Chapter 2

Export Performance and Instability

The issue of export instability and export performance have never been included in the same study or topic. We usually separate the studies in export instability into 2 parts; cause of instability and impact of instability. The existence, causes, and impact of export earnings' instability have been examined by a number of economists. Most of all tried to analyse the instability of exports in developed and developing countries. The results are quite the same, that is, the developing countries are more vulnerable than developed countries when face the problem of export earnings instability.

In the topic of export performance, there are so many works done on this issue. Generally, export performance has examined the growth, competitiveness and comparative advantage of export of each commodity or country.

In this study we will try to analyse export performance by using CMS model which tell us about the growth of export. Moreover, we will relate the export instability to the export performance. The hypothesis is when export instability declines the performance of export should be more stable in the competitiveness. For example, during two periods of time, if instability

index decline while the growth in export competitiveness decrease, this implied that these commodity unable to compete effectively to that of competitors.

Export Performance

Since Thailand is a small open-economy country, the relationship in international finance, international trade, and investment with international economy is unavoidable. In other words, Thailand has to compete with the other in the world market.

Therefore, the competition in international trade can be divided into 2 cases :

1. Price Competition that establishes on the principle of market mechanism by demand and supplies of each commodity.
2. Non-price Competition that relies on the principle of comparative advantage such as location advantage.

Because of the difference in currency unit among countries, we can evaluate price competitiveness of selected commodities by using Relative Purchasing Power Parity as follow.

$$R_i = e_i \ [P^* / P_i]$$

Where

R_i = index of price competitiveness of country i

P_i = price of selected commodity in foreign market

P* = price of selected commodity in world market

e_i = exchange rate of country i versus US$

Furthermore, there are two poplar measurements to reflect the country comparative advantage as following.

The Revealed Comparative Advantage *(RCA)*

The *RCA*, developed by Balassa [4], is an index used for reflecting a country's comparative advantage. The *RCA* is predicted on the assumption that an international trade pattern for a particular product is capable of reflecting the comparative advantage. That is, a country has a comparative advantage on a particular product if export of the product performs over the whole country's exports. A ratio of export value of a particular product performance.[5]

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[4] Bela Balassa. Trade Liberalisation and Revealed Comparative Advantage. (Connecticut: Economic Growth Centre, Yale University Press,1965). cited in Archanun Kohpaiboon. "Policy Distortion and Competitiveness of Thai Textile Industries" (The Master's Thesis, Faculty of Economics, Thammasat University, 1995).

[5] Archanun Kohpaiboon. "Policy Distortion and Competitiveness of Thai Textile Industries" (The Master's Thesis, Faculty of Economics, Thammasat University, 1995).

Thus, the *RCA* is defined as a country's share of a group of countries' exports of a given product relative to its share of the same country-group total for exports of a wider range of products.[6] A formula of the *RCA* is presented in the equation below.

$$RCA_{ij} = \frac{x_{ij}}{\sum_{j=1}^{m} x_{ij}} \div \frac{\sum_{i=1}^{n} x_{ij}}{\sum_{j=1}^{n}\sum_{i=1}^{m} x_{ij}}$$

where, RCA_{ij} = the *RCA* of the country i^{th} on the product j^{th}

x_{ij} = export values of the j^{th} product of the country i^{th}

n = number of countries

m = number of products

From equation (1), it shows that the number is a country i^{th}'s share of export value of the j^{th} product to total export value whereas the denominator is the share of all the n countries. If the *RCA* index is greater than 100 percent, the i^{th} country can perform better than the average proportion on n countries by having a higher share of the j^{th} product export to the total export

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[6] John Peterson, "Export Shares and Reveal Comparative Advantage: A Study of International Travel". Applied Economics 20 (March 1988): p352. cited in Archanun Kohpaiboon. "Policy Distortion and Competitiveness of Thai Textile Industries" (The Master's Thesis, Faculty of Economics, Thammasat University, 1995).

and, thus, the i^{th} country has a comparative advantage on the j^{th} product, and vice versa.

The *RCA* is regarded under some assumption. Firstly, to reflect a comparative advantage, the *RCA* assumes the uniformity in tastes and a uniform incidence of duties in every industry. Secondly, the duties are nondiscriminatedly implemented to all countries. However, in reality, these two assumptions are easily violated. Tariff barriers become a protection policy that the government in a country provides protection for some industries and the policy is different country by country. A low export value that indices a lower *RCA* may be a result of high tariffs on products from importing countries. The low *RCA* cannot imply that a country has a comparative disadvantage. Moreover, several trade blocs have been built, and some privileges has been provided especially on tariffs to member countries. A non-member country cannot equally compete with a member country to export to the other member countries because of a different tariff rather than a relative disadvantage.[7]

There are some researches that using *RCA* in theirs studies such as Natchamai Maharattanawong ; and Supinda Wasinrat.

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[7] Bela Balassa, op. Cit., footnote 1: p.101. cited in Archanun Kohpaiboon. "Policy Distortion and Competitiveness of Thai Textile Industries" (The Master's Thesis, Faculty of Economics, Thammasat University, 1995).

Natchamai Maharattanawong [8] studied The International Trade Competitiveness of Thailand Integrated Circuit Industry by using Herfindahl Index (H) to analyse market structure from product differentiate and industrial concentration. Furthermore, using the real exchange rate from under the theory of Relative Purchasing Power Parity as the measurement of price competitiveness and using the Revealed Comparative Advantage (RCA) as the measurement of industry's comparative advantage.

Supinda Wasinrat[9] tried to analyse the export potential of Thai gemstone and jewellery industry during 1988-1992. Revealed Comparative Advantage Index has been used to study export potential of gemstone and jewellery industry and apply CMS model to evaluate export performance from the value of export of this industry.

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[8] Natchamai Maharattanawong. "The International Trade Competitiveness of Thailand Integrated Circuit Industry" (The Master's Thesis, Faculty of Economics, Chulalongkorn University, 1996).

[9] Supinda Wasinrat. "An Analysis of Export Potential of Thailand's Gemstone and Jewellery Industry" (The Master's Thesis, Faculty of Economics, Chulalongkorn University, 1996).

The Constant-Market-Share Approach (CMS)[10]

The CMS approach states that a country's export may fail to grow as rapidly as the world average for three reasons:

1. its export may be concentrated in commodities for which demand is growing relatively slow;
2. its exports may be concentrated in relatively stagnant regions;
3. the country in question may have been unable or unwilling to compete effectively with other sources of supply.

The heart of the CMS approach is the assumption that a country's share of exports in the world market should remain unchanged over time if its competitiveness remains constant. The difference between the export growth implied by this constant-share norm and the actual export performance is attributed to the change in the country's competitiveness. In general, the actual growth in exports is divided into competitiveness, commodity composition and market-distribution effects. The basic assumption of the approach is described by the following relationship:

$$q_1/q_2 = f(p_1/p_2) \qquad (1)$$

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[10] Edward E. Leamer and Robert M. Stern. Quantitative International Economics (Allyn and Bacon, Inc, 1970).

where q_i and p_i are the quantity sold and price of the commodity from i^{th} supply source.

Relationship (1) may be manipulated by multiplying by (p_1/p_2) to obtain

$$p_1q_1 / p_1q_2 = (p_1/p_2)\, f(p_1/p_2) \qquad (2).$$

In addition, country 1's share of exports can be written as follows:

$$(p_1q_1) / (p_1q_1 + p_2q_2) = 1 / [1 + (p_2q_2 / p_1q_1)]$$
$$= \{ 1 + (p_2q_2 / p_1q_1) \}^{-1}$$

From (2), $f(p_1/p_2) = q_1/ q_2$, by substituting $f(p_1/p_2)$ we obtain

$$(p_1q_1) / (p_1q_1 + p_2q_2) = \{1 + [(p_1 f(p_1/p_2)) / p_2]^{-1} \}^{-1}$$
$$= g(p_1/p_2) \qquad (3)$$

which indicates that country 1's share of the market in question will remain constant except if (p_1/p_2) varies. This suggests that the difference between the export growth implied by the constant-share norm and actual performance has been labeled the "competitiveness effect". Thus when a country fails to maintain its share in world markets, the competitive effect will be negative, indicating that the country's export price has increased more than that of its competitors.

There are several studies that using CMS model such as: Jeerasak Pongpissanupichit; Doo Hyun Hwang; Prasit Suntayodom; Nuthariya Kontein; Supinda Wasinrat.

Jeerasak Pongpissanupichit[11] studied the Export Performance of Developing ECAFE Countries, in the case Thailand. He tried to undertake a comprehensive analysis and economic evaluation in order to assess the past performance of Thailand's export. The main point of this study concentrated on the investigation of Thailand's performance of some selected commodities from the stand point of the external demand versus the internal supply influences. Applied CMS model was used in this study because the CMS model itself generally assessed the export performance in broad and hypothetical aspects. The quantitative study was done without taking into account the effects of price and non-price factors or trade and non trade factors on export performance. In the case of demand effect components he did not investigate in detail the demand conditions as well as the internal condition affecting them in the various importing countries for each commodity. However, in this study Jeerasak had tried to show the performance of Thailand's exports in various market levels, i.e. all countries, regions, and individual countries rather than only for all countries. This would at least tell us about the performance in various market groups, though

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[11] Jeerasak Pongpissanupichit. "Export Performance of Developing ECAFE Countries: The Case of Thailand" (The Master's Thesis, Faculty of Economics, Thammasat University, 1974).

the detail of each of them was scarce. The share effect calculated in this study did not actually explain the real competitiveness of the country. It was the mixture of commercial trade, non-commercial trade, the domestic conditions, as well as the government policies. The CMS analysis failed to separately identify the share effects which were determined by the domestic parameters and these which are determined by the degree of competitiveness of other exporting countries as well as institutional factors. The domestic production of agricultural commodities a factor depends on the luck of the country and therefore the CMS analysis is subject to some short comings.

Doo Hyun Hwang[12] studied the export performance of Korean Textile Industry by using Constant-Market-Share Model (CMS model) to examine a country's export growth. He mentioned that this model basically ascribed favourable or unfavourable export growth either to a country's export structure or to its "competitiveness".

Prasit Suntayodom[13] tried to analyse the export performance of Thailand's three major export commodities namely: rice, natural rubber and maize during 1966-1978. The study was base on the Constant-Market-Share Approach(CMS). Some revisions and extension of

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[12] Doo Hyun Hwang. "Export performance of Korea Textile Industry" (The Master's Thesis, Faculty of Economics, Thammasat University, 1978).

[13] Prasit Suntayodom. "Export performance : A Case Study of Thailand's Rice, Rubber and Maize Exports During 1966-1978" (Ph.D. Dissertation, Clark University, 1981).

CMS approach were made in order to suit the nature of this study. The projections of the world demand for and supply of these commodities by the World Bank and the Food and Agriculture organisation of the United Nations (FAO) was discussed. The major analysis in the process was on the analysis of passed export performance and the consequent policy implications.

Nuthariya Kontein[14] studied Export Performance of Thailand's Manufactured Goods to the European Union by applying Leamer and Stern's CMS model to investigate export performance and competitiveness. He also employed the Revealed Comparative Advantage to describe the potential and competitiveness of Thai manufactures goods versus competitors of the same product in the EU market. The results of this study showed that overall export performance of Thai products to EU was not quite interesting because of internal change in EU itself.

As mentioned above that The CMS model was a famous measure used to examine the export performance and growth. From the related measurement of the competitiveness of country discussed above. The CMS model could explain the ability to compete with the competitors and, could explain causes of ability and disability of commodity would more clearer than the *RCA* and Relative PPP. Therefore, in this study we will use

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[14] Nuthariya Kontein. "A Study of Export Performance of Thailand's Manufactured Goods to the European Union" (The Master's Thesis, Faculty of Economics, Chulalongkorn University, 1996).

the *RCA* and Relative PPP. Therefore, in this study we will use CMS model for the examination of Thai rice and rubber exports to the world market.

Before going deeper into the CMS approach, the following definitions were needed.

V = total value of A's exports in period 1

V^* = total value of A's exports in period 2

V_i = value of A's exports of commodity i in period 1

V_i^* = value of A's exports of commodity i in period 2

V_{ij} = value of A's exports of commodity i to country j in period1

V_{ij}^* = value of A's exports of commodity i to country j in period2

V_j = value of A's exports to country j in period 1

r = percentage increase in world exports from period 1 to period2

r_i = percentage increase in world exports of commodity i from period 1 to period 2

r_{ij} = percentage increase in world exports of commodity i to country j from period 1 to period 2

It follows from the above definitions that for period 1:

$$\sum_j V_{ij} = V_i \quad \text{and} \quad \sum_i V_{ij} = V_j \quad . \qquad (4)$$

The value of country A's exports in period 1 was given by

$$\sum_i \sum_j v_{ij} \quad = \quad \sum_i v_i \quad = \quad \sum_j v_j \quad = \quad V.$$

Since exports were quite a diverse set of commodities, we would write an expression for the increase in the export of the i^{th} commodity as

$$V_i^* - V_i \quad = \quad r_i V_i \quad - (V_i^* - V_i - r_i V_i) \qquad (6)$$

Which may be aggregated into

$$\begin{aligned} V^* - V \quad &= \quad \Sigma r_i V_i \quad + \Sigma (V_i^* - V_i - r_i V_i) \\ &= \quad r V + \underset{\underline{2}}{\Sigma (r_i - r) V_i} + \underset{\underline{3}}{\Sigma (V_i^* - V_i - r_i V_i)} \qquad (7). \\ &\quad \underline{1} \end{aligned}$$

Equation (7) divided the change in the value of A's exports into three parts which represent:

1) the general rise in world exports;

2) the commodity composition of A's exports in period 1;

3) an unexplained residual indicating the difference between A's actual export increase and hypothetical increase if A had maintained its share of the exports of each commodity group.

The commodity composition effect in equation (7) indicated whether A's exports concentrated in commodity classes with growth rates higher than the world average. Thus, if the world export of commodity i increased by more than the world average for all commodities, A's commodity composition effect, $(r_i - r)\, v_i$, would be positive. Conversely, if the opposite was true, the $(r_i - r)\, v_i$ will be negative.

Finally, exports were differentiated by destinations as well as by commodity type. Allowance must be made for the fact that some countries had easier access to rapid growing regions, while others were surrounded by relatively slow-growing neighbors. The appropriate expression that took this into account is

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\begin{aligned}
V^* - V \quad &= \quad \underset{i\ j}{\Sigma\Sigma} r_{ij} V_{ij} \; + \; \underset{i\ j}{\Sigma\Sigma} \left(v_{ij}^* - r_{ij} V_{ij} \right) \\
&= \quad rV \; + \; \underset{i}{\Sigma} (r_i - V) V_i \; + \; \underset{i\ j}{\Sigma\Sigma} (r_{ij} - r_i)\, V_{ij} \\
&\qquad\quad \underline{1} \qquad\qquad \underline{2} \qquad\qquad \underline{3} \\
&\quad + \; \underset{i\ j}{\Sigma\Sigma} (V_{ij}^* - V_{ij} - r_{ij} V_{ij}) \qquad\qquad (8). \\
&\qquad\quad \underline{4}
\end{aligned}
$$

Equation (8) represents a "three-level" analysis in which the increase in A's exports is broken down into parts representing:

1) the general rise in world exports;

2) the commodity composition of A's exports;

3) the market distribution of A's exports; and

4) a residual reflecting the difference between the actual export growth and the growth that would have occurred if A had maintained its share of the exports of each commodity to each country.

The market distribution term in equation (8) maybe interpreted in the same manner as the commodity-composition effect.

It was defined as

$$\sum_i \sum_j (r_{ij} - r_j) V_{ij} \qquad (9)$$

and would be positive if A had concentrated its exports in markets that were experiencing relatively rapid growth. The term would be negative if A had concentrated in more stagnant regions.

The interpretation of the competitiveness residual was somewhat more complicated. If export demand was described by relationship (1), the residual component necessarily associated with change in the price ratio p_1/p_2. However, this left out many other factors which could affect the saleability of a country's exports in foreign markets, such as

a) differential rates of quality improvement and the development of new exports;

b) differential rates of improvement of efficiency of marketing or in term of financing the sale of export goods; and

c) differential change in abilities for prompt fulfillment of export orders.

Thus, the main weakness of the CMS approach lies in its explanation of the residual component. It explained the residual component entirely in term of relative prices.*

It should be clear that the just mentioned factors affected only the export demand for the product. The actual value of the residual would, of course, be the result of the interaction between demand and supply. The CMS approach completely overlooked the supply side. As with the time-series analysis of demand, it improved to be difficult to identify the separate influence of demand and supply. It is nonetheless instructive to list some supply factors that might affect one country's export-supply price vis-a-vis its competitors in world trade.[15] Some of these supply factors are:

a) differential rates of productivity growth in different countries and

b) differential rates of increase of national price levels.

Other non-supply factors which may affect export-supply price and therefore should be included in the analysis are: change in exchange rates and change in export taxation or subsidization.**

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* Crucial supply factors are taken into account in the Revised CMS approach.

[15] Prasit Suntayodom. "Export performance : A Case Study of Thailand's Rice, Rubber and Maize Exports During 1966-1978" (Ph.D. Dissertation, Clark University, 1981).

** Data on subsidisation schemes are vary rare and are not available for this study.

The CMS approach described above is the approach used by Stern[16] in his study of foreign trade in Italy. He did not, however, incorporate other demand and supply factors into his study. Although the CMS approach contained many defects, it nevertheless posed an interesting and important question concerning the extent to which a country's exports were concentrated in commodities and markets that have relatively high or low growth. Presumably a country would prefer export to be concentrated in commodities and markets that were rapidly expanding. For policy makers, the approach would show the preferable distribution of exports. The developing countries in particular might find that the slow expansion of their export market was due to the negative commodity and/or regional effects. With regard to the competitiveness residual, where the main weakness of the CMS approach lied, regression analysis could be used to analyze the impact of supply and demand factors other than relative prices on the competitiveness residual.

Because there were many drawbacks in the CMS model, the revision should be made before we further applied to this studies. This study would follow the Revised CMS Model which Prasit Suntayodom[17] used

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[16] Stern, R.M. , Foreign Trade and Economic Growth in Italy, 1967. cited in Prasit Suntayodom. "Export performance : A Case Study of Thailand's Rice, Rubber and Maize Exports During 1966-1978" (Ph.D. Dissertation, Clark University, 1981).

[17] Prasit Suntayodom. "Export performance : A Case Study of Thailand's Rice, Rubber and Maize Exports During 1966-1978" (Ph.D. Dissertation, Clark University, 1981).

used in his dissertation. However, there were some points of the model that different. The revised CMS model used in this study was following.

As mentioned above this study focused on the rice and rubber export performance and the influence of export fluctuation on total export. We could sketch the general approach or methodology of this study into two parts as following.

In this study we adopted the revised CMS approach which based on the traditional CMS approach. The revision and extension were made in order to remove some of the defects inherent in the original CMS approach. Thus we began the Revised Approach with a different set of definitions from that of the original CMS approach.[18] These definitions were as follows:

Q_i = quantity of Thailand's exports of commodity i in period1

Q_i^* = quantity of Thailand's exports of commodity i in period2

Q_{ij} = quantity of Thailand's exports to region j in period1

r_i = percentage increase in Thailand's (and its competitors') exports of commodity i from period1 to period2

r_{ij} = percentage increase in Thailand's (and its competitors') exports of commodity i to region j from period1 to period2

i = rice, rubber.

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[18] Ibid, pp 28-35.

We had used quantity statistics in our study instead of using value statistics. Typical CMS studies had used export value shares rather than export quantity shares because of the absence of reliable quantity data. As a result, the standard interpretation of various CMS effects in identity (8) could be misleading. For example, other things being equal, falling relative prices should indicate rising competitiveness, and export volume should increase. However, if the demand for exports was inelastic, the country's export value would decrease rather than increase and the traditional CMS approach would show a negative competitive residual rather than a positive one for the country.* Similarly, in the case of positive commodity (market) effect, the typical CMS study concluded that the country's exports were relatively more skewed toward goods (markets) which were growing rapidly in world export. Yet this case could also be since the country's exports were more skewed toward goods (markets) whose prices were rising relatively rapidly. In short, using quantity data instead of value data would give a more reliable interpretation of all the CMS effects.

Looking back at the original CMS approach we saw that q_2 in equation (1) was the world total exports. In addition, the original CMS approach had used world growth rates of exports as standard to judge export performance of a particular country. This meant that every country with the same export commodities was competing with one another. In reality,

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* In this study , change in competitiveness is defined as change in quantity shares rather than value shares.

however, not all exporters of all the same commodities were competing with one another. This was because the geographical distance and/or the economic political reasons. Thus, the appropriate standard was not the world standard, but the standard of the country under the study and its competitors.* Therefore, we have changed the definitions of r_i and r_{ij} accordingly.

Unlike the original CMS approach, which analyzed exports by different commodity groups, the Revised CMS Approach would be used to analyze rice; rubber; and fresh, chilled or frozen shrimps, prawns and lobsters separately. Thus the commodity effect would disappear from the analysis. For the i^{th} commodity we might write an expression analogous to equation (8)

$$Q_i^* - Q_i = r_i Q_i + \sum_j (r_{ij} - r_i) Q_{ij} + \sum_j (Q^*_{ij} - Q_{ij} - r_{ij} Q_{ij}) \qquad (10)$$

$$(a) \qquad (b) \qquad (c)$$

where (a) represented the general rise in exports of commodity i from Thailand and its competitors, (b) represented the market distribution of Thailand's exports of commodity i and (c) represented a residual reflecting the difference between the actual export growth rate of commodity i and the growth rate that would have occurred if Thailand had maintained its share of the exports of commodity i to each region.

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* Due to the tremendous amount of calculation, only major competitors of Thailand are take into account in the analysis.

We had previously discussed the main defect of the traditional CMS approach and its treatment of the competitiveness residual. In this study, we should not try to eliminate this defect entirely, but rather try to correct it in a way which enable us to address some of the main issues concerning the competitiveness of commodities. These main issues were:

a) the extent to which the competitiveness residual depends on the change in relative price ratio,
b) the extent to which the competitiveness residual depends on price stability and
c) whether the competitiveness residual depends on the availability of supply.

The relationship between the competitiveness residual and various factors in a), b) and c) could be analyzed by utilizing multiple regression analysis. The competitiveness residual of each commodity was specified in linear form as follows:

$$CR_i = a_{0i} + a_{1i} [(P_i^*/P_{ic}^*) - (P_i/P_{ic})] + a_{2i} PST_{ik} + a_{3i} S_i \qquad (11)$$

Where

CR_i = competitiveness residual = $(Q^*_{ij} - Q_{ij} - r_{ij} Q_{ij})$ from equation (10)

P_i = Thailand's export price of commodity i in period1

P_i^* = Thailand's export price of commodity i in period2

P_{ic}^* = weighted average of competitors' export price of commodity i in period2

PST_{ik} = index of export price stability*

S_i = index of supply availability**

k = 1,2,3

The expected sign of the regression coefficient areas follows:

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* The index of export price stability was defined as the deviation of current export prices from the average of export prices of previous years. In other words, it was a deviation from an export price trend. Mathematically, it was expressed as $[(P_i - PW_i) / (P_{ic} - PW_{ic})]$, where PW_i and PW_{ic} were the average of Thailand's and competitors' export prices of previous years. There were three indices of export price stability, PST_{i1} , PST_{i2} , and PST_{i3}. PST_{i1} was the deviation of current export price ratio from last year's export price ratio. PST_{i2} and PST_{i3} were the deviation of current export price ratio from the average of export price ratio of the previous two and three year respectively. It was assumed that the less the deviation from the price trends (a more stable export price), the more competitive was the exporters vis-a-vis other competitors. But, in this study, because of the short period of data that we used we would use $[(P_i - \bar{P}_i) / (P_{ic} - \bar{P}_{ic})]$ instead, where $\bar{P}_i$ meant average of P_i and $\bar{P}_{ic}$ was average of P_{ic}.

** Usually, the availability of supply was defined as total production plus carry-over stocks minus domestic consumption. Actual domestic consumption figures, however, were not available. When an estimation of demand was needed, it was normally based on the rate of growth of population, with an assumption of constant per capita consumption. In this study, however, we used the change in the ratio of exports to production as an indication of supply availability (ability to supply). Mathematically, it is written as

$[(E_i^*/T_i^*) - (E_i/T_i)] / [(E_{ic}^*/T_{ic}^*) - (E_{ic}/T_{ic})]$. where

E_i^* and E_{ic}^* are Thailand's and its competitors' export of commodity i in period 2,

T_i^* and T_{ic}^* are Thailand's and its competitors' production of commodity i in period 2,and

E_i, T_i, E_{ic}, T_{ic} are defined likewise for period 1.

It was assumed that the higher the availability of supply, the more effectively the exporter could compete with other competitors.

a_{1i} & a_{2i} = negative

a_{3i} = positive

Equation (11) determines the relative importance of price and non-price to the competitiveness residual.

Export Instability

There are several empirical studies about export earnings instability such as : Odin Knudsen and Andrew Parnes; Massell; Macbean and Nguyen; Praiphol Koomsup; David Murray; Premachanan Athukorala and Frank Cong Hiep Huyuh; and Anotai Ittisupornrat.

Benton F. Massell[19] tried to determine whether diversification was likely to provide a greatly increased measure of instability in export earnings by examining empirically, in a sample of 36 countries (including Thailand). A linear regression model was used which express export instability, the dependent variable, as a function of several independent variables. The two measures of instability index, both trend-corrected, are used. One was the standard error of estimate (square root of

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[19] Benton F. Massell. "Export Concentration and Fluctuations in Export Earnings : A Cross-section Analysis" *The American Economic Review*, 1964; pp. 47-63.

the unexplained variance), divided by the mean of the observations. This measure was the normalised standard error. Another measure of the instability index was the average annual percentage rate of change in the value of exports. Next, the measure of export concentration is the Gini-coefficient. There were several points to follow from the preceding analysis. First, it was clear that the relationship between instability of export earnings and concentration of exports was a tenuous one indeed. Furthermore, fluctuations in commodity prices may have a real cost to primary producers quite apart from the visible effect on annual earnings. However, diversification would presumably not reduce this cost for the individual producer. This paper was concluded it is unlikely that either instability of export earnings or the disutility arising from such instability would be eliminated by simple policies, such as producing a wider range of exports.

Odin Kundsen and Andrew Parnes[20] investigated the degree and the causes of export instability in a sample of developed and less developed countries. The method looked at the individual trade flows from one economies to another instead of focusing on the overall level of exports from each nation. In this way, we were able to account for the effects of that certain structural variables have on export instability. These variables fell into three categories—the composition of exports, the commodity concentration of exports, and the direction of trade. In addition, variables to

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[20] Odin Knudsen and Andrew Parnes. "Trade Instability and Economic Development : An Empirical Study" (Lexington Books, 1975).

distinguish the level of development of the trade partners and the value of the individual trade flow was included in the estimation. Analysis of covariance was used to estimate the model. This procedure yielded coefficients for the independent variables that were net of the country effects and thus did not include any bias that might have been present in simple inter-country comparisons of the past literature in the field. In summary, this study showed the country-specific nature of export instability and the importance of reexamining the results of previous studies based on inter-country samples. The significance of some explanatory variables in passed works had to be questioned because of their insignificance when holding the country effects constant.

Hossein Askari and Gordon Weil[21] examined export earnings instability for 70 LDCs, over a time period from 1954-1968. Their intention was to test a traditional hypothesis that LDCs exporting a large percentage of primary products must on this account suffer from a large degree of export instability. The results led us to reject this hypothesis. They did not found any evidence in their work to support this view, in fact they find the opposite was true, that instability appeared to be a larger problem for exports of manufactured than non-manufactured goods.

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[21] Hossein Askari and Gordon Weil. "Stability of Export Earnings of Developing Nations" *Journal of Development Studies*.

David Murray [22] examined the instability of export prices and volumes and the relative importance of supply and demand fluctuations in determining earnings instability. Relative levels of instability for developed and underdeveloped countries had been compared, and the decline in instability in the postwar had been examined. The measures used in his study are the Macbean Index (MBI) – which measured deviations from a 5-year moving average of observed values- and a measure which would be termed the Log Trend Index (LTI) – which measured deviations from a constant growth rate trend line. Using two measures of instability, it had been shown that price and volume instability had generally been greater for the less developed than for the developed countries.

John R. Hanson II [23] tried to cast historical export data into Murray's Framework. The seven developed countries (DCs) covered are Belgium, France, Germany, The United Kingdom, Australia, Canada, and the United States. The last three countries resembled many of LDCs in having primary products as critical export early in the development process. The ten LDCs covered are Ceylon, Chile, Cuba, Egypt, India, Jamaica, Nigeria, Philippines, Taiwan, and Thailand. The index of instability used here were the standard deviation of the observed deviations from an exponential time trend

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[22] David Murray. "Export Earnings Instability : Prices, Quantity, Supply, Demand?" *Journal of Economic Development and Cultural Change*. 1978; pp. 61-73.

[23] John R. Hanson II. "Export Earnings Instability before World War II : Price, Quantity, Supply, Demand?" *Journal of Economic Development and Cultural Change*. 1983; pp. 621-637.

(EXP) and the normalized standard error of deviations from an estimated linear line trend (LIN).

Praiphol Koomsup [24] sought to examine the relationship between export diversification and export instability in a LDC. The study examined the problem of the export instability- - its effects and causes, and the relationship between export instability and the process of agricultural export diversification in Thailand. Using two types of index for measuring in stability in export earnings. The first was percentage deviations from five-year moving average of earning from merchandise exports (II_1). The second was percentage deviations from trend of merchandise export earnings which were assumed to have an exponential growth trend (II_2). In both cases only the absolute values were considered. The degree of export commodity concentration and geographical concentration were measured by Hirschman-Gini Coefficient Index.

Premachanan Athukurala and Frank Cong Hiep Huyuh [25] found the average export instability of Sri Lanka during the period 1950-1978 to be moderate in the international setting, despite its heavy dependence on primary commodity exports and the high degree of the commodity

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[24] Praiphol Koomsup. "Export Instability and Export Diversification : A Case Study of Thailand" (Unpublished Ph.D. Dissertation, Yale University, 1978).

[25] Premachanan Athukorala and Frank Cong Hiep Huyuh. "Export instability and Growth : Problems and Prospects for the Developing Economic", 1987.

concentration. The analysis of the commodity composition offered two major explanations: (1) the relative instability of the export proceeded from tea, which, despite a certain decrease in importance in recent years, still represents the mot important export commodity and (2) the contrasting time patterns of proceeds from the major export commodities.

Marian E. Bond [26] studied the flow of primary commodities grouped by geographical region. The empirical results obtained in this study were very much in line with those obtained from other studies.

I. Macbean and D. T. Nguyen [27] stated in their book that, although, price and earnings instability were interrelated and might share common causes, it was useful to examine them separately. The causes of earnings instability at the individual country level suggested by a priori reasoning and investigated by many economists were (I) high commodity and geographical concentration of exports, (II) specialisation in primary commodities, (III) small economic size, (IV) a high degree of openness to trade and (V) a high rate of export growth. The results of the studies reviewed

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[26] Marian E. Bond. "An Econometric Study of Primary Commodity Exports from Developing Country Regions to the World" *IMF Staff Papers*. Vol. 34, No. 1-2, 1987; pp. 191-227.

[27] Alasdair I. Macbean and D. T. Nguyen. "Commodity Policies : Problems and Prospects" (Croom Helm Ltd., Provident House, Burrell Row, Beckenham, Kent, BR3 1AT, 1987).

seemed to be sensitive to the time periods of investigation, the formula used for measuring instability and/or concentration and the samples of countries chosen.

Anotai Ittisupornrat[28] tried to measuring the level of export instability and investigating the causes and consequence of instability to domestic economy. Using the absolute deviation from trend as the index of instability and the Gini-Hirschman as the degree of concentration in Thai export. The empirical results indicated that the export instability mainly came from the export of manufactured products and the export to the Central Planned Economies. Moreover, the analysis with macroeconomics model suggested that the export instability induced the instability in domestic economy and was and obstacle to economic performance. The major adverse impact appeared to operate through instability in imports, private investment, and income in terms of growth rate.

We could divide causes of the export earnings instability into two cases as follows:

1. The causes of the higher degree of instability experience by the LDCs in export trade were generally believed to stem from three inherent features of their export structure.

    1.1 the specialisation in primary commodities

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[28] Anotai Ittisupornrat. "An Analysis of Export Instability in Thailand" (Master's thesis, Faculty of Economics, Thammasat University, 1998).

1.2 the heavy dependence on one or a few commodities (commodity concentration)

1.3 the concentration of exports in a small number of foreign market (geographical concentration).

2. The sources of instability from export prices, export quantities, supply, and demand fluctuations.

In estimating an instability index, it was necessary to eliminate the influence of the trend, thus defining instability as the deviations from this trend factor. Otherwise, steady growth of exports would be interpreted as a high degree of instability. This explanation of instability implied that the trend of export movement from year to year was expected, while the deviations from it were not.

There were several methods of eliminating the trend and weighting the deviations from it. The three popular methods used in previous studies were shown below.[29]

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[29] Odin Knudsen and Andrew Parnes. "Trade Instability and Economic Development : An Empirical Study" (Lexington Books, 1975).

The Least-Squares Indices of Export Instability

The least-squares method of constructing an index of export instability involved fitting a linear function of time either to the logarithm of export earnings yielding the exponential index, or to export earnings directly, yielding the linear index. The fitting of either a logarithm or linear function implied assumption both on the deterministic and random components of export earnings. If the logarithmic function was fitted, the assumption was that the deterministic component was exponential and, depending on the properties demanded of the estimate, the random component was either independent of time or autocorrelated. If the linear function was used, the deterministic component was assumed to be proportional to time. It was well known in econometrics that criteria such as goodness of fit could not be used to distinguish between the functional forms of the deterministic component. In case the random component of export earnings was large or autocorrelated in a specific manner, it was possible that the true functional form had a poor fit for the years of the sample, and, by chance, the incorrect functional form had a good fit. If the incorrect functional form was selected in the construction of the index, the magnitude of the export instability would be understand. In practice, then, the specification of the functional form for the deterministic component was made either by assumption or by observation of behaviour. Massell, for instance, in justifying the exponential form for one index, postulated that countries tended to plan in terms of absolute growth rates (instead of constant increments to the gross national products), which implied

that expectations take a geometric form and hence could be represented by an exponential function.

Once the functional form was specified for the deterministic component, the function was fitted to a time series of export earnings using the criterion of minimisation of the sum of the squared residuals. These squared residuals were then designated as the index of export instability. Since the process of squaring weights large deviations (for example, a deviation of 3 percent in one year was weighted nine times as much as tree yearly deviations of 1 percent), the implicit assumption of this procedure was that large deviations contribute proportionally more to uncertainty. Therefore, countries with the larger but more rare deviations in export earnings were assigned a higher index of export instability than countries with smaller but more frequent deviations. If the relation between deviations and observable phenomena could be specified more precisely, either by improved theory on behaviour under uncertainty or though tracing the causes of deviations in detail, then a specific weighting scheme would be justified.

Therefore, we could separate the measurement of the least-square indices of instability index as follow.

1. Exponential least-squares index is the consists of the sum of squared deviations from an exponential trend line. Fitted by minimising sum of squared residuals.

$$Var(x) = \frac{1}{N} \sum_{t=1}^{n} (x_t - \bar{x}_t)^2$$

when;

$x_t = X_t - \bar{X}_t$

X_t = the actual values of X_t

$\bar{X}_t$ = the exponential trend predicted values

N = the number of investigation period

$\Rightarrow$ Instability Index = $\sqrt{V \log}$ *100

2. Linear least-squares index is the consists of the sum of squared deviations from a linear trend line. Fitted by minimising sum of squared residual.

$\Rightarrow$ Instability index = $\dfrac{\sum_{t=1}^{n} \frac{100(x_t - \bar{x}_t)}{\bar{x}_t}}{N}$

When;

$\bar{X}_t = a + bt$

X_t = the actual values of X_t

N = the number of investigation period.

3. Average percentage deviations from least-squares trend line was similar to linear least-squares index, but instead of squaring deviations, it

used the average percentage deviations from the linear trend line in constructing the index.

The Index of Deviations from a Moving Average

This method defined the index of instability as the sum of the absolute deviation of each year's export earnings from an n-year moving average, with the value for n specified by assumption. If the n-year moving average index was considered as an expectation of export earnings, this procedure had the advantage over the least-squares method in that each year's expectations were specified by only earnings for n years and not by the entire period of observations. This decreases the bias introduced by the misspecification of the exponential or linear function that was discussed in the previous section.

A problem that arose with the moving average method of trend removal was that the interval a determines the degree of smoothing and hence the degree of instability measured by the index. The difficulty in the selection of the interval n is fundamental to the criticism of all currently used indices. Ideally, the theoretical considerations—or at least the data—should determining the period used in the formation of expectation for a certain year was being calculated. Expectations should only be formed using the experience of the past.

The deviation from an *n*-year Moving Average Index was the consists of the sum of absolute deviations from an n-year moving average. The value of n is determined a priori and controls the degree of smoothing.

$$\Rightarrow \quad \text{Instability Index} = \frac{\sum_{t=3}^{n=2} \frac{100(X_t - \overline{X_t})}{\overline{X_t}}}{N}$$

When;

X_t = the actual values of X_t

$\overline{X_t} = \sum_{t=1}^{5} \frac{x_t}{5}$

N = the number of investigation period.

Additional problems arose with the selection of one time period for averaging when cross-country comparisons were involved. Since the interval n represents the time horizon in forming expectations, specification of the same interval for all countries implied the same time horizon for all countries. However, the time horizons were influenced by the level of uncertainty and hence the degree of export instability. Attributing the same length time horizon, *n,* to all countries and then measuring different levels of instability had to implicitly assume that the degree of uncertainty generates by export fluctuations does not influence the time horizon in forming expectations.

The moving average procedure, besides attenuating frequency components of periods greater than *n* years, also removed some of the shorter period components resulting in an underestimate of the degree of instability. However, this imperfection in the filter was characteristic of any

practical procedure. The degree of this leakage of Higher-frequency components can only be reduced by alternative and more complex procedures.

Coppock's Log Variance Index

The log variance index of instability developed by Coppock in his study *International Economic Instability* has a seemingly complicated form:

$$V\log = \frac{\sum_{t=2}^{n} (\log Xt + 1 - \log Xt - M)^2}{N-1}$$

When;

$$M = \frac{\sum_{t=2}^{n} (\log Xt + 1 - \log Xt)}{N-1}$$

X_t = the actual values of X_t

N = the number of investigation period.

V log = variance in term of logarithm

$\Longrightarrow$ Index of instability = antilog $\sqrt{V\log}$

However, examination of the equation of M reveals that the trend removal term depends only on the first and the last observations.

In Coppock's index, therefore, the expectation's component was determined exclusively by the first and the last observation. This made the index sensitive to the particular period chosen by the researcher.

If the period for averaging were varied by a year or two, large changes in the index of instability could result. Also, the information of expectations on a first and last observation basis created some conceptual difficulties, since it seemed unreasonable to designate only the first and the last years as indicators of expectations without regard for the intermediate years. This difficulty with the log-variance method probably resulted from an error in designating the index, not from a belief that the expectations component was only a function of the first and last observations.

From the measurement of instability index discussed above, in this study we would examine the instability of export by the exponential least-squares index. And we would follow the method that David Murray used in *Export Earnings Instability : Prices, Quantity, Supply, Demand?* to find the contributor of export instability and the source of export instability. The methodology of this study in the part of export instability will be organised as followed.

The first step was to examine the instability index of export value of Thai rice and rubber export by using the exponential least-square trend index which is:

$$Var(x) = \frac{1}{N} \sum_{t=1}^{n} (x_t - \bar{x}_t)^2$$

when;

$x_t = X_t - \bar{X}_t$

X_t = the actual values of X_t

$\bar{X}_t$ = the exponential trend predicted values

N = the number of investigation period

$\Rightarrow$ Instability Index = $\sqrt{Var(x)}$ *100

The second step was to examine the components of the variance of the logarithm of earnings around an exponential trend in order to assess the relative importance of price and quantity fluctuations. Given the identity :[30]

export earnings = price × quantity

$$E = P \times Q \quad \ldots(1)$$

then $$\log E = \log P + \log Q \quad \ldots(2)$$

and the variance of log E around a fitted constant growth-rate trend line was given by the identity ;

$$\text{var}(\log E) = \text{var}(\log P) + \text{var}(\log Q) + 2\,\text{cov}(\log P, \log Q) \quad \ldots(3)$$

where the variances and covariance were around trend lines. The terms on the right-hand side were calculated from the price and quantity indexes. They were divided through by their sum and expressed as percentages. The term

$$CP = 100\ \frac{\text{var}(\log P)}{\text{var}(\log P) + \text{var}(\log Q) + 2\,\text{cov}(\log P, \log Q)} \quad \ldots(4)$$

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[30] David Murray. "Export Earnings Instability : Prices, Quantity, Supply, Demand?" *Journal of Economic Development and Cultural Change*. 1978; pp. 61-73.

might be interpreted as the contribution of the (trend-corrected) variance of price to the (trend-corrected) variance of earnings.

Equation (4) was taken as an indicator of the proportional contribution of price instability to earnings instability. An similar interpretation was placed on CQ , the adjusted var (log Q) , as an indicator of the proportional contribution of quantity fluctuations which showing in equation (5).

$$CQ = 100 \frac{\text{var (log Q)}}{\text{var (log P)} + \text{var (log Q)} + 2\,\text{cov (log P , log Q)}} \quad \ldots(5)$$

The covariance term , positive or negative , reflected the extent to which price and quantity movements were reinforcing of offsetting.

Finally , the third step was to examine the significance of supply and demand variations to earnings instability. By the reason of the fluctuation in prices and quantities traded, fluctuation did not happen randomly but reflect underlying changes in demand and supply. The changes in the same direction for price and quantity were caused by demand shifts. On the other hand , the change in the opposite direction for price and quantity were caused by supply shifts. A change in one variable, the other remaining constant, might be associated with either supply or demand shifts. Therefore, in this step, the sign was an indicator of whether supply or demand variations had been the dominants source of instability.