

Producer Price Indices-present practice, future developments and international comparisons

by Caron Walker and Debra Richards, Central Statistical Office

Introduction

The CSO's producer price indices (PPIs) are series of economic indicators which measure the price movements of goods bought and sold by UK manufacturers. Output PPIs indicate changes in the prices manufacturers charge for goods as they leave the factory gates. Input PPIs measure changes in the prices of materials and fuel bought by manufacturers for processing.

PPIs work on the "basket of goods" concept. A wide collection of representative products is selected and the prices of this fixed set of goods are collected each month. The movements in these prices, weighted to reflect the relative importance of the products in a chosen year (the base year), are aggregated for various sectors of industry to give the required indices.

The PPIs have a number of uses:

- i. They are used by the government to monitor and measure inflation at different stages within the UK economy, for manufacturing as a whole and for individual industrial sectors.
- ii. They are used as deflators in many economic series. For example, they are used to remove the effect of price changes from the value of sales in the construction of the Index of Production (IOP).
- iii. They are used by industry for contract price adjustment. Many detailed PPIs are used in price variation clauses in trading contracts.

Present Practice

Some 3,000 companies, whose turnover accounts for about 40% of the total turnover of UK manufacturing industries, contribute to the producer price index inquiry. Between them, they provide about 11,000 price quotations for a wide range of home-produced and imported commodities.

Contributors are sent a card for each price quotation, or item they have agreed to provide. They enter the latest price, and details of any changes to the item on this card and return it to CSO. The card is shuttled back and forth each month. Since the aim is to measure actual rather than list prices, we ask for an ex-works quote for current orders, excluding VAT and after any discounts. Currently, queries are resolved over the telephone. Company visits may be used in future to assist in the resolution of the more difficult problems.

The raw price data are converted into a basic set of some 4,500 price indices, from which broader series are built up that reflect price trends of manufacturing input and output across whole industrial

sectors. Approximately 1,000 of these indices are published each month.

The weight (that is, the importance of each product or index within its group) is set by the value of sales or purchases it represents in the base year. This base is changed periodically to allow for changes in industry, and a reference year is set for which the rebased monthly PPI numbers are averaged to equal 100. Work is currently under way to switch the base year from 1984, with a reference year of 1985 = 100, to 1989 with 1990 = 100.

At higher levels of aggregation there are, in fact, two weighting patterns - one for net sector and one for gross sector indices. The difference between a gross and a net index for any sector is that in the latter we remove (or net out) *within*-sector transactions and are left with only the *between*-sector transactions. The gross sector indices are therefore intended to measure all transactions, whereas the net sector indices are intended to measure only those transactions between the sector concerned and the other sectors. For example, the net sector index for materials and fuel purchased by manufacturing industry is designed to reflect only changes in the prices of those purchases the manufacturing industry obtains from the UK non-manufacturing sectors and from abroad. It does not reflect changes in the prices of purchases from within the UK manufacturing sector.

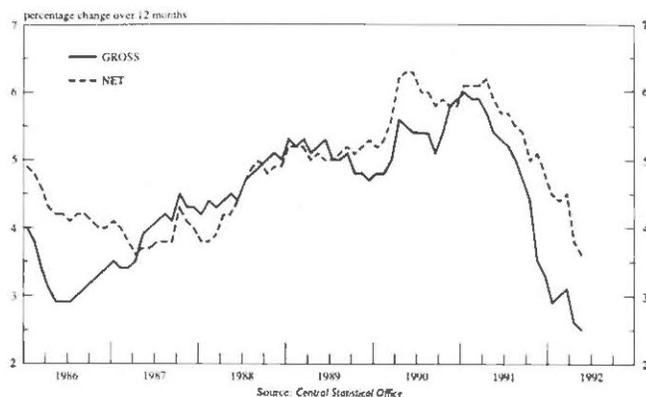
When compiling gross sector indices, an index at a higher level of aggregation can be derived from the component indices at the lower level. A gross sector index for any sector can be regarded as a weighted average of the sub-sector indices. Therefore, its value will always lie within the range of the sub-sector index values.

However, this is not the case for net sector indices. A different set of weights will apply at the sector and sub-sector levels. This is because the components used to calculate a net sector index at one level will not necessarily be needed for the next level of aggregation.

For example, manufacturers of motor vehicle bodies (classified to Activity Heading 3521) might sell their product to manufacturers of motor vehicles (AH 3510). In such circumstances the net sector indices at the AH level would be no different from the gross sector indices. This is because the transaction is taking place *between* sectors (AHs); there are no *within*-sector transactions. However, when calculating the higher aggregate net sector index for Class 35, the sales of motor vehicle bodies would become a *within*-sector transaction and would therefore be netted out.

In general, the extent of the "netting out" is fairly small in producing *output* indices so the differences between the net and gross indices tend not to be very large at activity heading level or even class level. However there are differences between the net and gross output index at the all-manufacturing level, as shown on the following chart.

PRODUCER PRICES FOR MANUFACTURING INDUSTRY
GROSS OUTPUT (ABOVE AH LEVEL) ALL MANUFACTURED PRODUCTS
NET OUTPUT ALL MANUFACTURED PRODUCTS



In contrast, the net sector *input* indices require a considerable amount of netting out at the higher levels of aggregation. The AH level input indices include a significant proportion of purchases of semi-manufactures. When calculating the input index for all manufacturing, for example, these will be classed as within-sector transactions and will disappear, leaving just imports and purchases from sectors outside manufacturing.

The decision as to whether a gross sector or net sector index is appropriate in any particular instance depends on the use to be made of it. If the index is to be used as a deflator of value figures (eg sales), a gross index will be required because the value figures themselves are on a gross basis. If the intention is to use the price information as a general economic indicator then a net sector index is appropriate. Hence, the index numbers published in the PPI press notice are on a net sector basis.

Recent Developments

On 19 November 1991 the Chancellor of the Exchequer announced that the PPI was to become a statutory inquiry. This change in the legal status of the inquiry formed part of a wider initiative to improve the quality of economic statistics. It also brought the PPI into line with other important inquiries carried out by the CSO. Statutory shuttle cards were despatched to existing contributors in January 1992. The first statutory recruitment letters were despatched in the following month.

The statutory PPI inquiry will enable CSO to improve the quality of existing indices, and to obtain price information for important areas where there is little or no coverage despite earlier voluntary recruitment drives. Improvements in the quality of the indices will, in turn, lead to improvements in the quality of the IOP and gross domestic product (GDP).

Future Developments

A number of possible developments to the PPI are currently being pursued. This section gives a brief outline of each of these developments.

Hedonic Price Indices

Changes in the specifications of items in the basket of goods frequently occur. The most difficult problems for the PPI arise when these changes are considered to improve the service being offered, thus making the item more useful to the purchaser. In these circumstances, a price rise may be due partly to a quality change and

partly to an actual price increase. A more difficult situation is one in which a specification change has improved the quality of the item without increasing the cost of production or the selling price. At present, the contributor is asked to give an assessment of the improvement and the item is considered to have been reduced in price accordingly.

The separation of quality and price elements in these cases is not easy, even for the contributors. The problem is particularly acute in industries which are subject to rapid technological change. For example, in the computer industry, old, higher priced models are frequently replaced by new models manufactured by improved methods and introduced at lower prices. Research has suggested that the current PPI methodology may not allow for all the quality changes occurring in computers, over periods where the technology has changed rapidly. It is likely, therefore, that the present price index for computers overstates the real price level to some extent.

Hedonic price indices are based on the premise that differences in the prices of goods offered in the same market, at the same time, mainly reflect differences in the characteristics of the goods. The underlying assumption is that quality is a function of the technical characteristics of the product. We can use this assumption to determine a theoretical price for a developed product based on observed links between current prices and characteristics. The actual quoted price can then be used to determine the price change relative to the theoretical price, independently of any quality change.

A very simple example would be where a refrigerator of 10 cubic feet is sold for £100, and observation suggests a linear relationship between cubic feet and price. Then a new model of 12 cubic feet is introduced to replace the 10 cubic feet model, at a price of £110. Normal matching methods would suggest no price rise on the introduction of the new model, but the hedonic approach would suggest a price fall of £10, from the expected price of £120 to the observed price of £110.

A research project into hedonic methods and the treatment of quality changes in computers has recently begun. It is intended that this work will shortly lead to improvements in the price indices for the computer industry.

Export Prices

The PPIs currently reflect only the prices of sales in the UK (home sales); ie they do not cover the prices of exported goods. Consequently, in the calculation of the IOP, exported sales are generally deflated by home sales prices rather than by export prices. Recent research has confirmed that deflating exports by the export deflators used in international trade estimates produces a different estimate of growth in the IOP compared to that obtained when using home sales prices.

The measures to improve the quality of economic statistics, announced by the Chancellor on 19 November 1991, included a study into the consistency between measures of price changes in overseas trade and domestic output. This study, which will consider the feasibility of collecting export price data, has recently begun. Depending on its recommendations, the collection of export price data could begin soon afterwards.

Current Weighting/Chain Linking

The PPI is a base weighted index, ie the weights are derived from information applicable to the base year. The weights remain fixed between rebasings. A major disadvantage of an index with fixed weights is that changes in the relative importance of the products within it are eliminated from the index. Consequently, over time, the fixed set of weights may cease to represent the real world.

A current weighted index, on the other hand, is one whose weights relate to the period covered by the index. The weights of such an index change each period to take into account changes in spending or production patterns.

The use of a current weighted index, in its strictest sense, is not practicable for the compilation of the PPI because we do not have the necessary data. At the time that an index is calculated, the sales data for the period covered by the index are not yet available. However, sales data for the latest available full year could be used to provide weights for the index. These weights could then be updated annually, and the indices chain-linked to remove that part of the index movement which would be due solely to the change in weights.

A feasibility study is to be mounted in 1993/94 to determine whether such "current weighted" versions of the PPI can be compiled. It will also investigate the possibility of chain-linking the National Accounts. This approach, if successful, would avoid the five-yearly upheaval of rebasing and the necessary reappraisal of growth rates.

International Practice

The CSO recently conducted two surveys to investigate international practices in the compilation of producer price indices and the collection of export prices. All countries in the European Community were approached, as well as a number of others including the USA, Canada and Australia.

The main aim of the survey into PPI compilation methods was to find out how many countries conduct statutory inquiries. This led to other related questions: how often is price information collected? What is the coverage of industry in terms of turnover or sales? How many products and items are covered? etc. The questionnaire on the collection of export prices was simpler, requesting information on any difficulty experienced in obtaining data.

Summary of Findings

Producer Price Indices (Tables 1 & 2)

- Most countries approached (11 out of 18) conduct statutory inquiries
- All countries (except France) have monthly price series
- Most countries approached (12 out of 18) visit firms as standard practice

Export Prices (Table 3)

- Ten out of the eighteen countries approached do collect export prices direct from manufacturers
- Of these, where an investigation has been made, evidence of different movements between export prices and home prices has been found
- Examples of industries with detectable differences are oil, iron and steel
- Where firms have difficulty in providing export price data this is usually due to changes in exchange rates

Detailed Findings

Compilation of PPIs - Tables 1 & 2

The results on aspects of practice in the compilation of PPIs are shown in tables 1 and 2. See Annex A for the complete list of questions.

TABLE 1
GENERAL ASPECTS

COUNTRY	TYPE OF INQUIRY	PERIODICITY OF PRICE SERIES
BELGIUM	V	M
DENMARK	S	M
FRANCE	S	Q
GERMANY	S	M
GREECE	..	M
IRELAND	V	M
ITALY	S	M
LUXEMBOURG	S	M
NETHERLANDS	V	M
PORTUGAL
SPAIN	S	M
UK	S	M
AUSTRALIA	S	M
CANADA	S	M
JAPAN	V	M
KOREA	S	M
SWEDEN	S	M
USA	V	M

KEY : V = Voluntary S = Statutory M = Monthly
Q = Quarterly .. = Data not available

- a. Eleven of the eighteen countries approached conduct statutory inquiries (now including the UK).
- b. All countries collect price information monthly except France. In France, they currently collect data quarterly, but aim to collect and publish raw materials indices monthly by 1993. In other sectors (consumption goods and investment goods) it is unlikely that they will change the periodicity. It is possible that France will publish monthly aggregated indices for macroeconomic use around 1995, even if collection is still quarterly.
- c. Japan collects ten-day price quotations, and obtains monthly average prices by simply averaging three ten-day price quotations every month.
- d. Responses suggest that various interpretations have been applied to the questions concerning industry coverage and the number of indices and products involved. This is probably due to a lack of international standardisation in the use of such terms. Due to this lack of comparison it was decided that these responses should not be included in the tables.

- e. Similarly, responses in relation to the number of staff employed in the compilation of PPIs have been omitted. Some countries appeared to quote simply the numbers involved in the compilation of the figures, whilst others included the staff employed in the collection of price data.

TABLE 2
RECRUITMENT AND COLLECTION OF PRICE INFORMATION

COUNTRY	VISIT MADE TO FIRMS ?	NO. OF FIRMS CONTRIBUTING	NO. OF ITEMS COVERED
BELGIUM	YES	400	..
DENMARK	NO	1,150	2,072
FRANCE	YES	..	16,000
GERMANY	NO	6,000	15,500
GREECE	YES	1,000	..
IRELAND	YES	830	3,500
ITALY	UNUSUAL	4,047	11,757
LUXEMBOURG	YES	115	..
NETHERLANDS	YES	5,697	15,000
PORTUGAL
SPAIN	NO	2,200	4,400
UK	NO	3,000	11,000
AUSTRALIA	YES	3,000	15,000
CANADA	YES	..	900
JAPAN	YES	..	2,930
KOREA	YES	..	2,300
SWEDEN	YES	1,400	3,000
USA	YES	6,000	80,000

KEY : .. = Data not available

- a. Twelve countries conduct visits to firms. In most cases visits are made to resolve queries concerning the specification of products, problems arising from product changes etc., and are conducted if such queries cannot first be resolved by telephone. Korea and Canada visit firms regularly in order to check on, e.g., item specifications. Canada currently visit 300 firms per year. Japan also visits approximately 300 firms per year. France currently has a team of 5 'engineers' who visit 130 firms per year, and hope to increase this number. The USA conducts visits to approximately 6,000 establishments per year. The Netherlands, Greece and Korea are the only countries who use visits to collect price information.
- b. The number of items covered by price quotations varies considerably ranging from Canada with 900 items, to the USA with 80,000 items.

The Collection of Export Prices - Table 3

The results of the questionnaire on the collection of export price data are shown in Table 3. See Annex B for the complete list of questions.

TABLE 3
INTERNATIONAL PRACTICE IN THE COLLECTION OF EXPORT PRICES

COUNTRY	EXPORT PRICES COLLECTED DIRECT FROM MANUFACTURERS?	MOVEMENT OF EXPORT PRICES DIFFER FROM HOME PRICES	FIRMS FIND PROVISION OF EXPORT PRICES DIFFICULT
BELGIUM	NO		
DENMARK	NO		
FRANCE	NO		
GERMANY	YES		YES
GREECE	YES		NO
IRELAND	YES	NOT USUALLY	NOT USUALLY
ITALY	NO		
LUXEMBOURG	YES	COMPARISON NOT POSSIBLE	NO
NETHERLANDS	YES	YES	NOT USUALLY
PORTUGAL			
SPAIN	NO		
UK	NO		
AUSTRALIA	YES	YES	NO
CANADA	NO		
JAPAN	YES	YES	YES
KOREA	YES	POSSIBLY	
SWEDEN	YES	YES	YES
USA	YES	NO	NO

- a. Ten of the eighteen countries included in the analysis collect export prices direct from manufacturers. (In the Netherlands some firms are unable to provide the required information in which case exporters are approached for the export prices.)
- b. The Netherlands, Japan, Sweden and Australia state that there is a detectable difference between the movements of export prices and home prices in certain industries.
- c. The Netherlands has noted oil and natural gas production as industries where these differences occur, and cites the Gulf War as the main reason for this.
- d. In Japan, the Iron and Steel sector and the General Machinery and Electrical Machinery industries are those with most notable differences between export and home prices. However, it depends on whether the contract is in yen or on a contractual currency basis. In terms of yen the two series have been almost parallel since 1986, but in contractual currency terms, the annual percentage change in the Export Price Index is higher than that of the Domestic Price Index, reflecting the tendency of export orientated manufacturers to emphasise profit.
- e. Sweden has found differences between home and export prices in industries where products are not specialised or the specialisation is poor, and where there is high competition with foreign markets e.g. the Basic Metal industry and the Pulp industry.

- f. Australia states that export prices move differently to home prices, especially in the short term. No study has been undertaken to examine differences across industries, but a number of reasons for these differences are put forward. Movements in exchange rates, the fact that most exports are sold on a long term contract basis, that the level of competition and demand can be different in export markets and the fact that exports are influenced by Government measures designed to promote them, all contribute to a different movement.
- g. Ireland states that it is unusual for export prices to move differently to home prices; however different price change trends can arise where goods for export are priced in a foreign currency. Korea is of the opinion that it is possible but has not yet undertaken any study. Neither have Germany or the USA. Luxembourg is unable to make any comparison as most goods are produced for export.
- h. Six of the ten countries who do collect export prices, state that firms do not have difficulty providing the data. However a number of countries have found that firms have experienced problems.
- i. Germany cites problems with price quotations in various commodity groups i.e. seasonal items, product groups subject to continuous improvement (e.g. computers) and single-piece work (e.g. 'one-off' orders made to customers' specification).
- j. Japan pinpoints difficulties in determining commodity specification and the fact that manufacturers expand local production overseas.
- k. Sweden has found that firms experience difficulty in providing prices when goods are invoiced in a foreign currency, due to changes in exchange rates, and also in providing sales prices when delivering to subsidiaries.

ANNEX A

Survey of International Practice in the Compilation of Producer Price Indices - List of Questions

1. Is your inquiry statutory or voluntary?
2. Are the price series monthly or quarterly?
3. What is the coverage (in terms of the percentage of industry sales or turnover) represented by your price quotations?
4. How many price indices are compiled?
5. For how many products do you compile price indices?
6. For how many individual items do you obtain price quotations?
7. How do you obtain price quotations? For instance, do you write to firms, visit or telephone them?
8. How many firms do you visit?
9. How many staff are employed in compiling the Producer Price Indices and what level of academic qualifications do they have?

ANNEX B

Survey of International Practice in the Collection of Export Prices - List of Questions

1. Do you collect export prices direct from manufacturers?
If you do:-
2. Do export prices move differently from prices for the home market?
3. For which industries is the difference most noticeable?
4. Do firms have any difficulty in providing export prices for their products?