itself – or to its customers – that if formerly produced on its own account. This can give rise to the term "captive unit", describing the unit in country B

19 OECD-Eurostat (2005) p17

the service industries and subtracting the cost of intermediate inputs. Care should be taken with ensuring that the aim of measuring gross services output is not confused with the “output less inputs” step taken in the final calculation of GDP. This sometimes proves problematic since, as noted by McCully (2007), *revenue* from service industries does not always directly align with the *output* of service industries. Indeed, there are some industries where the value of the gross output of the service cannot be directly measured. It worth considering broad groups of service products where this issues arises to a greater or lesser degree, and where some clarity is required.

4.3.1 Distributive Trade (Margin) services

The previous section included discussion of retail and wholesale trade services, noting that the revenue received by the industry included a component for goods sold plus a component for the service delivered by the distributive trade units. The output of the industry is typically determined by considering the difference between the revenue from sales and the cost of goods bought. A key definitive feature of the distributive trade industries is that goods change ownership – the distributive trade units received goods into inventory and resell them to different customers.

4.3.2 “Brokerage” services

In addition to the retail and wholesale trade industries, a variety of other similar types of service exist where the servicing unit is not responsible for the production of goods or services themselves. These service industries include brokerage services, but also include ticketing agents, travel agents, some real estate services, and freight forwarders. The nature of these services brings together the service producer (or range of producers) with a purchaser (or range of purchasers), for which the service provider charges a fee (to either the purchaser or the seller). The output of the industry includes a range of facilitating services that enable producers and purchasers to make contact with each other, and to better enable market transactions to take place. Traditional stock brokerage services are a clear example of such a service, but these have much in common with ticket agents, travel agents and so forth. Freight forwarding services are perhaps an extreme example, where the service is extended to manage transactions across a range of producers; at no time does the forwarding agent own the goods to be transported, nor provide the transport service themselves, but they instead allow the owner of the goods to benefit from a range of different types of freight service without directly interacting with the freight service providers.

Measurement difficulties arise for these industries due to potentially different book-keeping and accounting practices employed by the different service providers. In some instances, such as a travel agent, revenue for the brokerage service (booking) and the brokered service (air travel) are collected simultaneously, with the collection of the revenue for the brokered service part of the service provided (to the airline). In other instances payment may be made simultaneously but separately to the broker and to the transport provider.

4.3.3 Employment placement services

Employment services warrant individual consideration because such services can be delivered through two similar but different mechanisms. The first instance may be considered a brokerage-type service, where the employment service identifies a suitable employee for an establishment with a current vacancy. This service is bringing together the employee and the establishment, and for that service the employment agency charges a fee (perhaps based on the salary of the employee, or by some other mechanism). This fee reflects the output of this particular establishment – identifying the employee with the skills and bringing the employee and establishment together.

The second instance arises when the employee is actually employed by the placement agency, although placed in the establishment with the current vacancy. The fee charged then includes a

service component but also the complete labour costs of the employee. This fee now reflects the output of the placement agency – not only bringing together the employee and establishment but remunerating the employee, as well as carrying the burden of ongoing labour costs such as insurance and employer superannuation. This is quite a different service than the former example.

These examples are concerned with the *output* of the agencies. This is not the same as their contribution to GDP. With regard to the second example, the determination of the value added, as measured by the production approach to GDP, will involve subtracting compensation of the placed employee from the received revenue. Note most importantly that with the explicit and stated exception of distributive trade (margin) industries, the measurement of the difference between outputs and inputs is the responsibility of *national accountants*, and not undertaken by those responsible for directly measuring output of service industry.

4.3.4 Advertising placement services

As with employment services, two distinct types of activity occur within the advertising placement industry. On the one hand, some placement agencies provide a broker-type service, bringing the customer and the media agency together. Other agencies may themselves buy media spaces and on-sell them to customers. In this case the advertising placement service is more similar to the distributive trade services, such as wholesaling, since there is a change of ownership of the advertising space. Understanding the type of activity taking place is a fundamental step in measurement, since the two different activities will have distinctly different relationships between revenue and output.

5. A framework for summarising issues raised

The 22nd meeting of the Voorburg Group was presented with a range of issues of concern to national accountants, and further concerns were elaborated upon in the ensuing discussions. These issues can be conveniently summarised through development of a simplified *supply-use framework*²⁰. The supply-use framework is fundamental to the compilation of the national accounts of many statistical agencies, and was mentioned explicitly by both Norrman(2007) and Smedes (2007).

For purposes of comparison, the issues will be illustrated using examples from the United Kingdom (UK) Office for National Statistics (ONS). In line with the agenda for the 23rd Voorburg group, these examples will consider Road Freight Services²¹ and Computer Services.

5.1 The supply table

Supply tables (product-by-industry) show how each individual product or product group within the economy is supplied. The supply table indicates which domestic industries produce each product, and also show how much of each product is imported.

Products	Industries	Industries			Imports	Total
		Agriculture	Industry	Service activities		
Agricultural products		Output by product and by industry			Imports by product	Total supply by product
Industrial products						
Services						
Total		Total output by industry			Total imports	Total supply

20 The supply-use framework is included here as a useful summary tool. Full description of the tool is beyond the scope of this document, but is included in most resources describing the system of national accounts; for example see Eurostat (2008) or UN (1999).

21 The tables in this section use the label “Land transport”, as per the detail in the original ONS and Eurostat sources. Land transport in this instance is non-rail land transport - mostly comprising road freight services.

Figure 1 – Supply Table²²

In interpreting the supply table it crucial to recall that an imported service is provided or delivered by a non-resident²³ unit, and as such the focus of the Voorburg Group (output of services) is more concerned with the supply of products by domestic industries.

In the following examples, a subset of the supply table is provided, considering a single product (row), and the equivalent industry (column) total. Emphasis is also placed on *domestic production*.

**TABLE 1 SINGLE PRODUCT SUPPLY TABLE:
- UK Land Transport, £million, basic prices, 1995²⁴**

Products \ Industries	Industries		Total Domestic	Imports	Total Supply
	Land transport; transport via pipeline services	All other industries			
Land transport; transport via pipeline services	30,639	2,829	33,468	424	33,892
All other products	991	1,310,047	1,311,038	192,906	1,503,944
Total	31,630	1,312,876	1,344,506	193,330	1,537,836

The supply table for 1995²⁵ UK Land Transport products, Table 1, shows that the land transport industry supplies £30,639 million of the £31,630 million Land Transport products. Aggregate Land Transport industry output includes a portion (£991 million) of other product types. Focusing on industry aggregates alone would miss £2,829 million Land Transport products, produced by establishments whose primary value added is in the production of other product types (that is, non-Land Transport industries). The supply table as presented in Figure 1 also shows that in 1995 the UK imported £424 million Land transport products.

**TABLE 2 SINGLE PRODUCT SUPPLY TABLE:
- UK Computer Services, £million, basic prices, 1995²⁶**

Products \ Industries	Industries		Total Domestic	Imports	Total Supply
	Computer and related services	All other industries			
Computer and related services	14,721	1,281	16,002	1,324	17,326
All other products	1,144	1,327,360	1,328,504	192,006	1,520,510
Total	15,865	1,328,641	1,344,506	193,330	1,537,836

Table 2 shows the supply table for Computer Services products, which illustrates that £1,144

²² Eurostat (2008), p18

²³ As per the discussion in Section 4.2

²⁴ Data in the supply table examples are for the 1995 reference period as provided on the Eurostat website (as extracted August 2008), which notes “All the data is consistent with the 2004 ONS Blue Book and the 2004 Edition of UK Input-Output Analyses published on 20th August 2004.” This Eurostat source was utilised due to the availability of supply tables showing product-by-industry. See <http://epp.eurostat.ec.europa.eu/pls/portal/url/ITEM/0B2FC51EDA723176E0440003BA9321FE>.

²⁵ The choice of the 1995 reference period, while perhaps non-contemporary, allows detailed decomposition of both supply and use estimates.

²⁶ Eurostat website, *op. cit.*

million of the £15,865 million industry output comprises £1,144 million non-Computer Service products, with a further £1,281 million Computer Services products produced by other industries, together with £1,324 million imports. Considering industry output alone would erroneously include the \$1,144 million non-Computer Services and miss the £1,281 Computer Services provided by other industries. Examination of the supply table illustrates two key themes:

- The key aim of the Voorburg Group is measuring the domestic *output of services* (£33,468 million of Land Transport Services and £16,002 million of Computer Services)
- National accountants require estimates of *products*, instead of industry aggregates.

5.2 The use table

Use tables show usage of particular products by individual industries (or products), as well as the consumption of the product as different components of final demand.

Products \ Industries	Industries			Final uses			Total
	Agriculture	Industry	Service activities	Final consumption	Gross capital formation	Exports	
Agricultural products	Intermediate consumption by product and by industry			Final uses by product and by category			Total use by product
Industrial products							
Services	Value added by component and by industry						Value added
Value added	Value added by component and by industry						Value added
Total	Total output by industry			Total final uses by category			

Figure 2 – Use Table²⁷

The use table has several important features of particular importance to both national accountants and the Voorburg Group. First, like the supply table, it considers total use, and so extends beyond the scope of the Voorburg Group to specifically include imports (however, see 6.2.3 below for a disaggregated approach).

Second, the “industry use” panel measures all domestic business-to-business transactions, showing how products are consumed in the production of other products. This segment of total use is but one economic destination for produced goods services. As is evident from the use table, service products may be consumed as part of final demand – that is, consumed directly by governments, by non-profit institutions serving households (NPISH), or by the household sector itself. The use table also suggests that services may be consumed as part of gross fixed capital formation (GFCF). In particular, those services considered inextricably part of the formation of capital are included in GFCF. For example, this typically includes some legal services involved with the creation or transfer of capital (property), and some real estate agency services.

Third, complementing the import of products on the supply table, the use table shows the export of products, where a domestically produced serviced is provided to a non-resident unit.

In the following examples, a subset of the use table is provided, considering a single product (row), and the equivalent use in the production of that product (column) – that is, a product by product matrix. The particular type of use table considered in the examples focusses on the destinations of products, and so includes summaries of intermediate usage and final uses; this table also excludes the value added row.

5.2.1 Combined, or total, use tables

The use or destination of service products was a common theme running through the national

²⁷ Eurostat (2008) p20

accounts discussions. This is most readily illustrated by considering a combined (or total) use table that shows use of all products of a given type, regardless of their particular source. This sort of use table combines domestically produced services as well as those services produced by non-resident units (imports).

**TABLE 3 SINGLE PRODUCT COMBINED USE TABLE:
- UK Land Transport, £million, basic prices, 1995²⁸**

Supply	Use		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use
	Use in production of products			Final consumption	Gross fixed capital formation	Exports		
	Land Transport; transport via pipeline	All other types of products						
Land Transport; transport via pipeline	1,025	20,533	21,558	4,946	505	1,026	6,477	28,035
All other products	10,936	669,271	680,207	548,449	111,379	202,517	862,345	1,542,552
Total use	11,961	689,804	701,764	553,395	111,884	203,544	868,822	1,570,587

The use table for UK Land Transport products, Table 3, shows that of the £28,035²⁹ million land transport products used in 1995, £21,558 million were consumed in the UK production of goods and services. Some £4,946 million worth of road transport products were consumed as part of final consumption, with exports of services to non-residents comprising £1,026 million.

**TABLE 4 SINGLE PRODUCT COMBINED USE TABLE:
- UK Computer Services, £million, basic prices, 1995³⁰**

Supply	Use		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Consumption)	Total use
	Use in production of products			Final consumption	Gross fixed capital formation	Exports		
	Computer Services	All other types of products						
Computer Services	348	13,236	13,583	45	2,647	1,553	4,245	17,828
All other products	7,044	681,137	688,181	553,350	109,238	201,991	864,578	1,552,759
Total use	7,392	694,372	701,764	553,395	111,884	203,544	868,822	1,570,587

The use table for 1995 UK Computer Services, Table 4, shows that of the £17,828 million computer services products used, £13,583 million were consumed in the production of other goods and services. Exports comprised a further £1,553 million. Unlike Land Transport, a considerable portion of computer services products were consumed as part of gross fixed capital formation, whereas final consumption was negligible.

5.2.2 Consumption of services of the same type

In addition to the split between intermediate (business-to-business) consumption, final consumption and exports, the combined use tables also indicate that production of a service may actually consume resources of that same service type. Table 3 shows consumption of £1,025 million land transport services in the production of land transport services. For Computer Services, this figure was £348 million. This intermediate consumption arises in two typical ways. First, ongoing delivery of a specialised service may require expenditure on similar services – examples may include:

- the delivery of vehicles by specialised vehicle haulage service, resulting in intermediate consumption of land transport services; or

28 Data in the use table examples are for the 1995 reference period, as presented in the ONS release ONS (2002). As detailed in the downloads, these data are “consistent with UK National Accounts Blue Book 2001”. This source was chosen because it shows detailed use data for both imported and domestically produced services.

29 While referring to the same reference period (1995), the data in the supply table and use tables show some differences (as here: £33.9 billion supply of land transport, £28 billion used). Discrepancies arise because the supply data incorporates additional revisions to source data introduced as part of the 2002-2004 compilation cycles for the ONS UK national accounts, not present in the earlier use tables. While revised (and consistent) use tables are available from the ONS, they do not provide sufficient levels of detail to illustrate the important issues considered in this section.

30 ONS (2002), op. cit.

- the purchase of bespoke computer systems for human resources and administration by a computer game producer.

Second, this type of intermediate consumption arises in the presence of subcontracting of the same type of service. Considering the computer game example, a game developer may subcontract the development of routines for joystick or game-controller to specialised competitors, focussing instead the efforts of their production where they maintain a comparative advantage (e.g. perhaps on computer graphics or game design).

Intermediate consumption of the same type of service does not indicate, necessarily, the presence of subcontracting (or outsourcing) in the delivery of a product – yet absence of this type of intermediate consumption means that subcontracting is not occurring.

5.2.3 Use tables for domestic supply and imported supply

The combined use tables above may be disaggregated according to the source of the product.

**TABLE 5 SINGLE PRODUCT USE TABLES FOR DOMESTIC SUPPLY AND IMPORTED SUPPLY:
- UK Land Transport, £million, basic prices, 1995³¹**

	Use	Use in production of products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use
		Land Transport; transport via pipeline	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Domestic supply	Supply								
	Land Transport; transport via pipeline								
	All other products	1,011	20,169	21,180	4,677	424	979	6,081	27,261
	Total use	10,654	572,644	583,298	500,899	83,350	195,989	780,238	1,363,535
Imported supply	Supply								
	Land Transport; transport via pipeline								
	All other products	14	363	377	269	81	47	397	774
	Total use	1,307	117,160	118,467	52,496	28,534	7,555	88,585	207,052
Total supply	Supply								
	Land Transport; transport via pipeline								
	All other products	1,025	20,533	21,558	4,946	505	1,026	6,477	28,035
	Total use	11,961	689,804	701,764	553,395	111,884	203,544	868,822	1,570,587

Table 5 indicates that of the £1,025 million land transport services used in the production of UK land transport service since 1995, £14 million were provided by non-resident suppliers, with the majority being sourced from within the UK.

**TABLE 6 SINGLE PRODUCT USE TABLES FOR DOMESTIC SUPPLY AND IMPORTED SUPPLY:
- UK Computer Services, £million, basic prices, 1995³²**

Domestic supply	Use	products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use
		Computer Services	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Supply									
Computer Services		287	12,157	12,444	43	2,464	1,553	4,060	16,504
All other products		4,959	565,895	570,854	500,856	80,886	194,436	776,177	1,347,031
Total use		5,245	578,052	583,298	500,899	83,350	195,989	780,238	1,363,535

Imported supply	Use	products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use
		Computer Services	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Supply									
Computer Services		61	1,079	1,140	2	183	0	184	1,324
All other products		2,086	115,241	117,327	52,494	28,351	7,555	88,400	205,728
Total use		2,147	116,320	118,467	52,496	28,534	7,555	88,585	207,052

Total supply	Use	products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use
		Computer Services	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Supply									
Computer Services		348	13,236	13,583	45	2,647	1,553	4,245	17,828
All other products		7,044	681,137	688,181	553,350	109,238	201,991	864,578	1,552,759
Total use		7,392	694,372	701,764	553,395	111,884	203,544	868,822	1,570,587

Table 6 shows the import of £61 million worth of computer services used in the production of computer services in the UK, compared with the total £287 million provided by UK resident service providers.

As with subcontracting and the combined use table, the presence of imports of the same service into intermediate usage does not indicate offshoring. The absence of imports prohibits offshoring (of this particular service – note that outsourcing and offshoring may involve the removal of other services formerly undertaken on own account).

5.2.4 Final demand and consumption by households

As indicated previously the use table illustrates consumption of products by households. The national accountants at the 22nd Voorburg group indicated that consumer price indexes (CPIs) were used to varying degrees as deflators when SPPI's did not adequately measure business-to-household transactions. Closer examination of the use table indicates two possible problems with this approach. First, as *input-indexes* CPIs measure purchasers' prices, concerned with prices *paid* by households, inclusive of both taxes and subsidies. This contrasts with the output-index approach required for SPPI's, measuring prices received by providers of services. In circumstances where differential taxation exists or subsidies are likely to occur, CPIs may behave differently compared with the related SPPI's.

Second, household consumption (as part of final consumption as shown in the use table) includes consumption of domestically provided services as well as those services produced by non-residents. For some service products (for example, those associated with transport), the level of imports as a share of total household consumption may be significant. Use of CPIs (covering both imported and domestic services at purchasers' prices) as proxies for SPPI's (concerned with domestic production at basic prices) requires assumption of equivalent price change. This problem is exacerbated when domestic and imported products are tailored to different segments of the household market.

6 Summary

The 22nd Voorburg Group were presented with a range of issues by national accountants, and through discussion sessions pursued more. The key issues raised by the presenters were:

32 *ibid*

1. Production approach to GDP uses double deflation – that is, deflation of outputs as well as intermediate inputs.
2. Dedicated SPPI's measured to constant quality are the national accountants deflator of choice for the production approach.
3. Some use of SPPI's is made in the expenditure approach to GDP measurement.
4. Output from the non-market sector (such as health and education, supplied by non-profit institutions or by governments) is generally not deflated through SPPI's since the products are not sold at economically significant prices, and is instead measured by deflating input components.
5. National accounts require a product focus as opposed to industry only.
6. Faced with the lack of suitable SPPI's national accountants reluctantly (and sometimes subjectively) use proxy measures, with examples including:
 - a) nearest CPI equivalents, for services with significant consumption by households;
 - b) measures based on separate deflation of inputs; and
 - c) “nearest” PPI for goods (for retail and wholesale margins).
7. Integration, coherence and consistency between prices, values and volumes.
8. The importance of understanding the difference between income (revenue) from production and output of products
9. Disparity between PPIs for goods and SPPI's for services, given the relative importance of services to economies.
10. Common gaps:
 - a) financial services;
 - b) wholesale trade;
 - c) retail trade;
 - d) intangibles such as research & development, and software;
 - e) international trade in services.

The Group raised several issues for discussion and for subsequent clarification:

11. The conceptual basis for distributive trade, in particular retail margins, and how on the one hand the output of the retail industry differed from the revenue received by the industry, and on the other hand how the price of the retail margin (service) differed from the retail prices as measured typically included in the CPI.
12. The different types of service industry (payment received, margin, brokerage)
13. The need for clarity regarding subcontracting, and the related concepts of outsourcing and offshoring

A supply-use framework summarises many of the issues (particularly with respect to scope). This summary is represented in Figure 3 below.

Output of domestic services

Business to business transactions

Components of CPI, including purchases by visiting non resident households

SUPPLY TABLE				
Domesic supply	Industries	Supply by Industries		Total Domestic Supply
		Usual Industry of Specific service	All other industries	
Products				
Specific service product				
All other products				
Total				

Imported supply	Industries	Imports		Total Imports Supply
Products				
Specific service product				
All other products				
Total				

Total supply	Industries	Total =		Total Supply
		Domestic + Imports		
Products				
Specific service product				
All other products				
Total				

USE TABLE									
Domesic supply	Use	Use in production of products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use of domestic products
		Specific service product	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Supply									
Specific service product									
All other products									
Total use									

Imported supply	Use	Use in production of products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use of imported products
		Specific service product	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Supply									
Specific service product									
All other products									
Total use									

Total supply	Use	Use in production of products		Total Industry Usage (Intermediate Consumption)	Final Uses			Total final use (Final Demand)	Total use of all products
		Specific service product	All other types of products		Final consumption	Gross fixed capital formation	Exports		
Supply									
Specific service product									
All other products									
Total use									

Figure 3 – Supply table illustrating concepts of scope

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