Chapter 6. Transportation and storage

This chapter presents main issues and challenges for compiling SPPIs for Freight transport by road (ISIC 4923), Sea and costal water transport (ISIC 5012), Air transport (ISIC 51), Warehousing and storage (ISIC 5210), Cargo handling (ISIC 5224), and Courier and postal activities (ISIC 53).

6.1. Freight transport by road (Christopher Jenkins and Aspasia Papa, Office for National Statistics United Kingdom)

6.1.1. Industry description (ISIC 4923)

Freight transport by road is the predominant component of the freight transport industry. Business enterprises classified to this industry are primarily engaged in all land-based transport other than rail transport. The industry also includes service providers that specialise in renting trucks with drivers for road freight transport.

6.1.2. Classification aspects

6.1.2.1. Industry classification

On an industry basis, the various international classification systems are fairly well harmonised. Depending on the country, localised differences show up at the lower level of their respective industry classification structure. Nonetheless, there is a high degree of standardisation and integration in terms of the definition of the service being measured.

Indeed, ISIC and NACE are aligned. According to these classifications, the industry provides the efficient transportation of a wide variety of goods from source to destination, either by man or animal-drawn vehicles. These include haulage of a wide range of products, including the products of logging activities, general stock, refrigerated goods, automobiles, haulage in tanker trucks, furniture removal and transport of waste and waste materials. This class excludes log hauling within the forest, as part of logging operations (0240 ISIC), distribution of water by trucks (3600 ISIC), operation of terminal facilities for handling freight (5221 ISIC), crating and packing activities for transport (5229 ISIC), post and courier activities (5310 and 5320 ISIC) and waste transport as an integrated part of waste collection activities (3811 and 3812 ISIC).

The NAICS class 484 - Truck transportation, comprises firms primarily engaged in the truck transportation of goods. These firms may carry general freight or bulk, dry, forest or specialised freight. Specialised freight comprises goods that, because of size, weight, shape or other inherent characteristics, require specialised equipment for transportation. Firms may operate locally, that is within a metropolitan area and its adjacent non-urban area or over long distances, *i.e.* between metropolitan areas. Lower level industry classification focuses on long distance as opposed to local trucking, and a full truckload as opposed to less than a truckload. Whereas ISIC includes freight transport services only as a principal activity, NAICS 484 explicitly includes incidental packaging and storage services. In the U.S., these services are included in bundled freight transport transaction prices.

In a similar vein, ANZSIC 4610 consists of business enterprises engaged in the transportation of freight by road. It also includes those mainly engaged in renting trucks with drivers for road freight transport. Specifically, principal activities of this industry include delivery service, road (except courier), furniture removal service (road), log haulage service (road); road freight transport service; taxi truck service (with driver); and truck hire service (with driver).

When considering how to employ the appropriate classification systems in the compilation of the index, it is important to analyse how the industry is organised nationally. This will facilitate the identification of establishments or services within homogenous sub-classifications that can be used for the purposes of imputation and

quality assurance. For example, establishments primarily engaged in long haul freight transport may have significantly different cost drivers and price movements to those engaged primarily in the delivery of short haul or metropolitan freight transportation. Failure to consider these factors in index compilation could lead to the introduction of biases and unrepresentative price movements.

6.1.2.2. Product classification

Unlike the industry classification comparison, product classifications are not harmonised to the same degree. The CPA and CPC classifications closely follow each other; however there are several noticeable differences when compared to NAPCS. More specifically:

- The CPA and CPC include road transport of letters and parcels (49.41.18 - Road transport services of letters and parcels and 65116 - Road transport services of letters and parcels respectively), while NAPCS places these under a different output group (492001 - Courier, parcels and local messenger and delivery services);
- The CPC has a category for freight transport by man – or animal-drawn vehicles (64334 - Road transport services of freight by man or animal-drawn vehicles) which is excluded in NAPCS for road transport.

6.1.3. Scope of the survey

Traditionally, the activities of business enterprises engaged in road haulage were focused on simply providing the physical means of transporting goods from point A to point B, with a small minority having an ancillary, but less important, interest in providing storage and warehousing services for goods in transit. As a result, the task of isolating and collecting data for the total activity of contracted road freight services has been relatively straightforward with the vast majority of business enterprises being classified to 4923 of ISIC.

However, in recent years the industry structure has changed and service producers are more likely to generate a significant share of turnover from secondary activities. Increasing competition in the industry coupled with recent developments such as a shift to just-in time inventory and production management practices, have prompted business enterprises to integrate other transport-related services. In these cases, the actual transportation of goods may no longer be the principal activity. Service producers may offer clients a bundle of freight-related services, or “supply chain solutions”, tailored to suit the needs of each specific client. These services may include some or all of the following:

- Freight forwarding;
- Packaging, crating, palletising and containerisation of goods;
- Cargo consolidation (groupage), management and handling;
- Stock control and re-ordering;
- Storage and warehousing;
- Transport consultancy services;
- Vehicle recovery, repair and maintenance;

- Dealing with documentation;
- Negotiating return loads for clients' own transport;
- Information management services *e.g.* operating web sites linking loads to haulers and the increased use of Electronic Data Interchange (EDI);
- Courier services.

As previously noted in chapter 1, the larger the share of industry turnover generated from the provision of secondary service activities the stronger the argument for compiling product based (or approximate product based) SPPIs.

Other notable issues include the difficulty of distinguishing road freight from freight forwarding (5229 - Other transportation support activities of ISIC) and treatment of those establishments providing a range of inter-modal freight transport (see for example classes 50 - Water Transport and 51 - Air Transport of ISIC). Conceptually, the index should only capture data for pure road freight and therefore bundled services as well as the blended operations of freight forwarders fall out of scope and should be excluded. Nonetheless, in practice respondents may be unable to isolate road freight services from a bundled price containing additional logistics services and similar value added services. In Germany for example, the main providers of freight transport by road services are classified under 5229 - Other transportation support activities, of ISIC and excluding these could have a significant impact on the measurement of price movements in the industry.

In addition, subcontracting, whereby large business enterprises subcontract significant parts of their activities to other operators, is common within the road-freight industry. As previously noted in chapter 1, sub-contracts of services should be treated in an index in the same way as any other service, irrespective of whether a service contains sub-contracts or is itself a sub-contract. However, for practical reasons the subcontracted components of service activities are often excluded from price collection.

In general, the product classification of the road freight industry may be appropriately subdivided by the type of goods being transported (*e.g.* liquid, livestock, refrigerated etc.). As operating costs (such as fuel costs, toll charges etc.) differ across international boundaries, it is recommended that international road freight should be treated as a separate product group within the industry, so as to maintain homogeneity within product groups. It is also recommended that the ISIC and CPC classifications are used as a preliminary basis for freight transport by road. National deviations from the activities included within these classifications should be recognised and included in the national SPPI.

6.1.4. Sample design

As a first approach, it is recommended that probability proportional to size (PPS) sampling is applied. Options for stratified sampling, using employment or turnover as the stratification variable, may be utilised to improve efficiency of the sample by reducing variance. In selecting the appropriate sampling method, particular consideration should be given to classification issues. Indeed, because of the natural overlap between freight transport by road and other industries (such as storage and warehousing and freight forwarding), a number of road freights operators may be classified elsewhere.

Where regional variations in price movements exist, stratification by region should be applied. If national road freight is recognised to be dominated by a small number of large

service producers, a mixture of non-probability and random sampling may be considered. This is because larger service producers are likely to offer long-standing contracts whereas smaller producers tend to be more active in the "spot hire" market (one-off contracts). Therefore, a combination of random and non-probability sampling would ensure that the leading units are always included in the sample, with the remaining units also being adequately represented in the sample.

It is also important that where possible, consideration is given to organising the sample according to homogenous establishment groups in terms of their price drivers and the nature of their work, as discussed under sub section on classification aspects. Another example might be to consider during the sample design the types of ancillary, or bundled, services that establishments provide.

6.1.5. Collection of information and specification of the service

The selection of service products for pricing by individual establishments should be representative of their main activities and defined and agreed with the appropriate establishment contact during the respondent initialisation process.

It is important that service specification is sufficiently detailed to ensure that a consistent price is collected from period to period, relating to the same service with the same terms of sale in each period. In an ideal situation, the following characteristics of a road freight service should also be quoted:

- Size and type of vehicle;
- Nature and weight of cargo;
- Distance of journey and/or destination;
- Routing information (distribution or joint cargo);
- Time criteria for delivery, if applicable;
- Availability of return cargo;
- Inclusion of packaging and loading/unloading services;
- Name and customer-status of the customer;
- Domestic or export category;
- Any other special conditions which might apply to the contract.

An example of a road haulage service price description is given in box 6.1.1.

Box 6.1.1. Example of a service description for a price quotation for road haulage services

- Truck and trailer 25 tonnes. From Assen to Mayer (Germany), 217 km, ± 6.5 hours. Advance notice of 3 days.
- Excluding return cargo, including loading, unloading and reimbursement for waiting. Including German toll.
- Contract price for a fixed client n° 10502. Price per ton.

Source: Kirsten (2006), "The PPI for road haulage services in the Netherlands"

However, collection of all of these attributes for every price observation provided could place an unreasonable and unwelcome burden on respondents. Therefore, a more pragmatic approach may be applied which accepts descriptions of freight services which differ from the above, but are in line with the normal business practice of the respondent. This is subject to the important proviso that the respondent is able to identify the specific contract and can supply the latest (and correct) price for that service on a regular, repeating basis. Following initialisation, respondents should be required to provide prices for the same service (as long as it remains representative), whereas any change in the service description should be noted by the respondent and the forms should be updated accordingly.

6.1.6. Main pricing methods

The road freight industry offers a complex variety of pricing mechanisms, which may vary depending on, for example, cargo-type (liquid, containers etc.) or distance (short-haul, long-haul, international) etc. Within the industry, larger service producers tend to generate more turnover from repeated contract work from regular customers, while smaller producers may be more likely to operate on an ad-hoc, single contract basis. A number of different pricing methods may therefore be employed, reflecting the variety of pricing mechanisms than can be observed.

6.1.6.1. Contract pricing

Contract pricing refers to the use of prices in long term contracts for the repeated delivery of the same (or a very similar) service. This is a special case of using real transaction prices. Usually they are available for large road freight suppliers and regular customers, who negotiate discounts from the list prices through their guarantee of business volume. Respondents are asked to supply prices for the repeated delivery of the same or a very similar service in many survey periods, as set out in long-term contracts. These services should be typical and representative of the main activities of the respondent.

Contract transaction pricing places the least compliance burden on the survey respondent since the prices are relatively easy to retrieve from respondents' accounting/financial systems. The contract pricing method can be implemented such that the basic price (the per unit revenue received by the service producer, excluding taxes but including subsidies and discounts) is identified for road freight service provision. However, it is recognised that there is a potential weakness in this pricing method, as a large element of the overall market may not be fully represented, namely the one-off or spot market, where the service relates to a single journey which is unlikely to be repeated. Indeed the use of transaction prices is not suitable for smaller respondents, who compete for individual journey contracts. The transaction price is also sensitive to the volume of business that a customer can offer and it is essential that this is defined in the service-product specification when using the model pricing approach.

6.1.6.2. Direct use of prices of repeated services using list prices

In the absence of actual transaction prices, list prices might also be available for use in the compilation of an SPPI. List prices are the published prices for services (usually published as rates applied, based on mileage, weight, volume and additional services) and are often used as a starting point to negotiate discounts for spot prices or transaction/contractual prices. List price collection is most appropriate for smaller road

freight service producers and results in relatively small respondent burden. However, it does not capture the actual transaction price unless any discounts applied are known. List price collection may therefore not entirely capture price development resulting from competition in the market environment.

6.1.6.3. Model pricing

Model pricing is mostly applicable to service producers offering ad-hoc, one-off or irregular trips, such as:

- Smaller producers or those specialising on the spot markets;
- Grouped cargo where customers and payment conditions are constant overtime but the quantity and type of cargo varies;
- Transportation of heavy loads which are not repeated services.

As the compiler requires in each period a price for a standard service with constant specifications, this method allows for estimation of the price for a standardised final service product, a model transaction which is not transacted in the comparison period. The respondent may give a real transaction price in the base period and in the following periods the price is calculated as an expert estimate, because the exact same service is not being provided on an ongoing basis. If a model service is no longer considered to be representative of the typical services provided by the respondent, an alternative and representative service should be specified for ongoing pricing.

In the absence of real transaction prices, model pricing offers a suitable compromise. Model pricing can also control for quality change. This does however require a significant investment of time by the respondent and compiler to define a representative set of service models thereby increasing direct costs and compliance burden. There is also a danger, with time, that model services become outdated, which necessitates frequent monitoring of models.

6.1.7. Quality issues

Within the road freight industry, respondents are asked to provide details of any changes to the service provided. Furthermore, instances of unexplained price changes that are outside set thresholds (or validation gates) are checked to determine whether they have been caused by a genuine price change or a change in quality. In these cases, contact with respondents is required and explicit methods can be applied to quantify the changes that have occurred.

When a contract is discontinued or a service is no longer representative of the activity of the respondent, a replacement contract should be sought. If the service is still deemed representative but the contract has been discontinued, the replacement should be as close to the original as possible (match-models method). If the service is no longer representative then a replacement representative and repeatable service should be identified in consultation with the respondent. For the linking of the two prices, several quality adjustment methods can be applied. The preferable method is the overlap method where a price is provided for the new service in both the previous and current periods. However, if the old service stops before the new one starts, other methods can be applied, such as expert judgement and the mean imputation method.

In the U.K., a quality assurance process which monitors prices that are “too stable” is applied across a number of SPPIs. Where a price has remained static for a number of

periods, the respondent is contacted to check that the service specification is still representative and that the price remains correct. This is even more important to carry out when model pricing is being used, so as to ensure that the respondent does not simply return the same price for a model each period.

Another important issue is that of temporarily missing products, such as the transportation of agricultural goods where prices may only be available on a seasonal basis. In Germany, an example of seasonal products is the transportation of sugar beets which are harvested between mid-September and mid-November. Price quotations of real transaction prices can only be given during these periods so for the rest of the year a suitable imputation method can be applied. Prices can, for example, be imputed by with reference to mean class imputation. Another method is to use the Rothwell price index which applies different weights for the reporting periods, so the missing product is assigned a zero weight.

6.1.8. Weighting and aggregation

The choice of weights to be used for weighting and aggregation depends on the availability of reliable source data. In principle, different data sources can be used, such as turnover data collected through a dedicated turnover survey, weighting data provided by an external supplier, national accounts input/output tables or a combination of the above data sources. The weighting structure below industry level will depend on the chosen classification structure, based on standard classifications and perhaps modified or extended to take account of the national organisation of the industry.

In the U.K., two sources of weights are used to aggregate the SPPI. At the elementary aggregate level, a dedicated quinquennial turnover survey of all respondents providing price data to the SPPI is carried out to collect the corresponding turnover generated for these services. This source of turnover is used to calculate elementary aggregate weights, which in turn are used to weight together the elementary aggregate price relatives to produce higher-level indices, up to and including the industry level aggregate.

At the industry level, the U.K. uses national accounts data to derive industry level weights (input/output tables). These weights are then used to aggregate the industry level price movements together to calculate a 'service sector' SPPI, although it should be noted that this aggregate is only representative of the industries which are currently included in the SPPI. This aggregate SPPI is produced on both a gross and a net basis through the adjustment of the industry weights. It should be noted that in this context, the net sector series refers to transactions between business services and other sectors excluding business services whereas the gross sector series measures transactions between business services and other sectors including business services.

6.1.9. Specific aspects

One of the issues that confront compilers of SPPIs for the road freight industry is the provision of bundled services. In order to respond to the increasing demand for expedited freight service, road freight service producers are increasingly providing additional "supply chain services" or "complete logistic solutions" in addition to the basic transportation services. Consequently, respondents are often unable to separate prices for pure transportation services and additional service activities such as storage and warehousing and freight forwarding. The problem of misclassification can also arise if prices are provided for inter-modal services, for which the price cannot be split between the different modes of transport.

As previously noted, subcontracting of service provision may also create difficulties in index compilation. In addition, fuel surcharges can be an important price-determining factor, particularly in periods of rising fuel prices. Depending on how fuel surcharges are paid and collected their inclusion if often straightforward. In addition, differences in fuel costs between countries can affect prices and so the domestic or export nature of the service should be captured in the service definition.

Other common market conditions such as highway congestion, driver shortages, safety and security issues, regulation of hours worked by drivers and other legal requirements might impact on the price movements.

6.1.10. Overview of national methods

Austria

Austria uses the direct use of prices of repeated services method in the compilation of SPPIs for freight transport by road activities. The price collection covers domestic and cross-border transportation by different types of trucks. Price quotations for the representative service transactions selected by respondents are aggregated to form 6 sub-indices (dangerous-, food-, tank-, silo-, building materials- and others- transportation) that are the most representative service sub-categories. These 6 main groups were selected in cooperation with the Association of freight transport. These 6 sub-indices are then aggregated to an overall SPPI for NACE 49.4 - Freight transport by road.

Australia

In Australia, non-probability sampling is employed. Initialisation interviews with prospective respondents are then conducted to assess their suitability for participation in the survey and to determine which services are most representative of their service activities.

Data is collected from respondents via mail, email or fax on a quarterly basis. Respondents are asked to provide a price for one or more of their given services. Respondents also provide reasons for reported price changes. This information is very valuable to the validation of prices. Individual specifications for repeat services on the same route or source to destination have their own weights. Weights are based on the amount of turnover of the establishment, the market segment they represent in the sample (which is established in the initial interview conducted with the respondent) and on other sources.

Basic prices including fuel surcharges are collected. The fuel surcharge is usually reported separately as fuel is a significant cost driver of price change in this industry. Respondents are required to report prices exclusive of goods and services taxes. Both contracted and non-contracted services are covered.

There are persistent issues with maintaining the quality of the index. Large establishments engaged in road freight frequently utilise other modes by substituting rail, sea or even air freight for part of the journey. Respondents are asked to separate out the road freight component where possible. Attempting to avoid quality issues by overly tightening transaction specifications might result in few or no services being performed as described in any given period. When there is a price due to a change in the modes of transport, the respondent is asked to provide either a previous period price on the same basis or estimate the change since the last pricing point. This normally occurs when the

respondent contact has changed and there is need for some clarification as to the specific transaction to be priced.

Occasionally respondents provide inadequate reasons for a price change and further investigation and follow up is required. Contacting respondents can be difficult at times and if a query on a price cannot be resolved a new price is imputed.

Australia is not subject to the problems of import or export of road freight and the consequential differential costs of fuel between countries. However, there are differences between states in fuel excise levels, and occasional rebate schemes, which must be borne in mind.

Canada

In Canada, the survey frame is derived from the Statistics Canada Business Register which contains about 5,500 establishments in this sector. Establishments with under $1,000,000 annual revenue were excluded from the frame. These are assumed to be owner-operators of trucks who lease themselves and their trucks out to the larger trucking companies. The units on the frame are stratified by 5-digit NAICS (48411 - General freight trucking, local; 48412 - General freight trucking, long distance; 48421 - Used household and office goods moving; 48422 - Specialised freight (except used goods) trucking, local; 48423 - Specialised freight (except used goods) trucking, long distance).

The sample is a cross-sectional design, with the sample and weighting information derived from transportation activity data obtained from the business register frame. The sample consists of trucking businesses which were selected on the basis of establishment revenue and stratified by 5-digit NAICS. Each NAICS stratum was further stratified by take-all (large units) and take-some (smaller units).

Monthly prices are collected directly from respondents once a quarter. The initialisation (or first) phase of the survey, conducted via survey forms and telephone contact, consists of identifying and collecting baseline information for typical shipment/services provided by the respondents. In the second phase and thereafter, respondents are asked to provide monthly specific shipment price information for the predetermined representative commodity groups/services offered and to identify the main reason for each reported price change.

The main pricing method employed is contract pricing. In the case of smaller sized freight carriers a mix of contract and list prices are collected. Prices are collected with reference to actual and specific contracts for the movement of goods. Respondents are asked to supply prices for specific service transactions which they consider to be typical and representative of their business for which they can provide current prices in each survey period.

When the services specified are no longer being provided or have become unrepresentative, new service transactions (and their specifications) are obtained from the respondent. In such cases an explicit adjustment is made to remove the effect of any change in quality, ensuring that we are measuring pure price change. Given the nature of the industry, frequent changes to “for-hire” trucking services specifications are not expected. Respondents are asked to provide estimates in cases where they did not provide the specific service in the selected month. Missing prices are imputed for using the average of reported prices in designated cells. Estimates are produced by calculating a weighted average of price relatives by industry, which are chained together to form an

index series. The for-hire motor carrier freight services price index is a national index that uses establishment revenue as its weighting source.

Netherlands

In the Netherlands, almost all respondents provide prices for specific service activities on a repeated basis. Typically, this would allow for the use of the direct use of price of repeated services method of price collection. However, the model pricing method is employed as it is well suited to industries, such as freight transport by road, in which specific service transactions are not always repeated (and therefore observed) in a given period. An additional benefit to using the model pricing method is that quality issues can be easily identified. If there is a change in a specific service model, the overlap method is used to account for the difference in quality.

Prices, provided quarterly by respondents, are quality assured. Large price changes reported by more significant respondents are queried by telephone. When a smaller respondent reports a large price change, the price change is only queried if it is so large as to actually have a significant effect on the index. As a result, larger respondents are queried more often since even small changes in the prices of their services can affect the index.

United Kingdom

The U.K. SPPI for freight transport by road is split into seven main categories organised by the type of service provided: general haulage; warehousing & distribution; tipping and construction; agriculture & livestock; tankers; international haulage and temperature controlled transport.

Prices for freight transport by road are collected using quarterly questionnaires. Respondents are selected using a weighted stratified simple random sampling technique, where potential responders are stratified by size (employment band) and industry (according to the U.K. SIC '07 classification).

Respondents are asked to provide details of actual transactions undertaken for real clients (or for regular routes serving a number of customers with similar requirements and cargoes) as a preference. However, there are a variety of ways in which respondents set their prices and a mixture of transaction and list prices are observed. The pricing method employed is the direct use of prices of repeated services. Any atypical or extreme price changes are queried with the respondent so as to confirm that they are a genuine price change as opposed a price change resulting from a change in the quality of service defined in the contract.

United States

The U.S. publishes distinct price indices for various types of freight transport by road. These indices are differentiated on the basis of the type and amount of freight shipped and whether it is transported locally or over a long distance. During the respondent initialisation process, representative service transactions are selected and initial prices are collected through in-person visits. In subsequent periods, updated price information is provided by respondents through survey forms returned by mail, fax, or online submission. Probability proportional to size sampling (with employment as the size variable) is used to select the sample for each of the various industries.

Turnover data collected by the U.S. Census Bureau are used for index weights. Item weights are derived using sample company turnover which is obtained from the

respondent during the respondent initialisation process, adjusted to account for accurate statistical representation of firms that were not selected in the sample.

The direct use of prices of repeated services method is employed for nearly all freight transportation by road transactions. The price for each transaction is typically set as a base rate plus a surcharge for fuel expenses, with both charges expressed on a per distance basis. In subsequent periods, respondents are asked to provide the current price for the selected transaction.

6.2. Sea and coastal water transport (Anne-Sophie Fraisse, OECD)

6.2.1. Industry description (ISIC 5012)

Water transport services: recent developments

Water transport industries play a fundamental role in globalisation, particularly as it gathers pace with the increasing international fragmentation of production. Measuring the value of water transport services, both in current and constant prices, is therefore important both for large importing economies but in particular for those economies with large maritime sectors.[1]

Measurement of price changes is non-trivial, complicated in large part by the organisation of business enterprises in this sector but also by the predominance of cross border trade. Therefore this *Guide* focuses mainly on the international dimension of water transport (water and coastal freight transport).

Water and coastal freight transport is a complex service industry that includes both short-sea and deep-sea shipping. Short-sea shipping, which should not be confused with inland water transport, is the maritime transport of goods over relatively short distances (*e.g.* from Lisbon to Rotterdam, Philadelphia to New Orleans). Short-sea shipping is preponderant in the European Union with 40% of the freight exchange between EU member states conducted by sea in 2010.[2] Deep-sea shipping refers to the maritime transport of goods via intercontinental routes, crossing oceans and is particularly developed in countries with large ports concentrating on intercontinental trade.[3]

The complexity of the industry, at least from a measurement perspective, reflects the multitude of categories of services offered. Water and coastal freight transport services are characterised either by: type of goods carried (dry bulk, chemicals; oil product, liquefied gas, etc.); mode (liner shipping, charter and tramp shipping); type of ship (oil tankers, bulk carriers, cargo incl. refrigerated, specialized cargo, Roll-on Roll-off, container ships and other ships including chemical tankers, liquefied gas carriers etc.); vessel size; and geographical regions.

Water and coastal freight transport industries are highly sensitive to developments in the world economy and international trade. In recent years, globalisation, containerisation and development of intermodal freight transport have reshaped the maritime transportation sector. The market is therefore extremely internationalised with a high level of specialisation, particularly in regions with many smaller countries like the European Union, or with large intercontinental trade activity like Asia. This is also the case, and to an even higher degree for intercontinental transport. Furthermore, the liner shipping and tramp shipping markets do not operate independently of one another. Those business enterprises active in liner shipping use, to a considerable extent, chartered vessels as an input. Each of these features of the water and coastal freight transport market can highly influence pricing.

1. Globalisation: maritime shipping is a highly globalised industry, both in operation and ownership, with an increasing contribution made by developing countries. The contribution of various regions to world seaborne trade volumes underscores the dominance of large emerging countries: in 2010, Asia was by far the most important loading and unloading area with a share of 40% of total goods loaded and 55% of goods unloaded. Other loading areas (exports) were the Americas (21%), Europe (19%), Oceania (11%) and Africa (11%). Europe unloaded (imported) more cargo (23%), than the Americas (16%), followed by Africa (5%) and Oceania (1%). Developing countries almost entirely dominate labour-intensive low-cost domains such as ship scrapping and the provision of crews. Access to cheap labour, coupled with more efficient and larger ships has led to a reduction of international transport costs;[4]

2. Containerisation: globalisation would not have been possible without containerisation. Container trade and major dry bulks are the main drivers in the development of seaborne trade. Since the 1990's, container trade volumes have seen a continuous expansion (containerised cargo expanded at an average rate of 8.2% between 1990 and 2010), mirrored by both the growth of containers ships and the fleet of container ships themselves. Since 2005, the dry bulk fleet has almost doubled and the containership fleet has nearly tripled. In 2010, total world containerised trade was estimated at 1.4 billion tons – an increase of around 17.6 % over the previous year. Approximately 17 % of world seaborne trade in volume terms (tons) is transported in containers;[5]

3. Intermodal freight transportation: containerisation has also fostered the expansion of the intermodal freight transportation. Intermodal transport involves the use of two or more transport modes (ship – maritime and inland, rail and road) without any handling of the cargo itself when changing modes. Therefore, measuring price change, at least in constant quality terms, requires consideration of each of the components of the overall cost such as the transportation mode, transhipment and warehousing activities.

   The use of Roll-on Roll-off cargo (Ro-Ro) has also been a key driver of intermodal transport, in particular in Europe where 14% of goods are transported in Ro-Ro units (while 12% are carried by containers). The specificity of Ro-Ro cargoes is that they facilitate intermodal transportation by design, facilitating transportation by lorry. This is in contrast to Lift-on Lift-off vessels (Lo-Lo) where cargo is loaded and unloaded by use of crane.

Price determining factors and price strategies

The price that a carrier, a ship-owner or charterer charges for transported cargo is known as a freight rate. The freight rate depends on many factors including distance covered, type and value of goods, the cost of operating the vessel (crew wages, fuel prices, maintenance and insurance), the capital costs of buying the vessel (such as deposit, interest and depreciation) and the cost of shore-side operation (which covers office personnel, rent and marketing). Freight rates are rarely all-inclusive and may be subject to numerous additions such as bunker adjustment factors, currency adjustment factors, terminal handling charges, war risk premiums, piracy surcharges, container seal fees, late fees and equipment shortage fees.

For price measurement of the freight industry sector, two main categories should be distinguished: the liner market and the tramp market. Liner shipping relates to vessels,

primarily container ships which carry containerized cargo, between fixed ports on a strict timetable with published freight rates. Note that Ro-Ro traffic is normally liner shipping.

Tramp shipping operates predominantly on a spot market and does not have a fixed schedule or itinerary/port calls. When vessels are not chartered out on a long term basis, ship-owners and charterers, using brokers to find cargoes for their ships to carry, establish a contract to lease the vessel at individually negotiated prices.[6] The service offered is therefore typically unique. The duration of contracts depends on a number of market conditions. Currently, short-term contracts of less than six months represent the majority of the total tramp shipping contracts (in 2010, they accounted for 60% having risen from 45% in 2008 and 52% in 2009). Experts assume that this is due to the current low prices and the expectation of a future price increase. On the other hand, long-term contracts of more than 24 months have tended to decline in recent years: they represented 18% of charters in 2008, 8% and 9% in 2009 and 2010.[7] Usually the financing of very large container ships is secured through long-term leasing contracts with liner shipping companies. In comparison with liner shipping, prices for leasing of vessels are usually more volatile; this applies particularly to new leasing contracts.

6.2.2. Classification aspects

6.2.2.1. Industry classification

Water transport is classified in section H - Transport and storage, division 50 - Water transport of the ISIC classification system. It covers both sea and coastal water transport and inland water transport including a distinction between passenger and freight transport. Inland and passenger transport have relatively small weights in most countries and so SPPI compilers mainly focus on sea and coastal freight water transport. Furthermore, because passenger water transport is typically consumed by households, price movements for these services are usually captured in the CPI:[8] Sea and coastal freight water transport (as defined by the ISIC classification) includes:

- Transport of freight overseas and coastal waters whether scheduled or not;
- Transport by towing or pushing of barges, oil rigs.

A review of other international classification systems by activity (NACE, NAICS and ANZSIC) shows a good concordance with the ISIC classification (see annex A). It should be noted however that the ANZSIC classification does not distinguish between sea and inland water transport.

6.2.2.2. Product classification

The corresponding products for ISIC 5012 - Sea and coastal freight water transport are classified in classes 6521 - Coastal and transoceanic water transport services of freight and 6602 - Rental services of water vessels with operator of the CPC. They are defined as follows:

- 65211 - Coastal and transoceanic water transport services of freight by refrigerator vessels. This subclass includes coastal and transoceanic water transportation of frozen or refrigerated goods in specially refrigerated compartments;
- 65212 - Coastal and transoceanic water transport services of freight by tankers. This class includes coastal and transoceanic water transportation of crude oil in

special tankers and other bulk liquids or gases such as natural gas, methane and refined petroleum products in special tankers;

- 65213 - Coastal and transoceanic water transport services of intermodal containers by container ships. This subclass includes coastal and transoceanic water transportation of individual articles and packages assembled and shipped in specially constructed shipping containers designed for ease of handling in transport;
- 65219 - Other coastal and transoceanic water transport services of other freight. This subclass includes coastal and transoceanic water transportation of letters and parcels on behalf of postal and courier services; dry bulk goods such as cereals, flours, cement, sand, coal; towing and pushing services on the high seas and on coastal waters and towing services for oil rigs, floating cranes, dredging vessels and buoys, as well as ships' hulls and incomplete vessels, on coastal waters or the open sea;
- 66022 - Rental services of freight vessels for coastal and transoceanic water transport with operator. This subclass includes rental services of all types of self-propelled freight vessels for coastal and transoceanic water transport with crew, such as tankers, bulk dry cargo vessels, cargo and freight vessels, tugboats and fishing vessels.

The CPA (as shown in annex B) is consistent with the CPC but provides a more detailed breakdown with a finer description of the type of cargo carried.

The NAPCS classification system used in North America provides a more detailed description of products for sea and coastal freight water transport by type of cargo (bulks liquids, bulk gases, dry bulk, automobiles, truck, livestock and waste), and type of vessel (such as tank containers, intermodal tank containers, cargo, tankers). The NAPCS (Canada) for 483002 - Water freight transportation services is defined as follows:

- 483002.1 - Transportation of bulk liquids and bulk gases in intermodal tank containers by water;
- 483002.2 - Transportation of bulk liquids and bulk gases, except in intermodal tank containers, by water;
- 483002.3 - Transportation of dry bulk, except in intermodal containers, by water;
- 483002.4 - Transportation of climate-controlled boxed, palletized and other packed goods, except in intermodal containers, by water;
- 483002.5 - Transportation of boxed, palletized and other packed goods, not climate-controlled, not in intermodal containers, by water;
- 483002.6 - Transportation of climate-controlled intermodal containers, n.e.c., by water;
- 483002.7 - Transportation of intermodal containers, not climate-controlled, n.e.c., by water;
- 483002.8 - Transportation of automobiles and light-duty trucks by water;
- 483002.9 - Transportation of livestock by water;
- 483002.10 - Transportation of waste by water;

- 483002.11 - Transportation of other goods by water;
- 483002.11.1 - Transportation of truck trailers by water;
- 483002.11.2 - Transportation of all other goods by water.

6.2.3. Scope of the survey

The ideal survey would track constant quality price change for the full range of output to all end users (such as business, household, exports and government etc.). Business customers, either resident or non-residents are the main clients of water freight transport providers and, as such, the survey could be produced on a business-to-business basis capturing separate prices for resident and non-resident clients.

The inclusion in the SPPI of establishments categorised under transport of towing or pushing of barges (included in class 5012 of ISIC) may not be necessary where they are small and unlikely to have a significant impact on the overall price index.

The collection of price data for non-scheduled freight water transport, either tramp time or tramp trip, is likely to prove difficult and resource intensive. A pragmatic decision to cover only liner shipping may therefore be appropriate, on the grounds that the contribution of non-scheduled freight water transport is of little importance and/or the price changes recorded in this sub-sector may follow price changes in non-scheduled and one-off shipping services, even if the actual prices differ. However, considerable care is necessary in using this assumption, as the experience in some countries (see below for Sweden) suggests that it may not always hold.

It is also important to bear in mind the notion of residency: the residence of the business enterprise is determined from its base of operations, rather than the point of delivery.[9] In other words, the activity of the service producer is attributed to the economy in which it is resident.

6.2.4. Sample design

Sampling design requires decisions on sampling techniques, sampling frames, sampling structures, sample allocation between strata and methods for reducing non-sampling errors.

For liner shipping, there are typically only a small number of dominant service providers. These units should, as a rule, always be covered in the survey with smaller units selected by sampling based on turnover or number of employees. Sample rotation is advisable among smaller units in order to limit the length of time they remain on the survey panel. Rotation keeps the sample up to date and helps to alleviate the problems caused by sample depletion. Indeed, shrinking markets (in terms of the number of service providers and/or overall activity of the sector) may lead to a loss of respondents over time so the sample should be reviewed at regular intervals.

For tramp shipping, it is advisable to distinguish between one-way freight and time charter[10], between small and large ships, and also between types of ship (freight) namely dry bulk, tankers and container vessels. Distinguishing between small and large ships helps to identify short sea and coastal transporters from long distance sea transporters. In the case of Sweden for example, the short sea and coastal transporters refers to freight transported in the Baltic Sea and the North Sea (a regional market with its own price developments). Long distance transports can be performed anywhere in the world and

prices are set on the world market. The distinction between dry bulk and tanker is recommended as the price development in these two markets can differ.

Samples from service industries are usually drawn from business registers using probability proportional to size, cut-off sampling or stratified sampling. It may however be advisable in some cases (*e.g.* when business registers do not differentiate between establishments operating in passenger transport and those operating in freight transport), to combine business registers with data from other sources like trade institutes and representative associations. For tramp shipping in particular, prices can be collected directly from shipbrokers. In Sweden for example, much use is made of these networks (brokers and the Swedish Ship-owners' Association).

The size of the sample can vary considerably between countries according to the structure and size of the market. For example, in Germany, 600 price quotations for liner shipping and Ro-Ro services are collected from 30 respondents while 560 prices are collected for the U.S. SPPI. Norway and Singapore both collect 300 prices quotations per period. On the other hand, in Poland only 14 price quotations are collected. A number of countries collect on average between 30 and 70 price quotations per period. In the Netherlands, 129 price quotations are collected from 27 respondents.[11]

6.2.5. Collection of information and specification of the service

The selection of products for price collection should be conducted in consultation with each respondent so as to ensure that they are representative of the service activities provided. Information on the main transport activities of establishments may come from transport statistics or from commercial sources. Most prices are collected directly from the service producers. Some additional sources can also be used: e. g. Australia uses data from other government agencies; Germany (only for Ro-Ro) and Norway collect data from the Internet and, as already mentioned, shipbrokers can also be a source of price data.

The choice of whether or not to include non-scheduled water freight transport will greatly influence the way in which the price collection is organised.

Particular services are specified in as much detail level as possible, taking into account the following parameters:

- Origin and destination of the transport;
- Type of freight;
- Weight or volume for non-containerised cargo;
- Size and type of container (general, dangerous, refrigerated);
- Type of vessel (general, dangerous or refrigerated);
- Need for additional services (loading/unloading, storage etc.).

Ideally, non-water freight component prices that are bundled together with the transport service should be collected separately and excluded from the price of the water freight transport. On the other hand, fuel surcharges pose a specific problem when collecting prices. It may be advisable to collect fuel surcharge prices separately (as is done in Australia and Germany).

It is essential that during the respondent initialisation process detailed information is collected to ensure that specific service transactions can be priced to reflect constant

quality in subsequent periods. It is advisable to organise personal interviews and provide tailored forms during this process. Once the base specifications have been agreed with respondents, collection of prices can be conducted on a regular basis, usually quarterly. Note however that tramp market prices can be updated on a more regular basis as is the case in Sweden where tramp market prices are collected weekly.

Any notable changes in the price or collection need to be checked with respondents to identify the reasons for change. Where a change in price has been caused by a change in service specification, the appropriate quality adjustment is carried out to ensure the service remains representative and at a constant quality.

6.2.6. Main pricing methods

The most commonly used pricing method is contract pricing, where the survey aims to capture prices of scheduled transport services, namely liner shipping. An alternative is the use of model pricing which is of particular relevance for tramp shipping.

6.2.6.1. Liner shipping: contract pricing

Contract pricing is the appropriate method when long-term prices for the repeated delivery of the same or very similar services can be observed. The survey should, where possible, collect actual prices including price reductions (*i.e.* not list prices) for transport of the same cargo between the same origin and destination, repeated on an ongoing basis for a set of regular clients. Surcharges for the client (*e.g.* fuel adjustment factor, port charges, war risk) should be included.

Contract pricing is commonly used for liner shipping services that operate vessels between fixed ports on a strict timetable. Difficulties may arise in cases where liner services are operated by a group of establishments, such as an alliance or consortium, which may share costs and revenues. However, in these cases the underlying principles for measuring price change remains the same.

6.2.6.2. Tramp shipping: model pricing

For non-scheduled transport, either tramp time or tramp trip, the model pricing approach is the appropriate pricing method. In practice, compilers often use market data (estimates from shipbrokers[12] and international indices[13]) to estimate price trends on the tramp market. The use of market data in this instance follows the model pricing method as brokers supply an estimate of what a certain transport would cost if it was carried out. This differs from conventional model pricing in that the estimate is not made directly by the service provider. International indices are compiled from data supplied by panels of shipbrokers, ship-owners and charterers, but can still be considered as a form of model pricing.

6.2.7. Quality issues

Precise specification of sea and coastal water transport is necessary and must be kept constant over time. As in another transportation services, advances in technology and logistics, which may impact on prices, must be identified and appropriately dealt with. The volatility of surcharges can also have a considerable influence on price development over time.

The most common method for treating quality changes is the overlapping method. The second most common quality adjustment method is the comparable replacement

approach. The U.K. uses a "with specification change" mechanism which revises the base period price but does not reflect a price change in the index. This is equivalent to the "linked to show no price change" method.

6.2.8. Weighting and aggregation

The sources of weight data vary between countries. Most countries use data from annual surveys such as structural business surveys, annual sectoral surveys and annual surveys of services for transport services. In some countries, weight data are collected using a specific SPPI survey. Australia and Netherlands use national accounts data (in the Netherlands these are combined with data collected in the SPPI survey). In Germany, turnover is estimated by multiplying price data (from the SPPI) with transportation performance data (tonne km) collected for transport statistics.[14]

6.2.9. Specific aspects

The increasing share of container transport must be considered. However, a definite allocation of container freight in terms of product classification is not always possible. The index structure should therefore mainly focus on traffic routes, *i.e.* principle origins and destinations. A distinction by different types of goods carried is advisable only at the second level, where this information is available.

An important issue when measuring price change in the sea and water freight transport industry is price fluctuation on the tramp market. Given that the collection of price data for tramp shipping is likely to prove difficult and resource intensive, it may be advisable to concentrate price collection and measurement on liner shipping only.

Many transport services are sold as a “package” together with other services like freight forwarding and storage, or combined with other transport modes. In these cases, it can be difficult to identify a price for the actual sea and coastal water freight transport component. Care should be taken to ensure that a price index that includes elements of these bundled packages should align with the recording of the output as measured in the national accounts industry statistics.

6.2.10. Overview of national methods

Most services within this industry constitute international transportation. This international dimension is complicated by the fact that the residency of the service producer is not necessarily related to the ports from which any particular ship may operate. For example, Panamanian service producers (can) tender for exactly the same services as British and Indonesian producers. However, this additional complexity can provide a mechanism to assure the quality of national SPPI estimates. The high degree of international competition in the market and the flexibility with which different operators are able to provide services irrespective of their residence means that SPPIs across different countries should at least, broadly, align especially over the medium to longer term.

Hong Kong

Hong Kong is well known as a major international maritime centre and has maintained its position as one of the world’s busiest container ports. An SPPI is published for maritime transport as a whole covering both sea passenger transport and sea freight transport. A separate SPPI for sea freight transport services only is not published.

Producer prices for sea freight transport services are compiled as quarterly averages of actual transacted prices net of any discounts, premiums, rebates or allowances given to buyers, but including surcharges. Respondents provide price data for their most representative transport services based on stable and continuing transactions. These data should also be readily available to the respondent. These data should also be readily available to the respondent. Respondents are also asked for the total amount of business receipts of sea freight services plus receipts in respect of individual major services, and receipts for prominent product items of major service products.

Data are collected through the quarterly survey of service industries. The survey is based on a stratified sample of establishments engaging five or more persons. A rotational replicate sample design is adopted. Every year about one-third of the sample is rotated out and replaced by newly selected establishments.

Germany

Since 1970, the German Statistical Office has compiled monthly price indices for sea freight transport. Due to the lower economic importance of inland water transport, no official price indices for that industry are compiled. In 2003, the compilation of a separate index for tramp shipping was abandoned due to the low quality of data and the high burden of the survey. In 2006, the scope of the index was extended to cover sea and water transport as a whole as a consequence of the EU regulation on short-term statistics and data collection was extended to Ro-Ro and passenger transport.

Since 2006, the index has been compiled on a quarterly basis although prices are collected monthly. Monthly collection is necessary in order to take account of the high volatility of prices including surcharges and changes of currency exchange rates.

The main pricing method employed for liner shipping is contract pricing while for Ro-Ro shipping and passenger transport the direct use of prices of repeated services (tariff) is used.

For liner shipping, freight rates are collected monthly through a sample of 20 reporting units (shipping companies, ship brokers and agencies) for a representative selection of traffic relations and important goods.

Freight rates are calculated for each type of service with regard to a specific traffic route on a peer-to-peer basis. The objective is to capture the effective freight rate (*i.e.* including discounts etc.) for a total of 117 traffic routes. These routes, combined with different types of goods, give rise to 672 price observations. Detailed transport statistics (mainly physical data) and the Federal National Bank survey on “Revenue and expenditure of the German maritime shipping” are used in the calculation of the weighting structure. Additional modelling was required to convert physical data into monetary amounts for the purposes of calculating the weights.

The index of sea freight rates is divided into homeward-bound and outward-bound services. An additional regional breakdown of the index by the four traffic routes of Europe, Africa, America, and Asia/Australia is available.

The price collection for tramp shipping was discontinued in 2003 due to quality issues. In light of the difficulties in estimating the real development of sea and coastal shipping during the economic crisis of 2008 and 2009, it has become obvious that this gap in the SPPI for sea and coastal shipping has to be closed. During 2013, German compilers worked on developing a reliable picture of the relative importance of the various maritime shipping sectors. Based on this analysis it may be possible to develop a

weighting scheme that allows for the compilation of a SPPI that utilises all the available market data (estimates from shipbrokers and international indices) in an appropriate manner.

Sweden

The Swedish water transport market mainly consists of sea and coastal transport. Sea and coastal water freight transport represents 99.6% of the turnover for freight water transportation, and 65.4% of the turnover for all water transportation (passengers and freight). The Swedish SPPI covers NACE 50.2 - Sea and coastal freight water transport, with the assumption that prices on the inland transportation market – representing 0.25% of the water transport sector's turnover in 2007 – follow price movements on the sea and coastal market. Passenger water transport is covered in the CPI and is not included in the SPPI.

The sea freight market for Sweden is international and there are several submarkets which employ different pricing mechanisms. The tramp market is dominant in terms of volume of international shipping. Line cargo shipping, in which traffic is mostly carried out by large container vessels that service particular ports, is the second largest sub-market. There are numerous Swedish sea and coastal freight transport establishments but the industry is dominated by a few large ones.

The Swedish SPPI covers both liner shipping and tramp shipping. Tramp market prices are collected from shipbrokers that can provide a good overview of market prices given the role they place in the functioning of the market. Prices were initially collected on a quarterly basis but this proved problematic as prices on the tramp market are volatile, especially in the one-way freight market segment (a spot market) and a price quote at a given point in time could be unrepresentative of price development over the entire quarter. Prices are now collected weekly in order to ensure their representativeness.

When liner shipping functions as a "bus line" (where the exact route is sailed very frequently and anyone can buy the transport service) the direct use of prices of repeated services pricing method is used. List prices are collected for different kinds of standard transports. Note that in Sweden this kind of traffic is usually short-distance.

Where a ship-owner signs a contract with a customer, usually a producer of some kind of goods, to sail according to a fixed schedule during a settled period of time, contract pricing is used.

United Kingdom

The U.K. index for sea freight services is split into three main categories: coastal (domestic); near sea (Europe); and deep sea (rest of world) which have weights of 60%, 2% and 38% respectively. Prices for sea & coastal water freight transport are collected using quarterly questionnaires. In selecting the sample, a weighted stratified simple random sampling technique is applied; where potential respondents are stratified by size (employment band) and industry (SIC '07 classification). Turnover data for sea & coastal water freight transport are collected using the service turnover survey (STS).

Prices are collected either from existing ongoing contracts or using tariff rates (including discounts) charged to U.K. businesses for scheduled services on specific trade routes. The price of specific services for this industry is determined by the volume of goods and the final destination. As with the other freight industries, one-off services and regular services for repeat customers are provided. Currently 25 prices are collected from 9 respondents.

The direct use of prices of repeated services pricing method is employed. After prices are collected, any atypical or extreme measure is queried with the respondent. This is to confirm that price movement is real, rather than resulting from change to the quality of the service defined in the contract.

6.3. Air transport (Christian Puchter, Statistics Austria)

6.3.1. Industry description (ISIC 51)

The air transport industry has become increasingly liberalised in recent decades. The liberalisation process began in the late 1970's in America and around the mid 1980's in Europe as a result of legislative change. Large airlines and strategic alliances increase their market influence and enlarge their network capacities through mergers with national carriers.

The air transport service industry may differ in size across countries, but in the majority of cases the industry is quite similar in nature. That is, a small number of large establishments provides almost all passenger air transport services, with smaller establishments providing other kinds of air transport such as air taxis and air sightseeing.

The variety of prices and offers for air transport tickets has increased as the industry has deregulated. Airlines attempt to maximise their income through use of computer-developed pricing mechanisms called yield management systems (YMS). These systems are based on the assumption that different consumers are willing to pay different prices at different times for the same service. Consumers who buy their tickets in advance benefit from cheaper ticket prices but may have to accept ticket restrictions and consequential extra fees for changing the ticket specification (*e.g.* rebooking). Conversely, consumers (perhaps business travellers) who buy their tickets closer to the date of travel are willing to pay higher prices in order to get a ticket instantly and to benefit from higher flexibility.

In recent years a number of new, mostly small, air carriers have entered the market offering lower air fares (the so-called "low-cost carriers"). These carriers compete with both existing airlines and other transportation systems in general. They can offer cheaper ticket prices by using second best airports in urban centres, maximising the daily operating time of their planes and crew and perhaps by paying lower wages and benefits for their staff.

Air transport services cover passenger air-, freight air-and space transport. However, space transport is generally not covered in SPPI compilation. Both passenger and freight flights are often sub-divided by scheduled and chartered flights.

6.3.2. Classification aspects

6.3.2.1. Industry classification

In the ISIC, division 51 - Air transport, is split between passenger and freight air transport. Space transport, renting of air transport equipment and general aviation are included as supplementary groups. The same differentiations apply to ANZSIC and NACE.

Only NAICS distinguishes between scheduled and non-scheduled air transportation, as was the case in earlier versions of NACE and ISIC.

6.3.2.2. Product classification

According to the CPC classification the corresponding activities for air transport services include:

- Passenger air transportation on regular routes and on regular schedules; transportation of passenger baggage and other items that may be carried at no extra cost;
- Passenger air transportation on a non-scheduled basis supplied in aircraft of any type; sightseeing services and air taxi services by helicopters; transportation of passenger baggage and other items that may be carried at no extra cost;
- Transportation of letters and parcels by air on scheduled and non-scheduled flights;
- Air transportation of individual articles and packages assembled and shipped in specially shipped containers designed for ease of handling in transport; air transportation on freight not elsewhere classified;
- Space transportation services; launching and placing of satellites in space; services provided by space laboratories;
- Rental and leasing services of freight- or passenger-carried aircraft of any type and for any purpose with crew.

Table in annex B illustrates the appropriation of CPC codes to the corresponding ISIC codes.

6.3.3. Scope of the survey

As noted in chapter 1, SPPIs should comprise of prices for the provision of services to all institutional sectors, financial and non-financial corporations, government units, and non-profit institutions (NPISH), households and the rest of the world. In practice, it is often difficult to separate prices charged to different end-users of air transport services and compilers may instead calculate a single PPI covering all end users.

Air transportation of freight and space transport, where significant, should be included in the scope of the SPPI. However, it appears that in a considerable number of national indices the scope is limited to transportation of passengers only. A survey of 28 EU countries in 2010 found that approximately one third exclude freight transport services, and more than one half explicitly exclude space transport from the calculation of SPPIs for the air transportation service industry. Many countries also exclude both non-scheduled and charter services.

6.3.4. Sample design

The sampling frame should comprise of all producers of air transport services and business registers are normally considered a reliable source of data. It is important to ensure that establishments specialising in providing air-freight services are included in the frame. Generally, the frame could be stratified by sub-sector (for example, according to the CPC classifications presented above) or size using turnover or employment as a size variable. In theory, any available probability based sampling strategy can be used. In practice, due to the size and structure of the industry, with small numbers of large establishments dominating, stratified probability proportional to size sampling or non-

probability sampling are more likely to be employed. Rotating samples may only be required in countries with a large number of small to medium establishments in the air transport sector, as all large establishments can be included.

6.3.5. Collection of information and specification of the service

Quarterly or monthly prices may be collected via establishment surveys and/or directly from airline websites. If passenger airfares are included in the national CPI, data may be shared between the surveys in order to minimise respondent burden.

As is the case for a number of other service industries, relevant data may also be provided by a national regulatory authority. Compilers may be able to minimise the costs for data collection and respondent burden in respect of freight transportation services by using data compiled by the International Air Transport Association (IATA).

Irrespective of the mode of data collection, it is important to have well trained staff and an on-going program of review of sampled prices to ensure they remain representative of both the services produced and the development of prices in the market.

It is also important that representative services for on-going pricing are as well specified as possible. Among EU countries, the most commonly used price determining characteristics for air transport are:[15]

- Passengers:

– Destination/route;
– Distinction business/economy;
– Fare type;
– Time of reservation;
  – Type of connection.

- Freight:

– Destination/route;
– Type of good;
– Weight;
  – Speed of delivery.

6.3.6. Main pricing methods

The direct use of prices of repeated services, the unit value method and the model pricing method appear to be the most appropriate pricing methods for this industry.

The use of the unit value method is becoming the preferred method under the prevailing yield management practice in the airline industry. The model pricing method may also be employed but it involves more burdensome data collection.

Innovations in the yield management systems allow airlines to observe real-time vacancies for each scheduled flight and to change their price quotes more dynamically in order to maximise profit. These innovations create challenges for compilers. For example, ticket prices for the same flights (and flight class) can vary significantly depending on the timing of the ticket purchase.

6.3.6.1. Direct use of prices of repeated services

The direct use of prices of repeated services is one of the more appropriate pricing methods for passenger air transport services. Representative flights, covering destination and ticket characteristics (such as fare class, luggage allowance and travel flexibility, should be selected. The timing of the fare purchase (for example 30 days before date of travel) should also be specified and held constant as this can have a very significant impact on price. This will allow for the collection of prices for constant quality services.

6.3.6.2. Unit value method

The unit value method is also employed; primarily in response to the difficulty in pricing constant quality services sold under yield management systems. If airlines are willing to cooperate, average prices for representative routes and tickets can be surveyed for business and economy class tickets. The unit value method can also be employed for air freight transport. As in the case of passenger air transport, representative modes of transportation and destinations for air freight transportation should be selected. Additional price relevant characteristics of the services should also be defined (for example; kind of good transported, type of transport container, speed of delivery) in order to form homogeneous subgroups which are essential for the calculation of constant quality unit values. A homogeneous subgroup, and accordingly the resulting sub-index, should be constructed of services with almost identical price determining characteristics.

6.3.6.3. Model pricing

It may not always be possible to secure satisfactory cooperation from airlines. In such a circumstance, the model pricing method may substitute for the unit value method. In applying this method, the compiler is first required to identify as many key conditions relevant for yield management as possible. Suppose for example, that the compiler identifies two relevant conditions; then, the compiler should collect a two-dimensional vector of price quotes either directly from the airlines, or from their websites. The weighted average of these price quotations is regarded as a model price which approximates the unit value price. However, this method is burdensome when there are a large number of key conditions for airlines' yield management and/or the set of key conditions changes frequently.

6.3.6.4. Quality issues

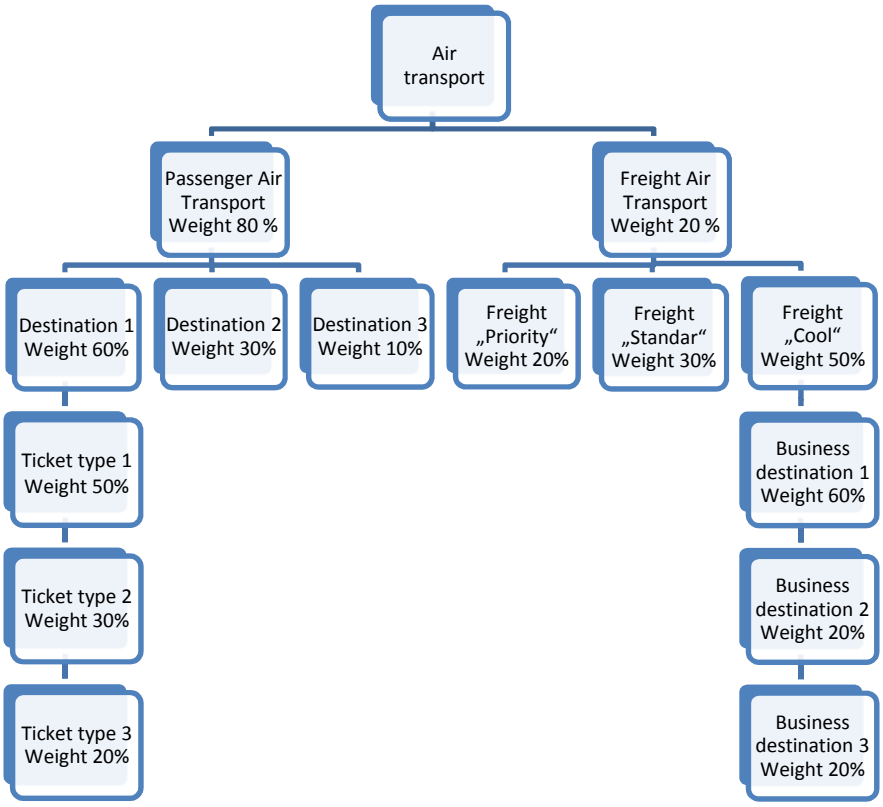
It is not always clear as to how compilers should deal with changes in the characteristics and pricing structure of fares and services. Changes in pricing structure are often accompanied by changes in the quality of the service such as the introduction of charges for meals, changes to booking conditions, duration of tickets and changes to the quantity of free baggage allowed. Jenkins and Puchter (2011) examine the issues arising from quality changes in air transportation, including several clear examples of quality changes and their impacts on index development. They favour the use of the production function of the service producer rather than the utility function of the consumer as the basis for quality adjustment. However, an internationally agreed approach to these issues, as well as for the appropriate treatment of frequent flyers programs, has not yet been found.

6.3.7. Weighting and aggregation

As previously noted, at the first stage of the compilation of an SPPI for air transportation a distinction should be made between passenger and freight transport. Fortunately, in most cases data for the two sub-indices can be collected from the same respondent.

Figure 6.3.1 serves as an example of a possible aggregation structure for an overall SPPI for air transportation. The first distinction is made between passenger and freight transport. At the next level of sub-indices further differentiations can be made between destinations (passenger transport) and different types of transportation (freight transportation). At the next lower level of the aggregation structure, various ticket types per destination (passenger transport) and several important freight routes (freight transport) have been chosen. The examples of "business destination 1" and "freight type cool" illustrate how disaggregation can be made. These disaggregations should be applied uniformly for all destinations and freight types covered in the example.

Figure 6.3.1. Example of an aggregation structure for an SPPI for air transport services



The example also shows possible available weighting information based on turnover information. Such information could be generated by respondent accounting systems. It should serve as the starting point of the index development process in that it can be used to select the most representative services for an SPPI for air transport. Using a Laspeyres

type index, the weighting structure and the representative services for on-going pricing, should be updated at least every five years.

The design of the index aggregation structure will depend on the availability of data and the willingness of the respondents to cooperate. For example, if it were possible to obtain further weighting information in regard to the status of the traveller (business, government, and consumer) for the aggregation structure presented at figure 1, it would be possible to incorporate an additional disaggregation at the top level of the aggregation tree in order to calculate indices by type of end user.

6.3.8. Specific aspects

Additional charges which influence price, such as taxes and airport landing and security charges should be excluded if they are not retained by the service provider. However, surcharges imposed by respondents to cover rising input costs (*e.g.* fuel) must be included.

Theoretically, the price for an observed service should be recorded when the service is provided, thereby obeying the accrual principle.[16] The same rule applies to the recording of output. As previously noted in chapter 1, the 2008 SNA suggests that prepayments can be recorded as "interest free loans" (rather than as purchases of tickets) from clients to service providers that are paid back at the time of service provision. The client "buys" the ticket once again at the time of service provision, which ensures consistency between supply and demand of services. However, in the case of air travel this not fully satisfactory as prices offered at two different points of time cannot be automatically be considered as relating to a constant quality service transaction.

Another specific aspect of the air transport service sector is frequent flyer programs (*e.g.* Miles and More) which are common amongst airlines. These programs aim to bind the consumer to one airline or one alliance of airlines by offering special premiums (*e.g.* free flights, upgrades) for travelled miles. Typically, several different levels of frequent flyers exist within one frequent flyer program, based on the number of miles travelled miles in the previous 12 months. Frequent flyer programs offer additional "free" services such as priority check in, access to luxury airport lounges with drinks and snacks, and additional baggage allowance. The extent to which these additional "free" services should be taken into account in the quality adjustment of prices (and the methodology for doing so) requires further discussion in the future.

In countries with only one or two domestic carriers it may not be possible to publish indices for reason of confidentiality.

6.3.9. Overview of national methods

Austria

Austria calculates SPPIs for both passenger and freight air transport services. The passenger air transport index is compiled using the direct use of prices of repeated services method whereas the freight transport index is compiled using the unit value method. In both indices the characteristics of the respective services (ticket type, destination, mode of freight transport, etc.) have been chosen conjointly with the respondents. Weighting information is also provided by the respondents. Due to reasons of confidentiality the indices are not published.

France

In France an SPPI for air freight transport services is calculated by the Ministry of Transport. As in the case of Germany, data used in the compilation of the index are provided by the International Air Transport Association (IATA) in order to reduce respondent burden and the cost of compilation. The index covers 72% of the total air freight transport market and comprises of the most important carriers departing from France.

Germany

Germany compiles a BtoAll index that covers scheduled passenger air transport (national and international) and freight air transport. One of the main difficulties in the production and publication of a price index for air transport is the very small number of resident service producers. For reason of confidentiality, the SPPI for resident producers is not published but only provided to the national accounts and to Eurostat on a confidential basis. A separate SPPI for air transport services, covering both resident and non-resident service producers, is compiled and published.

The direct use of prices of repeated services method is employed for the SPPI for air passenger transport, mainly using prices that are collected for the CPI. The weighting scheme is organised by destination, by airline and by type of booking class.

For freight air transport services, the index is compiled using data supplied by IATA's Cargo IS service, which provides "standard reports" with data for the whole market and single airlines. Both unit value prices (for freight rates) and prices of repeated services (for surcharges) are provided. The sum of the freight rate and surcharges forms a per-kilo-price which is methodologically classified by the NSI as component pricing.

Japan

Japan compiles price indices for air transport services including air passenger transport and air freight transport for air passenger transport, the model pricing method is employed. Air passenger transport services selected for pricing are stratified according to international and domestic routes. Prices for international routes are further stratified into three arrival regions: North America, Europe, and Asia/Oceania. Indices are focused on BtoB transactions. For air freight transport, Japan uses the unit value method. Average-monthly prices for freight fee per tonnage are collected for specified routes, airlines, and types of cargo. These prices are stratified according to international and domestic routes.

Sweden

Sweden currently produces quarterly indices for passenger and freight air transport. However, these indices cannot be published for reason of confidentiality. Prices for air transportation of passengers on both national and international flights are collected, differentiating between business and consumer passengers using the direct use of prices of repeated services method. For air transportation of freight model pricing is used. No distinction in respect of the end user of the service (*e.g.* business or consumer) can be made.

United Kingdom

The U.K. business airfares index aims to measure quarterly movements in prices charged by U.K. airlines to U.K. business passengers. However, there are difficulties distinguishing between business and leisure travel for this industry. The index therefore includes transport of leisure and business passengers, over regular routes and on regular schedules.

The index is split into three main categories; long haul flights, European flights, and domestic flights. Long haul flights have a weight of 76% within the index, European flights 18% and domestic flights the remaining 6%. The majority of prices are collected from the U.K. Civil Aviation Authority in order to reduce respondent burden. These are supplemented with prices collected from a questionnaire sent to one of the large airlines in the U.K.

The index is compiled using the direct use of prices of repeated services method. An unrestricted or business class fare is taken as the representative business customer tariff. Budget airlines and chartered flights are excluded and the U.K. does not currently produce an index for air freight transport.

United States

The U.S. SPPI for Air transportation is a BtoAll index covers passenger and freight transportation on scheduled and non-scheduled (charter), and domestic and international routes. It is based on price information obtained directly from airlines. This index only covers domestic carriers. The pricing data excludes taxes and airport fees, but includes fees that are retained by the airlines such as fuel surcharges, baggage fees, and reservation cancellation fees.

Currently, the U.S. SPPI measures the price development of scheduled air transportation of passenger services by collecting monthly average revenue (turnover) per passenger for specific seats on selected flights, *i.e.* the unit value method. Total passenger revenue (turnover) and total passengers for select origins and destinations for a given passenger class (for example: first class, including business or coach) are collected directly from airlines each month. Separate indices are published for domestic first class, including business; domestic coach; and international. For non-scheduled or chartered passenger and freight transportation, transaction prices based on fixed service specifications are collected. The unit of measure is usually per trip or hour (passenger) and the price per kilo, per pound, per mile, per trip, or per hour (freight).

Adjustments for baggage fees and reservation cancellation fees for scheduled air passenger transportation have only been reflected in this U.S. SPPI since 2009. This new procedure was put in place at the time when many U.S. airlines added or expanded 1st and 2nd checked bag fees. Data on the amount each airline earns from baggage and cancellation fees on a per passenger basis are obtained from the U.S. bureau of transportation statistics. This amount is then added to the average revenue per passenger reported by each responding airline to get the final price used in the index. Using this fee adjustment, the U.S. SPPI now reflects all changes that are attributable to the implementation of 1st and 2nd checked bag fees, as well as any other bag fees (*e.g.* fees for oversized, overweight, or 3rd checked bags) and reservation cancellation fees. Prior to making these adjustments, the SPPI average revenue per passenger data did not include revenue attributable to bag fees or reservation cancellation fees due to data limitations at participating airlines.

6.4. Warehousing and storage (Paul Boling, Australian Bureau of Statistics)

6.4.1. Industry description (ISIC 5210)

The warehousing and storage class is one of the components of ISIC section H - Transport and storage and covers the operation of warehousing and storage facilities for merchandise. These facilities include those for general merchandise, refrigerated

merchandise, grain storage and other farm products, other bulk products in specialised facilities such as timber and petroleum, records management, storage of goods in foreign trade zones and blast freezing. Business enterprises for which these activities are the dominant revenue earner should be classified under warehousing and storage. Other business enterprises providing these services but where the dominant revenue earner is an additional service such as transport, or a wider range of complimentary or transport related services, should be appropriately classified elsewhere.

The market for warehousing and storage services has low barriers to entry for service providers and increasingly there are new or remodelled operations providing specialised services to cater to changed demands. Larger transport providers are increasingly likely to branch out into the provision of other modes of transport and services such as warehousing. Offering bundled services allows service providers to provide more attractive and effective services to the customer. Cross subsidisation of prices to win new business creates problems for compilers in obtaining and isolating genuine transaction prices.

In producing a fit for purpose index, the compiler must achieve a balance between ideal methods and what is actually practical, with particular reference to available resources.

6.4.2. Classification aspects

6.4.2.1. Industry classification

ISIC classifies warehousing and storage services under section H - Transport and storage, division 52 - Warehousing and support activities for transportation, group 521, class 5210 with no further breakdown. NACE provides the same classification structure.

However, other international industry classifications provide finer delineations. For example, NAICS delineates group 493 - Warehousing and storage services, by 49311 - General warehousing and storage, 49312 - Refrigerated warehousing and storage, 49313 - Farm product warehousing and storage, and 49319 - Other warehousing and storage. ANZSIC, provides a separate division 53 for warehousing and storage services, identical to group 530 and subdivided into two classes; 5301 - Grain storage services, and 5309 - Other warehousing and storage services.

6.4.2.2. Product classification

The CPC classification includes warehousing and storage under section 6 - Distributive trade services; accommodation, food and beverage serving services; transport services; and electricity, gas and water distribution services, division 67 - Supporting transport services, group 672 - Storage and warehousing services. This group is further divided into 3 classes:

- 6721 - Refrigerated storage services;
- 6722 - Bulk liquid or gas storage services;
- 6729 - Other storage or warehousing.

Only pure warehousing and storage service activities therefore are included. The CPA classification is very similar although it provides some additional detail in respect of grain storage services.

The NAPCS classification is far more detailed and provides a broader overview of all of the services offered by the sector including auxiliary services for storage and all the range of services offered by logistics providers. In doing so it facilitates the classification of products typically offered by other industries and the compilation of approximate product based indices in addition to industry based indices.

6.4.3. Scope of the survey

Ideally the survey should measure price changes for warehousing and storage activities provided for hire or reward to all end users. Activities performed by businesses enterprises on their own account for their own merchandise are not typically included as obtaining genuine transaction prices may be difficult.

6.4.4. Industry vs. Product based SPPI

Industry based indices measure the transaction prices of activities produced by establishments classified to the industry. Product based indices measure the transaction prices of relevant service activities produced not only by establishments classified to the industry but also the transaction prices of relevant activities produced by establishments classified elsewhere as a complimentary or secondary activity.

The survey sample is usually industry based (due to the unavailability of a product level sample frame) and structured to reflect the operational practices of each part of the industry. On this basis, warehousing and storage services provided as secondary activity in other industries may be missed even though these services are often an important secondary activity of establishments classified elsewhere in the transport and logistics sector (Goldhammer, 2010). Product level indices which offer a finer level of collection detail can be structured in a more logical hierarchy than industry indices and more closely resemble how the industries operate in the market.

Consideration needs to be given to whether these secondary activities affect the market price for the principal activity and if the price is affected, whether the secondary activity is a price driver of the principal activity. Consultation with industry representative associations and service providers can provide this information.

6.4.5. Sample design

National registers should be used initially to select respondents. Other sources including respondent and industry representative organisation provided information may also be utilised to ensure the sample is representative of the market.

The choice of sampling method may vary depending on the organisation of the industry in each country. Where there are a limited number of large national service providers which dominate a specific market (such as grain storage) almost full enumeration could be considered. Compilers should remain aware of geographical distribution which may affect seasonality. For example, the geographic size of Australia gives the country a huge range of climatic conditions. Regional differences in crops and yields between regions may result in different price trends. In markets characterised by a larger number of smaller operators to the use of probability based sampling may be more appropriate. A mixture of probability and non-probability sampling could be employed where there are a range of large, medium and small units.

Sub-samples may be drawn to represent different sub-industries as the warehousing or storage of different merchandise may have different cost drivers. For example, a

warehouse providing storage in respect of a defined space or volume under contract has different cost drivers to a facility providing temperature controlled short-term hire with a high throughput.

The sample size will be determined by the structure of the industry, the requirements for coverage of establishments within various size classes, burden considerations and by the availability for resources. Ideally the compiler should determine the optimal number of price observations to be collected from each respondent that will satisfy data quality standards while at the same time minimise respondent burden. Typically, if the respondent offers a wide and heterogeneous line of service activities then increasing the number of activities for which prices are collected will improve representativity. However, if the different services offered are limited in number, and homogenous, then fewer service transactions are required to measure price change.

6.4.6. Collection of information and specification of the service

During the respondent initialisation process, each respondent provides information about the range of services it offers and the respective shares of total turnover generated by each type of service activity. Representative service transactions are then selected for the main service activities for on-going pricing. Each transaction should be sufficiently well specified to ensure that it can be easily identified in each period so as to facilitate pricing to a constant quality. Some service transactions may be unique to a client but broadly representative of services provided to other clients.

Information which helps the compiler understand the nature of the industry and market conditions may also be collected (ideally by personal interview) during the respondent initialisation process. Industry representative associations may also be a useful source of market knowledge and perhaps even assist in questionnaire design.

A range of methods may be used to collect prices data from respondents in each survey period from respondents in a secure and cost-effective manner, while minimising the burden on the respondent. Prices data can be collected via survey forms, email, from company websites (particularly for services aimed at the consumer or small business), from administrative data such as exchange rates or from other statistical collections such as those relating to international merchandise trade. Some services activities may have published rate schedules which are updated on a regular basis.

6.4.7. Main pricing methods

6.4.7.1. Contract pricing

A key characteristic of the provision of warehousing and storage services is the bundling of services, often at unique rates to specific customers (Lucier, 2004). Consequently, the contract pricing method is commonly employed for this sector. This method facilitates the collection of prices for bundled services with multiple price-determining characteristics and is reflective of the pricing mechanism employed in the sector. Where standard services are provided to different customers at the same price the direct use of prices of repeated services method can be employed. Use of this method is facilitated by the fact that warehousing and storage services are usually easily described (Goldhammer, 2010).

6.4.7.2. Unit value method

The unit value pricing method can also be employed where total revenue can be divided by a measure of the total volume of services provided (such as per day, per m^2). However, it is important that the service provided must be very homogeneous and that the volume measure is reflective of the pricing mechanism employed. Furthermore, it may not be appropriate to use unit value measures based on time where fixed charges are a component of prices.

6.4.8. Quality issues

The SPPI should measure the change in price of a fixed basket of representative services to constant quality. Changes in the conditions, access, security and length of time warehoused or stored could all give rise to quality change. Specific service transactions priced in one period may not be available in a subsequent period either because of a change in the characteristics of the service or because it has been replace by a new service. Failure to account for quality changes will introduce a bias into the price index. Thus, if the qualities of goods or services being compared are not identical, quality adjustment is required.

The price collection instrument should require the respondent to note reasons for significant changes in price or changes to the product. These reasons may also provide signals to alert the compiler to changes in quality.

Missing values can be estimated using "class mean" imputation, wherein missing price movements are imputed using movements based on the next highest level of aggregation.

6.4.9. Weighting and aggregation

Weights should be based on contribution to the total industry revenue. These data may be available from different sources for different levels. For aggregates at or above the lowest level in the classification framework, values from structural business statistics or national accounts input/output tables could be used. For samples or aggregates below this level of the classification it may be necessary to use industry sourced information or data from turnover surveys or other surveys, perhaps by other organisations.

The key sources of data for upper level weights for the Australian SPPIs are the Australian national accounts input/output tables. In addition to broad data from input-output tables, other data sources used to construct national accounts aggregates are frequently used in the estimation of lower level weights. Whilst these data typically come from other Australian Bureau of Statistics (ABS) economic surveys, the national accounts component data are generally more complete in terms of consistent coverage and valuation basis. ABS economic surveys are also used in the production of lower level weights for the output producer price indices. These data typically provide information on type and characteristics of producers, as well as some detailed information on revenue. In addition, these ABS surveys frequently provide information regarding industry outputs in terms of quantity measures. Deriving lower level weights from these quantity data requires that they are combined with measures of average prices.

Other weighting data may be sourced from administrative data, industry associations or during the respondent initialisation process.

6.4.10. Specific aspects

Warehousing and storage services are increasingly bundled with transport services and other complimentary services such as packing and stock management. Many warehousing and storage providers also offer "supply chain management" or "logistics solutions" and bundle a variety of services for their customers. In these instances business contracts may be won by discounting part of the overall bundled task with this service effectively subsidised by the remaining parts. Obtaining separate market prices for specific services can be a challenge.

Another practice within the industry is to contract for a fixed quantity or period with 'take or pay' conditions whereby the purchaser's obligation to pay is unconditional whether or not the purchased service is taken. The current turnover rate and percentage of the fixed quantity in the contract which is utilised may then have an effect on the unit price of the storage. While list prices could be used for the pricing of some services, this practice could miss price changes arising from discounting.

Increased awareness and understanding of the issues facing this sector will lead to improved methodologies and ultimately better estimates of the real output and productivity for the warehousing and storage services sector.

6.4.11. Overview of national methods

The U.S. includes bundled services and produces both industry and product indices. Germany and Hungary also produce both, whereas industry indices are produced by Austria, New Zealand, Poland and Australia. Product indices are produced by France, Korea, Mexico, the Netherlands and the U.K. Most countries use ISIC, or a concordant system, as the industrial classification system and update weights with a five year frequency.

All countries rely on respondents to provide information explaining how much a change in price is due to a change in quality. This information is used to determine the method and amount of appropriate quality adjustment.

In the U.S., all services provided by firms classified in this sector are covered. Any services that are not principal to warehousing and storage are considered "other receipts" and given a chance of selection at each sampled firm. When publication criteria are met, a price index for "other receipts" is published. Examples of common "other receipts" include the arrangement of freight transportation, packaging and labelling services, and supply chain management consulting.

Model pricing is used in the U.S. for bundled transactions where a firm provides additional services such as sorting, packing and crating in addition to the storage service. For these bundled transactions an actual transaction is selected in the initial data collection period. This transaction may include, for example, a charge for storing 100 boxes of a product for 60 days along with a one-time per box charge for packing and crating. For the initial price, it is essential that the same quantities of the product are used to determine both the storage charge and the packing and crating charge. If the storage fee is for 100 boxes, then 100 instances of the "per box" packing and crating fee should also be recorded so as to ensure that these services are represented in the correct proportions. In subsequent periods the respondent estimates the current storage and packing and crating fees they would charge, while the quantity of 100 boxes is held constant. Explaining the pricing methodology is often challenging as some respondents prefer to update both the rates and the quantities, when only rates should be updated.

6.5. Cargo handling (Paul Boling, Australian Bureau of Statistics)

6.5.1. Industry description (ISIC 5224)

Cargo handling is one of the components of the transport and storage industry. This class includes the loading and unloading of goods or passengers' luggage irrespective of the mode of transport used for transportation. Stevedoring and the loading and unloading of freight railway cars are the largest components of the cargo handling industry. Stevedoring is dominated in most countries by the moving, lifting and securing of intermodal containers within the terminal facility onto or off the mode of transport. Cargo handling excludes the operation of the terminal facilities.

Cargo handling services are usually provided by large national or multi-national service providers and are concentrated in ports. Entry into the market at this level requires large areas of dockside land for container storage and transfer to other modes of transport. Handling equipment is large and requires multiple units to efficiently turn around a vessel. The capacity to secure large amounts of finance or the availability of cash is a barrier to entry to this industry.

6.5.2. Classification aspects

6.5.2.1. Industry classification

Cargo handling is classified under section H - Transport and storage, division 52 - Warehousing and support activities for transportation, group 522 - Support activities for transportation of the ISIC classification system. It covers the loading and unloading of goods or passengers' luggage irrespective of the mode of transport used for transportation operation of terminal facilities, stevedoring and the loading and unloading of freight railway car but excludes the operation of terminal facilities.

A review of the international industry classification systems shows varying degrees of concordance with the ISIC classification. The NACE classification is fully aligned with the ISIC classification. However, in the NAICS classification cargo handling activities are organised according to the mode of transportation such that, for example, the handling of air cargo and baggage is classified under industry 488119 - Other airport operations, while the handling of cargo carried over the road network is classified under industry 488490 - Other support activities for road transportation. The handling of cargo transported over water is classified as an industry 488320 - Marine cargo handling. Similarly, the ANZIC classification is organised according to the mode of transportation.

6.5.2.2. Product classification

The main international product classification systems are not well aligned.

In the CPC classification, the corresponding products for ISIC are classified under section 6 - Distributive trade services; accommodation, food and beverage serving services; transport services; and electricity, gas and water distribution services, division 67 - Supporting transport services, group 671 - Cargo handling services. The classification of cargo handling service products are split between the handling of containers (class 6711 - Container handling services) and non-containerised cargo (class 6719 - Other cargo and baggage handling services).

The European CPA classification system also differentiates cargo handling service products by the handling of container cargo and non-containerised cargo but additionally it differentiates by location – services provided at ports and not at ports.

In the NAPCS classification system cargo handling service products are classified under the warehousing and storage industry group. Cargo handling service products are in the main differentiated on the basis of the type of cargo: goods, bulk liquids and gases, dry bulks, climate-controlled goods, automobiles, project cargo and other cargo. The handling of boxed, palletised or packed goods and intermodal containers are also distinguished.

6.5.3. Scope of the survey

The ideal survey measures price changes for the provision of each of the different types of cargo handling services. Often, only the main service lines, on the basis of their share of the total output for the cargo handling industry, will be covered.

Furthermore, scope will be limited to those service activities performed for hire or reward as separate services. Cargo handling activities performed by enterprises on their own account for their own merchandise are typically not included as obtaining a genuine transaction price for a non-market service may be difficult.

In Australia, ANZSIC class 5211 - Stevedoring, covers the largest proportion of cargo handling and the SPPI is effectively limited to stevedoring for ship containers. The revenues generated by other types of cargo handling, such as break bulk and car carrying on Roll On-Roll Off (Ro-Ro) vessels are not significant enough to warrant their inclusion in the SPPI, given the limited resources available for survey compilation.

The market for stevedoring for ship containers currently operates as a duopoly and prices are subject to scrutiny by the Australian Competition and Consumer Commission (ACCC), under Part VIIA of the Competition and Consumer Act 2010. The ACCC monitors the prices, costs and profits of container terminal operator companies at the ports of Adelaide, Brisbane, Burnie, Fremantle, Melbourne and Sydney under the container stevedoring monitoring program. The ACCC publishes a representative price for container stevedoring services which is calculated as an average across all ports - no single port facility may actually charge that price. This price is used in the compilation of the SPPI. A third operator is in the process of building a new terminal in Brisbane.

6.5.4. Industry vs. Product based SPPI

Although product based SPPIs are the most appropriate measure for use in the deflation of the national accounts, they are rarely feasible as they require a sampling frame comprising of sufficiently detailed product level turnover data.

Alternatively, an industry based SPPI can be compiled from a sample of establishments classified to the cargo handling industry. All of the output of these sampled units is represented, including secondary activity output that is classified under other industries in the classification system, and aggregated to form a 4 digit industry level index.

The larger the shares of industry turnover generated from the provision of cargo handling services as secondary activities the stronger the argument for compiling product based SPPIs. Consideration also needs to be given to whether these secondary activities affect the market price for the principal activity and if so, whether the secondary activity

is a price driver of the principal activity Consultation with industry representative associations and service providers can provide this information.

6.5.5. Sample design

Samples are typically drawn from business registers using either probability proportional to size sampling or a non-probability technique. Where a limited number of large national service providers dominate a specific market almost full enumeration could be considered. In markets characterised by a larger number of smaller operators the use of probability based sampling may be more appropriate. A mixture of probability and non-probability sampling could be employed where there are a range of large, medium and small units. Sample rotation is advisable among smaller units in order to limit the length of time they remain on the survey panel. Rotation keeps the sample up to date and reduces the impact of sample depletion.

Cargo handling services for different types of merchandise can have very different cost drivers and therefore the sample should be representative different service activities. For example, the lifting of containers in a terminal from one mode of transport to another with a rate per container that is fixed irrespective of content or weight has different cost drivers to handling services for non-containerised merchandise.

6.5.6. Collection of information and specification of the service

During the respondent initialisation process, each respondent provides information about the range of services it offers and the respective shares of total turnover generated by each type of service activity. Representative service transactions are then selected for the main service activities for on-going pricing. Each transaction should be sufficiently well specified to ensure that they are easily identified in each period thereby facilitating constant quality pricing. Some service transactions may be unique to a client but broadly representative of services provided to other clients.

Specification parameters may include:

- Type of cargo (liquid, dry bulk, automobile, etc.);
- Containerised or non-containerised;
- Packed (box, pallet, etc.);
- Weight;
- Load on-Load off or Roll on-Roll off;
- Turn-around time;
- Security provided for cargo;
- Client.

Information which helps the compiler to understand the nature of the industry and market conditions may also be collected (ideally by personal interview) during the respondent initialisation process. Industry representative associations may also be a useful source of market knowledge and perhaps even assist in questionnaire design.

A range of methods may be used to collect prices data from respondents in each survey period from respondents in a secure and cost-effective manner, while minimising the burden on the respondent. Prices data can be collected via survey forms, email, from

company websites (particularly for services aimed at the consumer or small business), from administrative data such as exchange rates or from other statistical collections such as those relating to international merchandise trade. Some services activities may have published rate schedules which are updated on a regular basis.

6.5.7. Main pricing methods

Cargo handling services are usually repeatable and priced according to a consistent mechanism. The direct use of prices of repeated services can therefore be employed in most cases.

The industry does not appear to be subject to rapid technological change and it should be possible in many cases to price repeated services of constant quality over at least a number of years.

In Australia the representative price for stevedoring services is currently calculated annually as an administrative by-product of the regulating body. It is expressed as the container lift price of a twenty foot container.

6.5.8. Quality issues

The SPPI should measure the changing price of a fixed basket of services. Changes to service conditions, access, security and turn-around time could all give rise to quality change. A specified service may become unavailable over time because of a change in its specification or because it has been replaced by a new service. Failure to account for quality changes can introduce a bias into the index. Therefore, a quality adjustment is required if the quality of a specified service changes.

Respondents should be required to note reasons for significant changes in price or any changes to the specified service.

6.5.9. Weighting and aggregation

Weights should be based on contribution to the total industry revenue. These data may be available from different sources for different levels. For aggregates at or above the lowest level in the classification framework, values from structural business statistics or national accounts input-output tables could be used. For samples or aggregates below this level of the classification it may be necessary to use industry sourced information or data from turnover surveys or other surveys, perhaps by other organisations.

The key sources of data for upper level weights for the Australian SPPIs are the Australian national accounts input-output tables. In addition to broad data from input-output tables, other data sources used to construct national accounts aggregates are frequently used in the estimation of lower level weights. Whilst these data typically come from other ABS economic surveys, the national accounts component data are generally more complete in terms of consistent coverage and valuation basis. ABS economic surveys are also used in the production of lower level weights for the output producer price indices. These data typically provide information on type and characteristics of producers, as well as some detailed information on revenue. In addition, these ABS surveys frequently provide information regarding industry outputs in terms of quantity measures. Deriving lower level weights from these quantity data requires that they are combined with measures of average prices.

Other weighting data may be sourced from administrative data, industry associations or during the respondent initialisation process.

6.5.10. Specific aspects

Cargo handling services may be bundled with other transport services and or complimentary services such as packing and stock management. Obtaining separate market prices for specific services can be a challenge.

Increased awareness and understanding of the issues facing this sector will lead to improved methodologies and ultimately better estimates of the real output and productivity for the cargo handling services sector.

6.5.11. Overview of national methods

Germany, Hungary and the U.S. compile both industry and product level indices. France, Korea, the Netherlands and the U.K. compile product level indices.

Korea

In Korea the charge-out rates for cargo handling are adjusted annually as a result of labour-management negotiations. The adjustment of rates for water freight handling in each harbour requires government approval. The price data are collected from the industry representative association and government websites. Korea's SPPI for cargo handling services comprises of two elementary aggregates, for railroad loading and unloading charges and harbour loading and unloading charges. Their respective weights obtained from input/output tables and since 2013 the SPPI has been calculated as a chained index with annual updated weights.

Netherlands

In the compilation of the SPPI for cargo handling services in the Netherlands**,** elementary indices are calculated as geometric averages. Successive levels of aggregation are then performed company level weights (derived from the SBS survey) and then weights derived from the input/output tables. Weights are updated every 5 years although the introduction of an annual updating of weights is currently under consideration.

United Kingdom

In the U.K., SPPI compilers found that the CPA classification structure did not reflect the organisation of the cargo handling industry. Therefore a customised aggregation structure, which delineates the industry into sea, air and land cargo handling services, was developed after industry consultation. Cargo handling services represent a small part of the overall supply chain. Often a cargo handling service is arranged as a component of the whole process of moving goods from one point to another. This can lead to difficulties in identifying the price actually received for the handling element alone. Therefore, where appropriate, respondents are advised to include solely the price of cargo handling services.

6.6. Courier and postal activities (Denis Gac, INSEE & Ildikó Hamvainé Holocsy, Statistics Hungary)

6.6.1. Industry description (ISIC 53)

The service activities provided by the postal and courier industry are the collection and delivery of documents, letters and parcels (in general, light freight). The time between collection and delivery is one of the most important differences in quality among the variety of services.

The total turnover of postal and courier services (ISIC 53) represents approximately 1% of the European total GDP. Nearly 80% of the total turnover of this division is generated by national post activity, with the remainder generated by other postal and courier activities. In a number of countries, such as Australia and the U.S., courier services have a larger share of turnover although the provision of postal services dominates the industry.

The core definition of postal services and courier services are the same, except that postal services are rendered under a "universal service obligation" (USO).[17] Postal operators are traditionally state-owned and regulated. Many countries impose requirements on the incumbent postal operator to provide prescribed services at a certain level of quality, for example requirements to provide a given frequency of deliveries or collections, to limit the maximum distance to the nearest post office, and to propose affordable offers for mail, or small parcels.

Officially, the European Commission defines the "universal service obligation" (USOs) as the obligation for holders of postal monopolies to ensure every citizen has access at least one delivery and collection of mail five days a week, at affordable prices throughout the territory. Regulatory bodies ensure that these obligations are performed (not only in the EU, but also in countries such as the U.S., Norway and New Zealand).

The postal market is, for historic reasons, usually dominated by a single producer. If there is any competition, it often exists only in certain parts of the market such as mass mail or international mail. Despite legislation to allow competition and liberalise the market, it is unlikely that full competition on all postal services will be achieved, in all countries, due to the nature of the service activities. These monopolistic situations give rise to confidentiality issues.

However, some countries have completely liberalised their postal sector (Germany, Sweden, Finland, New Zealand), while some others have retained only a small reserved area.

In direct contrast to the market for postal services, the market for courier services is highly competitive. The provision of postal and courier activities is currently undergoing change, as service providers increasingly offer diverse products, such as logistics, storage and freight transport services to their customers. In addition, establishments classified to the freight transport by road division often compete directly with couriers, by offering similar services.

The structure of the population of couriers within European countries is quite similar. Most have few employees (small and medium size sized), but the largest dominate the turnover of this activity. In other words, this sector is controlled mainly by large enterprises. However, the structure of the population of postal enterprises is even more

extreme: one enterprise dominates the market typically accounting for at least half, but possibly much more, of the total revenue of the industry.

Both households and businesses purchase services from national post operators although businesses (including government) are by far the largest clients (in the EU their proportion is more than three-quarters of the total turnover). Courier and local messenger service producers also focus their activity on businesses. There are also some differences between the services they offer. Normally, national post services are more routine and have very specific characteristics that cannot be changed. On the other hand, courier service producers can offer 'tailor-made' services, often fixing prices with reference to the volume of documents and parcels for delivery.

Globalisation is also affecting this industry. Service producers are establishing alliances with equivalent providers abroad, in order to improve the international delivery of parcels.

6.6.2. Classification aspects

6.6.2.1. Industry classification

As a result of an international harmonisation process, the various international industry classifications are quite similar. As shown in annex A, the industry descriptions and parameters are broadly equivalent.

However, in several cases it is difficult to exactly classify business enterprises. Each unit is classified to a single activity, whether it is wholly or mainly engaged in that activity. Some units may have a very significant secondary activity, perhaps completely different from their main activity, and a small change in the relative importance of activities can lead to a reclassification of business.

There is an important classification issue in respect of the differentiation between courier firms and freight transport by road enterprises. As mentioned above, both can offer similar services although the weight of the goods transported is usually used to differentiate between 'courier services' and 'freight services'. However, there is no universal rule applied and the definition of these services varies between countries. Normally, transportation of items weighing up to 30 kg is considered as a postal and courier service and transportation of heavier items is classified as freight transport. An important requirement of couriers, which can distinguish them from service providers in similar industries, is that they must be able to provide end-to-end transportation, from origin to destination including local pick-up and delivery in a time sensitive to quality. In Germany, the size of the transport vehicles in use is used to distinguish between "courier services" and "freight transport by road." Additionally, a courier service has to provide both collection and delivery. In summary, the liberalisation of the postal market increasingly blurs the distinction between postal and courier or freight-related services (see under section 6.1.3).

The provision of "express delivery" services appears to lie between the postal and courier two activities. The core business of the express industry is the provision of door-to-door transport and delivery of next day or time-definite shipments, including documents, parcels and merchandise goods. In Germany, door-to-door transportation is the characteristic feature of courier services. Express services are mainly defined by delivery time. However, the differences in delivery time of postal and parcel services compared with express services are diminishing. A few (perhaps 4 or 5) enterprises

dominate this industry internationally (namely, DHL, FedEX, TNT and UPS). These enterprises are referred to as "integrators", as they maintain control over all aspects of the distribution process with each item being tracked at every stage of its journey. Express transportation is achieved by using a variety of different transport modes; lorries, vans, trains, passenger aircrafts, and freight aircraft as well as on-foot.

The courier and messenger sector defined by categories 4921 and 4922 of the NAICS consists of establishments primarily engaged in providing air, surface or combined courier delivery services. Local messengers comprise of establishments primarily engaged in providing messenger and delivery services of small parcels within a single urban area. Establishments engaged in the delivery of letters and documents, such as legal documents, often by bicycle or on foot; the delivery of small parcels such as take-out restaurant meals, alcoholic beverages and groceries, on a fee basis, usually by small truck or van, are included.

6.6.2.2. Product classification

The corresponding products for ISIC 53 - Courier and postal activities, are classified in classes 6811 - Postal services, 6812 – Courier services and 6813 - Local delivery services, of the CPC.

The international product classifications are however not well aligned and harmonised, and this may imply classification and comparability problems. CPA offers further details with additional subcategories for postal services under universal service obligation related to newspapers and periodicals (53.10.11 CPA) and three for the postal and courier services. In contrast, the other international product classifications (NAPCS and ANZSPC) provide less detail. None of the international product classifications provide sufficient detail to distinguish differing drivers of price change.

6.6.3. Scope of the survey

Ideally, the survey would track constant quality price change for the full range of output to all and users.

The postal and courier services industry groups should be fully covered, as it is the case for many European countries. Some exceptions may however exist according to the country context; in Germany only courier activities are covered despite a full de-monopolisation of the sector in 2006.

For postal services, one of the main challenges for compilers and data suppliers is the identification of domestic and non-domestic markets since the international agreements between national post offices and other postal and courier operators.[18] Thus in most countries, the portion of the total turnover generated by exported services is not covered by price indices. On the other hand, postal services in several countries are limited to letters and parcels, and some services such as those related to delivery of newspapers and periodicals, counter services or food home delivery service are not included.

As previously mentioned, business and government end users consume the majority of the service output. The household share of postal services is fairly small and in most of countries it is not representative of the overall activity. As a result, an index covering only the provision of services to business and government end users may closely approximate an index including services to households.

Additional data collected for the CPI could be used in the calculation of a BtoC, which in turn could be used in the compilation of a BtoAll.[19] Generally postal activities are covered by the CPI, so there should be no extra collection work involved.

6.6.4. Industry vs. Product based SPPI

A primary use of SPPIs is in the deflation of the service industry output to produce relevant statistical indicators at constant (real) prices. For the calculation of an industry based volume index an industry based SPPI is sufficient. However, for national accounts purposes a product based SPPI is more appropriate.

Many establishments classified to the CPA division 53 - Postal and courier services, have relevant turnover share generated from secondary activities. For example, as well as providing postal activities under universal service obligation (53.10 CPA) the Hungarian post office provides courier, logistic, telecommunication and other monetary intermediation services as secondary activities. On the other hand, enterprises classified to the freight transport or warehousing and support industries for transportation, may also have a relevant share of turnover generated from secondary courier activity.

In Hungary, the SPPI for the industry is compiled at both industry and product level (at NACE 4-digit level and CPA 4-digit level respectively). The sample of establishments classified to the division 53 is expanded to include establishments with relevant secondary activity in "other postal and courier activities". Respondents are asked to provide prices for both principal and secondary activities.

6.6.5. Sample design

As previously noted, the structure of this industry is quite similar from country to country. In particular, the ISIC class 5310 - Postal activities, is made up by one dominant service provider and possibly a small number of other providers. The smaller service providers should be included in the sample if they have a significant market share.

Price development can differ by product or client type, depending on the extent of liberalisation in specific markets. For instance, if only international postal services are liberalised in a certain country, it is important to get specific price data on this submarket (as well as relevant weighting data), because price development may differ from those submarkets that have not been liberalised. In liberalised submarkets volume discounts may be afforded to larger clients like banks and insurance companies. On the other hand, if the market is free of competition, the sole provider of postal services may not see any need to offer any discounts.

For courier firms, probability proportional to size (PPS) sampling, by turnover or number of employees, is advisable. Where a small number of large units dominate, they should always be included in the sample. Another option is to include only the largest units (cut-off sampling), when they account for almost entire market (*e.g.* greater than 80%) and therefore dictate the evolution of prices. This option will therefore minimise the response burden on small units. According to the Voorburg Group survey previously mentioned, cut off sampling is the predominant sampling method used among reporting countries. A census of the largest units is taken above a size threshold (or cut off line) and this may be supplement by a random or subjectively chosen sample of smaller units.

An additional consideration when designing a sample for the industry concerns the choice of submarkets and services to be sampled within the dominant/monopoly postal enterprise. The household share of postal services in most of countries is fairly small (Gac

and Holocsy, 2010). However, for courier activities in particular, the demand from households could be significant.

6.6.6. Collection of information and specification of the service

Prices should be collected for a set of well specified service transactions so as to facilitate constant quality pricing. Prices should be collected on the basis of the appropriate unit of measure, such as one mail (letter, package, other).

The price of each service activity depends on various factors including; transaction partners, geography (*i.e.* origin and destination of service); timing of delivery (*e.g.* overnight or next day and other); type of the item(s) being delivered; the size of the delivery (in number, weight, and/or volume); type of service (ground, air, etc.). In some countries, consideration is given to additional criteria, such as type of packaging; insurance or registered/special delivery.

For courier services, the most important price determining characteristic is the time it takes for a package to be delivered. The customer is not concerned by the modes of transportation used, only that the package is delivered within the allocated time. Express delivery services by air are faster (and higher priced) while standard courier services are slower (and lower priced). Courier services by air often include a domestic component and international component.[20]

The price of a service activity can typically be expressed as follows:

Price = Base rate + fuel surcharge + other applicable surcharges

It should however be noted that a large number of transactions take place in this industry, while the item allocation is comparatively small. Major service providers account for the bulk of transactions due to high concentration levels within the industry. The term "bulk mail" refers to larger quantities of mail prepared for mailing at reduced postage.

The prices of postal and courier services are often quite stable. Therefore quarterly collection of data may be sufficient to study the evolution of producer prices. If the index of postal services shows significant change at annual intervals only (*e.g.* in the first month or quarter of the year), this may have implications for the frequency of price collection.

The most commonly employed methods of collecting price data on an on-going basis are by survey or from the list prices displayed on the websites of service providers (although often only the larger service providers list their prices in detail on their websites). However, it must be remembered that list prices may not include discounts, unless for example, the company provides a discount calculator relating to volume purchases. Regulatory authorities may also be able to provide some data.

6.6.7. Main pricing methods

When selecting the pricing method to be employed for the measurement of price change in the industry, it is important to consider the pricing mechanisms used by service providers. The most common pricing methods employed in the compilation of SPPIs for post and courier service activities are discussed below.

6.6.7.1. Direct use of prices of repeated services

List prices for common service activities are often available, in particular for postal services, and these can be used to proxy for direct use of prices of repeated services. In some countries, large service providers may include a calculator service on their website to show the discounts that will apply to list prices based on the volume of services purchased. In such cases the observed prices may be closer to actual real transaction prices.

The use of list prices reflects the relative abundance of on-line information. However, it is important to establish the relative market share of services sold at the list price when establishing the index weighting structure to ensure they are not over represented in the index. List prices should only be used if it can be established that sufficient quantities of services are actually sold at their list prices, or in other words that the list prices are representative of real transaction prices.

In many countries certain postal and courier activities are covered by the CPI. It may therefore be possible to reuse data collected for the CPI in the compilation of SPPIs. However, these data may require certain transformations, to account for differences in survey periodicity and the treatment of taxes and subsidies. It should also be noted that prices collected for CPI compilation are unlikely to include volume discounts that may be important in the context of the provision of services to other businesses and to government. The use of CPIs as proxies for the SPPI is discussed in more detail under chapter 2.

6.6.7.2. Unit value method

Under the unit value pricing method, the unit price index is determined as the quotient of the value (sales revenue) and quantity of services sold over a large number of transactions. The method is applicable in cases when service types in a group of services are relatively homogeneous. The units have to be defined clearly for each product or service. The units should be as homogenous as possible, *e.g.* letters classified by size, parcels classified by narrow weight and/or dimension categories. To ensure the homogeneity of the units, detailed specifications including the speed of delivery and destination must also be included. In defining the unit, detailed information about the quantity of units sold has to be available; this may impose a general restriction on the degree of homogeneity that can be achieved.

If the services are homogeneous and can be quality adjusted for any changes occurring, then the unit value method is an optimum choice. A drawback of this method is that information about the quantity of products sold is often not available at a sufficiently detailed level that ensures the homogeneity of the underlying services. In such cases care must be taken to ensure that the range of services grouped together (at the lowest level for which quantity data are available) are relatively homogenous - otherwise the unit value method should not be used (*e.g.* if the lowest level of quantity data available is 'all letters' then this is too heterogeneous to consider using the unit value method).

6.6.7.3. Contract pricing

For services provided by a dominant postal service provider to large clients, contract pricing can be employed. The service provider selects representative services that are repeatedly to specific clients under long-term contracts.

Contract pricing is an ideal method as it measures the real transaction prices of services. However, it is difficult to apply to the full range of services provided by the industry, in particular when unique services are provided. Furthermore, the method should be used with caution because individual contract prices agreed in a previous period for future periods may not be representative of current price development in the industry

6.6.7.4. Model pricing

Under this method, bundles of service activities are described in detail and respondents provide prices for them in each survey period. The selected services have to be representative of common transactions within each relevant sub-sector of activity, and should be replaced if they become less representative over time. Usually, these models are defined on the basis of weight/size of parcels, speed of delivery and destination. Nevertheless, more characteristics could be taken into account if they influence price, for example, type of delivery, inclusion of insurance etc.

The main advantage of model pricing is that any improvements in productivity should be captured in price changes. It is important to ensure that the model remains representative and that respondents include all applicable discounts when re-pricing the model service activities each period.

6.6.8. Quality issues

In the past, services provided by the postal and courier industry were mainly defined by stable characteristics and consequently quality changes were relatively easy to measure. However, due to market liberalisation and the free movement of services, quality aspects have become increasingly important. In particular the increasing number of service providers offering both postal and courier services creates challenges in respect of the classification of services and service providers and strengthens the argument for product based indices.

The most commonly observed quality adjustment method for the industry is the overlap method. This method can be applied relatively successfully because new and old services are generally sold simultaneously. Where this is not the case, respondents can often provide previous period prices for new service activities. Comparable adjustment and quantity adjustment methods are also used.

In order to maintain the on-going quality of the index, significant price changes and changes to existing services should be queried with respondents and treated appropriately. Most compilers make comparisons, mainly on an ad hoc basis, with data from other sources (*e.g.* CPI, SPPI from other countries, regulatory or administrative data, and exchange rate movements). If service activities are performed on an ongoing basis, quality adjustment may rarely be required. However it is important to ensure that observed prices remain representative of the types of service activities provided. Prior to dissemination, the price indices should be analysed and historic trends reviewed.

6.6.9. Weighting and aggregation

Data used in the weighting and aggregation of the SPPI may be derived from a number of sources such as dedicated turnover surveys or the national accounts. Many countries collect turnover/revenue data on an annual basis to derive the necessary weights

for index compilation (*e.g.* the Netherlands, Hungary). Regulatory authorities may also be a potential source of data.

Hungarian experience

Hungary employs two sources of turnover data for weighting. For aggregation of establishment-level and higher-level sub-indices of "large" establishments, previous year "product-level" turnover data is collected using a dedicated SPPI survey. For the industry-based SPPI, turnover data from two years prior is obtained at the 4-digit and higher levels from the SBS. Weights are updated annually.

Lower level (CPA 6-digit) indices for the national post office are first calculated as a weighted arithmetical average and as un-weighted geometrical means for other respondents. Next, the respondents' class level (CPA 4-digit) aggregates are computed as a weighted arithmetical average, followed by sub-indices for "large" (weighted) and "smaller" (un-weighted) units, which are aggregated using the share of industry data as derived from the SBS survey.

Compilation of a business to all users aggregated index can be calculated as a weighted average of the BtoB and BtoC indices in the following way:

- A weighted average from BtoB and BtoC indices is calculated by applying the relevant turnover share as weights.
- Assuming that I_{BtoAll}, I_{BtoB}, and I_{BtoC} are the relevant indices, W_{BtoAll}, W_{BtoB} and W_{BtoC} are the weights, the formula could be expressed as follows:

$$I_{BtoAll} = I_{BtoB} * w_{BtoB} + I_{BtoC} * w_{BtoC,}$$

$$\text{where } 1 = w_{BtoAll} = w_{BtoB} + w_{BtoC}$$

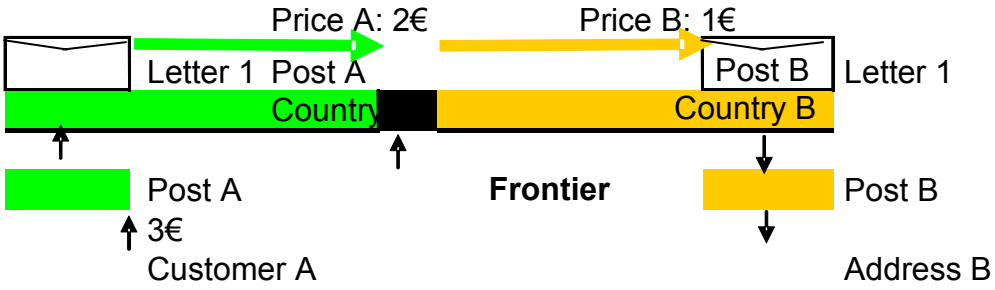
6.6.10. Specific aspects

For most countries there have not been any notable complications in obtaining a sampling frame, and respondents are able to provide pricing data with minimal difficulty. The main challenges in developing the index for postal and courier services are described below.

The SPPI for postal services should primarily focus on the dominant (or monopoly) service activity provider, as this business enterprise largely determines the total index. Confidentiality guidelines typically prohibit publishing the index for postal services meaning that only the overall index for postal and courier services or only the courier services index can be published. In European countries, the postal SPPI is generally available only to national accountants and to Eurostat for inclusion in EU-aggregates. However some countries, such as the U.S., have mechanisms for waiving confidentiality guidelines with the respondent's assent.

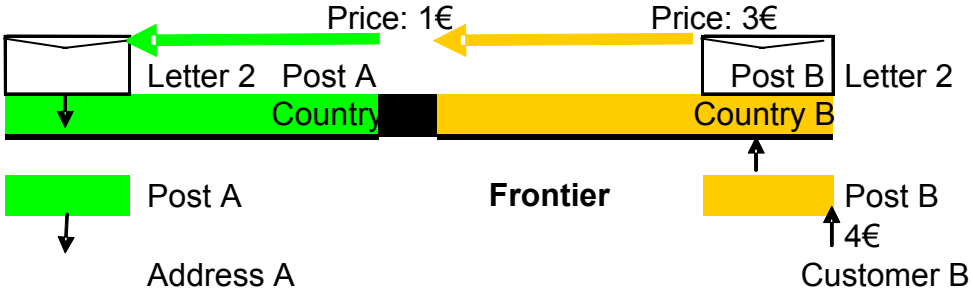
It is important to distinguish between resident consumption of international courier services and service exports. Assuming that for national accounts purposes exports means "products or services sold to non-resident customers", and that according to international rules, postal offices deliver letters (parcels) coming from abroad for an agreed sum, the simplified examples – figures 6.6.1. and 6.6.2. - illustrate export/import transactions as follows:

Figure 6.6.1. Delivery letters (parcels) from country A to the country B



From the point of view of country A, the delivery of post as presented is a domestic service (sold to the domestic customer). The value of the domestic turnover is 3€, which includes an imported service (provided by the Post B located in the country B for the agreed sum) for 1€.

Figure 6.6.2. Delivery letters (parcels) from country B to the country A



Again from the point of view of country A, the delivery of post as presented is an export service (sold to the Post B, located in the country B). The value of the export turnover is 1€.

6.6.11. Overview of national methods

Austria

For the compilation of SPPIs for postal activities under universal service obligation in Austria, data is collected from only one respondent, the national post company. On this account the index cannot be published. Currently the index calculation is based on official postal tariffs which can be obtained via the internet. The direct use of prices of repeated services pricing method is employed. The various resulting sub-indices (parcels, letters, etc.) are aggregated by turnover weights provided by the national post agency.

The direct use of prices of repeated services method is also employed for other postal and courier activities. Price determining characteristics are size, weight, destination and speed of delivery and the prices are provided by the respondents inclusive of discounts. The index for other postal and courier activities is published as there are an adequate number of respondents.

Canada

The courier and messengers service price index – CMSPI (NAICS 492) measures the change over time in prices for courier and messenger services provided by long and short distance delivery companies to Canadian based business clients. The courier service portion includes deliveries within and between Canadian cities and provinces/territories, as well as some international deliveries. The local messenger portion tracks price change for within-city deliveries only.

The sample and weighting information are derived from establishment revenue data obtained through the business register frame in Statistics Canada. The sample of courier establishments consists of five of the largest establishments accounting for approximately 80% of the operating revenue generated by the industry.

Model pricing is used taking into account the following specifications for courier services prices: geographical, type of parcel by weight and speed of delivery. For local messenger business enterprises the specifications are simpler. Several cities of each Canadian region are selected and only two services are priced: delivery in 1 hour or less, and delivery of 3 to 4 hours.

No index is compiled for NAICS 491 - Postal services.

France

In France, field-officers visit each respondent and identify representative service transactions. A mix of pricing methods is employed including, the direct use of prices of repeated services, unit values and contract pricing. The coverage of services for which prices are collected is limited to the mailing of items of correspondence up to 2kg letters sent to businesses and households under USO. Unaddressed postal advertising, express delivery and urban messengers are not covered.

Hungary

In Hungary, the SPPI for postal and courier service activities covers both postal activities under USO and other postal and courier services. Data are collected by quarterly questionnaires since 2007. The general pricing methodology with a standard product list was developed in close cooperation with respondents. A respondent initialisation survey was used to develop customised questionnaires for each respondent, based on the detailed service transaction specifications provided. Both BtoB and BtoC prices and turnover are collected from the Hungarian post office. The unit value pricing method is employed.

Other postal and courier respondents mainly provide BtoB prices. For these respondents a mixture of pricing methods is applied including; direct use of prices of repeated services, contract pricing and unit value pricing.

Currently, indices for BtoB service activities as well as BtoAll indices are compiled and transmitted to Eurostat. Sales to businesses account for about 75% of total output and the BtoB index is significantly lower than the separately compiled CPI for postal and courier services. The SBS survey was expanded to allow for the estimation of the turnover generated to BtoB and BtoC service activities. This will facilitate the calculation of a BtoAll index as a weighted average of the BtoB and BtoC indices.

Indices for both NACE 53 - Postal and courier activities, and NACE 53.2 - Courier activities, are published. Separately, the index for postal services is not published for reason of confidentiality.

Spain

In Spain the index for postal and courier includes both postal activities under USO (NACE 53.1) and other postal and courier activities (NACE 53.2). The observation units are selected using the cut-off method. The largest business enterprises are included such that a significant percentage of the turnover is covered.

The main price determining characteristics used to define representative service transactions are; destination of delivery, weight of parcels and time of delivery.

The index for postal activities under universal service obligation is calculated using official tariff prices, while the index for other postal and courier activities employs the direct use of prices of repeated services method.

Sweden

The national post index (NACE 53.1) is compiled using list prices collected from the Internet. The selection of representative service transactions was chosen in cooperation with the national postal service which also provides annual turnover data to calculate weights. This index is not published due to reason of confidentiality but it is included in higher aggregates, as well as in the overall SPPI.

In Sweden, class 53.20 of NACE - Other postal and courier activities is divided into three subclasses; other postal services, courier services and distribution of newspapers. Just over 50% of the turnover in the class comes from distribution of newspapers. Representative and constant quality service transaction prices are mainly measured through direct use of prices of repeated services. Each service transaction is specified with price determining factors, such as client, type of delivery, weight or size of delivery, time of delivery, dispatch and destination.

Only BtoB prices are collected but the index for other postal and courier activities is considered as a BtoAll index as the class covers services that are provided to consumers.

The Netherlands

Since April 2009, the key legislation regulating postal activities has been the Dutch Postal Act 2009. This Act requires a designated postal provider to perform the universal postal services in the Netherlands. The index for NACE 53.1 - Postal activities under universal service obligation, is calculated using list prices. Price quotations for the fifteen most representative services are collected and aggregated by a weighted average. Service products covered include services provided to both households and businesses. This index is not published for reason of confidentiality, but it is included in higher aggregates, as well as in the overall SPPI.

Class 53.20 - Other postal and courier activities, is divided into two subclasses: courier services and non-universal postal services. For couriers, three different types of prices are collected: list prices, fictitious (model) prices and prices of real transactions (*i.e.* direct use of prices of repeated services). Factors taken into account are: weight and/or size, duration between pickup and delivery, destination, insurance, tracking, inclusion of customs formalities, inclusion of extra services and bulk discounts. The index for courier services is published.

For non-universal-postal services (mainly services for the delivery of bulk letters, bulk printed matter such as advertising, magazines and unaddressed mail items) a limited number of respondents are active. The index for non-universal postal services is not published for reason of confidentiality, but it is included in higher aggregates, as well as

in the overall SPPI. For division 53 - Postal and courier activities, only business enterprises delivering nationwide are surveyed.

United Kingdom

The provision of courier activities covers the collection from the premises of the customer of relatively small consignments of documents, parcels or lightweight freight (often single items) and delivery to the destination by a specific time. For these personalised services, customers are willing to pay a premium price for guaranteed door-to-door, secure delivery. It is estimated that about 95% of activity is produced for business users. Couriers and express freight operators utilise all forms of road vehicles (bicycles, motorcycles, cars, vans and heavier goods vehicles) and air transport (both scheduled and non-scheduled) as well as the rail network due to the growth of high speed inter-city and continental links.

The vast majority of service producers publish highly detailed tariffs for the services they provide and the geographical locations covered. The key price-determining criteria are: the nature of the consignment – mail, documents, parcels or freight; the weight of the consignment; the destination – geographical areas are divided into tariff zones, the more zones crossed the higher the charge; the timing for delivery; and any special features (highly valuable consignments or hazardous material, for example). The destination and speed of delivery also dictate the model(s) of transport required, which is another important factor. Some service producers add a charge for insurance of goods in transit as standard; others offer it as an option to the customer. The published data for courier services has shown a steady increase, for the most part, over the last five years. The main reasons for price changes in this industry are overheads, wages and fuel costs. Prices are collected in 9 categories, split by destination and timing of delivery as follows: same day, next day, other for destinations U.K., other EU, and rest of world. Prices are collected according to three methods: those based on actual contracts; those taken from quoted tariff rates (although these may not be the achieved rate in every case); or those representative of the charge companies would make for a particular delivery (a model contract).

United States

In the U.S., the direct use of prices of repeated services method is employed for both postal services and courier services. For postal services, prices are collected directly from a sample of reporting firms.

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Notes

1. For example water transport industries generated 30% of the value added of transportation and storage total in Norway en 2009.In the European Union in 2010, water transport services generated 0.4% of value added of non-financial business economy total and 5.0% of the transportation and storage total. However, the importance of this industry varies widely from one country to another. Indeed, in

2009 Germany accounted for 40.3% of the EU27's value added followed by Denmark, Italy, Netherlands and the U.K.. For more detailed information on Water transport services in the EU see: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_transport_services_statistics_-_NACE_Rev._2

2. Note than an active European policy to promote short-sea shipping has been established given its high efficiency in terms of environmental performance and energy efficiency in order to meet the goal of the European sustainable transport policy. More at: http://ec.europa.eu/transport/modes/maritime/short_sea_shipping/index_en.htm

   Statistical data on short sea shipping for European countries are available at: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Maritime_transport_statistics_-_short_sea_shipping_of_goods

3. The world 20 leading container ports for 2008-2010 includes 14 ports in Asia, 3 in Europe (Rotterdam, Antwerp and Hamburg) and 3 in North America (Los Angeles, Long Beach and New York/New Jersey).

4. UNCTAD (2011), pp. 10-1 & 166-7.

5. UNCTAD (2011), p.75.

6. The Baltic Exchange, the physical headquarters for tramp ship brokerage in London, allows co-operation between ship-owners, charterers and brokers and provide shipping market information: http://www.balticexchange.com/default.asp?action=article&ID=1

7. UNCTAD (2011), p.73.

8. Note that the European countries are required to deliver SSPI covering sea and coastal water transport for both passenger and freight. However, among the 18 countries that publish an SPPI for sea and coastal water transport, half exclude passenger transport. See Eurostat (2012).

9. See IMF (2009), §4.136. The BPM6 highlights however that "an institutional unit that operates ships on the high seas and various territorial waters has its residence determined according to the criteria in paragraphs 4.131–4.135, and the economy of residence is not necessarily the same as the location where the ships spend the most time or the territory of registration of the ships. Additionally, the enterprise that operates the ships is not necessarily the same as the enterprise that owns the ships, such as where the ship operator has an operating lease from the ship owner, who is resident in another economy. The residence of the enterprise that owns the ship is determined according to the criteria in paragraphs 4.131–4.135. Flags of convenience used by enterprises do not determine the residence of the operator, and indeed a single shipping operator may have ships registered in several economies. Similarly, the residence of enterprises that charter ships is determined by the location of its own base of operations, rather than the flags or locations of particular ships. The base of operations does not necessarily equate to the location from which the enterprise is managed. A company operating mobile equipment may be legally domiciled in one economy but managed from another economy".

10. The experience of Statistics Sweden shows that "the tramp market changes over time and the distribution between time charter and one-way freight is variable. When the market is booming the freight owners want to assure that they have enough transport capacity and rent ships on the time charter market that thus grows. During a freight

market depression the freight owner´s are not interested in renting ships and the ship owners choose to operate on the one-way freight market. The consequence is that the time charter market decreases and the one-way freight market grows" (Olsson (2009), p. 11).

11. See Olsson (2010), p.6.

12. For example, the Hamburg Shipbrokers' Association, also known by its German acronym, VHSS available at: http://www.vhss.de/objectives_and_services.php

13. See, for example the dry cargo freight, UNCTAD (2011), p. 72.

14. See Olsson (2010), p. 6.

15. Eurostat (2012), PEEIs in Focus; A summary for the services producer price index, Luxembourg, Office for Official Publications of the European Communities, p. 14.

16. See definition in chapter 1.

17 . See: http://www.oecd.org/regreform/sectors/34343050.pdf

18. See under section 6.6.10 on specific aspects.

19. As to the appropriateness of using CPIs to deflate the output of this industry, the Handbook on price and volume measures in national accounts (European Communities, 2001, p. 89) recommends: "The use of detailed CPIs to deflate output other than that consumed by households can be a B method if price developments can be shown to be similar for households and business. However, CPIs are unlikely to be suitable for the full range of postal services, because of the availability of discounts and the different range of products consumed by businesses. Using detailed CPIs for business purchases where it is known that businesses receive discounts or purchase a different range of products than households would be a C method."

20. See under section 6.6.10 on specific aspects.