

Estimation of Unit Value Index for Exported Goods

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A B S T R A C T

Unit Value Index (UVI) for export measures the changes over time in the unit value of exported goods. It is essential for assessing the impact of international trade on the domestic economy. Moreover, the UVI for export is an important indicator for analyzing growth and inflation in an open economy.

This paper aims to develop an estimation methodology in generating UVI for export using compiled data from administrated records taken from the Bureau of Customs.

The research study uses the 2015 Philippine Standard Commodity Classification (PSCC), which is a detailed classification of all commodities on exports and imports linked to the ASEAN Harmonized Tariff Nomenclature (AHTN). Furthermore, the study utilizes the 2018 to 2021 export data at the 10-digit PSCC level.

There are three methodologies considered in the study. These are Paasche, Laspeyres and Fisher index formula. The three formula yield indices with similar trend. However, Paasche is consistently lower than the Laspeyres and Fisher, and is consistently at the middle of the two as these averages the indices obtained from Paasche and Laspeyres.

KEYWORDS: Export, Unit Value, Index, Commodities

I. INTRODUCTION

A. Background/Rationale

The Unit Value Index (UVI) for export measures the changes over time in the unit value of exported goods. It is essential for assessing the impact of international trade on the domestic economy; deflating economic statistics in the context of national accounts and balance of payment; and market monitoring and pricing of private companies. Moreover, the UVI for export is an important indicator for analyzing growth and inflation in an open economy.

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Currently, there is no indicator to measure the changes over time in the unit value of exported goods that is generated in the country. Previously, the National Statistics Office, which is now part of the Philippine Statistics Authority, generated Foreign Trade Index (FTI). However, this was discontinued starting with the 2007 data series because of the need to shift to new coding system based on the 2004 Philippine Standard Commodity Classification.

Realizing the importance of an indicator to measure the changes in the prices of exported goods in the country, a research study was done to determine the methodology to be used in measuring UVI for exports.

B. Objectives

This paper aims to develop an estimation procedure in generating UVI for export using compiled data from administrated records taken from the Bureau of Customs. Specifically, it determines the best methodology from among the three methods of index computation, namely, Laspeyres, Paasche and Fisher.

C. Coverage

This paper covers the periods January 2018 to December 2021 for export data at the PSCC version 2015 level.

II. REVIEW OF LITERATURE

External trade indices can be generated from three different types to reflect prices for imports and exports: unit-value indices, which are primarily based on customs records; price indices, which are based on survey data; and hybrid indices, which combine both customs records and survey data. Although price indices are normally chosen from a methodological perspective, some countries may have lack resources necessary to gather that data. Many countries generate unit-value indices or survey-based price indices, others combine the two methods. (IMTS 2010 Compilers Manual)

Among the different types of indices, the Unit Value Indices was the most preferred for countries with limited financial resources (IMF Price Index Manual).

According to the findings of a 2005 United Nations survey on national practices for compiling and disseminating external trade index numbers, for 77 countries that generate unit value and/or price indices, 75.0 percent of these countries construct unit value indices, 17 percent only calculate price indices, and 8 percent compute both unit value and price indices. By type of index formula used by these respondent countries, 29.7 percent calculate a Laspeyres index number for the unit value and 17.6 percent for the price index using the same formula. Furthermore, 95% of respondents said that they used customs records as the main documents used in the generation of unit value indices. The custom administrative foreign trade records often provide almost complete coverage of the transactions on which the target population of a foreign trade index should be based,

and this type of data source is more frequently updated than most other data sources (IMTS 2010 Compilers Manual).

Based on the consolidated information collected from ASEAN member states (AMS) websites, 70.0 percent or seven (7) ASEAN member states of the total AMS generates external trade indices. The Unit Value Indices is the kind of indices produced by AMS as it accounts for more than 50.0 percent and the Laspeyres type of index formula was used. Other countries like Hongkong and Japan likewise produced Unit Value Indices based on custom records.

III. METHODOLOGY

A. Coverage

For this paper, the monthly export data for 2018 to 2021 classified according to the Philippine Standard Commodity Classification (PSCC) for 2015 was used. PSCC 2015 is a 10-digit nomenclature of commodities that is aligned with the 2012 ASEAN Harmonized Tariff Nomenclature. Table A shows the number of classifications by commodity grouping.

Table A. Number of Classifications by Commodity Group for the 2015 PSCC

Grouping	Number of Classifications	Example	Description
Sections I - XXI	21	Section II	Vegetable Products
Chapters 01-98 (2-digit code)	98	Chapter 09	Coffee, tea, mate and spices
HS Headings (4-digit code)	1,240	0904	Pepper of the genus Piper; dried or crushed or ground fruits of genus Capsicum or the genus Pimenta
HS Subheadings (6-digit code)	5,286	0904.11	Neither crushed nor ground
AHTN codes (8-digit code)	9,643	0904.11.20	Black
PSCC codes (10-digit code)	14,336	0904.11.20-01	In bulk containers

B. Proposed and Alternative Index Formula

There are three index formula that were considered in this study. These are Laspeyres, Paasche and Fisher. The recommended formula is Laspeyres and the alternative formula are Paasche and Fisher.

1. Proposed Formula: Laspeyres

$$I_m = \sum_{n=1}^n W_{im} * I_{im}$$

where:

I_m = Unit Value Index for total export at month m

I_{im} = Unit Value Index of section i at month m

W_{im} = Weight of section i

2. Alternative Formula:

a. Paasche

$$I_m = \frac{1}{\sum_{i=1}^n \left(W_i \times \frac{1}{I_{im}} \right)}$$

where:

I_m = Unit Value Index for total export at month m

I_{im} = Unit Value Index of section i at month m

W_{im} = Weight of section i

b. Fisher

$$I_m = \left(I_m^L * I_m^P \right)^{1/2}$$

where:

I_m = Unit Value Index for total export at month m

I_m^L = Unit Value Index using Laspeyres

I_m^P = Unit Value Index using Paasche

C. Derivation of Unit Value

$$U_{ijk} = \frac{V_{ijk}}{Q_{ijk}}$$

where:

U_{ijk} = Unit Value of commodity k in chapter j in section i

V_{ijk} = Total Value of commodity k in chapter j in section i

Q_{ijk} = Total Quantity of commodity k in chapter j in section i

D. Computation of Unit Value Index for Export

The following are the key elements in the computation of the UVI for export:

1. Base Year

It is the reference point of the index number series. In this study, the Base Year is 2018

2. Market Basket

Market Basket refers to a sample of commonly exported goods used in the computation of UVI for export.

a. Criteria in selecting exported goods

Listed in Table B are the criteria in selecting commodities for inclusion in the market basket.

Table B. Criteria in Selecting Commodities

CRITERIA	DESCRIPTION	SCORE
1. Percent share to the total FOB value	Percent FOB to Chapter equals to 0.2 percent or greater in the base year	5
	Otherwise	0
2. Frequency of occurrence (number of months) during the base period	Frequency of occurrence is 7 months or higher in the base year and 12 months in the succeeding years from 2019 - 2020	3
	Otherwise	0
3. Homogeneity of Unit Value	Homogeneity equals 60 percent and over	1
	Otherwise	0

3. Weights

Weights refer to the relative importance of the chapter/section to the total value of the section/export.

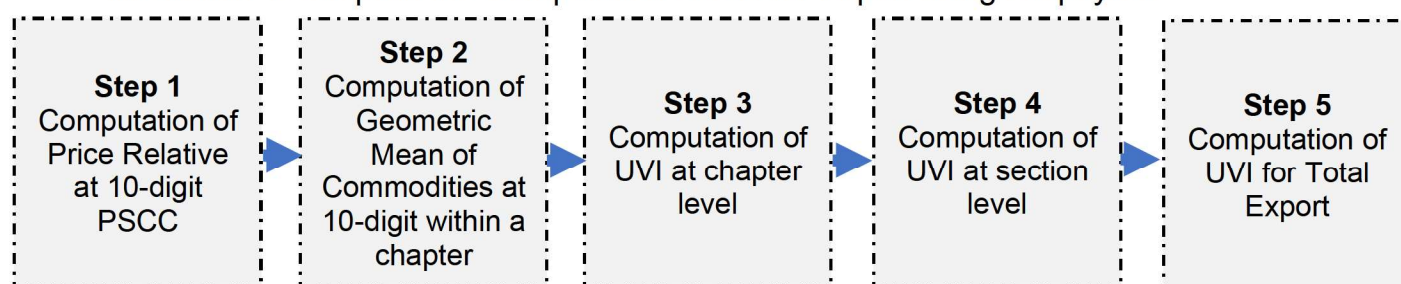
The weight of the chapter (2-digit PSCC) is the share of the chapter to the total value of export for the section. The sum of the weights of the chapters within a section is equal to one (1). On the other hand, the weight of a section is the share of the section to the total value of export. The sum of the weights of the sections is equal to one (1).

4. Index Computation

Steps in computing UVI for Export

Illustration 1 shows the five (5) steps in the computation of UVI for export using Laspeyres.

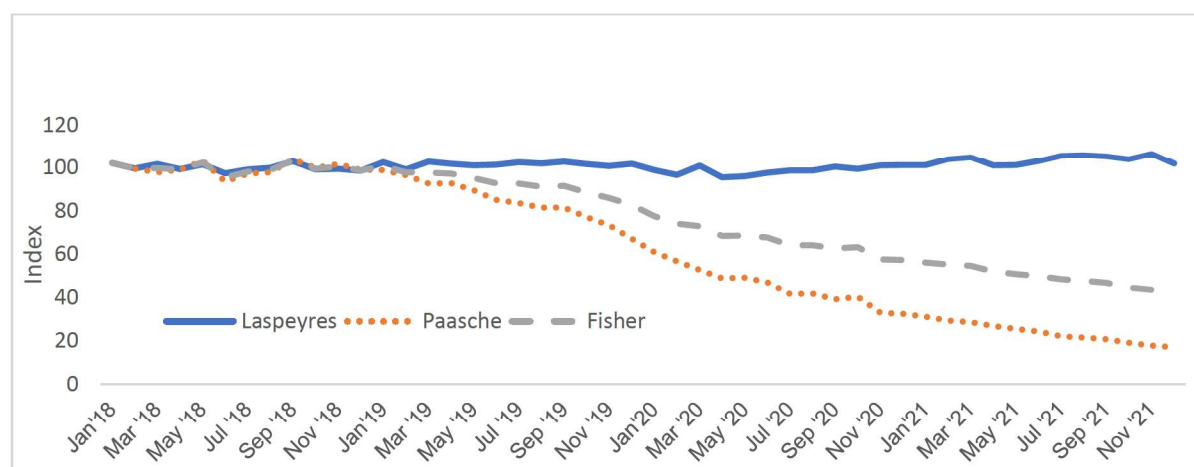
Illustration 1. Steps in the Computation of UVI for Export using Laspeyres



IV. RESULTS

Results showed that the indices for the period 2018-2021 using Laspeyres formula are generally higher than the indices computed using Paasche formula and Fisher formula. Since the Fisher formula is just the geometric mean of the Laspeyres and Paasche, it is consistently at the middle of the two. (Table 1 and Figure 1)

Figure 1. Unit Value Index for Export using Laspeyres, Paasche and Fisher Formula
January 2018 – December 2021

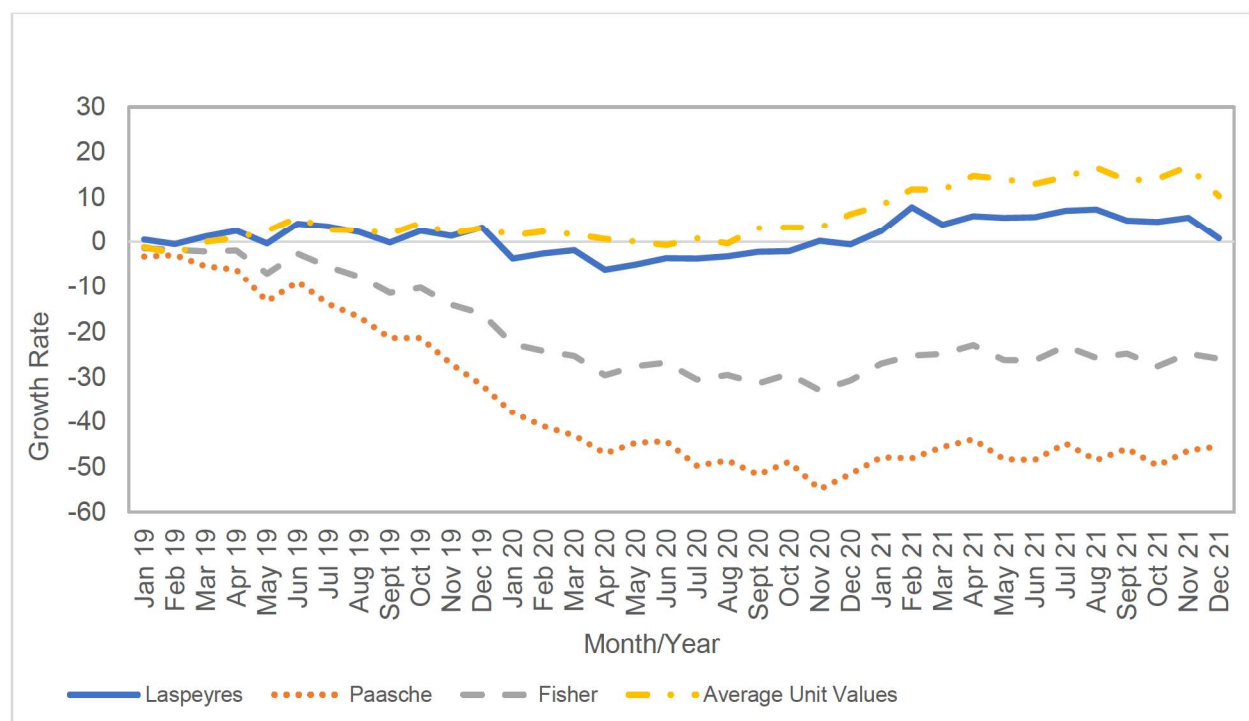


Year-on-year, the results showed that for the period in review, annual growth rates of UVI for total export using Laspeyres is consistently the highest with Paasche as the lowest. Similarly for the Fisher index, it remained in the middle of Laspeyres and Paasche indices. It can also be noted that in the periods where UVI was starting to already manifest positive annual growths like in the period January 2021 to December 2021, the Paasche and Fisher indices remained at high negative annual growth rates. (Figure 2)

Comparing the year-on-year growth rates of the average unit value of exported goods with the three types of indices, annual growth rates of Laspeyres indices follow the same trend as the annual growth rates of average unit value of exported goods. In

addition, annual growth rates of Laspeyres indices are consistently the closest to the year-on-year growth rates of the average unit value. (Figure 2)

Figure 2. Year-on-Year Growth Rate of Unit Value Index for Export by Method and Average Unit Value
January 2019 – December 2021



V. RECOMMENDATION

This paper recommends the adoption of the Laspeyres index formula for the generation of UVI for export. This is because it better reflects the true picture of the movement of prices of exported goods than the alternative formula when compared with the movement of the average unit price of exported goods.

VI. WAYS FORWARD

This recommendation will be presented in October 2022 to the Inter-agency Committee (IAC) on Trade and Industry Statistics for comments and IAC on Price Statistics in October 2022 for endorsement to the PSA Board. The presentation to the PSA Board will be during its fourth quarter meeting in November 2022. Once approved, the PSA will release the initial UVI for export covering the series January 2018 to December 2022 in April 2023. The succeeding releases will be done every month.

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APPENDICES

Table 1. Total Unit Value Index for Export by Method: 2018 – 2021

Mo	2018			2019			2020			2021		
	Laspeyres	Paasche	Fisher	Laspeyres	Paasche	Fisher	Laspeyres	Paasche	Fisher	Laspeyres	Paasche	Fisher
Jan	102.07	102.06	102.06	102.53	98.68	100.62	98.76	61.25	77.55	101.13	31.93	56.12
Feb	99.60	99.40	99.50	99.07	96.44	97.72	96.52	56.94	74.03	104.06	29.56	55.27
Mar	101.66	97.82	99.72	102.85	92.56	97.57	100.94	52.73	72.93	104.89	28.70	54.72
Apr	99.31	98.92	99.11	101.78	92.81	97.19	95.48	49.15	68.38	101.08	27.57	52.04
May	101.43	103.16	102.29	101.07	89.45	95.08	95.92	49.48	68.66	101.18	25.56	50.75
Jun	97.30	93.49	95.38	101.32	85.09	92.80	97.63	47.39	67.77	103.09	24.43	49.99
Jul	99.04	97.12	98.07	102.51	83.67	92.57	98.73	42.05	64.14	105.68	23.21	48.39
Aug	99.78	97.82	98.80	101.96	81.48	91.12	98.69	41.87	64.17	105.94	21.55	47.69
Sep	102.96	103.78	103.37	102.79	81.65	91.54	100.48	39.40	62.69	105.34	21.28	46.77
Oct	99.16	99.79	99.47	101.59	78.48	88.48	99.46	40.14	63.27	104.00	20.18	44.54
Nov	99.44	101.56	100.49	100.81	74.11	85.95	101.01	33.40	57.59	106.51	17.91	43.57
Dec	98.52	98.92	98.72	101.72	67.55	82.64	101.12	32.69	57.29	101.94	17.82	41.69
Ave	100.02	99.49	99.75	101.67	84.91	92.77	98.73	45.30	66.54	103.74	23.66	49.29

Table 2. Growth Rate for Export by Method: 2019 – 2021

Mo	2019			2020			2021		
	Laspeyres	Paasche	Fisher	Laspeyres	Paasche	Fisher	Laspeyres	Paasche	Fisher
Jan	0.45	-3.25	-1.42	-3.68	-38.33	-22.93	2.40	-48.85	-27.63
Feb	-0.53	-3.04	-1.79	-2.58	-41.08	-24.24	7.81	-48.30	-25.34
Mar	1.18	-5.38	-2.16	-1.86	-43.07	-25.25	3.92	-45.84	-24.98
Apr	2.49	-6.18	-1.94	-6.18	-47.24	-29.64	5.86	-45.29	-23.90
May	-0.36	-13.29	-7.05	-5.09	-45.05	-27.78	5.48	-48.21	-26.09
Jun	4.13	-9.09	-2.71	-3.65	-44.65	-26.97	5.59	-48.46	-26.23
Jul	3.50	-13.92	-5.61	-3.68	-50.16	-30.72	7.04	-46.82	-24.55
Aug	2.18	-16.76	-7.77	-3.21	-48.76	-29.57	7.35	-48.54	-25.68
Sep	-0.16	-21.45	-11.44	-2.25	-52.02	-31.51	4.84	-46.92	-25.40
Oct	2.45	-22.78	-11.05	-2.10	-47.76	-28.49	4.57	-52.62	-29.61
Nov	1.38	-27.84	-14.47	0.20	-55.20	-33.00	5.45	-45.73	-24.35
Dec	3.25	-32.12	-16.29	-0.59	-51.66	-30.68	0.81	-47.47	-27.23
Ave	1.66	-14.59	-6.97	-2.89	-47.08	-28.40	5.09	-47.75	-25.91