

Rebasing Producer Price Index, Malaysian Experience

Mazliana Mustapa¹

Abstract

This article presents the approach taken in rebasing the Producer Price Index (PPI) in Malaysia and focuses on the steps taken to address the issues encountered in the rebasing exercise. The input data for rebasing the PPI were obtained from the results of the Economic Census, Malaysia 2001¹, Final National Accounts 2000 and other sources of data for the value of local production and imports. In terms of locally produced items, compilation of the weights was done on the basis of producer values obtained from the National Accounts Statistics Division of the Department. As for imports, apart from the Final National Accounts 2000, the weights were derived from the value of trade transactions as given in the National Accounts Trade Table 2000.

Introduction

The Producer Price Index (PPI) is designed to measure the changes in the price of commodities charged by domestic producers and those paid by importers for importing goods into Malaysia. The first PPI was compiled for Peninsular Malaysia for reference year 1973 with 1972 as the base year. Since then, the methodology has been improved and PPI has become one of the leading economic indicators in the country. Subsequent to 1972 base year, PPI was constructed for base years 1978, 1989 and 2000. In August 2006, the Department of Statistics, Malaysia released the rebased series of PPI with 2000 as the new base year.

PPI constitutes both Local Production and Import Price Indices. The Local Production Price Index is an output based index, which measures the change in price of commodities sold to the domestic market at the point of leaving the factory gate. The Import Price Index, on the other hand, is an input based index which measures the change in the price of raw materials and intermediate goods imported by the local producers for the production of their final products and are valued at purchasers' prices. The Domestic Economy Price Index is a composite index which is based on the price data derived from that of the Local Production and Import Price Indices. It reflects the price movements of commodities used in the domestic economy.

¹ Mazliana Mustapa is currently the Assistant Director of Price, Income & Expenditure Statistics Division, Department of Statistics, Malaysia.

² Economic Census, Malaysia is conducted by the Department of Statistics, Malaysia once every five years.

PPI covers the following five broad sectors of the economy, namely:

- i. agriculture;
- ii. fishing;
- iii. mining;
- iv. manufacturing; and
- v. electricity, gas and water supply.

PPI has acquired a unique status among economic statistics in most countries. There are several factors which help to explain this:

- a. PPI is well known and closely observed indicator of macroeconomic performance;
- b. PPI is a direct indicator of purchasing power for various types of transactions and other flows involving goods and services;
- c. PPI is published monthly therefore the rate of inflation can be monitored closely. The PPI is released four weeks after the reference month;
- d. A monthly PPI with detailed product and industry data allows monitoring of short-term price inflation for different types of products or at different stages of production; and
- e. PPI is a deflator of nominal values of output or intermediate consumption for the compilation of production volumes and for the deflation of nominal values of capital expenditure and inventory data for use in the preparation of national accounts.

Objective to rebase

Rebasing is important due to the demand for more accurate, reliable and credible measure especially when the rate of inflation needs to be monitored. The rebasing and reweighting are conducted to ensure that:

- a. the scope and coverage of the indices continue to meet the needs of users;
- b. the structure of the indices reflects the current activities of the industry concerned; and
- c. the weights used continue to be representative of the industry concerned.

Issues in rebasing PPI

a. Updating weights

For the current base year, the Department of Statistics, Malaysia adjusted the weights of the commodity groups and selection of the enterprises within the commodity groups so that they are representative of the base year 2000, reflecting the new production situation between enterprises and market shares.

The weights are obtained from the Economic Census, Malaysia 2001, Final National Accounts 2000 and other sources of data for the value of production and imports.

In terms of locally produced items, the compilation of weights is done on the basis of producer values obtained from the National Accounts Statistics Division of the Department. In the calculation of sector weights, it is based on the Final National Accounts figures. Sector weights are obtained based on the GDP (Gross Domestic Product) contribution of the respective sector to the total economy. The industry weights are based on the total producer value of the respective industry at the 5 digit level obtained from the Final National Accounts (FNA) Tables 2000. Product weights are based on the commodities (in terms of sales value) of each product to the total sales value of the selected industry.

As for imports, apart from the Final National Accounts 2000, the weights were taken from the value of trade transactions as given in the National Accounts Trade Table 2000.

The proportion weight for domestic economy is made up of 65.6 per cent of local production and 34.4 percent of imports. The weights at commodity section level are given in Appendix 1.

b. Selection of commodity ²

The selection of the commodities for the monthly price survey is based on their contributions to the total of the industry. The selected commodities are representative of the industry. For local production, the items included in the index calculation collectively could be more than 70 percent of the total output of the industry selected.

c. Selection of establishments

The list of establishments for local production is drawn up from the Economic Census 2001 as well as from other sources. The sample covers about 1,500 establishments selected on a purposive basis. The selection of establishments which produce or import the selected items for domestic supply are done in the later stage.

As it is not cost effective to price every establishment that imports selected items, only establishments with imports c.i.f value of RM10 million and above are selected. In total 664 outlets were selected to represent for the import sector.

d. Selection of commodity specification

The commodities are selected based on their relative importance to the establishments. Generally, the establishments will list three main products with detail

² Commodity refers to product.

specifications (based on the sales value) which are regularly produced or imported and transacted by the establishments. The list of products was determined based on discussion with the selected manufacturers and data users. At present, about 2,008 commodities are covered in the compilation of PPI. A total of 3,783 types of commodities are surveyed each month from 2,211 establishments. Overall, about 2,665 products are selected for locally produced goods and about 1,118 to represent imported products. For example:

Commodity

SITC 776451000 – Integrated Circuits

Detail Commodity Specifications

Integrated circuits – Type A

Integrated circuits – Type B

Integrated circuits – Type C

For determining the specifications, the respondents have to list three types of integrated circuits based on the sales value for the first month. Later, the respondents need to report the producer price for the products specifications as stated in the form in the following months.

e. Basket of commodities

The basket of commodities for PPI refers to a sample of commodities produced by large manufacturing establishments. A wide range of commodities are selected to represent the various sectors of the economy. A total of 820 commodity items are used in the compilation of the local production price index, while 1,188 commodity items are used in the import price index. The prices for these commodities are collected monthly.

Method and computation of index

a. Calculation of base price

In developing the PPI (2000=100), the base period for the index is 2000. The base price for each item is the average prices for that particular brand for the twelve months of 2000.

b. Calculating the price relatives

The price relative of each item at the commodity brand level provides the basic level for the compilation of higher level indices. Price relatives are calculated as percentage ratios of the current prices to those prevailing in the base period and are obtained by dividing by the corresponding base year prices and multiplying them by 100. The simple arithmetic averages of these price relatives are obtained to form indices at the commodity item level. This procedure uses the formula:

$$\text{Price Relative (Specification ABC)} = \frac{\text{Current period price (ABC)}}{\text{Base period price (ABC)}} \times 100$$

For example :

If specification ABC has a price in the current period of 152.70 and had a price in the base period of 132.80, the price relative in the current period would be :

$$\frac{\text{RM}152.70}{\text{RM}132.80} \times 100 = 114.98$$

c. Index formula

The Laspeyres base-weighted formula is used to compile the PPI.

$$\frac{\sum_{i=1}^n p_i^t q_i^s}{\sum_{i=1}^n p_i^s q_i^s} = \sum_{i=1}^n \left(\frac{p_i^s q_i^s}{\sum_{i=1}^n p_i^s q_i^s} \right) \times \frac{p_i^t}{p_i^s} = \sum_{i=1}^n w_i^s \times \frac{p_i^t}{p_i^s}$$

where $w_i^s = \frac{p_i^s q_i^s}{\sum_{i=1}^n p_i^s q_i^s} = \text{Relative value weights}$

p_i^t = Current period prices

p_i^s = Base period prices

n = Number of items

The formula selected has an advantage of determining what specific price or group of prices are responsible for any change in the aggregate index.

The movements in these prices are weighted to reflect the relative importance of the commodities in the base year, which is currently 2000. The weighted averages of commodity price indices are obtained to form price indices at the group level. The commodity division index is derived as weighted average of the indices of the commodities included in that division, while the commodity section index is obtained as weighted arithmetic average of the indices of all divisions included under that section.

The overall PPI is built up progressively from the commodity level to commodity item, group, division and section levels (Appendix 2).

d. Index aggregation³

At the first stage of elementary aggregation, individual prices are combined by computing their arithmetic average of the quotations under that commodity item (for example item 054400000), where one price from each of the several establishments (V, W, X, Y) is combined to give an elementary aggregate.

Example:

SITC	Establishments	Item description	Price				Index
			Base	Previous	Current	Relative	
054400000	V	Specification A	3.90	3.90	3.92	1.0051	
	W	Specification B	2.20	2.20	2.25	1.0227	
	X	Specification C	1.75	1.75	1.78	1.0171	
	Y	Specification D	1.60	1.60	1.65	1.0313	
Matched Quotations : 4			4.0762				1,019.0621

The detailed level product indices are weighted together to form the next level product indices.

Then, calculating at 9 digit index:

SITC	Description	Index		Weight	Weighted Index
		Previous	Current		
054400000	Commodity Item AAA	1018.3625	1019.0621	10.3621	10,559.6234

After calculating the 9 digit SITC, the index will be calculated into 3, 2, 1 digit SITC and at the total level. The procedures are showed below:

$$3 \text{ digit index} = \frac{\text{Total weighted index at 9 digit (commodity item)}}{\text{Total weight at 9 digit (commodity item)}}$$

$$2 \text{ digit index} = \frac{\text{Total weighted index at 3 digit (commodity group)}}{\text{Total weight at 3 digit (commodity group)}}$$

$$1 \text{ digit index} = \frac{\text{Total weighted index at 2 digit (commodity division)}}{\text{Total weight at 2 digit (commodity division)}}$$

$$\text{Total index} = \frac{\text{Total weighted index at 1 digit (commodity section)}}{\text{Total weight at 1 digit (commodity section)}}$$

³ The process of adding the values of lower-level aggregates to obtain higher level aggregates.

Other related issues of rebasing

a. Replacement of specifications

Occasionally, specifications have to be replaced either due to changes in the market conditions or the specification is no longer appropriate, for example a new product being produced. The procedure to overcome these issues is to collect prices for overlapping periods for both the old and the new specification. The new specification is included in the sample in such a way that its price relative reflects only price movement and is not affected by the change in specification. For example:

Specification	Price (RM)		
	Base Period	Period 1	Period 2
ABC	132.80	152.70	
XYZ		155.00	160.00

In Period 1

The price relative for specification ABC (old) is calculated as:

$$\frac{\text{RM}152.70}{\text{RM}132.80} \times 100 = 114.98$$

In Period 2

The price relative for specification XYZ (new) is calculated as

$$\text{Price Relative of ABC (Period 1)} \times \frac{\text{Price XYZ (Period 2)}}{\text{Price XYZ (Period 1)}}$$

$$= \frac{114.98 \times \text{RM}160.00}{\text{RM}155.00}$$

$$= 118.68$$

Therefore, only price movement for specification XYZ from period 1 to 2 of 3.22 per cent has been included and not the price change from specification ABC to specification XYZ.

$$\text{Price Movement} = \frac{\text{Price relative specification XYZ} - \text{Price relative specification ABC}}{\text{Price relative specification ABC}} \times 100$$

$$= \frac{118.68 - 114.98}{114.98} \times 100$$

$$= 3.22 \text{ per cent}$$

This method is equivalent to estimating a base period price for specification XYZ using the assumption that the price movement from the base period to period 1 would have been the same as what was recorded for specification ABC. The nominal base period for XYZ :

$$\text{Base Period Price (ABC)} \times \frac{\text{Price XYZ (Period 1)}}{\text{Price ABC (Period 1)}}$$

$$= \frac{\text{RM 132.80} \times \text{RM 155.00}}{\text{RM 152.70}}$$

$$= \text{RM 134.80}$$

Thus, the price relative for XYZ in period 2 becomes:

$$\frac{\text{RM 160.00}}{\text{RM 134.80}} \times 100 = \text{RM 118.69}$$

b. Product specification

The objective for selecting products specification is to ensure the consistency and the comparability of price collected between months.

Product brand, serial number, size, grade, colour, measuring unit, type of materials and packaging may influence the chosen product price.

The Matched-Models method is used to measure the true price changes. As the same product is compared from time to time and therefore must be maintained in the market for a long period.

PPI is different from the other establishment survey such as Monthly Manufacturing, Business Expectation Survey and Business Tendency Survey because the specifications of products must be obtained from the establishment before a routine data collection is done. The details of the products are only available at the establishments. The establishments are requested to list at least three types of their important products from their production value and monthly transaction. Specification is determined by field enumerator with the assistance from the establishments.

c. Limitations of the data

i. Non response bias

The indices are based on prices collected from the respondents. When there is no response for a particular period, the price is imputed. In this case, the price is imputed using the overall mean method.

- ii. Products not available
In the event that products are permanently unavailable, the price is imputed by using the most recent available price. This means the price show a bias towards no change.
- iii. Product specifications change rapidly
In this case, the products in the market change very quickly and they are not comparable especially for electric and electronic industry. As for Imports, the product may be the same, but the country of origin is different.
- iv. Products not imported monthly
Usually, the establishments import the product either quarterly or half yearly depending on the usage of the products.
- v. Poor quality information from respondents
Accurate information can in some instances be difficult to obtain. Many respondents find it convenient to indicate “no change” on their questionnaire rather than provide actual prices.
- vi. Unique products
A unique product is a product that is manufactured according to the specification of an individual customer. Within a group of products, each product will be different from the other, for example, clothing and furniture industry. In this case, the price cannot be observed over multiple periods. The main difficulty is to persuade the respondents to use hypothetical approach⁴, because they do not produce this specific product as described.
- vii. Lagged prices
In the case of lagged prices, it is not possible to get prices in time for the current period's compilation.
- viii. Seasonal products
Some products are only available during a certain period of the year, for example items associated with religious festivals and certain fresh fruits or vegetables.

Future development

Department of Statistics, Malaysia has taken up various efforts to meet the increasing needs of users as well as international statistical requirements. As such various indices have been developed and these include :

- a. Producer Price Index by Stage of Processing;
- b. Producer Price Index for Services (2005=100);
- c. Import Price Index (2005=100); and
- d. Export Price Index (2005=100)

⁴ Hypothetical approach - pricing is based on the assumption that the product is produced even though actual production does not take place during the reference period.

Conclusion

The new weights reflect the most recent information on business expenditure and revenues and as a result the indices reflect a more recent pattern of economic activity. PPI (2000=100) is more accurate and reliable because it is more stable when compared to PPI (1989=100). With this regard, the Department will continue on regular rebasing exercise.

References

- International Monetary Fund (IMF), Statistics Department. (2004). *Producer Price Index Manual: Theory and Practice*.
- Ismail Yusoff (2004). *Re-basing of the Consumer Price Index : Issues and Challenges* in Journal of the Department of Statistics, Malaysia., pp. 33-58.
- Statistics New Zealand. (2007). *Information about the Producers Price Index (PPI)*.
http:
//www2.stats.govt.nz/domino/external/omni/omni.nsf/outputs/Producers+price
+index+(PPI)
- Wikimedia Foundation. (2007). *Price Index*. Available from:
http://en.wikipedia.org/wiki/Price_index

Appendix 1: PPI (2000=100) Weight by Commodity Section (SITC 3), Malaysia

Commodity Section		Domestic Economy	Local Production	Import
0	Food and live animals	5.27	6.08	3.71
1	Beverages and tobacco	1.02	1.31	0.46
2	Crude materials, inedible except fuels	4.38	5.53	2.17
3	Mineral fuels, lubricants & related materials	11.86	15.55	4.81
4	Animal and vegetable oils and fats	3.80	5.70	0.17
5	Chemicals and related product n.e.s.	5.07	4.02	7.07
6	Manufactured goods classified chiefly by materials	10.84	10.91	10.70
7	Machinery and transport equipment	50.49	43.58	63.66
8	Miscellaneous manufactured articles	6.89	7.31	6.09
9	Commodities & transaction classified elsewhere in the S. I. T. C.	0.40	0.00	1.15
Total		100.00	100.0	100.00

Appendix 2 : Structure of Producer Price Index – Commodity Aggregation

