การปรับปรุงประสิทธิภาพของข้อมูลดัชนีราคานำเข้า/ส่งออกของประเทศไทย

IMPROVING EFFICIENCY OF IMPORT/EXPORT PRICE INDEX OF THAILAND

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อปรับปรุงประสิทธิภาพของข้อมูลดัชนีราคานำเข้า/ส่งออกของประเทศไทย เพื่อให้สามารถนำไปใช้เป็นตัวบ่งชี้เศรษฐกิจที่ดีในการพัฒนาประเทศได้ดียิ่งขึ้น ซึ่งจากสูตรการคำนวณค่าดัชนีราคานั้นเห็นได้ชัดเจนว่าดัชนีราคานำเข้า/ส่งออกมีปัจจัยสำคัญในการคำนวณคือค่าราคาสัมพัทธ์ ดังนั้นบทความนี้จึงมุ่งเน้นการปรับปรุงค่าราคาสัมพัทธ์ ให้มีความถูกต้องและเชื่อถือได้มากยิ่งขึ้น สำหรับค่าราคาสัมพัทธ์นั้นปัจจุบันในหลายๆ ประเทศยังคงใช้ค่าราคาต่อหน่วยในการคำนวณ ซึ่งบทความฉบับนี้ได้เสนอวิธีในการปรับปรุงค่าราคาต่อหน่วยด้วยวิธีทางสถิติ ได้แก่ การลดอิทธิพลของค่านอกเกณฑ์ด้วยวิธีการของ Chamber (1986) และวิธีการของ Thipbharos (2014) การลดค่าความเอนเอียง และลดความแปรปรวน โดยวิธีการจัดกลุ่มสินค้าจากราคาสินค้า นอกจากนี้ได้มีการศึกษาเกี่ยวกับนัยทั่วไปของความสัมพันธ์ระหว่างราคาต่อหน่วยและราคาจริง จากผลการศึกษานี้ได้พบว่า เมื่อทำการปรับปรุงค่าราคาต่อหน่วยแล้วทำให้ค่าราคาสัมพัทธ์มีความผันผวน และความลำเอียงลดลง อันจะส่งผลต่อประสิทธิภาพในการคำนวณค่าดัชนีราคานำเข้า/ส่งออกสำหรับประเทศไทยมากยิ่งขึ้น นอกจากนั้นผลการศึกษายังแสดงให้เห็นว่าข้อมูลราคาจริงที่ได้จากสถานประกอบการยังคงมีความจำเป็นในการคำนวณค่าดัชนีราคาดังกล่าว เนื่องจากไม่พบลักษณะนัยทั่วไปของความสัมพันธ์ระหว่างราคาต่อหน่วยและราคาจริง

คำสำคัญ: ดัชนีราคานำเข้า/ส่งออก ราคาสัมพัมธ์ ค่านอกเกณฑ์

Abstract

The objective of this research is to improve the efficiency of import/export price index of Thailand which is used as an indicator accurately reflecting to the movement of the import/export price. From the formula of the price index, we can see that the important factor is the relative price. Therefore, the accuracy of the price index could be improved by the modification of the relative price. Nowadays, the relative price in many countries is constructed by unit price. Thus, the price index in this paper has been modified by unit price for calculation of the import/export price index according to statistical principle;–reduce outliers effect using Camber (1986)'s method and Thipbharos (2014) method; decrease bias and variance stratified method. Furthermore, the generalized relationship between unit price and actual price was investigated. From the study, it was found that adjusting unit price has made unit price value more efficient in calculating the import/export price index. Also from this study it was found that actual price from entrepreneurs is still necessary for calculating the import/export price index of Thailand because the results showed found no generalized relationship between unit price and actual price data.

Keywords: Import/Export Price Index, Relative Price, Outliers

1. Introduction

Economic indicatorsare important tools to show the economic situation which is useful to prepare the planning, policy-formulation and decision-making in preparation for future economic trend. With the current country trend on Thailand 4.0 as a tool for driving the country forward, country information is quite important. Throughout the years, Trade Policy and Strategic Office, Ministry of Commerce, as the government agency responsible for establishing the important Thailand's economic index, has prepared the following Thailand import/export price index to analyze signs of inflations from transfer of product price from producers to domestic consumers. It is also a tool to measure domestic commercial rate in assessing Thailand's international competitive capacity as well as data to adjust the Nominal GDP into the Real GDP.

Therefore, it is essential that the import/export price index be prepared as correctly, accurately and as standardized as possible to truly reflect the movement of the export and import prices. At present, the import/export price index is calculated by using data from 2 parts : (1) data from the Customs Department called "Unit price" and (2) data from direct survey of outliers entrepreneurs called the "Actual price". The direct survey of export and import prices has limitations in terms of entrepreneur cooperation, thus, data from the Customs Department must be usedto calculated the import/export price index. Nevertheless, calculation of unit price using data from Customs Departments which has been widely-used in many countries, has been concerned in many issue as followed: (The International Monetary Fund, 2009)

1. The biasness of the import/export price index resulting from the non-harmonization of the product, such as mixture of sizes or different lots, etc. The problem can be solved by stratification that can decrease the bias but, as such, the statistic unit must have adequate data or information from the users or the entrepreneurs, which is very difficult to achieve in practice.

2. Data manipulation to ensure a more quality data such as coping with missing data, seasonal products, etc., must be obtained from the data collection, meanwhile, unit price cannot be replaced by real data.

3. There is a very high variance of the import/export price index because unit price is not harmonized. This problem has occured by the mix of size or lot of products as well as unit of export or import. The volume units used by the Customs Department differs greatly, for example, some unit count are reported in pieces, while some are reported as bulk.

4. Problems of outliers are frequent in the use of data to calculate statistical information, especially for calculating unit price. When good outliers are found and are excluded from the calculation of the import/export price index, this is a bad way because indices does not accurately reflect the fact as the good outliers were not used to calculate inflation. The value of the import/export price index may be underestimated or overestimated.

2. Unit price calculation and problems of using unit price in calculating the import/export price index

2.1 Calculating the price index

At present, the Trade Policy and Strategic Office, Ministry of Commerce uses the following formula to calculate the import/export price index (Bureau of Trade and Economic Indices, 2015):

1) The import/export price index is calculated by the Fixed Laspeyres formula:

$$I_t = \frac{\sum\left[(W_0)\times\frac{P_t}{P_0}\right]}{\sum(W_0)} \times 100$$

where I_t is the import/export price index at time t
P_t is the actual price at time t
P_0 is the actual price average at the base time t
W_0 is the weighted value at the base time t

2) The import/export price index is calculated by the Modified Laspeyres formula:

$$I_t = \frac{\sum\left[(W_{t-1})\times\frac{P_t}{P_{t-1}}\right]}{\sum(W_{t-1})} \times I_{t-1}$$

where I_t is the import/export price index at time t
P_t is the actual price at time t
P_{t-1} is the actual price average at the base timet-*1*
W_{t-1} is the weighted value at the time *t-1*
I_{t-1} is the import/export price index at time *t-1*

From the above formulas, we can see that the important factor of calculation is the relative price $\left(\frac{P_t}{P_{t-1}}\right)$. Thus this study has been focused on this term.

2.2 The problem of using unit price in the calculation of the import/export price index

2.2.1 The biasness of unit price

At present, the calculation of the import/export price index from unit price in several countries face the problem of bias that needs to be minimized or corrected as much as possible. Calculation of the price index from unit price is used in the case that the agency needs to utilize data from the Customs Department. The import/export price index can be calculated see formula (1), a simple calculation using the ratio between value of product at time t, and the value of product at base time.

$$P_i^{0:t} = \left(\frac{\sum_i p_i^t q_i^t}{\sum_i q_i^t}\right) \Bigg/ \left(\frac{\sum_i p_i^0 q_i^0}{\sum_i q_0^t}\right) \qquad (1)$$

Nevertheless, the calculation of unit price can be bias if products are not harmonized, such as differing sizes, etc. For example, refrigerators that are exported or imported come in seveal sizes: small, medium, large, as shown in the table below:

Table 1: Size of refrigerator

time	*size*											
	Small			*Middle*			*Large*			*Total*		
	q	p	v	q	p	V	q	p	v	q	p	v
Present	2	2	4	3	4	12	5	6	30	10	4.6	46
Pass	5	1	5	3	2	6	2	3	6	10	1.7	17

From table 1, we can see that the price of each size of refrigerator increases twice from the past to the present. However, if we calculate the import/export price index from formula (1), we can see that the result is 2.71. Therefore, the unit price ($p_i q_i$) can make the import/export price index bias (Silver, 1981).

Thus it can be said that the calculation of unit price is appropriate when the data is homogeneous, such as the unit of products are the same for import or export each month. Unit price of data certainly does not have this property. Due to the objective of data collection of the Customs Department, The data cannot be used to calculate the import/export price index.

2.2.2 Outliers of unit price

Checking for and managing outliers is another important point of the price index calculation and it should be established as the policy for calculating the price index for every country. Because outliers affect the results of the calculation of the price index both for import and export. Therefore, the statistical agencies assigned to find the price index must check and manage outliers according to statistical methods in order to reduce the influence of outliers when using the price index.

If good outliers are detected from the set of data, the calculated price index does not truly reflect the facts. They always influence by the result of inflation. That means the price index has been underestimated or overestimated.

To check outliers in the calculation of the price index, general statistical methods such as outlier checks using the upper and lower bound of the confidence interval can be used. Whenever outliers are found, they are limited by the value of the upper or the lower band of the data set which does not include outliers as suggested by Chambers (1986). We can see that, this method is one of the ways to reduce the effect of outliers by weighting approach. This research, thus has applied the recommendation of Chambers's to reduce the effect of outliers as followed:

1. Detect outliers.
2. Calculate upper and lower bounds of data excluding the outliers.
3. Limit detected outliers by upper and lower bounds which were calculated as this formula

$$P_i = \begin{cases} L_i & ; \ i \in s_1 \\ P_i^* & ; \ i \in s_0 \\ U_i & ; \ i \in s_2 \end{cases}$$

where P_i is unit price,

Li is lower bound of data excluding outliers,

$$L_i = P_i^* - Z_{\alpha/2}\hat{\sigma}_{P_i^*},$$

U_i is upper bound of data excluding outliers,

$$U_i = P_i^* + Z_{\alpha/2}\hat{\sigma}_{P_i^*},$$

P_i^* is unit price which is not outlier,

s_0 is the set of unit price which excluded outliers,

s_1 is set of lower outliers of unit price,

s_2 is set of upper outliers of unit price.

As described above, it can be seen that there are two principleto calculate the import/export price index. First, the actual price can be directly collected from entrepreneurs, and second, unit price index can be calculated from the data; namely quantity and value received from the Customs department. Therefore, the price index obtained by the second method dose not represent the price index obtained from the actual price. The most important factor to allow the statistical agencies to use unit price index instead of the actual price is to find the statistical relationship between the two price sets using the regression model as evident in the research in several countries, such as Germany and Japan for example (Silver, 1981).

3. Prediction of actual price using unit price

It is a well-known that if we can find the relationship between actual price and unit price in the function of unit price can well predict actual price as shown the relationship in the equation (2). It would be extremely useful for the calculation of the Thailand import/export price index. Such relationship can be found using the formula in (2) (Siver 1981).

$$\begin{aligned} AP_t &= \alpha + \beta P_t + \varepsilon_t \\ AP_t &= \alpha + \beta P_{t-1} + \varepsilon_t \\ &\vdots \\ AP_t &= \alpha + \beta P_{t-t} + \varepsilon_t \end{aligned} \qquad (2)$$

where AP is actual price

P is unit price

t is the time period.

Estimation of regression coefficient can be obtained using ordinary least square method. However, from past researches, it has not been found that the prediction of actual price by using unit price can be used in the long term (Silver, 1981).

4. Prediction of actual price by using unit price when outliers existing in the data

In order to find a linear relationship between actual price and unit price as explained in section 3, if outliers are detected, the responsible agency for calculating the price index must be extemely careful about the impact of these outliers.

From the approach of Chambers (1986) and Thipbharos (2014) that are proposed to reduce the effect of outliers in regression analysis, the researcher has applied the set of approaches to find the linear relationship beween unit price and actual price when the data consisting of outliers as follows:

Given that s_0, s_1 and s_2 have the meaning as shown in section 2.2.2, in the case that outliers are found, they are treated as missing data and the regression coefficients α and β have been estimated by using the data in s_0. The estimated parameters in the regression model would be $\hat{\alpha}^*$ and $\hat{\beta}^*$, which are used to calculate AP^* when P is the unit price which was reduced the effect of outliers as shown in section 2.2, that is

$$\begin{aligned} \hat{AP}_t^* &= \hat{\alpha}^* + \hat{\beta}^* P_t \\ \hat{AP}_t^* &= \hat{\alpha}^* + \hat{\beta}^* P_{t-1} \\ &\vdots \\ \hat{AP}_t^* &= \hat{\alpha}^* + \hat{\beta}^* P_{t-t} \end{aligned} \qquad (3)$$

The variance of $\hat{AP}^*$ with respect to P^* or $VAR\left(\hat{AP}^* \middle| P_0^*\right)$ have the value as.

$\hat{\sigma}^{*2}\left[1+\left(\sum P^*\right)^2 \Big/ \sum P^{*2}\right]$. Thus the confidence interval of $\hat{AP}^*$ with respect to P^* can be written as the formula (4)

$$\hat{AP}^* \pm Z_{\alpha/2} S.D.\left(\hat{AP}^* \middle| P_0^*\right), \qquad (4)$$

where $S.D.\left(\hat{AP}^* \middle| P_0^*\right) = \sqrt{\hat{\sigma}^2\left[1+\frac{\left(\sum P^*\right)^2}{\sum P^{*2}}\right]}$.

From this approach, we can limit the outliers that are both inand by upper and lower bound of the confidence interval as shown in formula (4), respectively. This can be expressed in the regression formula as followed.

$$AP_t^* = \begin{cases} L_i & ; \quad L_i = max\left\{ AP_t \ , \hat{AP}_t^* - Z_{\propto/2} S.D.\left(\hat{AP}_t^* \middle| P_0 \right) \right\}, \ t \in s_2 \\ AP_t & ; \quad t \in s_0 \\ U_i & ; \quad U_i = min\left\{ AP_{t\ t} , \hat{AP}_t^* + Z_{\propto/2} S.D.\left(\hat{AP}_t^* \middle| P_0 \right) \right\}, \ t \in s_1 \end{cases}$$

In coping with outliers as above, their effect will be decreased.

5. Recommendations for improving the calculations of unit price to determine import/export price index.

At present, unit price is still necessary for the calculation of the import/export price index, because it is very difficult to collect actual price from entrepreneurs in Thailand. Several entrepreneurs are still unwilling to provide actual information to responsible agencies. In the request for data, many times the burden falls on the data-providing entrepreneur, especially in countries where a code of practice has not been established regarding legal protection of state agencies in requesting data. Those responsible for the production of data, therefore, turned to unit price from the Customs Department. From Sections 1 to 4, the researcher has proposed the method to be used to adjust the import/export price index as follows:

1) In each item (HS Code) chosen to be indicator for the calculation of the relative[1] price and the price index, the selected entrepreneurs must have consistency imported or exported record and they are not "too new coming item "based on unit price data received from the Customs Department. This way was done to reduce the non-homogeneity of the data and higher variation of the export and import price index due to the mix of size and lots of product.

2) The entrepreneurs selected in 1) are then randomly sampled by using stratified simple random sampling. The number of entrepreneurs in each item of products must follow the population ratio.

3) Check the outliers of unit price using statistical method as the extreme value analysis, and reduce the influence of outliers by the method shown in the section 2.3.

1 This study conducted analysis by focusing on the relative price because it is the important factor in the calculation of the export and import price index and it is the factor reflecting the movement of the import/export price index

4) Calculate the relative of each $_i(R_{ti})$ – from the formula $R_{ti} = \frac{P_{ti}}{P_{(t-1)i}} \times 100\%$ when $i = 1,2,...,n$ and n is the number of entrepreneurs, and calculate the relative mean from the formula $\bar{R}_t = \frac{\sum R_i}{n}$

6. The result of value improvement and analysis of data

There are two parts of analysis in this study, namely 1) Improving the calculation of unit price to obtain at the import/export price index (as suggested in 5), and 2) finding the relationship between unit price and actual price to check whether or not unit price can be used to predict actual price in the case that data cannot be collected from entrepreneurs.

For this study, the researcher has selected product-items that was exported or imported in 2015 according to the export and import structure specified by the Ministry of Commerce as representative for the calculation of unit price and to find the relationship between unit price and actual price. The exported products are categorized following the Ministry of Commerce's classification, covering four main types: 1) Agricultural products, 2) Agro-industrial product, 3) Industrial products, and 4) Minerals and fuels products. Imported products, which were studied, are classified followed by the Ministry of Commerce's import product classification, coveringfive main groups: 1) Fuels, 2) Capital products, 3) Raw material and Semi-finished products, 4) Consumer products, and 5) Vehicle and Transport equipment.

This study selected products listed in the index basket provided by the Ministry of Commerce by singling out only items that have actual prices, both for export and import so that unit price and actual price can be relatively compared. In 2015, there were 81 exported items and 49 imported items with actual prices provided by entrepreneurs. Among these items, the researcher was able to calculate the unit price of 31 exported items and 19 imported items. All selected products have been frequently imported or exported and none of the items are new coming products. The results of the study can be divided into two parts:

6.1 Adjustment of the calculations of unit price to determine the Import/export Price Index

The researcher shows the fluctuation of the relative price of 2015 by comparing the variation of the relative price before and after the adjustment of unit price as shown in table 2and 3. It can be clearly seen that once calculations were adjusted for unit price as suggested in 5, the variation in relative price is lower than the traditional method of calculations and is more aligned with the present economic status.

6.2 Finding the relationship between unit price and actual price

In this part, the researcher has constructed the linear relationship between actual price (abbreviated by AP) and unit price (abbreviated by P), using regression analysis. After the effect of outliers was reduced using approaches described in Sections 2 and 4, the researcher studied five types of relationships as follows:

$$\hat{AP}_t^* = \hat{\alpha}^* + \hat{\beta}^* P_t$$
$$\hat{AP}_t^* = \hat{\alpha}^* + \hat{\beta}^* P_{t-1}$$
$$\vdots$$
$$\hat{AP}_t^* = \hat{\alpha}^* + \hat{\beta}^* P_{t-4}$$

From the analysis of relationship between AP and P, the researcher expressed the result of the analysis only in the cases where the items have had the linear relationship of AP and P is presented. The results have been shown in tables 4 and 5, conclusions are as follow:

1) Items, where AP has been depended on P in the **same period,** comprised two export items, and two import items.

2) Items, where UP has affected to AP with **one lag time,** comprised two export items, and two import items.

3) Items, where UP has affected to AP with **two lag time,** comprised one export item, and four import items.

4) Items, where UP has affected to AP with **three lag time,** comprised two export items, and one import items.

5) Items, where UP has affected to AP with **four lag time,** comprised one import item.

Table 2. The variance of the relative price of the exported products before and after adjustment

The variance of the relative price of the export product					
Item	Before adjustment	After adjustment	Item	Before adjustment	After adjustment
1	33.312	5.552	17	1095.889	182.648
2	727.864	121.311	18	904.047	150.674
3	1554.660	259.110	19	532.018	88.670
4	507.560	84.593	20	1117.063	186.177
5	826.535	137.756	21	1910.230	318.372
6	709.226	118.204	22	1099.182	183.197
7	1193.299	198.883	23	3049.588	508.265
8	3017.104	502.851	24	1108.894	184.816
9	2131.339	355.223	25	91.431	15.239
10	848.986	141.498	26	3615.488	602.581
11	899.763	149.961	27	145.960	24.327
12	572.159	95.360	28	1525.985	254.331
13	1779.505	296.584	29	125.082	20.847
14	1055.576	175.929	30	79.424	13.237
15	1539.249	256.541	31	187.908	31.318
16	887.030	147.838			

Table 3. The variance of the relative price of the imported products before and after adjustment

The variance of the relative price of the import product					
Item	Before adjustment	After adjustment	Item	Before adjustment	After adjustment
1	208.215	13.318	11	1351.656	355.699
2	1729.286	137.594	12	476.805	105.957
3	467.518	32.646	13	843.952	140.659
4	1887.976	227.467	14	263.555	28.962
5	487.822	53.607	15	207.485	32.934
6	962.289	155.208	16	320.336	76.271
7	47.612	9.336	17	1392.470	183.220
8	562.029	51.094	18	872.403	136.976
9	121.262	25.263	19	228.669	30.620
10	543.624	159.889			

Table 4. Result of the regression analysis of exported products

	β^*	F	p - value	R^2	β^*	F	p - value	R^2	β^*
Item1					Item6				
Pt	-0.652	7.397	0.022**	0.425	-0.473	2.881	0.120	0.224	-0.473
P(t-1)	0.151	0.210	0.657	0.023	0.542	3.734	0.085*	0.293	0.542
P(t-2)	0.294	0.759	0.409	0.087	-0.293	0.749	0.412	0.086	-0.293
P(t-3)	0.452	1.798	0.222	0.204	0.109	0.083	0.781	0.012	0.109
P(t-4)	-0.094	0.053	0.825	0.009	-0.065	0.025	0.879	0.004	-0.065
Item2					Item7				
Pt	-0.025	0.006	0.938	0.001	0.262	0.736	0.411	.069	0.262
P(t-1)	-0.023	0.005	0.946	0.001	-0.294	0.853	0.380	.087	-0.294
P(t-2)	-0.154	0.195	0.670	0.024	0.610	4.735	0.061*	.372	0.610
P(t-3)	0.834	16.005	0.005**	0.696	-0.167	0.201	0.168	.028	-0.167
P(t-4)	-0.030	0.005	0.945	0.001	-0.188	0.221	0.655	.035	-0.188
Item3					Item8				
Pt	0.200	0.417	0.533	0.040	-0.250	0.666	0.433	0.062	-0.250
P(t-1)	0.678	7.644	0.022**	0.459	0.118	0.127	0.730	0.014	0.118
P(t-2)	-0.290	0.733	0.417	0.084	0.575	3.959	0.082	0.331	0.575
P(t-3)	-0.452	1.802	0.221	0.205	-0.438	1.663	0.238	0.192	-0.438
P(t-4)	0.188	0.219	0.656	0.035	-0.125	0.095	0.769	0.016	-0.125
Item4					Item9				
Pt	-0.055	0.031	0.864	0.003	-0.250	0.666	0.433	0.062	-0.250
P(t-1)	0.500	2.995	0.118	0.250	0.118	0.127	0.730	0.014	0.118
P(t-2)	0.172	0.245	0.634	0.030	0.575	3.959	0.082	0.331	0.575
P(t-3)	0.743	8.611	0.022**	0.552	-0.438	1.663	0.238	0.192	-0.438
P(t-4)	0.148	0.135	0.726	0.022	-0.125	0.095	0.769	0.016	-0.125
Item5									
Pt	0.516	3.621	0.086*	0.266					
P(t-1)	-0.215	0.435	0.526	0.046					
P(t-2)	0.163	0.220	0.652	0.027					
P(t-3)	-0.342	0.928	0.368	0.117					
P(t-4)	0.454	1.555	0.259	0.206					

*Significant at level 0.10, ** Significant at level 0.05

Table 5. Result of the regression analysis of imported products

	$\hat{\beta}^*$	F	p - value	R2
Item1				
Pt	0.804	16.461	0.003**	0.647
P(t-1)	0.535	3.2	0.111	0.286
P(t-2)	0.081	0.047	0.835	0.007
P(t-3)	0.075	0.034	0.859	0.006
P(t-4)	0.290	0.460	0.528	0.084
Item2				
Pt	-0.099	0.089	0.773	0.010
P(t-1)	-0.421	1.722	0.226	0.177
P(t-2)	0.619	4.339	0.076*	0.383
P(t-3)	-0.266	0.457	0.524	0.071
P(t-4)	-0.087	0.038	0.853	0.008
Item3				
Pt	-0.063	0.036	0.853	0.004
P(t-1)	0.622	5.038	0.055*	0.386
P(t-2)	-.0364	1.071	0.335	0.133
P(t-3)	-0.457	1.588	0.254	0.209
P(t-4)	0.299	0.490	0.515	0.089
Item4				
Pt	-.008	0.001	0.980	0.000
P(t-1)	0.353	1.141	0.317	0.125
P(t-2)	-0.168	0.204	0.665	0.028
P(t-3)	-0.429	1.355	0.289	0.184
P(t-4)	-0.935	34.682	0.002**	0.874
Item5				
Pt	-0.001	0.000	0.997	0.000
P(t-1)	-0.837	21.042	0.001**	0.700
P(t-2)	-0.306	0.825	0.390	0.093
P(t-3)	0.433	1.618	0.244	0.188
P(t-4)	0.228	0.329	0.587	0.052
Item6				
Pt	0.662	7.019	0.027	0.438
P(t-1)	0.293	0.750	0.412	0.086
P(t-2)	-0.530	2.730	0.142	0.281
P(t-3)	0.588	3.165	0.126	0.345
P(t-4)	-0.202	0.212	0.664	0.041

*Significant at level 0.10, ** Significant at level 0.05

7. Summary

From the analysis above, the following can be summarized:

1) The relationship of AP and P was not been unique, thus we can conclude that there was no generalization relationship of AP and P.

2) In case there is a relationship between AP and P, most are often occur when the price data are not more than three lag time.

3) Using of unit price data in calculating the import/export price index will still cause many problems if unit price is not adjusted to reflect more accuracy. It is well-known that unit price is appropriate if the data is homogeneous and there is no mix of lot or size of product. Several countries always face biasness problem of calculation of unit price and import/export price index if the analyst does not adjust unit price before calculating the price index.

The result will not accurately reflect the true economic status of the country. Moreover, unit price data obtained from Customs Department usually does not have a linear relation with actual price data, thus the actual price cannot be projected from unit price.

4) The formula for calculating the import/export price index comes from the actual price, therefore, in the case where we use the unit price instead of using actual price, we will take the risk of the consequence. From study in this research, it showed that several countries such as Singapore (Import & Export Price Index December, 2015), Australia (Producer and International Trade Price Indexes: Concepts, Sources and Methods, 2014) as well as(International Monetary Fund, 2009) use actual data to calculate the import/export price index.

5) In the case where the statistical agencies, which has the duty to analyze the import/export price index, apply methods provided in Sections 2 to 5then the import/export price index will not be effected by outliers and it is less biasedness and variance.

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