

Rebasing and Revision of Import, Export, Singapore Manufactured Products and Domestic Supply Price Indices

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The Singapore Department of Statistics has recently completed the rebasing and revision of the Foreign Trade and Producer Price Indices to reference year 2006, namely the Import Price Index (IPI), Export Price Index (EPI), Singapore Manufactured Products Price Index (SMPPI) and Domestic Supply Price Index (DSPI). This ensures that the coverage of commodities and the weighting pattern of the four indices are representative of the current structure of imports, exports, manufactured products and domestic supply. In the 2006 rebasing exercise, methodological changes were introduced to enhance the accuracy of the price indices and facilitate the early completion of the revision.

This article presents an overview of the approach and methodological improvements, and highlight changes in the weighting patterns and trends of the 2006-based price indices compared with the 2000-based series.

Methodological Issues

Index Classification and Weights Structure

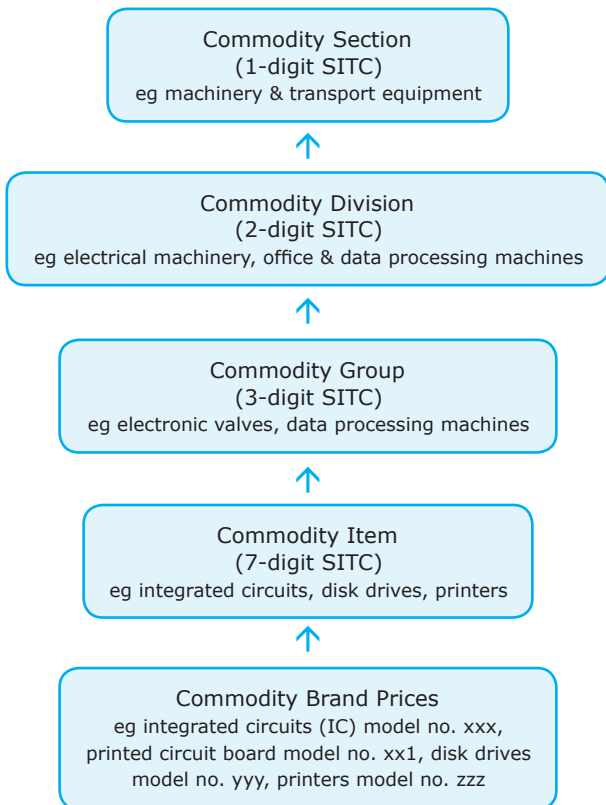
The four price indices are classified in accordance with the Standard International

Trade Classification, Revision 3 (SITC, Rev 3). Figure 1 shows the structure of the IPI, EPI and SMPPI. At the lowest level are the specific brand prices of the imported, exported and manufactured products. The indices at 7-digit commodity item level together with the attached weights form the elementary aggregates, from which the indices at 3-digit group level, 2-digit division level and 1-digit section level are built up. The DSPI is similarly constructed, starting from the commodity item level.

The weights at upper level of 1-, 2-, 3- and 7-digit SITC for the IPI, EPI and SMPPI are derived from imports, exports and production values for 2005. At the brand level, as data are not available to estimate the individual weights, equal weights are assumed for the individual brands within the elementary aggregates.

The domestic supply of goods is from external and local sources. The weight of the DSPI's external supply component is based on the "retained imports" which refers to the values of imports less re-exports in 2005. The weight of the DSPI's local supply component is based on the "domestic sales of locally manufactured goods" which is the total sales of local producers less the amount exported in 2005.

FIGURE 1 THE STRUCTURE OF IPI, EPI AND SMPPI



The DSPI, at the commodity item level, is the weighted average of the constituent IPI and SMPPI price relatives.

As it is neither possible nor practical to price every product, the weights of products for which price data at the commodity item level are not available were distributed to commodity items which shared similar product characteristics. It is reasonable to expect that the price trends of similar items would move in tandem with each other. It follows that commodity items with relative weights assigned in the basket not only carry their own weights but also the weights of similar items which are not specifically priced.

Improvements and Changes

In the latest revision, two methodological changes were introduced to further improve the accuracy and timeliness of the rebasing exercise.

Use of Different Weight/ Price Reference Period

A 'modified Laspeyres' index formula (also known as the Young index formula) where the weight reference period of 2005 preceded the price reference period of 2006 is adopted for the 2006-based series. This allowed the four price indices to be compiled concurrently and facilitated the early completion of the revision. The method is widely used by other countries for price index computation and rebasing.

The 2000-based series were compiled using the Laspeyres index formula, with the price and weight reference periods aligned to the same year 2000. Under this approach, the monthly prices and weights for 2000 were available for the compilation of the IPI and EPI in 2001. However, as the production and domestic supply data for 2000 used for the weights compilation of SMPPI and DSPI lagged the 2000 imports and exports data by at least a year, these two indices could not be compiled concurrently with the IPI and EPI. The 2000 rebasing exercise therefore took a longer time to complete.

Use of Geometric Mean Formula to Compute Elementary Price Indices

The calculation of price indices is first carried out at the base level and progressively built up to higher levels. It begins with the construction of the elementary aggregates (the lowest level aggregates), followed by the averaging of the elementary aggregates to obtain higher level indices.

Table 1 shows the formulae used in the computation of the elementary and higher levels of the IPI, EPI, SMPPI and DSPI. For the 2006-based series, the Geometric Mean (GM) formula has been adopted in the computation of elementary indices without weights in place of the Arithmetic Mean (AM) formula. This is in line with the recommendation in the International Monetary Fund (IMF) Producer Price Index Manual 2004. As the unweighted AM is biased towards observations with large price increases, GM is used in the calculation of price indices at the elementary aggregate level as weights are unavailable. The AM formula is retained for compiling indices at higher levels of aggregation where weights of specific sub-indices are available.

Sources of Price Data

The monthly prices required for the compilation of IPI, EPI and SMPPI are collected directly from the importers, exporters and manufacturers through surveys. The coverage of the three price surveys are given in Table 2.

The price information required to compile the DSPI are obtained from both the Import Price Survey and the Singapore Manufactured Products Price Survey. The DSPI is compiled from 583 commodity items from the IPI and 240 commodity items from the SMPPI.

TABLE 2 NUMBER OF COMPANIES, COMMODITY ITEMS AND BRAND PRICES

Price Index	Companies Covered	Commodity Items Included	Products Priced
Total	3,064	1,540	4,551
IPI	1,230	640	2,372
EPI	1,060	585	2,179
SMPPI	774	315	5,729

TABLE 1 FORMULAE USED FOR COMPUTATION OF ELEMENTARY AND HIGHER LEVELS OF THE IPI, EPI, SMPPI AND DSPI

Base Year of PPI	Index Formula	
	Elementary Level	Higher Level
2000, 1995, 1990 & Earlier Years	Unweighted AM of Price Relatives	Weighted AM Index
2006	Unweighted GM of Price Relatives	Weighted AM Index

Significant Changes in the Rebased Series

Weighting Patterns

There were significant changes in the weighting patterns of the 2000-based and 2006-based IPI, EPI, SMPPI and DSPI particularly in the oil, electronic and chemicals sectors, due to rapid changes in these industries during 2000 to 2005. Table 3 compares the new and old weights of the four price indices.

Between 2000 and 2005, though the Machinery & Transport Equipment

section, which comprises predominantly electronic products, continued to account for the largest share of imports, exports, production and domestic supply, its relative weight fell due to declines in the share of information & communications technology related products during the period. On the other hand, increasing global demand for crude oil led to a rise in oil prices which contributed to increases in the relative share of Oil for all four price indices between 2000 and 2005. In addition, recent expansion in the chemicals sector resulted in significant increases in the relative weight of Chemicals & Chemical Products.

TABLE 3 WEIGHTING PATTERNS BY COMMODITY SECTION

Commodity Section	IPI		EPI		SMPPI		DSPI	
	2005	2000	2005	2000	2005	2000	2005	2000
Total	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Oil	1,798	1,214	1,518	982	2,182	1,327	2,855	2,076
Non-Oil	8,202	8,786	8,482	9,018	7,818	8,673	7,145	7,924
Food	203	247	102	134	186	151	308	281
Beverages & Tobacco	67	84	54	78	47	55	54	50
Crude Materials	66	102	60	73	6	19	43	81
Animal & Vegetable Oils	15	16	11	15	23	24	27	25
Chemicals & Chemical Products	631	565	1,153	726	2,053	1,044	1,373	753
Manufactured Goods	761	737	463	419	430	579	807	891
Machinery & Transport Equipment	5,653	6,087	5,950	6,749	4,510	6,180	3,786	5,083
ICT-Related Products	4,524	4,782	5,098	5,929	4,033	5,717	2,963	4,369
Electrical Machinery	2,803	3,352	2,952	3,082	2,126	2,430	1,737	2,951
Office & Data Processing Machines	1,035	787	1,447	2,176	1,498	2,887	782	1,028
Telecommunication Apparatus	686	643	699	671	409	400	444	390
Others	1,129	1,305	852	820	477	463	823	714
Miscellaneous Manufactures	806	948	689	824	563	621	747	760

Price Trends

Table 4 shows the year-on-year changes of the 2006-based and 2000-based IPI, EPI, SMPPI and DSPI from January to March 2007.

The 2006-based and 2000-based series of the IPI, EPI, SMPPI and DSPI generally moved in the same direction, but some with marked differences in the magnitude of change due to different composition of items, introduction of new items, deletion of obsolete items and changes to the formula used for index computation. Due to their large relative weights, the Machinery & Transport Equipment index, Oil index and Chemicals & Chemical Products index had significant influence on both the 2006-based and 2000-based overall index. Table 5 shows the year-on-year changes of these three major sub-indices for the new and old rebased series of the four price indices.

Within the four price indices series, the 2006-based Machinery & Transport Equipment index declined more than the

2000-based series. This was because the prices of newer models of electronic products captured in the 2006-based series generally fell at a faster rate than the prices of older models represented in the 2000-based series.

Both the 2000- and 2006-based Oil indices within the four index series fell during January to March 2007, though with differences in their magnitude of decline. Ample oil supply in the global market, partially offset by supply uncertainty caused by geopolitical risks in the Middle East, was the main reason contributing to their declines.

The 2006-based Chemicals & Chemical Products index of exports and manufactured products differed considerably from their corresponding 2000-based series as a result of differences in product composition, addition of new products and substantial changes to the relative share of products within the section. This was attributed to rapid growth occurring in the chemicals and pharmaceutical industries in recent years.

TABLE 4 2006-BASED AND 2000-BASED IPI, EPI, SMPPI AND DSPI
JANUARY-MARCH 2007

Price Index	% Change Year-On-Year					
	Base Year 2006			Base Year 2000		
	Jan 2007	Feb 2007	Mar 2007	Jan 2007	Feb 2007	Mar 2007
IPI	-5.4	-4.5	-3.5	-3.1	-1.3	-0.9
EPI	-7.2	-7.1	-5.2	-3.0	-2.9	-2.9
SMPPI	-6.8	-5.0	-3.8	-3.0	-2.3	-0.2
DSPI	-5.3	-4.0	-2.7	-4.0	-1.2	0.2

TABLE 5 SELECTED SUB-INDICES OF 2006-BASED AND 2000-BASED IPI, EPI, SMPPI AND DSPI
 JANUARY-MARCH 2007

Price Index	Commodity Section	% Change Year-On-Year					
		Base Year 2006			Base Year 2000		
		Jan 2007	Feb 2007	Mar 2007	Jan 2007	Feb 2007	Mar 2007
IPI	Machinery & Transport Equipment	-5.9	-5.6	-4.9	-2.9	-2.8	-3.4
	Oil	-14.2	-10.4	-7.3	-11.0	-6.0	-2.6
	Chemicals & Chemical Products	1.9	2.1	1.5	-0.4	0.6	0.0
EPI	Machinery & Transport Equipment	-10.4	-10.8	-8.4	-2.8	-3.4	-3.4
	Oil	-6.6	-4.4	-2.4	-10.1	-6.4	-5.5
	Chemicals & Chemical Products	0.6	-0.3	-0.4	3.6	1.9	1.6
SMPPI	Machinery & Transport Equipment	-10.0	-9.9	-9.3	-3.4	-5.0	-3.9
	Oil	-12.6	-5.7	-3.1	-12.9	-6.4	-2.8
	Chemicals & Chemical Products	3.0	3.2	3.5	12.0	8.9	9.9
DSPI	Machinery & Transport Equipment	-6.3	-6.4	-5.9	-2.7	-2.9	-3.2
	Oil	-14.7	-10.1	-7.4	-12.0	-6.3	-3.0
	Chemicals & Chemical Products	5.2	4.1	4.7	6.6	4.9	4.9

Conclusion

The rebasing and revision of the four price indices to update the weighting pattern and improve the product coverage has been completed with

significant improvements in timeliness and accuracy. This would provide users with more timely and reliable data in analysing the price trends and as price deflators for a wide range of economic statistics.

Overseas Visitors

The Singapore Department of Statistics received the following visitors in the past six months.

Topics discussed include information on the purpose of the ASEAN Community Progress Monitoring System (ACPMS) and ASEAN Statistical Indicators Framework (ASI), as well as indicators relevant to these projects.

Other topics that were discussed included the collection of inward and outward investment data and the compilation of Singapore's international investment position.

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