Lars Andreas Lunde, Svein Lasse Røgeberg and Lasse Sandberg

Price Indices for Capital Goods. Part 1
A descriptive study

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Tall kan ikke forekomme	Category not applicable	.
Oppgave mangler	Data not available	..
Oppgave mangler foreløpig	Data not yet available	...
Tall kan ikke offentliggjøres	Not for publication	:
Null	Nil	-
Mindre enn 0,5 av den brukte enheten	Less than 0.5 of unit employed	0
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Foreløpige tall	Provisional or preliminary figure	*
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Rettet siden forrige utgave	Revised since the previous issue	r

Abstract

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This report is part 1 of a project aimed at investigating and suggesting improvements in methods on how to handle the problems of quality improvement and uniqueness of capital goods. Although the problems of handling quality changes and uniqueness is a general index problem, these problems are regarded as most severe for the commodities we call capital goods, which primarily are characterised by their technological complexity. The potential bias caused by these factors is considered to be a serious problem in index calculation.

The report is a descriptive study of methods used in EU/EFTA countries, as well as some other OECD countries on how these problems of quality changes and uniqueness of capital goods are handled. A number of frequently used methods to adjust for quality changes in index calculations are presented.

One conclusion is that there is a great variety among the responding countries in which methods they are using to handle quality changes. However, it seems that quality changes are always taken into account. Another conclusion is that for some commodities, which are extremely difficult to find reliable price indices for, such as aeroplanes and ships, most countries exclude them from their price indices. The problem is, however, only transferred to the national accounts divisions, which have to get reliable deflators for their fixed price calculations.

The report will be followed by a part 2, which is planned to be published in early 2001, and where recommendations will be made on how the problems of technological progress and uniqueness should be handled for selected representative capital goods.

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1. Background and summary

In 1997 Statistics Norway took the initiative to a project aimed at improving the methods for calculating price indices for capital goods (durables). Eurostat and Statistics Norway cofinance the project. The project has had a reference group and steering group consisting of heads of division at Statistics Norway. The project is divided in two parts. Part 1 is a descriptive survey, which was conducted mainly in 1998, and is concluded by this report. Part 2 will take place in 2000, and will be a normative study, building on the results and discussions on this report. Part 2 will be concluded by a final report, which is planned to be published in the year 2001.

The project group from Statistics Norway has done the practical work. It has cooperated with Eurostat as well as other National Statistical Institutes (NSI) in the EU/EFTA countries. The project group has been cooperating with the Research Programme on Price and Volume Measures, initiated by the Working Party of National Accounts in Eurostat in 1998, with the project leader taking part in one of the task forces established by the Research Programme, the Task Force on Large Equipment. The project group has three permanent members from three different divisions at Statistics Norway. In addition, during different phases of the project, members from other divisions with particular expertise needed for the project have joined the project group. Project leader has been Lars Andreas Lunde from the Division for External Trade, Energy and Industrial Production Statistics. Other permanent members of the project group have been Svein Lasse Røgeberg from the Division for National Accounts and Lasse Sandberg from the Division for Economic Indicators. For the design of the questionnaire, Heidi Kristin Reppen from Division for Sample Surveys joined the project group.

1.1. General background
A major problem in measuring price trends for goods is the complexity of the goods. In traditional methods of calculating price indices it is implicitly assumed that an unchanged "basket of products" is produced or consumed and therefore can be compared over a longer time period. However, goods are often affected by a fast pace of innovation, which means that it can be difficult to find "similar" goods over time. Moreover, the goods will frequently be specially designed to the user's needs and specifications. This may apply to both technical specifications and more exterior-type requirements. Furthermore, goods often have services attached that affect the price; the retail price of a mobile phone will depend on choice of network operator, or the purchase of a machine where the price may depend on the degree of service provided. In a dynamic economy new goods, new models of old goods, new technologies, higher performance of existing goods and new services associated with goods appear all the time. The potential bias caused by these factors is considered to be a serious problem in index calculation.

Several studies during the last years, such as Gordon (1990) and Boskin (1996) have focused on biases in the official price indices published by the statistical institutions as the official price indices often fail to take proper account of these factors.

Price indices have a double purpose. The first is that they are indicators of short-term fluctuations in the economy. The second purpose is that they are used to deflate national accounts from floating to fixed prices. A bias in the price indices may then not only give an incorrect picture of the business cycle of the economy, but may also give an incorrect picture of the composition and growth rate of the economy in fixed prices over a longer time span.

Such biases may appear in all price indices for goods, both to the producer price index (PPI), the consumer price index (CPI), as well as price (or unit value) indices of external trade.

Critics of traditional price indices, see Gordon (1990), have pointed out that although biases are a general problem, the problem is most serious for the goods we call capital goods. This is due to the fast technological development these goods are subject to. Capital goods are highly complex goods, frequently subject to important changes in technology, and there is

particular for this group of commodities difficult to find identical commodities over time. Therefore, although the problem of bias in price indices is considered to be a general one, this project is concentrated on the group of this group of commodities. The definition of capital goods is presented in chapter 2.3.

The work with data collection and the methods for measuring the price of capital goods is faced with a number of problems. These problems may be summarised by the following:
- Quality changes over time for the same product
- Uniqueness, for example in the form of special design
- Difficulty of distinguishing goods from the associated service
- Different sales and currency conditions
- Price differentiation

The aim of a price index is to measure the pure price change. Any changes in the quality of the goods and services must therefore be taken into account in index compilation. A further discussion on the problem of quality adjustment for capital goods is presented in chapter 2.

1.2. Survey
The methodology of the project is presented in chapter 3. Part 1 of the project is a descriptive study of methods used to handle quality changes for capital goods in the EU/EFTA member states, and some overseas OECD countries (the United States, Canada, Australia and New Zealand). Firstly, countries were asked to send documentation papers of their methodologies for index production. Secondly, a questionnaire was designed for systematically collecting information on how indices were produced in these countries, and specifically, how quality changes were handled in the production of these indices for capital goods. These questionnaires were divided in two parts. One part where general data on index production was collected, and one part where we asked which methodologies that were used to handle quality changes for some selected capital goods.

The indices covered by the project are the CPI, the PPI, the import price or unit value index and the export price or unit value index.

1.3. Results and conclusions
Tables with answers of the questionnaires are presented in chapters 4 (general methodology) and 5 (handling of quality changes).

The questions on general methodology cover the following areas:
- Sample design
- Weighting, computation and classification
- Data collection

1.3.1. Resample and reweighting
The tables on general methodology in chapter 4 show that chaining combined with resampling is more common for the CPI than for the PPI or external trade price indices. In calculating the CPI, France, Italy, Sweden and Norway are resampling both reporting units and representative items annually, as well as reweighting annually, but the whole sample is not always resampled. Also in the United Kingdom there is an annual reweighting of goods and services. In Luxembourg there is a continuous adaptation of the sample, made possible by the small size of the country, and annual reweighting. In France 10 per cent of representative items are resampled every year, and for Sweden 20 per cent of reporting units are resampled every year. The same countries that are following an annual sampling of firms and goods and services in the CPI as well as annual reweighting are also using annual chaining. By having an annual routine in selecting goods and services and chaining annually, new products are more rapidly incorporated into the index. Rapid changes in product engineering are incorporated earlier in the index than by the traditional way followed by most other countries of changing weights and sample every five years. Some countries have answered that they are resampling continuously as old units or items disappear, but not specifically mentioning product improvement. The United States is planning more frequent resampling in the future for items in markets undergoing rapid change, like capital goods.

For the PPI the most common period of resampling and reweighting is every five years, although Sweden and Finland are resampling reporting units and representative commodities, as well as reweighting annually. The United Kingdom is planning annual resampling from 1999/2000.

1.3.2. Data collection
Comparing the answers about the methodology for collecting data for the CPI and PPI in questionnaire "A", one observation is that the use of face-to-face interviewing by experts from the National Statistical Institute is more common in collecting data for the CPI than for the PPI. If one also studies the price indices for external trade (for those countries that are collecting external trade prices rather than using unit values), no country is using interviewers. Instead of interviewers, self-administered questionnaires are used. This is reflected in the answers in questionnaire "B", where we specifically asked how quality changes are handled, since the more explicit methods to handle quality changes in the CPI usually require visits to the companies by specialists from the National Statistical Institutes. It is difficult to detect more sophisticated methods used for the CPI than for the PPI.

For the CPI, only Norway and Switzerland answered that they were not using face-to-face interviewing at all. For the PPI only France, Greece and the United States answered that interviewers were used, while all the other countries were using self-administered questionnaires sent to the companies to be filled in by the employees of the companies. For external trade indices, all countries that are collecting prices are using self-administrated questionnaire.

New Zealand has developed their methodology on data collection in order to cover in their CPI the new technology of electronic trading as well. Information on bank charges and prices of goods and services are collected on the Internet.

1.3.3. Handling quality changes

Tables with answers from the "A" and "B" questionnaires are presented in chapters 4 and 5.

In questionnaire "B" we asked how quality changes for selected capital goods were handled. Among these selected capital goods were ships and aeroplanes. One main observation from these answers was that very few countries are including these two very complex capital goods in their PPI. Also, very few countries collect prices on these commodities for their external trade indices, although unit values for aeroplanes are often used. The only countries that have a producer price index for ships are Finland and the United Kingdom. For Finland the PPI and the export price index are input cost indices and not an output price index as for other goods in the PPI and the export price index. The price development for 12 important cost factors, involving both prices of manufactured items used as inputs, such as deck structure and machinery, and wage and social costs, are calculated. For the import price index, listed prices from the Lloyd's Shipping Economist are used.

There are only three countries covered by the survey that have a PPI for aeroplanes (Switzerland, the United Kingdom and the United States). For most countries that manufacture aeroplanes, the PPI is not produced.

One conclusion from the answers is that there is a great variety among the responding countries in which methods they are using to handle quality changes. Most countries have answered that they are using several methods for each commodity in questionnaire "B". The different methods used to handle quality changes for the same commodity and index may be widely different, from the simplest to the most sophisticated methods. However, it seems that quality changes are always taken into account in calculating both the CPI and the PPI. Those countries that have answered "unadjusted price comparison" have done so in combination with other methods, which shows that the

aspect of quality change is taken into account, but sometimes judged not important.

For the answers on questionnaire "B", we have grouped the methods together in four main categories. The first category of methods, called the A category, is implicit methods. The methods covered by this category are: unadjusted price comparison, link to show no change, price overlap and imputation.

The second category of methods, called the B category, is explicit methods. This category covers: option cost adjustment, production cost adjustment and hedonic adjustment.

The third category of methods, called the C category, is methods where the actual way of handling quality changes is not specified, so the method may be either implicit or explicit. This covers the method called judgmental adjustment and those who have answered "other method".

The fourth and last category of methods, called the D category, covers the answers where the statistical institute does not calculate an index for the commodity at all. This may be either because there is no production, import or export of the commodity, or because the statistical institute regards the commodity as so complicated that they have excluded the commodity from the index altogether, such as ships and aeroplanes.

For the CPI we see that the commodities for which explicit methods are most used are cars and personal computers. Overall, the most common methods used to handle quality changes in the CPI are overlap pricing and judgmental adjustment.

Also for the PPI the most common method is overlap pricing, together with hedonic adjustment for the PPI for personal computers. For the PPI there are fewer answers because commodities like personal computers, cars and aeroplanes are only produced in a few countries, and are therefore not included in their PPI.

Of the explicit methods, option cost adjustment is most commonly used in the CPI, while production cost adjustment is most commonly used in the PPI. One particularly difficult group of products is special purpose machines. For this group of products overlap pricing and judgmental adjustment are the most common methods.

A few countries are using hedonic methods in calculating indices. It is mostly in calculating the CPI that the hedonic regression method is used. The United States, France and Finland are using hedonic regression to calculate the CPI for some specified products. Of capital goods, the method is used for personal

computers and televisions in the United States, and there are plans for hedonic indices for these commodities in France as well. In France hedonic regression is only used for dishwashers at the moment. Finland is using this technique for used cars. The method is also used in some of the responding countries for other commodities falling outside our focus on capital goods (clothes, housing).

In the PPI hedonic regression is only used to adjust for quality changes for computers, and only France, Sweden and the United States use this method. The United States also use this method for other computer equipment (like printers), while France and Sweden are only adjusting for personal computers.

Examples of other sophisticated methods are to consult experts or study professional magazines to determine the price development. Sweden is using an expert panel, which meets once a year to produce a list of the details a car can have, and thereby determine quality changes in the CPI for new car models. One of the most important quality characteristics is petrol consumption. The Netherlands is studying computer magazines to determine the quality adjusted price development for computers and use expert's views to handle quality changes in the CPI for cars.

For external trade, 11 of the 15 responding countries are using unit value indices. For this method, quality adjustment is difficult. For the countries that are collecting prices directly and therefore have the possibility to adjust for quality changes, judgmental adjustment and overlap pricing are the most common methods. One result is, however, that if they are adjusting for quality changes at all, most countries are using implicit methods. The only country that is using only explicit methods for all commodities where they are calculating external trade indices is the United States. The United States is using hedonic regression to adjust for quality improvements of computers. Germany and the United Kingdom are also using an explicit method (production cost adjustment) for external trade indices, together with other methods, but none of these countries are using hedonic regression to calculate indices for external trade.

1.3.4. General impression
The general impression is that more resources are allocated to produce the CPI than the PPI, while least resources are allocated to the production of external trade indices. This priority on the CPI may reflect the higher interest in society at large for this index, compared to other indices. The countries that seem to invest most resources on sophisticated methods for the PPI are France, the Netherlands, Sweden, Finland and the United States.

For external trade indices, most countries are using the relatively simple unit value method where data already are collected to produce external trade statistics. Even those countries that are collecting prices directly from importers and exporters are using the simplest methods in doing so. They are for example relying on self-administrative questionnaires rather than visiting interviewers.

1.4. Further studies
Based on the results of the descriptive study, part 2 of the project will be a normative study, where different methods on handling problems raised in the project will be discussed and recommendations will be made. In our discussion on the relevant methods, we will follow the method outlined in Eurostat (1998) Draft Commission Decision on prices and volumes, and divide the methods into three classes, "A", "B" and "C" methods. The Draft Commission Decision on prices and volumes defines the "A", "B" and "C" methods as follows:
- A methods: most appropriate methods;
- B methods: those methods which can be used in case an A method cannot be applied;
- C methods: methods not to be used.

The Draft Commission Decision further states: "The following criteria for distinguishing A, B and C methods are absolute criteria, i.e. they do not depend on the availability of data. In practise it might be that the A methods are not attainable, and conventions need to be sought on B methods." This makes clear that the classification of methods into A, B and C methods should be based on objective standards; it should be a classification in the good, the less good and the bad methods, regardless of the feasibility of the methods.

The normative part of the study will be divided into first an objective classification of relevant methods, based on the classification method described above. Then there will be a feasibility analysis of the relevant methods for each category of goods. The classification of methods and the feasibility discussion will be treated separately. The classification of methods can, however, differ from product to product: what is a good method for one product can be a less good method for another. For example, the importance of taking quality changes into account will differ. In some cases, the lack of allowances of quality changes can be prohibitive for calling a method a B method. Such is the case if the product is characterised by a fast technological development. In other cases, even without allowance for quality changes a method could be called an A method if such quality changes can be considered to be negligible.

2. Quality change

Quality improvement is on the production side defined as an improvement on the capability of the capital good to create net income for its owners. One example is higher fuel efficiency of aeroplanes that creates higher net revenue, because of less fuel costs for the airlines that own the aeroplanes. On the consumption side, quality improvement is defined as an improvement in the capability to create net utility for its users. One example is improved sound and reception quality and greater reliability of radio and audio/stereo equipment.

Other examples of quality changes are:
- Timesavings to travellers created by the change from piston to jet planes.
- Greater ability of refrigerators to maintain a fixed low freezer temperature.
- Reduction in the frequency of service calls for refrigerators and washing machines.
- Better picture quality of colour television sets.
- Improved handling and driving capabilities of automobiles.
- Larger calculation or writing capabilities of electronic calculators and typewriters.

Most international studies have concentrated on price measurements for capital goods in restricted markets. Personal computer equipment has been an often-studied goods category in such work. This study has a wider perspective, considering the fact that the weakness of price measurements is a broad-based problem that is equally relevant to deliveries to different markets, to exports and not the least to imports of capital goods.

There are basically two different methods for measuring price changes of goods. One is to calculate a price index based on a survey. A different method is the unit value method, which is used by a number of countries for external trade statistics. Data for index calculation are not collected directly from firms, but from the primary data of external trade statistics. Both methods are covered in this study.

2.1. Handling of quality changes
The handling of quality changes and new goods can be separated into four general categories of potential errors:
- Failure to detect a change in quality.
- Failure to make the appropriate adjustment for a change that has been detected.
- Failure to include new goods in the sample without long time lags.
- Failure to include the net revenue/consumer surplus generated by new goods.

In general the new product bias is known to be an upward bias in contrast to the quality bias which in principle can go in either direction. The upward bias of new goods are based on the assumption that new goods must gain acceptance in the marketplace by offering better values than the goods they displace – combined with an index producer not having sufficient/optimal methods for taking into consideration the change in quality. Real price rises (hidden?) can accompany new goods because manufacturers plan price increases to coincide with the introduction of updated styles or models. Manufacturers may also delay price increases until their product line turns over to avoid "menu" costs. Buyers may also have less resistance to price increases that accompany product introductions because they in the same way as the index producer have difficulty assessing the value of the quality change. But as a general rule it is believed that the new product bias is an upward bias.

The goal of producing price indices like the CPI, the PPI and the external trade price indices is to measure pure price changes and exclude changes due to improvements or deteriorations in the quality of the goods. In a price index the appearance of new goods presents at least two important problems:
1. Bringing new goods into the samples.
2. Accounting for differences in price between new and old goods.

Sometimes new goods provide a similar service as an existing one, but with higher quality or a lower price. In other cases new goods provide entirely new services that were previously unavailable, such as cellular phones.

2.1.1. Special problems with unit values
The calculations of indices for external trade are associated with the decomposition of the series of value into price and volume changes. This implies that one has to decide for which component to choose formula. Because the price relatives are used as deflators for national accounts this is already determined. Volume indices are calculated according to the Laspeyre's formula, and price indices are calculated according to the Paasche's formula.

The main objection to the use of the unit value approach has been that even the most detailed commodity specification in foreign trade statistics is not detailed enough for the price data required for the decomposition of the flow values. Because of a heterogeneous composition of the commodity number, there is no meaningful unit of quantity for the commodity, and unit values have no meaning. The unit value method and its problems are discussed further in appendix B.

Several commodity classification categories and particularly those related to capital equipment, machine tools and several varieties of consumer goods have often no meaningful unit of quantity. These commodities are often unique in the sense that they are goods, which due to their characteristics cannot be matched over time with similar goods.

Unique goods exist only at one particular time, and that defeats all attempts to see them in terms of a flow. This of course makes it impossible to do any kind of decomposition. The solution to this problem will be to use substitute prices, and that is undoubtedly implicit done in many cases by classifying these goods under a common designation in the Customs Tariff.

2.2. A list of possible methods
There are several methods taking into account the quality changes and new goods, and the following is a list of possible methods that we have used in our questionnaire.

A.   Methods which involve replacements without explicit (or direct) quality adjustment.

1. *Unadjusted price comparison*. The estimated price change is the price of the new item in the comparison period divided by the price of the old item in the reference period.
2. *Link to show no change.* The estimated price change for the observation series is set to zero between the comparison period and the preceding period without use of an overlap method.
3. *Price overlap*. In at least one period prices for both an old and a new item are collected. Price change up to that period is estimated from the old item and after that period from the new item. An N-period overlap means that there are N consecutive periods of parallel pricing of both the old and the new item. The N-1

periods price change may then be based on either the old or the new item or of an average of the two.
4. *Imputation*. An average price change is imputed from a higher aggregate to which the observation series belongs.

B.   Methods that involve replacements combined with explicit quality adjustment.

5. *Quantity augmenting*. A simple measure of the volume content of a product is used for a proportional adjustment of either the reference or the comparison price in order to obtain comparable observations.
6. *Option cost adjustment.* This method values an extra characteristic, now included in the price of a composite product, at its actual price as an optional extra in the previous period or as a certain portion of that price.
7. *Production cost adjustment*. The producer is asked how much an extra characteristic costs to produce. This measure of cost is marked up to the retail level (in the case of a CPI) and used for adjusting the reference price.
8. *Hedonic adjustment*. The value of a characteristic is given by estimated coefficients in a multiple regression equation. Differences in the content of characteristics between the new and the old observation are multiplied with these values to provide a total adjustment to either the reference or the comparison price.
9. *Judgmental adjustment*. Experts, commodity specialists or price collectors make a quantitative judgment in such a way that a value is obtained for the quality difference between the old and the new observation.

2.3. Definition of capital goods
Different terms are used for the kind of goods we are studying. What we call "capital goods" may also be called durables. We have included goods used as gross fixed capital formation as well as capital goods held by households.

2.3.1. National Accounts classifications
According to SNA93 (System of National Accounts) and ESA95 (The European System of National and Regional Accounts) gross fixed capital formation of fixed assets are tangible assets that come into existence as output from processes of production and that themselves are used repeatedly or continuously in other processes of production over periods of time of more than one year.

2.3.2. Tangible fixed assets are subdivided by type into
(i)   Dwellings
(ii)   Other buildings and structures
(iii)   Machinery and equipment
(iv)   Cultivated assets – trees and livestock – that are used repeatedly or continuously to produce goods such as fruit, rubber, milk etc.

We will limit our study to machinery and equipment, i.e. manufactured output.

2.3.3. The COICOP
It is sometimes useful to estimate the stock of "capital goods" held by households. Goods in COICOP (Classification of Individual Consumption by Purpose) that are identified as durables are the basic elements for such estimates.

COICOP classes are divided into "services" (S), "non-durables" (ND), "semi-durables" (SD) and "durables" (D). The durable goods according to COICOP are covered by our definition of capital goods.

2.3.4. The BEC and the CPA
In Eurostat's manual "Methodology of industrial short-term statistics/Rules and recommendations" Broad Economic Categories – BEC (end use categories) are attached to NACE Rev. 1 classes and groups. The categories are:

A = Intermediate goods industry
B = Capital goods industry
CD = Durable consumer goods industry
CN = Non-durable consumer goods industry

The capital goods in our study are defined as characteristic output of capital goods industries and durable goods industries, i.e. BEC categories B and CD. This means that we define capital goods in our study as CPA products in divisions:

CPA division	Name	Excl. sub-division	Name
29	Machinery and equipment n.e.c.		
30	Office machines and computers		
31.1	Electric motors, generators and transformers		
31.2	Electricity distribution and control apparatus		
32	Radio, television and communication equipment and apparatus	32.1	Electronic valves, tubes and other electronic components
33	Medical precision and optical instruments; watches and clocks		
34	Motor vehicles, trailers and semi-trailers	34.3	Parts and accessories for motor vehicles and their engines
35	Other transport equipment		
36	Furniture; other manufactured goods	36.3	Sports goods

2.4. International studies
2.4.1. Gordon's study
Although many studies have concentrated on specific goods or a limited variety of indices, there are some important studies discussing the general problem of price measurement when facing quality adjustments for capital goods. One study was done by Gordon (1990). This work was primarily concerned with the producer price index (PPI), but also included a study on some important capital goods on the consumer side.

Gordon claims that there is a measured drift caused by a systematic failure in the official PPI and the CPI to adequately capture quality changes for those types of durables that have the most rapid rates of growth of nominal demand. Regression analysis shows a significant relationship between the drift and the technological complexity of the product or the presence of electronic components. He also claims that the PPI and the CPI introduce new models too late, and track obsolete models too long. New technological models are introduced as new goods, without any linking to the old ones which they replace (like integrated circuits for transistors). This technological innovation will therefore not be represented as a fall in prices.

For traditional product lines with a slow pace of technological advance, the PPI is adequate, and there are small differences between Gordon's study and the official PPI. But when technological change is rapid, the PPI relies on reporters (officials in manufacturing firms) who have little knowledge of the purposes of their PPI reports. They have little concern to flag quality improvements or to introduce new models in the index. The easiest way is to report prices of the same old model, even if sales have almost disappeared.

2.4.2. The Boskin report
Another study was the report to the United States Congress by a group of statistical experts in 1996 led by Boskin (1996) on bias in the CPI. This report was, at least for capital goods, building to a large degree on the results of Gordon's study, although the Boskin report was only discussing consumer prices, while Gordon was mostly concerned with producer prices. The Boskin report treated the whole spectrum of consumer goods, not just capital goods.

Both Gordon's study and the Boskin report are presented further in appendix C.

3. Methodology of the project

3.1. Limitations

Experiences from studies of personal computer's equipment have put the goods' qualitative characteristics as price determinants on the agenda. In the project we will also take into account other price determinants, and in our opinion it is therefore necessary to obtain more information on complex groups of capital equipment.

In the project, methods on calculating price indices for capital goods in the 22 selected countries are studied. The countries surveyed were the 15 member countries of the European Union, the EFTA members Switzerland, Iceland and Norway, and the overseas OECD countries United States, Canada, Australia and New Zealand.

3.2. Request for documentation

The project is divided into two parts. Part 1 is a descriptive study of present methods in the 22 countries. The National Statistical Institutes (NSIs) of these countries were first asked to send us any documentation they had on their methodology on computing producer price indices, consumer price indices and external trade price indices for capital goods. As we suspected that little documentation was available that was specifically describing methodology for capital goods, we also asked the NSIs to send methodological papers on their general methodology on index calculations if no specific documentation for capital goods was available. The reason for this request for methodological papers was to get an overview of methods used in the selected countries in calculating indices. Our interests were both on general methodologies, but also to get an answer to how they handled the specific problems often for capital goods.

As suspected, no NSI had any documentation on their specific methods on handling the problems specified for capital goods. However, for some NSIs there were chapters in their handbooks on how the problems of quality changes and unique goods were handled in their country. This was the case for the handbook on consumer price indices by Statistics Finland (1998)

and the handbook on the method of producer price statistics by Statistics Netherlands (1997).

3.3. Design of questionnaires

After receiving these methodological papers, the project group started work on designing a questionnaire to get more systematic information on index production in the selected countries. It was decided to divide the questionnaires into two parts. In part A we asked for key information on the general methodology in producing the PPI, the CPI and external trade price indices in the selected countries. In part B we asked for particular information on how the problem of quality changes in the calculation of these indices was handled in the NSIs for a number of selected goods.

The questionnaires are divided in two main parts - A and B. Part A is expected to give general information on how to calculate price indices, and not only for capital goods. In part B we ask how the NSIs handle quality changes of capital goods in their price indices.

To handle methods used in different price indices we separated the questionnaires into four categories:
1. Consumer price index
2. Producer price index
3. Import price index
4. Export price index

Questionnaire A covers the following areas:
- Data collection
- Sample design
- Weighting, computation and classification

Questionnaires A and B are enclosed in appendix B. Tables with results from questionnaire A are presented in chapter 4, while tables with results from questionnaire B are presented in chapter 5.

4. Tables from questionnaire "A"

In this chapter the answers from questionnaires are presented in tables. Related questions are grouped together in one table. In chapter 4.1 the answers to the questionnaires on the consumer price index (A1) are presented. In chapter 4.2 the answers to the questionnaire on the producer price index (A2) are presented, and in chapter 4.3 the answers to the questionnaires on indices for external trade (A3 and A4) are presented.

4.1. The consumer price index
Reporting is statutory in almost all countries. All countries except Sweden are using Laspeyre's index formula. Sweden is using a special method with a combination of short-term and long-term elementary aggregates, documented by Dalen (1992).

Half of the responding countries have chain indices. For those who have, annual chaining is most used.

All countries are using interviewers to collect prices, except Norway and Switzerland, who only depend on self-administered questionnaires.

New Zealand is also collecting information on bank charges and prices of goods and services on the Internet.

Table 4.1.   General issues

Country	Statutory (S) / Voluntary (V)	Index formula	Microindex[1]	Chaining
Austria	V	Laspeyre	A	No
Denmark	S	Laspeyre	R and A	No
Finland	V	Laspeyre	G	Every five years
France	S	Laspeyre	R, G and O	Annual
Greece	V	Laspeyre	No answer	No answer
Ireland	S: EU directive V: national law	Laspeyre	R	Every five years
Italy	S	Laspeyre	A and G	Annual
Luxembourg	S	Laspeyre	G	Annual
The Netherlands	S	Laspeyre	R	No
New Zealand	S	Laspeyre	R	No
Norway	S	Laspeyre	R	Annual
Portugal	V	Laspeyre	G	No
Spain	S	Laspeyre	R	No
Sweden	S	Other	O	Annual
Switzerland	S	Laspeyre	A	No
United Kingdom	S: EU directive V: national law	Laspeyre	R, A and G	Annual
United States	V	Laspeyre	G	No

[1] R = ratio of average prices, A = average of price ratios, G = geometric mean, O = other method.

Table 4.2.   Data collection

Country	Self-administered questionnaire	Face-to-face interviewing using paper questionnaire	Face-to-face interviewing, computer aided	Telephone interview
Austria	x	x		
Denmark	x	x		x
Finland		x		x
France		x		
Greece		x		
Ireland	x	x		
Italy		x	x	
Luxembourg		x		x
The Netherlands	x	x		x
New Zealand	x	x		x
Norway	x			x
Portugal		x		
Spain		x		x
Sweden		x		x
Switzerland	x			
United Kingdom	x		x	x
United States		x	x	x
Total	7	12	2	9

Table 4.3.   Pre-print of questionnaire with figures from the previous period

Country	Yes, always	Yes, in certain cases	No
Austria	x		
Denmark	x		
Finland			
France	x		
Greece	x		
Ireland		x	
Italy	x		
Luxembourg	x		
The Netherlands		x	
New Zealand	x		
Norway	x		
Portugal			x
Spain	x		
Sweden	x		
Switzerland	x		
United Kingdom		x	
United States	x		
Total	10	3	1

Table 4.4.   Visits from the statistical office to reporting units

Country	Does the NSI visit reporting units regularly for other purposes than collecting price information?	Reason for visit
Austria	No	
Denmark	No	
Finland	No	
France	No	
Greece	Yes	Checking and best coordination between our service and the enterprises
Ireland	Yes	Price accuracy checks
Italy	No	
Luxembourg	No	
The Netherlands	Yes	In some cases, reporting units are visited to get more information about a particular branch
New Zealand	No	
Norway	No	
Portugal	Yes	Updating lists of producers and control
Spain	Yes	Normally, visit different units to update weights. Visits are made twice a year for some items
Sweden	No	
Switzerland	No	
United Kingdom	No	
United States	No	

Table 4.5.   Quantitative data

Country	Number of reporting units	Number of elementary aggregates	Number of price equations in the computation of the index
Austria	4 000	14 000	60 000
Denmark	1 200	464	25 000
Finland	2 000	3 500	50 000
France	27 000 sales outlets + large companies provide tariffs data	21 000 for ordinary items (tariffs and fuel prod. excl.) 67 per cent of the CPI weighting	111 000 price quotations for ord. items + 50 000 (2*25 000) for fuel prod. + 50 000 for tariffs
Greece	3 200	10 000	20 000
Ireland	Not currently available	985 (variation of terms)	46 000
Italy	30 000	209	280 000
Luxembourg	850	242	7 000
The Netherlands	12 000	800	100 000
New Zealand	6 700	700	40 000
Norway	2 200 outlets for monthly price survey, 3 000 households for quarterly rent-survey	7 000	60 000
Portugal	10 600	190	
Spain	29 000	471	150 000
Sweden	2 200, of which 1 000 in the rented dwellings survey	912	32 000
Switzerland	3 000	200	100 000
United Kingdom	18 000 outlets visited or phoned. 800 approached by ONS staff by post or phone	4 900	5 000?
United States	23 000	211	80 000

Table 4.6.   Periods of resampling and reweighting

Country	Period of resampling of reporting units?	Period of resampling of goods and services (representative items)	Period of reweighting (using national accounts or household budget surveys)
Austria	If a unit becomes insignificant or newly significant	Every five years	Every five years
Denmark	Clothing and fresh food: every three years. Other groups every two-five years depending on type of outlets, etc.	Clothing and fresh food: every three years. Other groups every two-five years depending on type of outlets, etc.	Every five years
Finland	Every five years	Every five years	Every five years
France	Annually	About 10 per cent every year	Annually
Greece	Every five years	Every five years	Every five years
Ireland	Every five years	Every five years, based on five annual household budget surveys	Every five years
Italy	Annually	Annually	Annually
Luxembourg	No systematic periodical resampling	No systematic periodical resampling, but continuous adaptation	Annually
The Netherlands	New reporting units sampled when old units disappear	Resampling on different occasions: during reweighting and when necessary (items have disappeared or new items have become more common)	Every five years
New Zealand	Various. Attempt every five years	Every five years	Every five years
Norway	Annually	Annually	Annually
Portugal	Every five years	Every five years	Every five years
Spain	During change of base (every eight-ten years)	During change of base (every eight-ten years)	During change of base (every eight-ten years)
Sweden	The retail trade outlets are sampled annually with 20 per cent rotation, i.e. most outlets stay in sample for five years. For the rest of the CPI various methods are used	Annually for prepacked daily necessities (about 10 per cent of CPI weight) and new cars. Ad hoc on other goods and services	Annually
Switzerland	Permanent updates (when reporting units disappear or when new ones enter the market). Resampling during major revisions (~every five years)		Every five years (eventually moving to an annual reweighting from 2000)
United Kingdom	Every five years	Annually	Annually
United States	Historically, "every five years", but for markets undergoing rapid change, item and outlet samples will be resampled more frequently in the future	Historically, "every five years", but for markets undergoing rapid change, item and outlet samples will be resampled more frequently in the future	Every ten years. Starting in 2002, reweight every two years

Table 4.7.   Method of resampling

Country	Sample design of survey when resampling reporting units	Sample design of survey when resampling goods and services
Austria	Purposive	Judgmental
Denmark	Judgmental	Judgmental
Finland	Purposive for grocery stores. Judgmental for specialist's stores and other	Judgmental
France	Purposive	Judgmental
Greece	Judgmental	Judgmental
Ireland	Judgmental	Judgmental
Luxembourg		
Italy	Judgmental	Judgmental
The Netherlands	Sample new reporting units of a special type (e.g. bakery, warehouse, shoe-store) in one of the survey-cities. Specified optimal numbers of reporting units of different types in different regions per elementary aggregate	Judgmental
New Zealand	Purposive. Very few items are randomly sampled	Purposive
Norway	Purposive (PPS)	Judgmental
Portugal	Judgmental/purposive. There are pre-defined rules, such as geographic distribution, type of outlet, volume of sales	Judgmental
Spain	Judgmental	Judgmental
Sweden	Many designs. PPS-sampling in retail trade and rented dwellings, total counts of alcoholic beverages and medicine, various techniques for the rest, also some old undocumented samples	For prepacked daily necessities (food, detergents, paper, etc.) items are resampled annually with PPS without rotation. New car models are resampled PPS annually
Switzerland	Judgmental	Judgmental
United Kingdom	Purposive	Judgmental
United States	Other: Purposive-based. A point-of-purchase survey is used as the sampling frame for most establishments	Other: Probability

4.2. The producer price index

Table 4.8.   General issues

Country	Classification system for data collection	Statutory (S)/ Voluntary (V)	Index formula	Chaining
Denmark	CN	S	Laspeyre	No
Finland	CN	S	Laspeyre	No
France	CPA/PRODCOM	S	Laspeyre	No
Germany	Product classification for production statistics	S	Laspeyre	From one base year to the next
Greece	CPA/PRODCOM	V		No
Ireland	NACE 70	V	Laspeyre	At five annually releases
Italy	CPA/PRODCOM	S	Laspeyre	No
Luxembourg	CPA/PRODCOM	S	Laspeyre	No
The Netherlands	CPA/PRODCOM	S	Laspeyre	No
New Zealand	ANZSCC	S	Laspeyre	On reweighting
Norway	HS/CN	S	Laspeyre	No
Portugal	CPA/PRODCOM	S	Laspeyre	No
Spain	Spanish product classification of 1979	S	Laspeyre	No
Sweden	CN	S	Laspeyre	Yes, annual chaining
Switzerland	NACE Rev.1	V	Laspeyre	No
United Kingdom	CPA/PRODCOM	S	Laspeyre	No
United States	United States' standard industrial classification system	V	Laspeyre	Every five years reweighted and chained

Table 4.9.   Data collection

Country	Self-administered questionnaire	Face-to-face interviewing using paper questionnaire	Face-to-face interviewing, computer aided	Telephone interview
Denmark	x			
Finland	x			
France	x	x		
Germany	x			
Greece		x		
Ireland	x			x
Italy	x			
Luxembourg	x			
The Netherlands	x			
New Zealand	x			
Norway	x			x
Portugal	x			
Spain	x			
Sweden	x			
Switzerland	x			
United Kingdom	x			x
United States	x		x	
Total	13	2	1	3

Table 4.10.   Pre-print of questionnaire with figures from previous period

Country	Yes, always	Yes, in certain cases	No
Denmark	x		
Finland	x		
France	x		
Germany	x		
Greece	x		
Ireland	x		
Italy	x		
Luxembourg	x		
The Netherlands			x
New Zealand	x		
Norway	x		
Portugal			x
Spain			x
Sweden	x		
Switzerland	x		
United Kingdom	x		
United States	x		
Total	12	0	2

Table 4.11.   Visits from the statistical office to reporting units

Country	Yes	No	Purpose of the visits
Denmark		x	
Finland		x	
France		x	
Germany		x	
Greece	x		
Ireland	x		Units are visited for collecting accounting information. Undertaken on ad-hoc basis
Italy		x	
Luxembourg		x	
The Netherlands	x		Updating questionnaire. An important unit will be visited once a year, a less important unit can be visited from once every two years to once every five years. Importance = internal weight for the reporting unit within the commodity group
New Zealand		x	
Norway		x	
Portugal		x	
Spain	x		In case any problem arises from collecting data, of prices or in other industrial surveys
Sweden		x	
Switzerland		x	
United Kingdom		x	Some visiting in 1999, regular visits to each contributor are not feasible
United States		x	

Table 4.12.   Quantitative data

Country	Number of reporting units	Number of representative commodities	Number of price equations in computation of the index
Denmark	700	850	2 700
Finland	500	358 headings (CN)	654
France	5 000	22 500	
Germany	7 300	2 240	18 500
Greece	960	1 900	2 000
Ireland	800	472 representative product groups	4 066
Italy	3 680	1 034	12 120
Luxembourg	130	820	1 400
The Netherlands	5 500	650	27 785
New Zealand	3 000	450	16 000
Norway	800	1 100	3 000
Portugal	2 498	550	12 335
Spain	6 000	1 100	20 000
Sweden	1 359	4 250	4 250
Switzerland	1 600	1 800	8 500
United Kingdom	3 700	1 400	9 000
United States	25 000	105 000 items	105 000

Table 4.13.   Periods of resampling and reweighting

Country	Period of resampling of reporting units	Period of resampling of commodities	Period of reweighting
Denmark	Reporting units are kept in the sample as long as possible. New units are built into the sample when necessary	1968, 1975, 1980, 1990	1968, 1975, 1980, 1990
Finland	Annually	Annually	4-digit level (NACE), every five years; CN-level. Annually
France	Every five years, for personal computers and electronic components every two years	Every five years	Every five years
Germany	No sample in mathematical sense, therefore no resampling of reporting units normally	Every five years	Every five years
Greece	Every five years	Every five years	Every five years
Ireland	Theoretically annually based on census of industrial production data where samples are not actually changed, but coverage updated	Every five years. Companies are asked annually to update their most representative commodity prices	Every five years
Italy	Every five years	Every five years	Every five years
Luxembourg	No comprehensive resampling. Because of size of the country in most cases, the survey covers nearly all units	Every five years	Every five years
The Netherlands	Cut-off method; per commodity group the selecting reporting unit should on average cover 50 per cent of sales	Every five years	Every five years
New Zealand	Initially purposively sampled, then reviewed as indices are reweighted	Every five years	Every five years. Planning to move to annual reweighting
Norway	Larger establishments (>100 employees) are not subject to resampling. Resampling during major revisions	Annually	Every five years (from 1999/2000)
Portugal	Every five years	Every five years	Every five years
Spain	When rebasing the indices	When rebasing the indices or the firms are not producing any more	When rebasing the indices
Sweden	Annually. Once a reporting unit is in the system it remains there until the imports/exports/ production end	Annually. Once a reporting unit is in the system it remains there until the imports/exports/ production end	Annually
Switzerland	Permanent updates (when reporting units disappear or when new ones enter the market.). Resampling during major revisions (~every ten years)	Permanent updates by reporting units	Every ten years
United Kingdom	Annually, from 1999/2000	Annually, from 1999/2000	Index weights are updated every five years. Chain linking is currently being considered
United States	Approximately every seven years	Every seven years on average - sample by 4-digit SIC industry	Every five years

Table 4.14. Method of resampling

Country	Sample design used when resampling reporting units	Sample design used when resampling representative commodities
Denmark	Reporting units are kept in the sample as long as possible. New units are built into the sample when necessary	Purposive. The main principle for choosing goods is to include every HS (Harmonised System) category which had a turnover value or more than 40 million DKK in 1990
Finland	Judgmental	Purposive at CN-level
France	Purposive	Purposive
Germany	Purposive. Important reporting units are included; important = high production value	Judgmental
Greece	Judgmental. Criteria of selecting are the size of the unit and its position on the market to ensure representativity of the units selected	Judgmental. They are selected as the most participated, firstly on sales value 6 digit level of CPA from the results of the structural survey in industry, and secondly on sales value of commodities of the selected observation units
Ireland	Purposive, based on CIP data. Try to have a minimum of 40 per cent turnover coverage of every NACE category	Purposive. Using PRODCOM data
Italy		
Luxembourg		
The Netherlands	Purposive. PRODCOM and SBS (Eurostat) data	Purposive, using input and output data from the national accounts
New Zealand	Judgmental. Key market participants are identified and included in the sample	Judgmental. Key market participants are identified, contacted and asked to provide the most representative items for their market, using their own judgment
Norway	Purposive	Judgmental. The reporting units select their most important commodities
Portugal	Judgmental. The reporting units have to represent at least 80 per cent of sales value for national market of all the units that produced the representative commodities	Judgmental. Based on annual PRODCOM statistics, we select the commodities that cover 70 per cent of sales value, NACE 3-digit. At NACE 4-digit the minimum coverage is 40 per cent
Spain	Companies with 20 or more employees are selected	Commodities are selected according to the sales or production values
Sweden	The sample is determined in three stages: 1) CN with more than 250 million SEK are selected from the national accounts compiled list consisting of imports, exports and production. 2) The foreign trade register and manufacturing statistics register are the framework to find the enterprises with high values, connected to CN in stage one. 3) Commodities within the CN are selected in consultation with the data providers	The sample is determined in three stages: 1) CN commodities with more than 250 million SEK are selected from the national accounts compiled list consisting of imports, exports and production. 2) The foreign trade register and manufacturing statistics register are the framework to find the enterprises with high values, connected to CN in stage one. 3) Commodities within the CN are selected in consultation with the data providers
Switzerland	Judgmental. Judicious selection of reporting units. For each family of products, the sample includes most of the main producers and a sufficient number of small and medium producers	Judgmental. The reporting units select the commodities with significant market share
United Kingdom	Purposive	Purposive
United States	Purposive. Probabilities proportionate to size. Two-stage sampling; first of reporting unit, then of items to reprice	Purposive. First stage sampling of reporting units array frame by employment. Second stage sampling uses revenue by product category

4.3. Price or unit value indices for external trade

4.3.1. General

Table 4.15. Type of index

Country	Price indices produced	Unit values produced	A hybrid of unit values and price indices	No indices for external trade
Austria		x		
Denmark		x		
Finland	x	x		
France		x		
Ireland				x
Italy		x		
Luxembourg		x		
The Netherlands	x			
New Zealand		x		
Norway		x		
Portugal			x	
Spain		x		
Switzerland	x	x		
United Kingdom	x			
United States	x			
Total	5	10	1	1

Table 4.16. Publishing period

Country	Imports	Exports
Austria	Quarterly	Quarterly
Denmark	Quarterly	Quarterly
Finland	Monthly both for unit values and price indices	Monthly both for unit values and price indices
France	Monthly	Monthly
Ireland	No index	No index
Italy	Monthly	Monthly
Luxembourg	Monthly	Monthly
The Netherlands	Monthly	Monthly
New Zealand	Quarterly	Quarterly
Norway	Quarterly	Quarterly
Spain	Monthly	Monthly
Portugal	Annually	Annually
Switzerland	Monthly for price indices. Monthly aggregates (January to month) for unit value indices	Monthly for price indices. Monthly aggregates (January to month) for unit value indices
United Kingdom	Monthly	Monthly
United States	Monthly	Monthly

4.3.2. The external trade price index

Table 4.17.   General issues

Country	Classification system for data collection	Statutory (S) / Voluntary (V)	Index formula	Chaining
Finland	CN	S	Laspeyre	No
Germany	CPA/PRODCOM	S	Laspeyre	No
The Netherlands	CPA/PRODCOM	S for exports, V for imports	Laspeyre	Indices are computed as base-weighted arithmetic average of price relatives (chaining) by the Laspeyre's formula
Switzerland	NACE Rev.1 and further differentiation according to actual practices of the branches	V	Laspeyre	No
United Kingdom	Imports: SITC. Exports: CN	S	Laspeyre	No
United States	HS, SITC and by end use	V	Laspeyre	Chaining once every five years

Table 4.18.   Data collection

Country	Self-administered questionnaire	Face-to-face interviewing using paper questionnaire	Face-to-face interviewing, computer aided	Telephone interview
Finland	x			
Germany	x			x
The Netherlands	x			
Switzerland	x			
United Kingdom	x			
United States	x			
Total	6	0	0	1

Table 4.19.   Pre-print of questionnaire with figures from previous period

Country	Yes, always	Yes, in certain cases	No
Finland	x		
Germany	x		
The Netherlands			x
Sweden			
Switzerland	x		
United Kingdom	x		
United States	x		
Total	5	0	1

Table 4.20.   Visits from the statistical office to reporting units

Country	Yes	No	Purpose for the visits
Finland		x	
Germany		x	
The Netherlands	x		Updating questionnaire. An important unit will be visited once a year, a less important unit can be visited from once every two years to once every five years. Importance = internal weight for the reporting unit within the commodity group
Switzerland		x	
United Kingdom		x	
United States	x		To initiate new items into the market basket

Table 4.21. Quantitative data

Country	Number of reporting units		Number of representative commodities		Number of price equations in computation of the index	
	Imports	Exports	Imports	Exports	Imports	Exports
Finland	600	300	371 headings	220 headings	710	337
Germany	2 500	3 000	2 300	2 300	7 600	7 100
The Netherlands	2 400	1 900	561	441	10 055	6163
Switzerland	550	1 600	600	1 800	2 600	8 500
United Kingdom	335	1 163	150 industries	120 industries	800	2 300
United States	2 400	2 200	170	160	8 000	8 000

Table 4.22. Periods of resampling and reweighting

Country	Period of resampling of reporting units	Period of resampling of commodities	Period of reweighting
Finland	Annually	Annually	4-digit NACE level every five years, CN-level annually
Germany	If required in cases of non-response	Every five years	Every five years
The Netherlands	Cut-off method; per commodity group the selecting reporting unit should on average cover 50 per cent of sales	Every five years	Every five years
Switzerland	Permanent updates (when reporting units disappear or when new ones enter the market.). Resampling during major revisions (~every ten years)	Permanent updates by reporting units	Every ten years
United Kingdom	Periodically to refresh sample when contributor numbers fall	Periodically to refresh sample when contributor numbers fall	Every five years
United States	Every two years	Every two years	Every five years

Table 4.23. Method of resampling

Country	Sample design used when resampling reporting units	Sample design used when resampling representative commodities
Finland	Judgmental	Purposive. At CN-level
Germany	Purposive selection of important import/export firms in the respective market segment	The reporting unit is asked to select a commodity with a high sales value suitable for price observation within a given commodity group
The Netherlands	Purposive. Imports: Data from Division for International Trade. Exports: PRODCOM and SBS data	Purposive. Input and output data from national accounts
Switzerland	Judgmental. Judicious selection of reporting units. For each family of products, the sample includes most of the main importers/exporters and a sufficient number of small and medium importers/exporters	The reporting units select the commodities with significant market share
United Kingdom	Based on data from customs and excise for imports. This is used as in samples frame from which to recruit. Recruited companies are then used in the calculation with the sales as a weight. No estimates for non-sampled units covered	
United States	Probability proportion to size	Probability proportion to size

Table 4.24.   Collection of collected information on which country the commodity is exported to/imported in price collections

Country	Imports			Exports		
	Yes, by country of origin	Yes, but only divided into EU/not EU	No	Yes, by country of destination	Yes, but only divided into EU/not EU	No
Finland		x			x	
Germany	x			x		
The Netherlands	x			x		
Switzerland			x			x
United Kingdom	x			x		
United States	x			x		
Total	4	1	1	4	1	1

4.3.3. The external trade unit value index

Table 4.25.   General issues

Country	Index formula for unit value index	Chaining	Nomenclature used in data collection
Austria	Paasche	Annually	CN
Denmark	Fisher	Annually	CN
Finland	Laspeyre	Annually	CN
France	Paasche	Annually	CN
Italy	Laspeyre, Paasche and Fisher	Annually	HS
Luxembourg	Fisher	Annually	CN
New Zealand	Fisher	Annually	HS and BEC
Norway	Paasche	Annually	HS based 8-digit Norwegian Customs Tariff numbers
Portugal	Laspeyre, Paasche and Fisher	Every three years	CN
Spain	Paasche	No chaining	CN
Switzerland	Laspeyre, Paasche and Fisher. Only Fisher index is published	Annually	HS based 8-digit Swiss Customs Tariff numbers

Table 4.26.   Coverage

Country	Commodities covered by the index	Transactions covered by the index
Austria	All	All
Denmark	Excluded are: Ships	All
Finland	Excluded are: Ships	Excluded are: From imports: Re-imports of goods processed abroad. From exports: Re-exports of domestically processed goods
France	Excluded are: Ships	All
Italy	All	All
Luxembourg	All	All
New Zealand	All	All
Norway	Excluded are: Ships and oil rigs	All
Portugal	No answer	No answer
Spain	All	All
Switzerland	Excluded are: Monetary gold and silver, diamonds and precious stones, works of art and collectors' pieces, antiques	All. Corresponding to the special trade system

Table 4.27.   Data sources, in addition to customs data

Country	Data from INTRASTAT on intra-EU trade	Data from other indices at the statistical office	Data from other countries statistical office	Data from lists of international stock market prices for raw materials (f.ex. oil, coffee, copper)
Austria	Yes	No	No	No
Denmark	Yes	No	No	No
Finland	Yes	No	No	No
France	Yes	No	No	No
Italy	Yes	No	No	No
Luxembourg	Yes	No	No	No
New Zealand	Not EU member	No	No, but under development	No
Norway	Not EU member	No	No	No
Portugal	Yes	No	No	No
Spain	Yes	No	No	Not incorporated in the index, but use international trade prices to control the indices
Switzerland	Not EU member	No	No	No

Table 4.28.   Selection of representative commodities for unit value calculations by a statistical analysis of external trade data

Country	Selection of representative commodities	Lowest level of selecting representative commodities
Austria	Yes	Customs code * importing company
Denmark	No	
Finland	Yes	Most detailed customs code level
France	Yes	Customs code * geographical areas
Italy	No	
Luxembourg	Yes	Customs code * geographical areas
New Zealand	No	
Norway	Yes	Most detailed customs code level
Portugal	Yes	Most detailed customs code level
Spain	Yes	Main categories of expenditure * geographical area * SITC
Switzerland	Yes	Most detailed customs code level, if the amount is > 0.0005 per cent of total value

Table 4.29.   Approximately annual coverage of representative commodities related to total value

Country	Imports (per cent)					Exports (per cent)				
	0-20	21-40	41-60	61-80	81-100	0-20	21-40	41-60	61-80	81-100
Austria			x						x	
Finland					x				x	
France				x					x	
Luxembourg			x						x	
Norway			x							x
Portugal					x					x
Spain				x					x	
Switzerland					x					x
Total	0	0	3	1	3	0	0	1	3	3

Table 4.30.   Imputation of price relatives for non-representative commodities from the representative commodities belonging to the same commodity group

Country	Yes	No
Austria	x	
Denmark		x
Finland		x
France		x
Italy		x
Luxembourg	x	
Norway	x	
Portugal		x
Spain	x	
Switzerland	x	
Total	4	3

Table 4.31.   Handling of extreme price relatives in index calculations

Country	Exclusion	Highest acceptable price relative	Lowest acceptable price relative	Exclusion level
Austria	Yes	1 000	10	Commodity level
Denmark	Yes	500		Commodity level
Finland	Yes	No absolute limit	No absolute limit	Consignment level
France	Yes	150	67	Commodity level * geographical area
Italy	Yes	500	20	Commodity level
Luxembourg	Yes	No absolute limit	No absolute limit	Commodity level
New Zealand	No			
Norway	Yes	200	50	Commodity level
Portugal	Yes	300	45	Commodity level
Spain	Yes	The 85th, the 90th or the 95th percentile	The 5th, the 10th or the 15th percentile	Commodity level
Switzerland	Yes	Price relatives higher than 150 are reduced to 150	Price relatives lower than 67 are increased to 67	Commodity level

5. Tables from questionnaire "B"

In this chapter the answers on questionnaire B are presented. There is one questionnaire for each index (the consumer price index, the producer price index, the import price or unit value index and the export price or unit value index).

5.1. Number of countries by method used for each index

In this chapter we have counted how many of the responding countries who are using each of the listed methods to handle quality changes for the selected products for each index. Several countries have listed more than one method for each commodity. By this we can see which method is the most commonly used to handle these problems for each of the selected commodities.

There are far more answers than there are responding countries. Most countries are using a combination of several methods for most of the commodities specified, and have therefore answered several methods for each commodity.

Judgmental adjustment and price overlap are the two most common methods for quality adjustment of selected commodities for the consumer price index. A requirement for overlap pricing is that the old and new

model are available at the same time, which is not always the case. Therefore overlap pricing is used in combination with other methods in several countries. The United Kingdom answered that their preferred method is overlap pricing if available. But as it often is not available, option cost adjustment is used, where up to 50 per cent of the option cost is regarded as a quality improvement. Sweden is using a month to month linking in their overlap pricing for personal computers. By linking month to month instead of year to year there is a better possibility that the old and new model are available at the same time of observation. The method judgmental adjustment is usually based on an evaluation of the price and quality increase by price collectors with shop staff's help. Finland explained that this form of judgmental adjustment is their preferred method. The United States is using a judgmental evaluation for personal computers, televisions and electric household stoves to determine whether there has been a significant quality change or not. If there has been a significant change in quality, the adjustment is quantified using hedonic regression, if possible, for personal computers and televisions, while the price change is imputed for electric household stoves. If there is not a significant change in quality, unadjusted price comparison is used.

Table 5.1.   The consumer price index

Method	Personal computers	Televisions	Electric house-hold stoves	Passenger cars	Boats
Unadjusted price comparison	3	4	5	4	2
Link to show no change............................	1	2	1	2	1
Price overlap...	8	8	7	8	6
Imputation	4	5	5	7	2
Option cost adjustment............................	5	3	2	7	0
Production cost adjustment......................	0	0	0	1	0
Hedonic adjustment.................................	1	1	0	1	0
Judgmental adjustment............................	5	9	8	9	3
Other method	1	0	0	0	1
Excluded	0	0	0	0	3
No consumption......................................	0	0	0	0	4

Unadjusted price comparison is a frequently answered option for all the selected commodities. However, this handling of quality changes is often used in combination with judgmental adjustment. It is therefore first a judgment whether there has been a significant quality change, and if it has not been, unadjusted price comparison is used in calculating the index. This means that quality changes are almost always considered when calculating the CPI for the selected commodities. The countries are almost never answering that they only are using unadjusted price comparison.

Of the selected capital goods in the survey, it seems that personal computers and cars are the commodities where the statistical institutes have spent most resources on developing sophisticated methods for quality adjustment. For personal computers, the United States is using hedonic regression if there is a significant change in quality, and if the hedonic method is possible. If it is not possible to use hedonic regression to adjust for quality changes, price changes are imputed. A hedonic method for computers is also being tested in France. Denmark answered "other method" for personal computers. They are using the United States' export price index for computers, as well as parts to computers, adjusted for exchange rate changes, in the Danish CPI. The Netherlands is using a different methodology. Their methodology is a form of option pricing. They are looking up models and features in computer magazines. Where options are available separately, they consider half of the price of the option as the price for the quality improvement.

For cars several countries have developed special methods to assess quality improvement. Judgmental adjustment is the most common method (answered by 9 of the 17 responding countries). The judgment of price and quality changes is often done in cooperation with the car sellers or other experts. In Sweden there is a panel of experts meeting once a year to produce a list of prices of the details a car may have. Petrol consumption is handled separately and is one of the most

important quality characteristics. Austria is contacting experts as well as car sellers for their opinion of quality changes. Denmark is also contacting car sellers for an opinion quality adjustment. The Netherlands is using this form of judgmental adjustment for cars in combination with option pricing. When options are available separately, half of the option-price is estimated as quality improvement. When options are not available separately, a "guess" from an expert is obtained. The expert has then guessed the price for the option considered as the quality-improvement. New Zealand is following a similar method. The "perceived" value to the customer (usually supplied by the manufacturer) is used and then the judgmental adjustment is done. E.g. airbags put into a car may cost $800 for the manufacturer to have them put in, but the value or worth to the customer of the $800 expended may only be $200-$300. The "quality adjustment" is then on the $200-$300 level, and not the $800 cost in this case. Finland is using a simple hedonic approach as default for cars. Option costs are used when needed, while expert's judgments are only used occasionally. France tries to use option cost pricing, and use imputation if the option cost method is not appropriate. The United States tries to use production cost adjustment and reverts to imputation or unadjusted comparison only when production costs are unavailable.

For the producer price index there are also several answers on the methods used for each selected commodity. For the PPI, however, there are fewer answers than for the CPI, as several of the selected commodities (personal computers, passenger cars, aeroplanes and ships) are only produced in some of the responding countries. Several countries have therefore answered "no production".

Austria does not dispose of any industrial producer price at this time. Since this index is currently being developed by the Austrian Bureau of Statistics, most methodological questions are still being discussed. Therefore Austria has not completed this part of the questionnaire.

Table 5.2.   The producer price index

Methods	Special purpose machinery	Personal computers	Passenger cars	Aero-planes	Ships	Boats	Furniture
Unadjusted price comparison	0	1	0	0	0	0	0
Link to show no change	5	2	3	2	2	3	3
Price overlap	10	3	5	3	1	4	8
Imputation..	2	1	2	0	0	1	2
Option cost adjustment.....................	1	0	0	0	0	1	1
Production cost adjustment...............	2	2	2	1	1	2	1
Hedonic adjustment..........................	0	3	0	0	0	0	0
Judgmental adjustment.....................	6	1	2	1	0	4	6
Other method..................................	1	0	1	1	1	1	1
Excluded...	1	2	1	7	11	7	1
No production	0	5	5	5	3	1	1

One of the main results for this index is that the complicated commodities ships and aeroplanes are usually excluded from the PPI. Only three countries include ships in their PPI. The United Kingdom is using either production cost adjustment to handle quality changes, or assume that the whole change in value is due to quality improvement, and is linking to show no real price change. The United States is using either overlap pricing to adjust for quality changes, or is like the United Kingdom linking to show no change.

Finland is using an input method for ships in their PPI. The price development for 12 important cost factors, involving both prices of manufactured items used as inputs, such as deck structure and machinery, as well as wage and social costs, are calculated. This input method is described in the handbook on producer price indices by Statistics Finland (1998). The input index for ships in Finland covers the following cost items:
- Deck and frame structures
- Deck machinery and equipment
- Painting, insulation and decoration
- Heating, water, air conditioning and piping systems
- Machinery and equipment
- Electronic, radio and communication equipment
- Worker's wages, social security pay and social insurance contributions
- Employee's salaries, social security pay and insurance contributions
- Other costs

The cost indices are formed in cooperation with domestic manufacturers. The weight structure of these cost indices is constant and revised every five years. The input indices do not take into account changes in structure, productivity or gross margins.

All other responding countries answered either that ships were excluded from their PPI, or that they had no production of ships.

Exclusion is often also the case for pleasure boats, although they are smaller and less complicated than large merchant vessels. However, there are at least more countries that are including pleasure boats than ships in their PPI. Eight countries (Finland, Germany, Greece, the Netherlands, Norway, Sweden, the United Kingdom and the United States) answered that they were doing so, while seven other countries answered that also boats were excluded from their PPI. One country (Luxembourg) has no domestic production of pleasure boats. The most common methods to handle quality changes are judgmental adjustment and overlap pricing. A combination of several methods is common, and in some countries a combination of an explicit and an implicit method to handle quality changes is used. Examples are Norway using a combination of link to show no change, overlap pricing, option cost adjustment and judgmental adjustment, and the United States using a combination of link to show no change, overlap pricing and production cost adjustment.

As for ships, an aeroplane is also an extremely difficult commodity of which to produce a price index for production. Only four countries (Sweden, Switzerland, the United Kingdom and the United States) answered that they were including aeroplanes in their PPI. Sweden is using an overlap pricing method where the old item is replaced with a new as soon as it comes to their knowledge. Since it is annual chaining, December from the previous year is the base. If it is not possible to get a December price for the new item, the old item's price development during the same period is used. Switzerland is using a combination of overlap pricing and judgmental adjustment. The choice of method is according to the individual situation. The United Kingdom is using a combination of link to show no change and production cost adjustment.

The United States is using a different approach. An attempt is made to price a base configuration of the aeroplane so to minimise the needs to quality adjust. This method for military aeroplanes is described by Zierner and Kelly (1993). The price in a base year of a well-specified product and the current price are collected. All changes in prices are analysed for each component of the aeroplane (wings, engine, navigation equipment, etc.) to evaluate the quality change. Quality adjustment is regarded as adjusting for changes in the ability of each of the components to perform its assigned tasks. The procedure for this quality adjustment is known as the "performance/cost of production" method of adjusting for quality change. Changes in performance are not used to value the quality of a component. They are used only to determine whether there has been a quality change. Only adjustments that makes the component more able to perform its task is regarded as a quality change. Any other change, such as repair work to repair a defect in the new model, for example, is regarded as a price change.

When there is a change in quality of some elementary components, different methods can be used for quality adjustment depending on the nature of the product or of the change: judgmental adjustment provided by the enterprise, production cost, overlapping or option price.

Another important point is that the costs of improving the performance should be adjusted for learning effects. Manufacturing of complicated structures is technically advanced, and the manufacturing of a new model often gets less expensive over time as the process is learned. Therefore costs of the improvement should be measured after most of the learning effect is absorbed, and then deflated to the time period of the introduction of the improvement.

This method requires a detailed information about the cost structure of the production.

Another complicated product where most countries are calculating a PPI is special purpose machinery. Examples of such machinery are:
• Paper producing machinery
• Textile machinery
• Moulds
• Machinery for metal processing
• Electrical utility generating equipment

The most common method to handle quality changes for special purpose machines is overlap pricing. Sweden is using the same method for overlap pricing as mentioned for aeroplanes. The United States always attempts production cost adjustment first, with price overlap as a fallback method and link to show no change as the default method. A combination of production cost adjustment and link to show no change is also used in the United Kingdom. An estimate of the price rise due to quality change is achieved following discussions with the contributor (production cost adjustment), and then use link to show no change if the price rise is entirely due to quality. If there is a mix of quality and price rise the index is changed by an appropriate amount. To choose which method to use to correct for quality change following a dialogue with the reporting units is also done in Norway. Germany sometimes is using prices of parts to machinery as an estimate for the whole machines, and have therefore answered "other method" as one of their methods to handle quality changes for special purpose machinery.

For personal computers France, Sweden and the United States are using hedonic regression to adjust for quality changes, making hedonic regression the most common way of adjusting personal computers for quality changes. In the United States hedonic regression is used in combination with production cost adjustment. Depending on the ability to get reliable cost data, production cost adjustment is tried first and then hedonic adjustment.

Finland is following the price movement of the best selling computer models in the market. When the models change, new prices will be adopted as such without making quality changes. Finland has therefore answered unadjusted price comparison.

The methodology used for quality adjustment in the import price index depends on whether the statistical institute is using the unit value method or collecting prices directly from importing firms. Possibilities for quality adjustment are better when prices are collected directly, as it is then possible to follow the price movement of a specific model of the commodity. With the unit value method it is usually only possible to follow the price movement of the whole commodity number, which, although the most detailed level of the nomenclature is used, includes not only different models and qualities of a commodity, but even different goods.

Ten of the responding countries are using the unit value method to calculate import price indices (although Portugal is using a hybrid, where for some commodities like ships prices are collected directly). Additionally, in Finland and Switzerland, unit value indices are produced by the Customs authorities, while price indices based on surveys from importing firms are calculated at the statistical institute. Ireland does not have a price index for imports, and treats imported commodities like home sales.

The countries that are using the unit value method have usually answered unadjusted price comparison, as few countries have developed methods for quality adjustment of unit value indices. Several countries have also answered imputation. In some countries, like Norway, unit values are not calculated for all commodities, as for some, especially capital goods, it is difficult to find a meaningful unit of quantity. Instead, a number of representative commodities are selected, and unit values of these commodities are imputed as price relatives for related commodities that are not

Table 5.3.   The import price index

Methods	Special purpose machinery	Personal computers	Passenger cars	Aero-planes	Ships	Furniture
Unadjusted price comparison	7	7	7	4	2	6
Link to show no change	1	1	1	1	1	1
Price overlap	4	3	4	0	0	4
Imputation....................................	3	1	3	2	2	3
Option cost adjustment................	1	1	2	0	0	0
Production cost adjustment	2	2	3	2	1	2
Hedonic adjustment......................	0	1	0	0	0	0
Judgmental adjustment................	4	3	4	1	1	4
Other method..............................	1	0	0	1	3	0
Excluded......................................	0	2	0	7	8	1
No production	1	0	0	0	2	0

Table 5.4.   The export price index

Methods	Special purpose machinery	Personal computers	Passenger cars	Aero-planes	Ships	Furniture
Unadjusted price comparison	7	7	7	3	2	6
Link to show no change................	1	1	1	1	1	1
Price overlap.................................	4	2	3	1	0	4
Imputation	3	0	3	2	2	3
Option cost adjustment.................	1	1	1	0	0	0
Production cost adjustment...........	2	2	2	2	1	2
Hedonic adjustment......................	0	1	0	0	0	0
Judgmental adjustment.................	4	2	3	2	1	4
Other method	1	0	0	1	2	0
Excluded	0	2	0	5	7	1
No exports	0	2	1	3	3	0

representative commodities. As relatively few capital goods are suitable as representative commodities, imputation is often used for these commodities, which is reflected in the answers on which methodology is used. The unit value method, with an emphasis on the Norwegian method of selecting representative commodities, is described in appendix C.

The only country which answered that they were using a method for quality adjustment (not only answering unadjusted price comparison or imputation) is France, that is using overlap pricing in addition to imputation for special purpose machinery, passenger cars and furniture. Personal computers, aeroplanes and ships are excluded from the index.

For the countries that are not using the unit value method, the most common method for quality adjustment is overlap pricing and judgmental adjustment. As overlap pricing is not always possible, these two methods are often used in combination. Germany stated that they prefer the price overlap method under the pre-condition that the old and the new product have a relevant market share, i.e. the old product is not yet a phased-out model with selling off price. They are also using judgmental adjustment as in some cases they have to ask experts for a quantitative judgment. For passenger cars Germany is also using the method option cost adjustment under the pre-condition that the extra characteristics, now included in the price of the new product, enjoyed a sufficient demand as an optional extra in the previous period. The Netherlands is always using overlap pricing by adopting a price for the "old" product for period t which indicates the actual "real" price development in relation to period t-1. The method is further described in the handbook by Statistics Netherlands (1997). The United States is using hedonic regression for imports of personal computers.

As for the PPI, ships and aeroplanes are often excluded from the import price index. This is the case both for countries who are using the unit value method and

those who do not. Of the countries that are using the unit value method, only Italy, Spain and New Zealand are including ships in their index, and they have answered either unadjusted price comparison or imputation as their method of quality adjustment. Portugal is collecting prices directly for ships, as they are using a hybrid of unit values and directly collected prices, and is using judgmental adjustment as their method for quality adjustment. Of the other countries only the United Kingdom and Finland are including ships in their import price index. The import index in the United Kingdom is not operational at the moment, but have answered production cost adjustment as the method they will use for quality adjustment of ships. Finland is using a very different method by collecting prices from publications with international traded prices. Rates and prices data are collected from Lloyd's shipping economist.

A few more countries (Luxembourg and Norway) in addition to those that are including ships are including aeroplanes in their unit value index for imports. Of the countries that are not using the unit value method, the United States is including aeroplanes in their import price index, using production cost adjustment to handle quality changes, while Finland is not including aeroplanes in their import price index.

For the export price index the situation is quite similar to the one for the import price index. There is a distinction between those countries that are using unit values, and those who are using collected prices. Ireland does not have a price index for exports, and treats exported commodities like home sales. Switzerland has integrated their export price index in the PPI, together with deliveries to the home market. Their answers on the export price index are therefore the same as for the PPI.

One difference between the export price index and the import price index is that almost all the selected capital goods are imported into all the responding countries, while not all countries have a production, and

therefore often not any export of these commodities. Therefore some countries have answered that they do not include passenger cars or computers in their index, as they do not have any export of these commodities.

Finland is using a different method for their export price index for ships than for their import price index. The export price index for ships in Finland is integrated in the PPI together with deliveries to the home market, which is an input method, and is explained in the description of methods used in quality adjustment of the PPI.

5.2. Methods used in various countries for each index

In this chapter we have listed the type of method which is used in each of the responding countries for each of the specified commodities, with one table for each index. By this, we can see what kind of methods that are most common for each of the selected commodities, and see for example if an explicit method is common for one commodity, while for other commodities implicit methods are used. We have grouped the methods together in four main groups. The first group of methods, called the A group, consist of implicit methods. The methods that are covered by this group are: unadjusted price comparison, link to show no change, price overlap and imputation.

The second group of methods, called the B group, consist of explicit methods. This group covers option cost adjustment, production cost adjustment and hedonic adjustment.

The third group of methods, called the C group, consist of methods where the actual way of handling quality changes is not specified, so the method may be either implicit or explicit. This covers the method called judgmental adjustment and those who have answered "other method".

The fourth and last group of methods, called the D group, cover the answers where the statistical institute does not calculate an index for the commodity at all. This may be either because there is no production, import or export of the commodity, or because the statistical institute regards the commodity as so complicated that the commodity is excluded from the index altogether.

Table 5.5.   **The consumer price index**

Country	Personal computers				Televisions				Electric household stoves				Passenger cars				Boats			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Austria	x				x				x				x	x	x					x
Denmark			x		x		x		x				x		x		x			
Finland			x				x				x		x	x	x				x	
France	x				x				x				x	x						x
Greece			x				x				x				x					
Ireland	x				x				x				x				x			
Italy	x				x				x				x				x			
Luxembourg	x	x			x	x			x	x			x	x						x
The Netherlands		x			x		x		x		x		x		x		x		x	
New Zealand	x		x		x		x		x		x		x		x				x	
Norway	x						x				x		x				x			
Portugal	x				x				x				x				x			
Spain	x	x	x		x	x	x		x	x	x		x	x	x					x
Sweden	x						x				x				x				x	
Switzerland	x	(x)	x		x	(x)	x		x		x		x	x	x					x
United Kingdom	x	x			x				x				x	x						x
United States	x	x			x	x			x				x	x			x			
Total	13	6	6	0	13	4	9	0	13	2	8	0	15	8	9	0	7	0	4	6

Table 5.6.   The producer price index

Country	Special purpose machinery				Personal computers				Passenger cars				Aeroplanes				Ships				Boats				Furniture			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Denmark	x				x				x							x				x				x	x			
Finland			x		x							x				x			x					x			x	
France	x					x			x							x				x				x	x			
Germany	x		x		x		x		x		x					x				x	x		x		x		x	
Greece			x					x				x				x				x			x				x	
Ireland	x						x		x							x				x				x				x
Luxembourg	x							x				x				x				x				x	x			x
The Netherlands	x				x				x							x				x	x				x			
New Zealand	x		x					x	x		x					x				x			x		x		x	
Norway	x	x	x					x				x				x				x	x	x	x		x	x	x	
Portugal				x				x				x				x				x				x	x			
Spain	x				x				x							x				x				x	x			
Sweden			x			x					x				x					x			x				x	
Switzerland	x		x					x				x	x		x					x			x		x		x	
United Kingdom	x	x			x	x			x	x			x	x			x	x			x	x			x	x		
United States	x	x				x				x			x		x		x				x	x			x	x		
Total	12	3	7	1	6	4	2	6	8	2	3	6	3	1	3	12	2	1	1	13	5	3	5	8	12	3	7	2

Table 5.7.   The import price index

Country	Special purpose machinery				Personal computers				Passenger cars				Aeroplanes				Ships				Furniture			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Austria	x				x				x				x				x				x			
Denmark	x				x				x							x				x			x	
Finland			x		x						x					x			x				x	
France	x							x	x							x				x	x			
Germany	x	x	x		x		x		x	x	x					x				x	x			
Ireland	x							x	x							x				x				x
Italy	x				x				x					x			x				x			
Luxembourg	x				x				x							x			x		x			
The Netherlands	x				x				x							x				x	x			
New Zealand	x				x				x				x							x	x			
Norway	x		x		x				x				x		x		x			x	x		x	
Portugal			x				x				x				x				x				x	
Spain	x				x				x				x							x	x			
Switzerland	x		x		x	x	x		x	x	x		x				x				x			
United Kingdom	x	x			x	x			x	x			x	x			x	x	x		x	x		
United States		x				x				x			x							x		x		
Total	13	3	5	0	12	3	3	2	13	4	4	0	7	2	2	7	5	1	4	9	11	2	4	1

Table 5.8.   The export price index

Country	Special purpose machinery				Personal computers				Passenger cars				Aeroplanes				Ships				Furniture			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Austria	x				x				x				x				x				x			
Denmark	x				x				x							x			x		x			
Finland			x		x						x					x			x				x	
Germany	x	x	x		x	x	x		x	x	x					x				x	x			
Ireland				x				x				x				x				x				x
Italy	x				x				x				x				x				x			
Luxembourg	x				x				x							x				x	x			
The Netherlands	x				x				x							x				x	x			
New Zealand	x				x				x				x				x				x			
Norway	x		x		x				x				x		x				x	x	x			
Portugal			x				x				x				x					x			x	
Spain	x				x				x				x				x				x			
Switzerland	x		x					x				x	x		x					x	x		x	
United Kingdom	x	x			x	x			x	x			x	x			x	x			x	x		
United States		x				x				x				x						x		x		
Total	11	3	5	1	11	3	2	2	10	3	3	2	7	2	3	6	5	1	3	8	11	2	3	1

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Methods to handle quality changes and new goods

Permanently missing products

The need for quality adjustments in price index computation generally occurs when a priced product is *permanently* missing. It is temporarily missing if it is not available due to seasonal shortages, low inventory or similar reasons and the shop expects to continue to sell the product. So permanently means that the product no longer will be produced. When a permanently missing item has to be replaced a decision must be made as to whether the new and the old product are of comparable quality. The following three general procedures are the most common:

An expert examines information on the two versions of the item and determines whether;
a) the change of the quality of the item is not significant, and the two prices can be compared directly, or
b) a significant change has occurred, and information is available for estimating the quality change in monetary values, or
c) a significant change has occurred, but sufficient information is not available to estimate the value of the quality change.

In a) the new product chosen is comparable to the old product and no special procedures for calculating the index have to be made. In b) and c) an estimate is needed for the value of the quality difference, and a direct adjustment and imputation is done.

Explicit quality adjustment

Estimation of the quality difference in monetary values by direct adjustment is generally handled in two ways. The first method is for the data collector who is observing the goods to determine the value, either through direct knowledge or in consultation with the personnel in the outlet or firm where the product is sold or produced. A second method is hedonic regression analysis. Both methods have its limitations. Estimates by producers of their marginal costs for changes are often hard to come by because producers can be unwilling to provide such information which can be regarded as sensitive and confidential. Hedonic methods on the other hand require databases with product characteristics that require both substantial design and maintenance costs. When explicit adjustment is not practical some kind of implicit measurement of the effect of quality change must be found. Several methods can be used to implicitly measure the effect of quality change. The methods require different sets of data and a given way of data collection.

Implicit quality adjustment

A preferred implicit method is the so-called *overlap pricing*. In order to use this method it is necessary to

observe the new and the old product and their prices in the marketplace at the same time period. This period is known as the overlap period. In the overlap period the price change of the old product is used as the price index and the price change of the new product is used in the next period. The price differential between the two varieties is the value of the quality difference and has been determined by the market at market prices.

The overlap method requires availability of the old and the new product for the same time period. This is not always (or maybe normally) the case. Another frequently used method is *imputation* or *splicing*. With this method price change using current price information from other sample observation is employed to estimate the value of the quality change.

When imputing - the first step is to calculate the rate of price change based on a class of other goods and ignore the goods that were replaced. The method of imputation can produce good quality adjustment under certain assumptions, like all items in a class are close substitutes.

Extensive research has indicated that direct and implicit quality adjustments can be significant. For example, the change in the price index for new cars from 1967 to 1994 in the CPI (United States) would have been 80 per cent greater if no adjustments had been made for quality improvements, see Abraham (1995). Studies have also indicated that the difference between using explicit and implicit quality adjustments can be substantial. Gordon (1990) found that because the BLS indices failed to capture quality improvements fully using implicit rather than explicit methods (like hedonic methods), the inflation rate in consumer durables was biased upward by 1.5 per cent per year over the period 1947-1983.

Unique goods

By unique goods, we mean goods that are not regularly traded. They may be produced by special design, or for a special purpose. This is often the case for machines or other complicated constructions. For such goods it is by nature not possible to observe the actual transaction price of a commodity during subsequent time periods. One method to handle this problem, and calculate indices also including unique goods is the use of model pricing. In cooperation with the respondent enterprise the statistical institute selects one or more of the unique goods delivered during a past time period. A careful specification of the (physical) product and the kind of transaction is laid down, so that all of the price-determining characteristics are specified. The respondent is then asked to provide regularly a realistic offer for this commodity. In this offer price he must

take into account not only the actual production cost, but also the actual market condition (which determines the profit margin). These offers are then treated like actual transaction prices. One must regularly check the validity of this procedure. If a certain model becomes obsolete, a newer one must replace it.

The external trade unit value method

The unit value concept

There are basically two different methods for measuring price changes for goods in external trade. One is to calculate a pure price index for imports and exports based on a survey among exporters and importers. Producing firms are asked for their prices on goods for the export market, and importing firms are asked about basic prices of their imported goods. This methodology is similar to the methodology used in calculating the PPI.

A fundamentally different method is the unit value method, which is used by a number of countries, among them Norway. Data for index calculation are not collected directly from firms, but from the primary data of external trade statistics. The data source for external trade statistics is the reported data in the customs declaration all importers and exporters have to fill in when trading with a country outside the EU for the EU member countries, and for trade with all foreign countries for non-EU members. For trade within the EU (intra-trade), firms have to fill in a special questionnaire for statistical purposes (Intrastat). In this description of the unit value method we will not distinguish between intra-EU and extra-EU trade, but regard all trade with another country as external trade.

Prices of imported and exported goods are calculated from the same customs data as external trade statistics are based on as the ratio between the value and the volume of a commodity. Commodities are defined according to the nomenclature for external trade statistics, normally the international customs classification nomenclature, the Harmonised System (HS), from which the EU nomenclature for external trade, the Combined Nomenclature (CN), is based.

The unit value is defined as:

$$\overline{\overline{p}} = \frac{v}{q} = \frac{\sum\limits_{i=1}^{k} v_{ij}}{\sum\limits_{i=1}^{k} q_{ij}} = \frac{\sum\limits_{i=1}^{k} \sum\limits_{j=1}^{n_i} v_{ij}}{\sum\limits_{i=1}^{k} \sum\limits_{j=1}^{n_i} q_{ij}} = \frac{\sum_{ij} q_{ij} p_{ij}}{\sum_{ij} q_{ij}},$$

where
- v_{ij} is the value of the consignment j to (from) country i.
- p_{ij} is the price per unit for consignment j, country i.
- q_{ij} is the quantity of consignment j to (from) country i.
- n_i are the number of consignments to (from) country i (i=1,2,...,k).

The unit value of a commodity is the ratio between the total value and the corresponding total quantity of the commodity, both aggregated over consignment j and country i. This is equal to the weighted average of the price of the transactions involved using the corresponding quantities as weights. Imports and exports are treated separately.

In external trade statistics all volumes are given in tonnes, where this is meaningful (i.e. not electricity, which is normally given in kWh), and a supplementary unit suitable for the commodity if this is the most appropriate unit of quantity. This supplementary unit may be cubic metres, pieces, litres, etc. For capital goods the most common supplementary unit is pieces.

The unit value of a period (month, quarter, year) is divided by the unit value of the base period to obtain a price relative.

$$R_t^i = \frac{P_t^{i}}{P^i_{t-1}},$$

where
- R_t^i = the price relative of commodity k in period t.
- P_t^{i} = the unit value of commodity k in period t.
- P^i_{t-1} = the unit value of commodity k in period t-1 (the base period).

By dividing current values of each commodity by the price relatives of the respective commodity, one obtains the value of the commodity in constant prices (the prices of the previous period). By chaining to a fixed reference year we obtain the value in prices of the reference year. By adding together external trade commodities in constant and current prices, we get values in constant and current prices according to commodity groups of the nomenclature of the national accounts, such as NACE or CPA.

After calculating price relatives for every commodity, the Laspeyre's volume index for external trade is calculated as:

$$Q_{01}^{La} = \frac{\sum\limits_{i=1}^{n}(q_1^i p_1^i) / R_1^{i}}{\sum\limits_{i=1}^{n} q_0^i p_0^i} = \frac{\sum\limits_{i=1}^{n}(q_1^i p_1^i) / \frac{p_1^i}{p_0^i}}{\sum\limits_{i=1}^{n} q_0^i p_0^i} = \frac{\sum q_1 p_0}{\sum q_0 p_0},$$

where

- p_0^i = unit value of commodity i in period 0.

- p_1^i = unit value of commodity i in period 1.

- q_0^i = quantity of commodity i in period 0.

- q_1^i = quantity of commodity i in period 1.

- R_1^i = price relative of commodity i.

- $q_0^i p_0^i$ = value of commodity i in period 0.

- $q_1^i p_1^i$ = value of commodity i in period 1.

The commodities are summed up over n number of commodities. The number n may be the number of commodities belonging to a commodity group (NACE, CPA, SITC, etc.) at a decided level or, in calculating the total index, the total number of commodities.

The Paasche's price index is implicitly calculated as the ratio of the value index to the Laspeyre's volume index:

$$Q_{01}^{La} * P_{01}^{Pa} = \frac{\sum q_1 p_0}{\sum q_0 p_0} * \frac{\sum p_1 q_1}{\sum p_0 q_1} = \frac{\sum p_1 q_1}{\sum p_0 q_0} = V_{01} \,,$$

which gives:
$P_{01}^{Pa} = V_{01} / Q_{01}^{La}$, where

- P_{01}^{Pa} = the Paasche's price (unit value) index.

- Q_{01}^{La} = the Laspeyre's volume index.

- V_{01} = the value index.

Problems with unit values
The calculation of indices for external trade are associated with the decomposition of the series of value into price and volume changes. This implies that one has to decide for which component to choose formula. Because the price relatives are used as deflators for national accounts this is already determined. Volume indices are calculated according to Laspeyre's formula, and price indices are calculated according to Paasche's formula.

The theory seems unproblematic for this kind of decomposition. In practice, however, there are some difficulties.

Product-mix
The main objection to the use of the unit value approach has been that even the most detailed commodity specification in the foreign trade statistics is not detailed enough for the price data required for the decomposition of the flow values. The unit value approach may in this case fail to give a satisfactory price in the sense of being liable to unit value bias.

The aggregation of the quantities reported for a group of transactions classified into a given commodity number can only be achieved if the quantity units employed are important in determining the value. If, for example, the commodity classification is "electrical refrigerators for households" which in CN terms refer to a 9-digit item, the quantity is measured by number of refrigerators. Due to this classification it is not taken into account that capacity, trim and utility options can vary with each brand name and model size.

Measures of unit values will not give satisfactory results if the CN-commodity covers aggregated heterogeneous products. If shifts of products within such a commodity occur, they give rise to false movements in the indicator of price change. Even at the detailed level of CN-9 some of the commodities may be composed of very different goods. Examples of such goods are goods labelled as "other goods of ....", "parts to ....", etc. The unit values for these commodities can not be used in index computation.

No unit of quantity
Several commodity classification categories and particularly those related to capital equipment, machine tools and several varieties of consumer goods have often no meaningful unit of quantity. These commodities are often unique in the sense that they are goods which due to their characteristics, cannot be matched over time with similar goods.

Change in quality
When a commodity is exposed to quality changes, the critical point in connection with the problem of decomposition of the value flow is that changes in the physical characteristics of a commodity might indicate that the unit, in which quantity is measured, is no longer the same. Quantities before and after the change has taken place would not, strictly speaking, be comparable. The result can be that a commodity exposed to heavy quality changes causes a kind of false variation in price, and should not be incorporated in a price index. One example could be personal computers, where a new model this year costs about the same as a new model some years ago, but where the capacity has improved radically. In reality there has then been a sharp decline in the price of personal computers, but just to compare the prices of new computers from one year to another does not catch this. Commodities exposed to significant quality changes should therefore be deleted from the index calculations. This problem is not different from the problem of quality changes discussed for pure price indices, based on surveys, and which is discussed in other chapters of this report.

The problem of quality changes in external trade statistics can be of importance for analysing trade between countries that export different kinds of products. In that manner a worsening of the terms of trade for a country which exports raw materials and

imports industrial goods, can be a result of or partly a result of an "index-contribution".

Changes of commodities in the Customs Tariff
When commodities in the Customs Tariff are deleted, divided or new products are introduced, matching of commodities can be a problem. It will especially be a problem if there is a long span of time between the basis and the calculating year. But also changes in the nomenclature from one year to the next may be substantial, as the Customs Tariff some years is subject to major revisions. One way to overcome this is to establish a link between old and new commodity numbers that covers the same goods. This may be straightforward if goods just change commodity number from one year to the next (an one-to-one link), or if a commodity is split into two or more new numbers (one-to-many link). It is more difficult, or even impossible, if there is a total change across many commodity numbers, so that some parts of a commodity number are assigned to some other different commodity numbers (a many-to-many link).

How to deal with the problems of unit value indices?

We have now seen that a lot of commodities in the Customs Tariff do not have an accepted price concept. How can we express the price movements of these commodities?

In lack of an appropriate price concept we have to use the commodities with acceptable unit values as specimen products for them. This is a simple but most appropriate solution to the problem when the national accounts need price relatives for all commodities exported or imported.

The problems can be summarised as follows:

In order to calculate quantity and price indices on the basis of statistical data supplied for the regular external trade statistics, answers must be found to the following questions:

(i)   How should commodities in the Customs Tariff with acceptable unit value be identified (selected)?

(ii) Given the list of "acceptable commodities", how should the index be calculated when the indices are required to also cover commodities with unacceptable unit values?

(iii) Commodities in the Customs Tariff are not specific enough. This means that commodity numbers may cover a wide range of products which makes the value and quantity figures useless for statistical purposes.

(iv) Even physical homogenous products can be distributed to different prices in different markets, i.e. in different countries or in accordance with the size of the consignment of goods.

In the last mentioned argument the value of the goods can change as a result of:
• The prices have changed (in one or several markets).
• The quantities have changed.
• The relative share of the sales on various markets is changing.

The effects of these three relations are represented as the price effect, quantity effect and the shift effect. When we want to have a price and volume effect that reflects just the true price and volume changes, the shift effect must express the change in value that can not be explained by these components. The formula can be written as:

$$P \times Q \times S = V, \quad \text{where}$$

P is the price component, Q is the quantity component, S is the shift component and V is the value.

Since the value indices of the external trade shall be decomposed in only a price and a volume component given by the formula:

$$P^* \times Q^* = V, \quad \text{where}$$

P^* and Q^* are the "pure" price and quantity components, the shift component has to be placed together with either the price or volume component. This gives us the opportunity to decide which component we want to keep "pure".

The problems caused by the shift effects are considered as more serious in the national accounts figures at constant prices than for the indices of the external trade. The reason is that the national accounts have to take domestic deliveries into consideration. As a result it is common to implement the shift effects in the price component in the calculations of indices of external trade. An implication is that the volume component expresses changes in quantities for imports and exports. This assumes physical homogenous commodities and price differentiation due to conditions in the market.

There are two areas that are very important in connection with the choice of price concepts in the calculations of indices. One is that the calculations of indices should give coherent price and volume components for series of values. The other is that the volume component shall express changes in quantities. This leads to a price component that corresponds to value divided by volume, and that is the same as the average price or the unit price in the period the value figures refer to. The demand for a volume component that reflects the change in quantity leads to a Laspeyre index. Then it follows that the price index is given by the Paasche formula.

The selection of "unit value" commodities

The possibilities for unit value bias imply that the specification in the Customs Tariff, to which the basis price p_0 refers, contains different products. In order for this to lead to unit value bias, the price of the products in the base year must be different, and at the same time, the relative quantities of the products must have changed. To identify the unit value bias potential of commodities in the Customs Tariff, a more detailed analysis of the basic statistical data for external trade is of help. Such a selection is done in several countries, like Norway, by a statistical analysis of price variation of all Customs Tariff commodities from the external trade statistics. By this analysis commodities that show a small variance in unit price, as measured by the standard deviation, are selected as representative commodities.

The basic statistical data for foreign trade give the opportunity to analyse the shift effects when they can be related to price variation between countries and the size of consignments. These kinds of shift effects are accepted as real price changes when they are due to price differences between countries and size of consignments. The price differences between countries can be explained by conditions in the market, policy of trade etc. But shift effects related to variation in prices between countries because of specialisation are not accepted as a real price change.

Based on these representative commodities, price indices are calculated for every commodity group. The price index of the commodity group is imputed as the price relative of all non-representative commodities belonging to this commodity group. In Norway, these indices are calculated on a SITC-3 level, so that every commodity that is not a representative commodity gets as price relative the price index of the SITC-3 commodity group it belongs to. Commodities in the SITC-3 groups are by this method regarded as sufficiently close to be assumed to have a similar price movement.

The Norwegian method of selecting representative commodities, and using them to impute price relatives on non-representative commodities, was developed and documented by Brenna (1973). The United Nations (1991) has published a description of the Norwegian methodology in English.

International studies

Gordon's study

Although many studies have concentrated on specific goods or a limited variety of indices, there are some important studies discussing the general problem of price measurement when facing quality adjustments for capital goods. One important work was done by Gordon (1990). This work was primarily concerned with the producer price index (PPI), but also included a study on some important capital goods on the consumer side.

General methodology

Gordon used a new method to calculate producer price indices and consumer price indices for a selected number of capital goods for the period 1947 to 1983, and compared these indices with the conventional indices calculated by the Bureau of Labor Statistics (BLS) in the United States. The main difference between Gordon's method and the traditional method of the BLS was that Gordon followed a detailed analysis of price data for the individual capital goods, with a detailed history of technological and quality changes. He was also careful only to monitor real transaction prices rather than list prices. The sources for his indices were mail-order catalogue prices, price observations from Consumer Reports articles on household appliances, typewriters, outboard motors, as well as data on operating characteristics, repair records, reliability and similar data from other relevant magazines (mainly professional magazines) to find consumer price and producer price data over time. There was no overlap between Gordon's data and the data collected by the BLS for CPI or PPI.

Alternative index formula

Gordon was also using a different index formula, as he is critical of the Laspeyre and Paasche formulas. They both depend on the basket of commodities in the current year or the reference year, and are therefore not taking into account the consumers' or the producers' ability to change their consumption pattern or production technology to avoid the full impact of price changes. Gordon also criticised the weights for being out of date. Gordon found that the BLS was using 1972 weights in 1983, which was the last year of his study.

Gordon therefore used a so-called ideal index, the Tornqvist index, where such a substitution bias is almost eliminated. Another example of such an ideal index formula is the Fisher index formula.

Results

Gordon found in his study an unambiguously upward bias for durable goods in the PPI and, to a lesser extent, for durable goods in the CPI. The deviation between Gordon's study and the official PPI for the period 1947-1983 was for the total index on average 2.9 percentage points per year. For product groups the largest difference was 9.32 percentage points for office, computing and accounting machinery. In parts of the period the deviation was even larger, with a deviation of 12.69 percentage points for aeroplanes in 1947-1960, and 16.61 percentage points for office, computing and accounting machinery for 1960-1973.

For capital goods for consumption, Gordon found a deviation between his results and the CPI of 1.54 per cent over the 1947-1983 period. The largest deviation was for radios and TVs, with an average deviation per year of 5.9 per cent and of 9.1 per cent in 1947-1960.

Gordon claims that the measured drift is caused by a systematic failure in the official PPI and the CPI to capture quality changes adequately for those types of durables that have the most rapid rates of growth of nominal demand. Regression analysis shows a significant relationship between the drift and the technological complexity of the product or the presence of electronic components. He also claims that the PPI and the CPI introduce new models too late, and tracks obsolete models too long. New technological models are introduced as new goods, without any linking to the old ones which they replace (like integrated circuits for transistors). This technological innovation will therefore not be represented as a fall in prices, which they should by linking.

For traditional product lines with a slow pace of technological advances, the PPI is adequate, and there are small differences between Gordon's study and the PPI. But when technological change is rapid, the PPI relies on reporters (officials in manufacturing firms) who have little knowledge of the purposes of their PPI reports. They have little concern for flagging quality improvements or to introduce new models in the index. The easiest way is to report prices of the same old model, even if sales have almost disappeared.

This bias in the index causes a dramatic deviation of key macro-economic data of the United States in the period surveyed, compared with official indicators. There was a higher investment/GDP ratio, different price development for capital goods than for non-durables and services and higher share of durables in output compared with non-durables and services. There was also a change in relative prices and quantities of durables versus non-durables and services, and a bias in absolute prices and quantities for the GDP as a whole, compared with official figures.

The Boskin report
Another study was the report to the United States Congress by a group of statistical experts in 1996 led by Professor Michael Boskin (1996) on bias in the CPI. This report was, at least for capital goods, building to a large degree on the results of Gordon's study, although the Boskin report was only discussing consumer prices, while Gordon's most detailed study was on producer prices. The Boskin report treated the whole spectrum of consumer goods, not just capital goods.

The Boskin report divided the discovered bias in three categories:
1. Substitution bias. The fixed weights of the Laspeyre index fail to reflect that consumers adjust to price changes by substituting goods that may have become more expensive with goods that have come relatively cheaper when relative prices change, thereby being able to avoid the full impact of price increases. The Boskin report divides this into two kinds of substitution biases.
   1.1. Macro level: Because the BLS uses a Laspeyre index with fixed-weights to get total index from lower level indices instead of a Tornqvist index.
   1.2. Micro level. Consumers change from expensive to less expensive outlets, or they may change from a more expensive to a cheaper brand of a product.
2. Quality change bias occurs when improvements in the quality of goods, such as greater energy efficiency or less need for repair, are measured inadequately or not at all. This is one of most serious causes for bias of capital goods. Here the Boskin report is building on Gordon's work.
3. New goods bias occurs when new goods are not introduced in the sample of goods, or included only after a very long lag.

The Boskin report estimates upward bias of the CPI in the United States of 1.1 per cent per year. It gives a range of plausible values 0.8 to 1.6 per cent per year. Of this, it gives an estimate of bias caused by quality change and new goods together of 0.6 per cent.

This quantification of bias in the CPI was disputed by several experts within the National Statistical Institution in a collection of replies to the Boskin report, edited by Decharme (1997). Although there was a consensus also among the National Statistical Institutions on the qualitative statement, that there was a bias in the official CPIs caused by inadequate handling of quality changes and new goods, the ability to quantify this bias was regarded as dubious.

Questionnaires used in the survey of national practice on index calculation and quality adjustment

Statistisk sentralbyrå
Statistics Norway

<table>
<tr><td align="center">A1
The consumer price index
<i>Survey of methodology used in European and North-American statistical institutes</i></td></tr>
</table>

This part of the survey is expected to give general information on how to calculate the consumer price index, and not only for capital goods. In the questionnaire, we use the phrase "reporting unit" to refer to the unit responsible for the supply of all queried information.

Please take time to fill in the questionnaire. If nothing else is stated, tick only *one* box for each question.

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

Data collection in the consumer price index

1. Is it statutory or voluntary for the reporting unit to take part in your consumer price index?

☐   Statutory
☐   Voluntary

2. How do you collect data for your consumer price index?
If you use a combination of methods, please tick a box for each of the methods you use.

☐   Self-administered questionnaire —> go to question 3
☐   Face-to-face interviewing using paper questionnaire —> go to question 3
☐   Face-to-face interviewing, computer aided —> go to question 4
☐   Telephone interview —> go to question 4

3. Do you pre-print your questionnaire with figures from previous periods?

☐   Yes, always
☐   Yes, in certain cases. Please describe

Description: _____

☐   No

4. Do representatives from your statistical office visit the reporting units regularly for other purposes than collecting price information?

☐   Yes   ——> go to question 5
☐   No   ——> go to question 6

5. What is (are) the purpose(s) for the visits, and how often do they visit the units?

Please describe:

_____

_____

_____

_____

_____

Sample design in the consumer price index

6. How many reporting units contribute to your survey?

7. How often do you resample reporting units?

- ☐ Yearly
- ☐ Every five years
- ☐ Every ten years
- ☐ At other intervals, please describe

Description:_____

_____

8. What sample design is your survey based on when you resample reporting units?

- ☐ Judgmental ——> please describe
- ☐ Purposive   ——> please describe

Description:_____

_____

_____

_____

9. How many elementary aggregates are covered by your survey?
By elementary aggregates we mean the first level of aggregation.

10. How often do you resample goods and services (representative items)?

- ☐ Yearly
- ☐ Every five years
- ☐ Every ten years
- ☐ At other intervals, please describe

Description: _____

_____

11. What sample design is your survey based on when you resample goods and services?

☐   Judgmental ——> please describe
☐   Purposive   ——> please describe

Description:_____

_____

_____

_____

_____

Weighting and computation of the consumer price index

12. How often do you reweight (using national accounts or household budget surveys)?

☐   Yearly
☐   Every five years
☐   Every ten years
☐   At other intervals, please describe

Description: _____

_____

13. How many price equations do you enter into the computation of the index?

14. Which index formula do you use when computing the consumer price index?

☐   Laspeyre
☐   Other, please describe

Description: _____

_____

_____

_____

15. Do you use periodical chaining?

☐   Yes, yearly chaining
☐   Yes, other periodical chaining. Please describe

Description: _____

☐   No

16. How do you compute your microindex?
If you use a combination of methods, please tick a box for each of the methods you use.

☐   Ratio of average prices
☐   Average of price ratios
☐   Geometric mean
☐   Other, please describe

Description: _____

_____

_____

_____

17. Do you use hedonic regression in the consumer price index?

☐   Yes   ——> go to question 18
☐   No

18. For which commodities or commodity groups do you use hedonic regression?

Description:_____

_____

_____

_____

_____

_____

Thank you for filling in the questionnaire and giving us valuable information!

Statistisk sentralbyrå
Statistics Norway

A2
The producer price index
Survey of methodology used in European and North-American statistical institutes

This part of the survey is expected to give general information on how to calculate the producer price index, and not only for capital goods. In the questionnaire, we use the phrase "reporting unit" to refer to the unit responsible for the supply of all queried information. In the producer price index reporting units usually are enterprises.

Please take time to fill in the questionnaire. If nothing else is stated, tick only *one* box for each question.

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

Data collection in the producer price index

1. Is it statutory or voluntary for the reporting unit to take part in your producer price index?

☐   Statutory
☐   Voluntary

2. How do you collect data for your producer price index?
If you use a combination of methods, please tick a box for each of the methods you use.

☐   Self-administered questionnaire —> go to question 3
☐   Face-to-face interviewing using paper questionnaire —> go to question 3
☐   Face-to-face interviewing, computer aided —> go to question 4
☐   Telephone interview —> go to question 4

3. Do you pre-print your questionnaire with figures from previous periods?

☐   Yes, always
☐   Yes, in certain cases. Please describe

Description: _____

☐   No

4. Do representatives from your statistical office visit the reporting units regularly for other purposes than collecting price information?

☐   Yes   ——> go to question 5
☐   No   ——> go to question 6

5. What is (are) the purpose(s) for the visits, and how often do they visit the units?

Please describe:

_____

_____

_____

_____

Sample design in the producer price index

6. How many reporting units contribute to your survey?

7. How often do you resample reporting units?

☐ Yearly
☐ Every five years
☐ Every ten years
☐ At other intervals, please describe

Description:_____

_____

8. What sample design is your survey based on when you resample reporting units?

☐ Judgmental   ——> please describe
☐ Purposive   ——> please describe

Description:_____

_____

_____

9. How many representative commodities are covered by your survey?

10. How often do you resample representative commodities?

☐ Yearly
☐ Every five years
☐ Every ten years
☐ At other intervals, please describe

Description: _____

_____

11. What sample design is your survey based on when you resample representative commodities?

☐   Judgmental   ——> please describe
☐   Purposive   ——> please describe

Description:_____

_____

_____

_____

_____

Weighting, computation and classification of the producer price index

12. How often do you reweight?

☐   Yearly
☐   Every five years
☐   Every ten years
☐   At other intervals, please describe

Description: _____

_____

13. How many price equations do you enter into the computation of the index?

☐☐☐☐☐

14. Which index formula do you use when computing the producer price index?

☐   Laspeyre
☐   Other, please describe

Description: _____

_____

_____

15. Do you use periodical chaining?

☐   Yes, yearly chaining
☐   Yes, other periodical chaining. Please describe

Description: _____

☐   No

16. By what classification system do you collect data for the producer price index?

☐   HS/CN
☐   CPA/PRODCOM
☐   Other system, please describe

Description: _____

_____

17. Do you use hedonic regression in the producer price index?

☐   Yes   ——> go to question 18
☐   No

18. For which commodities or commodity groups do you use hedonic regression?

Description:_____

_____

_____

_____

_____

_____

Thank you for filling in the questionnaire and giving us valuable information!

Statistisk sentralbyrå
Statistics Norway

| **A3** |
| **The external trade price index** |
| *Survey of methodology used in European and North-American statistical institutes* |

This part of the survey is expected to give general information on how to calculate the external trade price index, and not only for capital goods. In the questionnaire, we use the phrase "reporting unit" to refer to the unit responsible for the supply of all queried information. On most questions, we ask you to give answers for imports and exports separately.

Please take time to fill in the questionnaire. If nothing else is stated, tick only *one* box for each question.

Please note that you *only* need to fill in this questionnaire if your index is entirely or partly based on *direct* price collection from reporting units.

Those who do *not* use direct price collection, please tick the box below, fill in the names, and return the questionnaire.

☐ **Direct price collection not in use.**

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

General questions

1. Do you use direct price collection for all commodities, or do you use a hybrid of unit values and indices calculated by direct price collection?

Imports

☐ Direct price collection for all
      commodities.

☐ A hybrid of unit values and indices
      calculated by direct price collection.

Exports

☐ Direct price collection for all commodities.

☐ A hybrid of unit values and indices
      calculated by direct price collection.

2. For which commodities or commodity groups do you use unit values?

Description:_____

_____

_____

_____

3. How often do you publish your indices?

Imports

☐ Monthly
☐ Quarterly
☐ Annually
☐ At other intervals, please describe

Description: _____

Exports

☐ Monthly
☐ Quarterly
☐ Annually
☐ At other intervals, please describe

Description: _____

Data collection in the external trade price index

4. Is it statutory or voluntary for the reporting unit to take part in your external trade price index?

☐ Statutory
☐ Voluntary

5. How do you collect the data for your external trade price index?
If you use a combination of methods, please tick a box for each of the methods you use.

Imports   **Exports**

☐ Self-administered questionnaire   ☐ Self-administered questionnaire
    —> go to question 3   —> go to question 3
☐ Face-to-face interviewing using paper   ☐ Face-to-face interviewing using paper
    questionnaire —> go to question 3   questionnaire—> go to question 3
☐ Face-to-face interviewing, computer aided   ☐ Face-to-face interviewing, computer aided
    —> go to question 4   —> go to question 4
☐ Telephone interview   ☐ Telephone interview
    —> go to question 4   —> go to question 4

6. If you use questionnaires, do you pre-print these with figures from previous periods?

Imports   **Exports**

☐ Yes, always   ☐ Yes, always
☐ Yes, in certain cases. Please describe   ☐ Yes, in certain cases. Please describe

Description: _____   Description: _____

☐ No   ☐ No

7. Do representatives from your statistical office visit the reporting units regularly for other purposes than collecting price information?

Imports   **Exports**

☐ Yes   ——> go to question 7   ☐ Yes   ——> go to question 7
☐ No   ——> go to question 8   ☐ No   ——> go to question 8

8. What is (are) the purpose(s) for the visits, and how often do you visit the units?
Please describe:
_____

_____

Sample design and weighting in the external trade price index

9. How many reporting units contribute to your survey?

Imports   **Exports**

☐☐☐☐☐   ☐☐☐☐☐

10. How often do you resample reporting units?

Imports	**Exports**
☐ Yearly	☐ Yearly
☐ Every five years	☐ Every five years
☐ Every ten years	☐ Every ten years
☐ At other intervals, please describe	☐ At other intervals, please describe

Description:_____   Description:_____

_____   _____

11. What sample design is your survey based on when you resample reporting units?

Imports

☐ Judgmental   ——> please describe
☐ Purposive   ——> please describe

Exports

☐ Judgmental   ——> please describe
☐ Purposive   ——> please describe

Description:_____   Description:_____

_____   _____

_____   _____

12. How many representative commodities are covered by your survey?

Imports

Exports

13. How often do you resample representative commodities?

Imports	**Exports**
☐ Yearly	☐ Yearly
☐ Every five years	☐ Every five years
☐ Every ten years	☐ Every ten years
☐ At other intervals, please describe	☐ At other intervals, please describe

Description: _____   Description: _____

14. What sample design is your survey based on when you resample representative commodities?

Imports

☐ Judgmental   ——> please describe
☐ Purposive   ——> please describe

Description:_____

_____

_____

_____

Exports

☐ Judgmental   ——> please describe
☐ Purposive   ——> please describe

Description:_____

_____

_____

_____

15. How often do you reweight?

Imports

☐ Yearly
☐ Every five years
☐ Every ten years
☐ Other intervals, please describe

Description:_____

Exports

☐ Yearly
☐ Every five years
☐ Every ten years
☐ Other intervals, please describe

Description:_____

16. Do you collect information on which country the commodity is exported to/imported from when you collect prices?

Imports

☐ Yes, by country of origin
☐ Yes, but only divided into EU/not EU
☐ No

Exports

☐ Yes, by country of destination
☐ Yes, but only divided into EU/not EU
☐ No

Computation and classification of the external trade price index

17. How many price equations do you enter into the computation of the index?

Imports

Exports

18. What index formula do you use when computing the external trade price index?

Imports	**Exports**
☐ Laspeyre	☐ Laspeyre
☐ Other, please describe	☐ Other, please describe

Description: _____

Description:_____

19. Do you use periodical chaining?

Imports

☐ Yes, yearly chaining
☐ Yes, other periodical chaining.
  Please describe

Description: _____

☐ No

Exports

☐ Yes, yearly chaining
☐ Yes, other periodical chaining.
   Please describe

Description:_____

☐ No

20. By what classification system do you collect data for the external trade price index?

Imports

☐ CPA/PRODCOM Nomenclature
☐ CN/HS Nomenclature
☐ SITC Nomenclature
☐ Other system, please describe

Description: _____

Exports

☐ CPA/PRODCOM Nomenclature
☐ CN/HS Nomenclature
☐ SITC Nomenclature
☐ Other system, please describe

Description:_____

21. Do you use hedonic regression in the external trade price index?

Imports

☐ Yes ——> go to question 21
☐ No

Exports

☐ Yes ——> go to question 21
☐ No

22. For which commodities or commodity groups do you use hedonic regression?

Description:_____

_____

_____

Thank you for filling in the questionnaire and giving us valuable information!

Statistisk sentralbyrå
Statistics Norway

A4 **The external trade unit value index** *Survey of methodology used in European and North-American statistical institutes*

This part of the survey is expected to give general information on how to calculate the external trade unit value index, and not only for capital goods. In the questionnaire, we use the phrase "reporting unit" to refer to the unit responsible for the supply of all queried information. On most questions, we ask you to give answers for imports and exports separately.

Please take time to fill in the questionnaire. If nothing else is stated, tick only *one* box for each question.

Please note that you *only* need to fill in this questionnaire if your index is entirely or partly based on *unit values*.

Those who do *not* partly or entirely use the unit value method, please tick the box below, fill in the names, and return the questionnaire.

☐   **Unit values not in use**

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

General questions

1. Do you use the unit value method for all commodities, or do you use a hybrid of unit values and indices calculated by direct price collection?

Imports

☐　Unit value method for all commodities.

☐　A hybrid of unit values and indices
　　calculated by direct price collection.

Exports

☐　Unit value method for all commodities.

☐　A hybrid of unit values and indices
　　calculated by direct price collection.

2. For which commodities or commodity groups do you use indices calculated by direct price collection?

Description:_____

_____

_____

3. How often do you publish your indices?

Imports

☐　Monthly
☐　Quarterly
☐　Annually
☐　At other intervals, please describe

Description: _____

Exports

☐　Monthly
☐　Quarterly
☐　Annually
☐　At other intervals, please describe

Description: _____

Data collection and Publication

4. By what nomenclature do you collect your data?

Imports

☐　CN
☐　HS
☐　SITC
☐　Other, please describe

Description: _____

Exports

☐　CN
☐　HS
☐　SITC
☐　Other, please describe

Description: _____

_____　_____

5. Do you use data from INTRASTAT to calculate your indices?

Imports	**Exports**
☐ Yes	☐ Yes
☐ No	☐ No
☐ Not relevant, not EU-member	☐ Not relevant, not EU-member

6. Do you use data from other indices calculated at your statistical office as input data for your unit value indices?

Imports	**Exports**
☐ Yes —> go to question 7	☐ Yes —> go to question 7
☐ No —> go to question 8	☐ No —> go to question 8

7. Please specify the type of index, and for which commodities it is used.

Imports

Index	*Country*	*Commodity*
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Exports

Index	*Country*	*Commodity*
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

8. Do you use indices from other countries' statistical offices as input data for your indices?

Imports	**Exports**
☐ Yes —> go to question 9	☐ Yes —> go to question 9
☐ No —> go to question 10	☐ No —> go to question 10

9. Please explain which indices you are collecting, from which country and for which commodities.

Imports

Index   *Country*   *Commodity*

_____   _____   _____

_____   _____   _____

_____   _____   _____

Exports

Index   *Country*   *Commodity*

_____   _____   _____

_____   _____   _____

_____   _____   _____

10. Do you use data from lists of international stock market prices for raw materials (oil, coffee, copper) when you calculate your indices?

Imports   **Exports**

☐   Yes —> go to question 11   ☐   Yes —> go to question 11
☐   No —> go to question 15   ☐   No —> go to question 15

11. For which commodities do you use data from lists of international trade prices or publications?

Imports   **Exports**

_____   _____

_____   _____

_____   _____

Coverage

12. Which commodity groups are covered by your indices?

Imports

☐ All
☐ All, except for ships
☐ All, except for SITC-9
   (misc. goods and services)
☐ Other variants, please describe

Description: _____

_____

Exports

☐ All
☐ All, except for ships
☐ All, except for SITC-9
   (misc. goods and services)
☐ Other variants, please describe

Description: _____

_____

13. Are all transactions covered by your indices?

Imports

☐ Yes —> go to question 15
☐ No —> go to question 14

Exports

☐ Yes —> go to question 15
☐ No —> go to question 14

14. What transactions are not covered by your indices?

Imports

☐ Goods imported after
   processing abroad
☐ Other transactions,
   please describe

Description: _____

_____

Exports

☐ Re-export of domestically processed
   goods
☐ Other transactions,
   please describe

Description: _____

_____

Analysis and methodology

15. Which index formula do you use for unit value indices?

Imports

☐ Laspeyre
☐ Paasche
☐ Fisher
☐ Other, please describe

Description: _____

_____

Exports

☐ Laspeyre
☐ Paasche
☐ Fisher
☐ Other, please describe

Description: _____

_____

16. Do you use periodical chaining?

Imports

☐ Yes, yearly chaining
☐ Yes, other periodical chaining.
Please describe

Description: _____

_____

☐ No

Exports

☐ Yes, yearly chaining
☐ Yes, other periodical chaining.
Please describe

Description: _____

_____

☐ No

Selection of representative commodities

17. Do you select representative commodities for unit value calculations by a statistical analysis of external trade data?

Imports

☐ Yes —>go to questions 18-21
☐ No —> go to question 24

Exports

☐ Yes —> go to questions 21-23
☐ No —> go to question 24

18. What is your lowest level of selection of representative commodities?

Imports

☐ Most detailed customs code level
☐ Customs code * country of origin
☐ Customs code * importing company
☐ Other, please describe

Description: _____

Exports

☐ Most detailed customs code level
☐ Customs code * country of destination
☐ Customs code * exporting company
☐ Other, please describe

Description: _____

19. What is your approximate annual coverage of representative commodities related to total import and export?

Imports

☐ 0-20 per cent
☐ 21-40 per cent
☐ 41-60 per cent
☐ 61-80 per cent
☐ 81-100 per cent

Exports

☐ 0-20 per cent
☐ 21-40 per cent
☐ 41-60 per cent
☐ 61-80 per cent
☐ 81-100 per cent

20. Do you impute price relatives for non-representative commodities from the representative commodities?

Imports

☐   Yes —> go to question 21
☐   No —> go to question 22

Exports

☐   Yes —> go to question 21
☐   No —> go to question 22

21. Please give a short description of your method for imputation.

Imports

_____

_____

_____

_____

_____

_____

_____

Exports

_____

_____

_____

_____

_____

_____

_____

22. Do you impute price relatives from other sources?

Imports

☐   Yes —> go to question 23
☐   No —> go to question 24

Exports

☐   Yes —> go to question 23
☐   No —> go to question 24

23. Please give a short description of your method for imputation.

Imports

_____

_____

_____

_____

_____

_____

_____

Exports

_____

_____

_____

_____

_____

_____

_____

24. Do you exclude extreme price relatives in index calculations?

Imports

☐ Yes —> go to questions 25-27
☐ No

Exports

☐ Yes —> go to questions 25-27
☐ No

25. What is the higher limit?

Imports

_____

Exports

_____

26. What is the lower limit?

Imports

_____

Exports

_____

27. Is the exclusion of extreme price relatives on consignment or commodity level?

Imports

☐ Consignment level
☐ Commodity level

Exports

☐ Consignment level
☐ Commodity level

Thank you for filling in the questionnaire and giving us valuable information!

Statistisk sentralbyrå
Statistics Norway

B1
Calculation of indices for capital goods –
The consumer price index
adjusting for quality changes
Survey of methodology used in European and North-American statistical institutes

---

In this questionnaire, we ask how you handle quality changes of capital goods in your consumer price index.

How to answer this questionnaire

On the next page, we have listed various methods used for handling such changes. On the following pages, we ask which method you use for certain types of capital goods. Several ticks are possible. If you use a **combination** of different methods for different products within a group for this index, tick the relevant boxes and give a further explanation below. If you use **other** methods than the methods listed, tick the box "other method" and give a further explanation below. If the commodity is **not relevant**, tick the last box.

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

A list of currently used methods for accounting for quality changes

A. Methods which involve replacements without explicit (or direct) quality adjustment.

1. **Unadjusted price comparison**. The estimated price change is the price of the new item in the comparison period divided by the price of the old item in the reference period.
2. **Link to show no change**. The estimated price change for the observation series is set to zero between the comparison period and the preceding period without use of an overlap method.
3. **Price overlap**. In at least one period prices for both an old and a new item are collected. Price change up to that period is estimated from the old item and after that period from the new item. An N-period overlap means that there are N consecutive periods of parallel pricing of both the old and the new item. The N-1 periods price change may then be based on either the old or the new item or of an average of the two.
4. **Imputation**. An average price change is imputed from a higher aggregate to which the observation series belongs.

B. Methods which involve replacements combined with explicit quality adjustment.

5. **Option cost adjustment**. This method values an extra characteristic, now included in the price of a composite product, at its actual price as an optional extra in the previous period or as a certain portion of that price.
6. **Production cost adjustment**. The producer is asked how much an extra characteristic costs to produce. This measure of cost is marked up to the retail level (in the case of a CPI) and used for adjusting the reference price.
7. **Hedonic adjustment**. The value of a characteristic is given by estimated coefficients in a multiple regression equation. Differences in the content of characteristics between the new and the old observation are multiplied by these values to provide a total adjustment to either the reference or the comparison price.
8. **Judgmental adjustment**. A quantitative judgment is made by experts, commodity specialists or price collectors such that a value is obtained for the quality difference between the old and the new observation.

1. Which method do you use for handling quality change when you calculate the consumer price index for *personal computers*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index

Further description:

_____

_____

_____

2. Which method do you use for handling quality change when you calculate the consumer price index for *televisions*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index

Further description:

_____

_____

_____

3. Which method do you use for handling quality change when you calculate the consumer price index for *electric household stoves*?

☐   Unadjusted price comparison
☐   Link to show no change
☐   Price overlap
☐   Imputation

☐   Option cost adjustment
☐   Production cost adjustment
☐   Hedonic adjustment
☐   Judgmental adjustment

☐   Other method, please give a further description below
☐   Not relevant, since these commodity is excluded from the index

Further description:

_____

_____

_____

4. Which method do you use for handling quality change when you calculate the consumer price index for *passenger cars*?

☐   Unadjusted price comparison
☐   Link to show no change
☐   Price overlap
☐   Imputation

☐   Option cost adjustment
☐   Production cost adjustment
☐   Hedonic adjustment
☐   Judgmental adjustment

☐   Other method, please give a further description below
☐   Not relevant, since the commodity is excluded from the index

Further description:

_____

_____

_____

5. Which method do you use for handling quality change when you calculate the consumer price index for *boats*?

By boats we think of yachts, other vessels for pleasure or sport, rowing boats and canoes.

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no domestic consumption of these commodities

Further description:

_____

_____

_____

Statistisk sentralbyrå
Statistics Norway

B2
Calculation of indices for capital goods –
The producer price index
adjusting for quality changes
Survey of methodology used in European and North-American statistical institutes

---

In this questionnaire, we ask how you handle quality changes of capital goods in your producer price index.

How to answer this questionnaire

On the next page, we have listed various methods used for handling such changes. On the following pages, we ask which method you use for certain types of capital goods. Several ticks are possible. If you use a **combination** of different methods for different products within a group for this index, tick the relevant boxes and give a further explanation below. If you use **other** methods than the methods listed, tick the box "other method" and give a further explanation below. If the commodity is **not relevant**, tick the last box.

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

A list of currently used methods for accounting for quality change

A. Methods which involve replacements without explicit (or direct) quality adjustment.

1. **Unadjusted price comparison**. The estimated price change is the price of the new item in the comparison period divided by the price of the old item in the reference period.
2. **Link to show no change**. The estimated price change for the observation series is set to zero between the comparison period and the preceding period without use of an overlap method.
3. **Price overlap**. In at least one period prices for both an old and a new item are collected. Price change up to that period is estimated from the old item and after that period from the new item. An N-period overlap means that there are N consecutive periods of parallel pricing of both the old and the new item. The N-1 periods price change may then be based on either the old or the new item or of an average of the two.
4. **Imputation**. An average price change is imputed from a higher aggregate to which the observation series belongs.

B. Methods which involves replacements combined with explicit quality adjustment.

5. **Option cost adjustment**. This method values an extra characteristic, now included in the price of a composite product, at its actual price as an optional extra in the previous period or as a certain portion of that price.
6. **Production cost adjustment**. The producer is asked how much an extra characteristic costs to produce. This measure of cost is marked up to the retail level (in the case of a CPI) and used for adjusting the reference price.
7. **Hedonic adjustment**. The value of a characteristic is given by estimated coefficients in a multiple regression equation. Differences in the content of characteristics between the new and the old observation are multiplied by these values to provide a total adjustment to either the reference or the comparison price.
8. **Judgmental adjustment**. A quantitative judgment is made by experts, commodity specialists or price collectors such that a value is obtained for the quality difference between the old and the new observation.

1. Which method do you use for handling quality change when you calculate the producer price index for *special purpose machinery*?

By special purpose machinery we think of machinery for metallurgy, machinery for mining, dairy machines, weaving machines, machines for paper and paperboard production etc.

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no domestic production of these commodities

Further description:

_____

_____

_____

2. Which method do you use for handling quality change when you calculate the producer price index for *personal computers*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no domestic production of the commodity

Further description:

_____

3. Which method do you use for handling quality change when you calculate the producer price index for *passenger cars*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no domestic production of the commodity

Further description:

_____

_____

4. Which method do you use for handling quality change when you calculate the producer price index for *aeroplanes*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no domestic production of the commodity

Further description:

_____

_____

5. Which method do you use for handling quality change when you calculate the producer price index for *ships?*

☐   Unadjusted price comparison
☐   Link to show no change
☐   Price overlap
☐   Imputation

☐   Option cost adjustment
☐   Production cost adjustment
☐   Hedonic adjustment
☐   Judgmental adjustment

☐   Other method, please give a further description below
☐   Not relevant, since the commodity is excluded from the index
☐   Not relevant, since there is no domestic production of the commodity

Further description:

_____

_____

6. Which method do you use for handling quality change when you calculate the producer price index for *boats*?
By boats we think of yachts, other vessels for pleasure or sport, rowing boats and canoes.

☐   Unadjusted price comparison
☐   Link to show no change
☐   Price overlap
☐   Imputation

☐   Option cost adjustment
☐   Production cost adjustment
☐   Hedonic adjustment
☐   Judgmental adjustment

☐   Other method, please give a further description below
☐   Not relevant, since the commodity is excluded from the index
☐   Not relevant, since there is no domestic production of these commodities

Further description:

_____

_____

7. Which method do you use for handling quality change when you calculate the producer price index for *furniture*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no domestic production of these commodities

Further description:

_____

_____

_____

Statistisk sentralbyrå
Statistics Norway

B3
Calculation of indices for capital goods -
The import price index
adjusting for quality changes
Survey of methodology used in European and North-American statistical institutes

---

In this questionnaire, we ask how you handle quality changes of capital goods in your import price or unit value index.

How to answer this questionnaire

On the next page, we have listed various methods used for handling such changes. On the following pages, we ask which method you use for certain types of capital goods. Several ticks are possible. If you use a **combination** of different methods for different products within a group for this index, tick the relevant boxes and give a further explanation below. If you use **other** methods than the methods listed, tick the box "other method" and give a further explanation below. If the commodity is **not relevant**, tick the last box.

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

A list of currently used methods for accounting for quality changes

A. Methods which involve replacements without explicit (or direct) quality adjustment.

1. **Unadjusted price comparison**. The estimated price change is the price of the new item in the comparison period divided by the price of the old item in the reference period.
2. **Link to show no change**. The estimated price change for the observation series is set to zero between the comparison period and the preceding period without use of an overlap method.
3. **Price overlap**. In at least one period prices for both an old and a new item are collected. Price change up to that period is estimated from the old item and after that period from the new item. An N-period overlap means that there are N consecutive periods of parallel pricing of both the old and the new item. The N-1 periods price change may then be based on either the old or the new item or of an average of the two.
4. **Imputation**. An average price change is imputed from a higher aggregate to which the observation series belongs.

B. Methods which involve replacements combined with explicit quality adjustment.

5. **Option cost adjustment**. This method values an extra characteristic, now included in the price of a composite product, at its actual price as an optional extra in the previous period or as a certain portion of that price.
6. **Production cost adjustment**. The producer is asked how much an extra characteristic costs to produce. This measure of cost is marked up to the retail level (in the case of a CPI) and used for adjusting the reference price.
7. **Hedonic adjustment**. The value of a characteristic is given by estimated coefficients in a multiple regression equation. Differences in the content of characteristics between the new and the old observation are multiplied by these values to provide a total adjustment to either the reference or the comparison price.
8. **Judgmental adjustment**. A quantitative judgment is made by experts, commodity specialists or price collectors such that a value is obtained for the quality difference between the old and the new observation.

1. Which method do you use for handling quality change when you calculate the import price index for *special purpose machinery*?

By special purpose machinery we think of machinery for metallurgy, machinery for mining, dairy machines, weaving machines, machines for paper and paperboard production etc.

☐   Unadjusted price comparison
☐   Link to show no change
☐   Price overlap
☐   Imputation

☐   Option cost adjustment
☐   Production cost adjustment
☐   Hedonic adjustment
☐   Judgmental adjustment

☐   Other method, please give a further description below
☐   Not relevant, since the commodity is excluded from the index

Further description:

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2. Which method do you use for handling quality change when you calculate the import price index for *personal computers*?

☐   Unadjusted price comparison
☐   Link to show no change
☐   Price overlap
☐   Imputation

☐   Option cost adjustment
☐   Production cost adjustment
☐   Hedonic adjustment
☐   Judgmental adjustment

☐   Other method, please give a further description below
☐   Not relevant, since the commodity is excluded from the index

Further description:

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3. Which method do you use for handling quality change when you calculate the import price index for *passenger cars*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index

Further description:

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4. Which method do you use for handling quality change when you calculate the import price index for *aeroplanes*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no imports to our country of this commodity

Further description:

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5. Which method do you use for handling quality change when you calculate the import price index for *ships*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no import to our country of this commodity

Further description:

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6. Which method do you use for handling quality change when you calculate the import price index for *furniture*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index

Further description:

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Statistisk sentralbyrå
Statistics Norway

> **B4**
> **Calculation of indices for capital goods –**
> **The export price index**
> **adjusting for quality changes**
> **Survey of methodology used in European and North-American statistical institutes**

In this questionnaire, we ask how you handle quality changes of capital goods in your export price or unit value index.

How to answer this questionnaire

> On the next page, we have listed various methods used for handling such changes. On the following pages, we ask which method you use for certain types of capital goods. Several ticks are possible. If you use a **combination** of different methods for different products within a group for this index, tick the relevant boxes and give a further explanation below. If you use **other** methods than the methods listed, tick the box "other method" and give a further explanation below. If the commodity is **not relevant**, tick the last box.

Country:

Name of institution:

Name of responding person(s):

E-mail address of responding person(s), if available:

A list of currently used methods for accounting for quality changes

A. Methods which involve replacements without explicit (or direct) quality adjustment.

1. **Unadjusted price comparison**. The estimated price change is the price of the new item in the comparison period divided by the price of the old item in the reference period.
2. **Link to show no change**. The estimated price change for the observation series is set to zero between the comparison period and the preceding period without use of an overlap method.
3. **Price overlap**. In at least one period prices for both an old and a new item are collected. Price change up to that period is estimated from the old item and after that period from the new item. An N-period overlap means that there are N consecutive periods of parallel pricing of both the old and the new item. The N-1 periods price change may then be based on either the old or the new item or of an average of the two.
4. **Imputation**. An average price change is imputed from a higher aggregate to which the observation series belongs.

B. Methods which involve replacements combined with explicit quality adjustment.

5. **Option cost adjustment**. This method values an extra characteristic, now included in the price of a composite product, at its actual price as an optional extra in the previous period or as a certain portion of that price.
6. **Production cost adjustment**. The producer is asked how much an extra characteristic costs to produce. This measure of cost is marked up to the retail level (in the case of a CPI) and used for adjusting the reference price.
7. **Hedonic adjustment**. The value of a characteristic is given by estimated coefficients in a multiple regression equation. Differences in the content of characteristics between the new and the old observation are multiplied by these values to provide a total adjustment to either the reference or the comparison price.
8. **Judgmental adjustment**. A quantitative judgment is made by experts, commodity specialists or price collectors such that a value is obtained for the quality difference between the old and the new observation.

1. Which method do you use for handling quality change when you calculate the export price index for *special purpose machinery*?

By special purpose machinery we think of machinery for metallurgy, machinery for mining, dairy machines, weaving machines, machines for paper and paperboard production etc.

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no exports from our country of these commodities

Further description:

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2. Which method do you use for handling quality change when you calculate the export price index for *personal computers*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there is no exports from our country of the commodity

Further description:

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3. Which method do you use for handling quality change when you calculate the export price index for *passenger cars*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there are no exports from our country of the commodity

Further description:

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4. Which method do you use for handling quality change when you calculate the import price index for *aeroplanes*?

☐ Unadjusted price comparison
☐ Link to show no change
☐ Price overlap
☐ Imputation

☐ Option cost adjustment
☐ Production cost adjustment
☐ Hedonic adjustment
☐ Judgmental adjustment

☐ Other method, please give a further description below
☐ Not relevant, since the commodity is excluded from the index
☐ Not relevant, since there are no exports from our country of the commodity

Further description:

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5. Which method do you use for handling quality change when you calculate the export price index for *ships*?

- ☐ Unadjusted price comparison
- ☐ Link to show no change
- ☐ Price overlap
- ☐ Imputation

- ☐ Option cost adjustment
- ☐ Production cost adjustment
- ☐ Hedonic adjustment
- ☐ Judgmental adjustment

- ☐ Other method, please give a further description below
- ☐ Not relevant, since the commodity is excluded from the index
- ☐ Not relevant, since there are no exports from our country of the commodity

Further description:

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6. Which method do you use for handling quality change when you calculate the export price index for *furniture*?

- ☐ Unadjusted price comparison
- ☐ Link to show no change
- ☐ Price overlap
- ☐ Imputation

- ☐ Option cost adjustment
- ☐ Production cost adjustment
- ☐ Hedonic adjustment
- ☐ Judgmental adjustment

- ☐ Other method, please give a further description below
- ☐ Not relevant, since the commodity is excluded from the index
- ☐ Not relevant, since there are no exports from our country of these commodities

Further description:

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