The Method of Constant Market Shares (CMS) – Competitiveness Effect Reconsidered: Case Studies of ASEAN Countries[1]

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Abstraksi

Constant Market Share (CMS) merupakan alat analisis empiris yang banyak digunakan untuk melihat kinerja ekspor suatu negara. CMS pertama kali dikenalkan oleh Tyszynki (1951), namun CMS versi Leamer dan Stern (1970) lebih banyak digunakan dalam penelitian empiris. Menurut Leamer dan Stern (1970), perubahan nilai ekspor suatu negara dapat dipilih menjadi empat efek yaitu (a) efek trend ekspor dunia, (b) efek distribusi pasar (c) efek komposisi komoditi dan (d) residual tidak-terjelaskan (efek daya saing). Kritik Richardson (1971a, 1971b) terhadap CMS versi ini tidak mengurangi popularitasnya. Menurut Fagerberg and Sollie (1987), ketidakmampuan mengidentifikasi residual tidak-terjelaskan (efek daya saing) merupakan kelemahan mendasar CMS versi ini. Fagerberg dan Sollie mengembangkan lebih lanjut CMS versi Tyszynki (1951).

Paper ini memiliki dua bagian utama. *Pertama*, paper ini mendiskusikan secara komprehensif metode-metode CMS tersebut dan kemudian memperbaiki CMS versi Leamer dan Stern (1970) berdasarkan kritik Richardson (1971a, 1971b) dan Fagerberg dan Sollie (1987). Paper ini menurunkan rumus baru CMS dimana perubahan nilai ekspor suatu negara dapat dipilah menjadi enam efek yaitu (a) efek trend ekspor dunia (b) efek pangsa pasar (c) efek komposisi komoditi (d) efek komposisi pasar (e) efek adaptasi komoditi dan (f) efek adaptasi pasar. Versi baru CMS ini mengoreksi kelemahan versi Leamer dan Sterm (1970) berkaitan dengan subyektivitas penentuan urutan efek distribusi pasar dan efek komposisi komoditi, interpretasi efek daya saing dan penggunaan indeks.

Kedua, metode CMS baru ini kemudian diaplikasikan untuk menganalisis kinerja ekspor negara-negara ASEAN (Indonesia, Singapore, Malaysia, Thailand dan Philippine) untuk periode 1980-1985, 1985-1990, 1990-1995, 1995-2001 dan 2001-2006. Paper ini berkesimpulan bahwa trend ekspor dunia memiliki peranan dominan terhadap kinerja ekspor negara-negara ASEAN. Regionalism dan ekonomi integrasi pada periode 1990-1995membawa perubahan pola perdagangan, dimana pada periode ini perdagangan intra-regional lebih dominan. Efek pangsa pasar dan efek komposisi pasar juga lebih signifikan mempengaruhi kinerja ekspor negara-negara ASEAN pada periode tersebut.

Keywords: Constant Market Share (CMS), Commodity Adaptation Effect and Market Adaptation Effect.

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1. Introduction

The changes of a country's exports can be explained by the demand and supply sides. The demand side relates with the economic development of the country's exports destinations or markets. Meanwhile, the supply side closely engages with how the country could compete with other sources of supply. Many researchers have tried to explain factors underlying countries' export performance. Paper by Tyszynski (1951) provided a fundamental analytical tool in examining a country's export performance. The analytical tool is then famous as Constant Market Share (CMS)[3]. He broke down the change in a country's share of exports into two components i.e. due to the constant share (hypothetical exports) and the competitiveness effect. The more comprehensive and applicable version of the CMS was proposed by Leamer and Stern (1970). Although Richardson (1971a, 1971b) noted some shortcomings of the CMS, it does not discourage the popularity of the CMS. Fagerberg and Sollie (1987) tried to explain factors underlying the changes in a country's shares in world exports. They noted that the change in the country's shares in world exports can be broken into five effects i.e. market shares, market distribution, commodity composition, commodity adaptation and market adaptation effects.

The aim of this paper is to develop a new version of the CMS method which avoids the problems and weaknesses as Richardson (1971a, 1971b) clearly outlined. Fagerberg and Sollie (1987) argued that the CMS method can be improved in theoretical consistency and in empirical applicability if initial years' weights (Laspeyres indices) are

[3] Since then the CMS has been employed by many authors such as Fleming and Tsiang (1956), Baldwin (1958), Spiegelglas (1959), Junz and Rhomberg (1965), Leamer and Stern (1970), Richardson (1971a, 1971b), Fagerberg and Sollie (1987) and James and Movshuk (2004), among others. The CMS analysis has also been used to the study of regional growth, where it is recognized as "shift and share" analysis (See Ashby (1964) and Houston (1967) for examples).

employed throughout the calculation and the economic interpretation of the residual terms is made explicitly (instead of including them in an arbitrary way in some of other effects). Considering the works of Tyszynski (1951), Richardson (1971a, 1971b) and Fagerberg and Sollie (1987), this paper derived a new version of the CMS method by Leamer and Stern (1970). The new version is then applied to a sample of ASEAN countries (Indonesia, Singapore, Malaysia, Thailand and Philippine).

The rest of this paper is organized as follows. Part 2 describes the constant share norm. Part 3 discusses the levels of analysis. Some shortcomings of the CMS are presented at Part 4. Part 5 shows the CMS method which explains the change in share of a country's exports. A new version of the CMS method is proposed and presented in Part 6. Part 7 exhibits empirical results on ASEAN countries' export performances. Concluding remarks are in Part 8.

2. The Constant Share Norm

The CMS method is derived from the constant share norm. Suppose, there were two competitive countries A and B exporting their commodity to a particular market. Demand for exports from the two competing suppliers may be shown by the following expression:

$$\frac{q_A}{q_B} = f\left(\frac{p_A}{p_B}\right) \qquad (1)$$

where q_A and q_B refer to quantity sold by A and B, respectively. Meanwhile, p_A and p_B represent price of the commodity from country A and B, respectively. By multiplying the both right-hand and left-hand sides of equation (1) with p_A/p_B, the following expression is obtained:

$$\frac{p_A q_A}{p_B q_B} = \frac{p_A}{p_B} f\left(\frac{p_A}{p_B}\right) \tag{2}$$

The country A's share of exports is:

$$\begin{aligned} \frac{p_A q_A}{p_A q_A + p_B q_B} &= \left(1 + \frac{p_B q_B}{p_A q_A}\right)^{-1} \\ &= \left\{1 + \left[\frac{p_A f(p_A/p_B)}{p_A}\right]^{-1}\right\}^{-1} \\ &= h\left(\frac{p_A}{p_B}\right) \end{aligned} \tag{3}$$

Equation (3) implies that country A's share of the market in question $\left(\frac{p_A q_A}{p_A q_A + p_B q_B}\right)$ will be unchanged except as the price ratio $\left(\frac{p_A}{p_B}\right)$ changes. This refers to the validity of the constant share norm. It also shows that the difference between export growth implied by the constant share norm and actual growth may be illustrated by price changes. Tyszynki (1951) calculated the aggregate market share of a country on the world market would have been if its market share in individual commodity groups had remained constant (hypothetical). He referred to the difference between the hypothetical market share and the initial share as the changes in the market share due to structural changes in world trade. The residual –the difference between the final and the hypothetical market share- is referred to as change caused by changes in competitiveness. This method is recognized as "constant market shares (CMS) analysis".

Leamer and Stern (1970) called the discrepancy between the constant share norm and actual performance as the "competitiveness effect". It is simply that a country fails to maintain its share in world markets, the competitiveness term will be negative. It also indicates that price increases for the country in question is relatively greater than its

competitors as in Equation (3). However, Richardson (1970) stated that this is the case if the additional assumption of the elasticity of substitution exceeding one in absolute value is added.

Figure 1 about here.

3. The Levels of Analysis: Change in Exports

Figure 1 illustrates countries' and the world's trade flows for two periods 0 and t, which is used to explain the CMS method. Suppose there are number of exporter countries (z) in the world and number of importer countries (k). Exporter country A is a country in question. From Figure 1, some definitions are firstly determined:

$V_{i\bullet}^{W0}$ = value of the world's exports of commodity i in period 0
$V_{i\bullet}^{Wt}$ = value of the world's exports of commodity i in period t
$V_{\bullet j}^{W0}$ = value of the world's exports to country j in period 0
$V_{\bullet j}^{Wt}$ = value of the world's exports to country j in period t
V_{ij}^{W0} = value of the world's exports of commodity i to country j in period 0
V_{ij}^{Wt} = value of the world's exports of commodity i to country j in period t
$V_{\bullet\bullet}^{W0}$ = value of the world's exports in period 0
$V_{\bullet\bullet}^{Wt}$ = value of the world's exports in period t
$V_{i\bullet}^{A0}$ = value of country A's exports of commodity i in period 0
$V_{i\bullet}^{At}$ = value of country A's exports of commodity i in period t
$V_{\bullet j}^{A0}$ = value of country A's exports to country j in period 0
$V_{\bullet j}^{At}$ = value of country A's exports to country j in period t
V_{ij}^{A0} = value of country A's exports of commodity i to country j in period 0
V_{ij}^{At} = value of country A's exports of commodity i to country j in period t

r = percentage increase in total world exports;

$$r = \frac{V_{\bullet\bullet}^{Wt} - V_{\bullet\bullet}^{W0}}{V_{\bullet\bullet}^{W0}}$$

r_i = percentage increase in world exports of commodity i;

$$r_i = \frac{V_{i\bullet}^{Wt} - V_{i\bullet}^{W0}}{V_{i\bullet}^{W0}}$$

r_{ij} = percentage increase in world exports of commodity i to country j;

$$r_{ij} = \frac{V_{ij}^{Wt} - V_{ij}^{W0}}{V_{ij}^{W0}}$$

From above definitions, the country A's total exports value for commodity i and to country j for period 0, respectively, can be written as:

$$\sum_j V_{ij}^{A0} = V_{i\bullet}^{A0} \text{ and } \sum_i V_{ij}^{A0} = V_{\bullet j}^{A0} \quad (4)$$

and similarly for period t. In addition, the value of country A's exports in period 0 is described by:

$$\sum_i \sum_j V_{ij}^{A0} = \sum_i V_{i\bullet}^{A0} = \sum_j V_{\bullet j}^{A0} = V_{\bullet\bullet}^{A0} \quad (5)$$

There are three levels of CMS analysis, which depend on how we treat markets and commodities (Leamer and Stern, 1970). *First*, it may be assumed that exports can be treated as a single and completely undifferentiated good. In addition, export destination markets can be treated as a single market. In short, exports may be treated as a single good destined for a single market. If country A maintains its share in this market, then exports would simply increase by $rV_{\bullet\bullet}^{A0}$, and the following identity is obtained:

$$V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} \equiv \underset{(a)}{rV_{\bullet\bullet}^{A0}} + \underset{(b)}{(V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} - rV_{\bullet\bullet}^{A0})} \quad (6)$$

Equation (6) is called a "one level" analysis. It implies that the change in A's exports $\left(V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0}\right)$can be divided into two parts i.e. (a) a part related with the general increase in world exports $\left(rV_{\bullet\bullet}^{A0}\right)$ and (b) an unexplained part, the competitiveness effect $(V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} - rV_{\bullet\bullet}^{A0})$.

Second, it may be assumed that exports are quite diverse set of commodities. For a specific commodity (say i), an analogous identity may be written:

$$V_{i\bullet}^{At} - V_{i\bullet}^{A0} \equiv r_i V_{i\bullet}^{A0} + (V_{i\bullet}^{At} - V_{i\bullet}^{A0} - r_i V_{i\bullet}^{A0}) \quad (7)$$

Taking the aggregate equation (7), the following expression is obtained:

$$\begin{aligned} V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} &\equiv \sum_i r_i V_{i\bullet}^{A0} + \sum_i (V_{i\bullet}^{At} - V_{i\bullet}^{A0} - r_i V_{i\bullet}^{A0}) \\ &\equiv \left(rV_{\bullet\bullet}^{A0}\right) + \sum_i (r_i - r) V_{i\bullet}^{A0} + \sum_i (V_{i\bullet}^{At} - V_{i\bullet}^{A0} - r_i V_{i\bullet}^{A0}) \quad (8) \\ &\qquad (a) \qquad (b) \qquad (c) \end{aligned}$$

Equation (8) is called a "two level" analysis. The change in A's exports $\left(V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0}\right)$ is broken into three components associated with: (a) the general rise in world exports $\left(rV_{\bullet\bullet}^{A0}\right)$, (b) the commodity composition of A's exports in period 0 $\left(\sum_i (r_i - r) V_{i\bullet}^{A0}\right)$; and (c) an unexplained residual (the competitiveness effect) $\left(\sum_i (V_{i\bullet}^{At} - V_{i\bullet}^{A0} - r_i V_{i\bullet}^{A0})\right)$. The difference between the "one level" and "two level" analysis is in the existence of the commodity composition effect, $\sum_i (r_i - r) V_{i\bullet}^{A0}$. If the world exports of commodity i increases by more than the world average for all commodities, $(r_i - r) > 0$, the exports of commodity i contributes the increase in country A's exports. Therefore, the sum up representing by $\sum_i (r_i - r) V_{i\bullet}^{A0}$ would be positive if A has concentrated on the export of commodities whose markets were growing relatively fast and would be negative if A has concentrated in slowly growing commodity markets.

Third, it may be assumed that exports are differentiated by destination as well as commodity type. In this case, exports of a particular commodity for a particular destination are considered. Therefore, the analogous identity can be written:

$$V_{ij}^{At} - V_{ij}^{A0} \equiv r_{ij} V_{ij}^{A0} + (V_{ij}^{At} - V_{ij}^{A0} - r_{ij} V_{ij}^{A0}) \quad (9)$$

Taking the aggregate equation (9) yields:

$$V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} \equiv \sum_i \sum_j r_{ij} V_{ij}^{A0} + \sum_i \sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij} V_{ij}^{A0})$$

$$\equiv r V_{\bullet\bullet}^{A0} + \sum_i (r_i - r) V_{i\bullet}^{A0} + \sum_i \sum_j (r_{ij} - r_i) V_{ij}^{A0} + \sum_i \sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij} V_{ij}^{A0}) \quad (10)$$

(a) (b) (c) (d)

Expression (10) shows a "three level" analysis. The increase of country A's exports $\left(V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0}\right)$ can be divided into four components associated with: (a) the general rise in world exports, $\left(rV_{\bullet\bullet}^{A0}\right)$; (b) the commodity composition of country A's exports, $\left(\sum_i (r_i - r) V_{i\bullet}^{A0}\right)$; (c) the market distribution of country A's exports, $\left(\sum_i \sum_j (r_{ij} - r_i) V_{ij}^{A0}\right)$; and (d) an unexplained residual (the competitiveness effect), $\left(\sum_i \sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij} V_{ij}^{A0})\right)$. The market distribution effect $\sum_i \sum_j (r_{ij} - r_i) V_{ij}^{A0}$ will be positive if country A has concentrated its exports in markets with relatively rapid growth. It is important to note that whether the commodity effect (b) follows the market distribution effect (c), or vice versa. Therefore, equation (10) can be exhibited in another way:

$$V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} \equiv r V_{\bullet\bullet}^{A0} + \sum_j (r_j - r) V_{\bullet j}^{A0} + \sum_i \sum_j (r_{ij} - r_j) V_{ij}^{A0} + \sum_i \sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij} V_{ij}^{A0}) \quad (11)$$

(a) (b) (c) (d)

Now, the increase of country A's exports $\left(V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0}\right)$ can be divided into four components associated with: (a) the general rise in world exports $\left(rV_{\bullet\bullet}^{A0}\right)$; (b) the market distribution of country A's exports $\left(\sum_j (r_j - r) V_{\bullet j}^{A0}\right)$; (c) the commodity composition of country A's exports $\left(\sum_i \sum_j (r_{ij} - r_j) V_{ij}^{A0}\right)$; and (d) an unexplained residual (the

competitiveness effect) $\left(\sum_i\sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij}V_{ij}^{A0})\right)$. The equation (10) can be normalized by dividing $V_{\bullet\bullet}^{A0}$ (Laspeyres index) or $V_{\bullet\bullet}^{At}$ (Paasche index)[4]:

Laspeyres Index: $$\frac{V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{A0}} \equiv \underset{(1)}{\frac{rV_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{A0}}} + \underset{(2)}{\frac{\sum_i (r_i - r)V_{i\bullet}^{A0}}{V_{\bullet\bullet}^{A0}}} + \underset{(3)}{\frac{\sum_i\sum_j (r_{ij} - r_i)V_{ij}^{A0}}{V_{\bullet\bullet}^{A0}}} + \underset{(4)}{\frac{\sum_i\sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij}V_{ij}^{A0})}{V_{\bullet\bullet}^{A0}}} \quad (12)$$

Paasche Index: $$\frac{V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{At}} \equiv \underset{(1)}{\frac{rV_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{At}}} + \underset{(2)}{\frac{\sum_i (r_i - r)V_{i\bullet}^{A0}}{V_{\bullet\bullet}^{At}}} + \underset{(3)}{\frac{\sum_i\sum_j (r_{ij} - r_i)V_{ij}^{A0}}{V_{\bullet\bullet}^{At}}} + \underset{(4)}{\frac{\sum_i\sum_j (V_{ij}^{At} - V_{ij}^{A0} - r_{ij}V_{ij}^{A0})}{V_{\bullet\bullet}^{At}}} \quad (13)$$

4. The Shortcomings of CMS

Richardson (1971b) noted some shortcomings of application of the CMS by Leamer and Stern (1970). *First*, the various components in the basic equation (10) will vary with the level of commodity aggregate i.e. the composition of class i. Therefore, commodity classification (i) should be as homogeneous as possible. *Second*, the CMS effects will vary with the degree of market consolidation, i.e. the identity of each market (j). *Third*, which identities either equations (10) or (11) applied is somewhat arbitrary. It depends on the researcher's subjectivity. In equation (10), the commodity effect $\left(\sum_i (r_i - r)V_{i\bullet}^{A0}\right)$ is calculated "before" the market effect $\left(\sum_i\sum_j (r_{ij} - r_i)V_{ij}^{A0}\right)$. In contrast, in equation (11) the market effect $\left(\sum_j (r_j - r)V_{\bullet j}^{A0}\right)$ is calculated "before" the commodity

[4] Tyszynski (1951) actually employed a formula:

$$\frac{V_{\bullet\bullet}^{At}}{V_{\bullet\bullet}^{Wt}} - \frac{V_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{W0}} = \left(\frac{\sum_i (r_i + 1)V_{i\bullet}^{A0}}{V_{\bullet\bullet}^{Wt}} - \frac{V_{i\bullet}^{A0}}{V_{\bullet\bullet}^{W0}}\right) + \left(\frac{V_{\bullet\bullet}^{At}}{V_{\bullet\bullet}^{Wt}} - \frac{\sum_i (r_i + 1)V_{i\bullet}^{A0}}{V_{\bullet\bullet}^{Wt}}\right)$$

effect $\left(\sum_i \sum_j \left(r_{ij} - r_j \right) V_{ij}^{A0} \right)$. Even if the sum of the two effects would be the same, this change in the sequence of calculation would change the values of the individual commodity and market effects. *Fourth,* alternative choice of the world or standard area will cause CMS to vary. In principle, the appropriate "world" (i.e. the area to which the denominator of an export shares refers) should include only true competitor. *Fifth,* the ability to make more than one choices of calculation basis represents the index number problem, for example Laspeyres Index (12) and Paasche Index (13). Fagerberg and Sollie (1987) argued that the CMS method might be improved in theoretical consistency and in empirical applicability if initial years' weights (Laspeyres indices) are employed throughout the calculation. They also argued that the CMS method by Leamer and Stern (1970) is lack of economic interpretation of the residual term. Therefore, it can be also improved by creating additional explanatory effects which the economic interpretation of the residual term is made explicitly (instead of including them in an arbitrary way in some of other effects).

5. Changes in the Share of Exports

The interpretation of competitiveness effect or residual term (d) in equation (10) is not as straight forward as the other terms. There are many other things beside the relative prices affecting a country's competitiveness such as (a) the differential rates of export price inflation, (b) differential rates of quality improvement and the development of new products, (c) differential rates of improvement in the efficiency of marketing or in the terms of financing the sale of export goods, (d) differential changes in the ability for prompts fulfillment of export orders. More recently, Fagerberg and Sollie (1987)

developed a new version of the CMS method by Tyszynski (1951) which gave much more explanation on the competitiveness effect.

The change in share of exports depends on how we treat markets and commodities in our analysis (Fagerberg and Sollie, 1987). To give clear explanation, two cases will be described i.e. 'several commodities – one market' and 'several commodities – several market' cases[5]. The following symbols and definitions will be used:

V = value of exports;
i = commodities
j = exports (destinations) markets
n = number of commodities;
k = number of countries (K is the last exports market)
0,t = subscripts which refer to the initial year and to the final year of the comparison, respectively;
A = country in question
W = world
S^A = market shares of country A in world exports (the ratio of A's total exports and the world total exports;

$$S^A = S^{A1} + S^{A2} + ... + S^{AK} = \frac{\sum_i \sum_j V_{ij}^A}{\sum_i \sum_j V_{ij}^W}$$

s^A = macro share of country A in world exports (the ratio of A's total export and world total export in each market); row vector of dimension K:

$$s^A = \left[s^{A1} \quad s^{A2} \quad ..... \quad s^{AK} \right] = \left[\frac{\sum_i V_{i1}^A}{\sum_i V_{i1}^W} \quad \frac{\sum_i V_{i2}^A}{\sum_i V_{i2}^W} \quad .... \quad \frac{\sum_i V_{iK}^A}{\sum_i V_{iK}^W} \right]$$

α^{Aj} = market shares, by commodity, of country A (micro share of country A) in the world exports to market j (the ratio of country A's and the world's exports of commodity i to country K); matrix of dimension Kxn:

[5] This paper will use variable (data) on exports only, which is slightly different with that of Fagerberg and Sollie (1987). They used term exports of specific country. However, for market destination they employed "total import" of a country instead of "world exports" to the country. Theoretically, the two terms must be the same i.e. the "total imports" value of a country is the same with the "world exports" to the country. In practice, since imports are calculated based on cost-insurance-freight (CIF) meanwhile exports are calculated base on free-on-board (FOB), the use of only exports therefore avoids misleading.

$$\alpha^{Aj} = \begin{bmatrix} \alpha_1^{A1} & \alpha_2^{A1} & ..... & \alpha_n^{A1} \\ \alpha_1^{A2} & \alpha_2^{A2} & ..... & \alpha_n^{A2} \\ \vdots & & & \\ \alpha_1^{AK} & \alpha_2^{AK} & ..... & \alpha_n^{AK} \end{bmatrix} = \begin{bmatrix} \frac{V_{11}^{A}}{V_{11}^{W}} & \frac{V_{21}^{A}}{V_{21}^{W}} & .... & \frac{V_{n1}^{A}}{V_{n1}^{W}} \\ \frac{V_{22}^{A}}{V_{12}^{W}} & \frac{V_{22}^{A}}{V_{22}^{W}} & .... & \frac{V_{n2}^{A}}{V_{n2}^{W}} \\ \vdots & & & \\ \frac{V_{1K}^{A}}{V_{1K}^{W}} & \frac{V_{2K}^{A}}{V_{2K}^{W}} & .... & \frac{V_{nK}^{A}}{V_{nK}^{W}} \end{bmatrix}$$

β^{Wj}= commodity shares of the world exports to country j to the world total exports (the ratio of world's specific commodity exports and total world's exports to country K); matrix of dimension nxK:

$$\beta^{Wj} = \begin{bmatrix} \beta_1^{W1} & \beta_1^{W2} & \beta_1^{WK} \\ \beta_2^{W1} & \beta_2^{W2} & \beta_2^{WK} \\ \vdots & \vdots & \cdots \ \vdots \\ \beta_n^{W1} & \beta_n^{W2} & \beta_n^{WK} \end{bmatrix} = \begin{bmatrix} V_{11}^{W1} \Big/ \sum_i V_{i1}^{W1} & V_{12}^{W} \Big/ \sum_i V_{i2}^{W} & V_{1K}^{W} \Big/ \sum_i V_{iK}^{W} \\ V_{21}^{W} \Big/ \sum_i V_{i1}^{W} & V_{22}^{W} \Big/ \sum_i V_{i2}^{W} & V_{2K}^{W} \Big/ \sum_i V_{iK}^{W} \\ \vdots & \vdots & \cdots \ \vdots \\ V_{n1}^{W} \Big/ \sum_i V_{i1}^{W} & V_{n2}^{W} \Big/ \sum_i V_{i2}^{W} & V_{nK}^{W} \Big/ \sum_i V_{iK}^{W} \end{bmatrix}$$

δ^{wj} = country shares of the world exports (the ratio of the world exports to country j and the world total exports); column vector of dimension K:

$$\delta^{Wj} = \begin{bmatrix} \delta^{W1} \\ \delta^{W2} \\ \vdots \\ \delta^{WK} \end{bmatrix} = \begin{bmatrix} \sum_i V_{i1}^{W} \Big/ \sum_i \sum_j V_{ij}^{W} \\ \sum_i V_{i2}^{W} \Big/ \sum_i \sum_j V_{ij}^{W} \\ \vdots \\ \sum_i V_{iK}^{W} \Big/ \sum_i \sum_j V_{ij}^{W} \end{bmatrix}$$

The 'several commodities – one market' case

In the case of 'several commodities – one market case', it is assumed that country A in question export several commodities (n) in only one market, say market K (i.e. j=K). In Figure 1, it is depicted by the last column. Based on the definitions and symbols, the macro share of country A (S^{AK}) can be written as the inner product of the vector of its micro share (α^{AK}) and the vector of commodity share in total world export to county K (β^{WK}), as follows:

$$S^{AK} = \alpha^{AK}\beta^{WK} = \left[\frac{V^{A}_{1K}}{V^{W}_{1K}} \quad \frac{V^{A}_{2K}}{V^{W}_{2K}} \quad .... \quad \frac{V^{A}_{nK}}{V^{W}_{nK}}\right]\begin{bmatrix} V^{W}_{1K}\Big/\sum_{i} V^{W}_{iK} \\ V^{W}_{2K}\Big/\sum_{i} V^{W}_{iK} \\ \vdots \\ V^{W}_{nK}\Big/\sum_{i} V^{W}_{iK} \end{bmatrix} \tag{14}$$

The change in macro share of country A (ΔS^{AK}) between time t and 0 can be obtained:

$$\begin{aligned} \Delta S^{AK} &= S^{AK}_{t} - S^{AK}_{0} \\ &= \alpha^{AK}_{t}\beta^{WK}_{t} - \alpha^{AK}_{0}\beta^{WK}_{0} \\ &= \left[\frac{V^{A}_{1K,t}}{V^{W}_{1K,t}} \quad \frac{V^{A}_{2K,t}}{V^{W}_{2K,t}} \quad .... \quad \frac{V^{A}_{nK,t}}{V^{W}_{nK,t}}\right]\begin{bmatrix} V^{W}_{1K,t}\Big/\sum_{i} V^{W}_{iK,t} \\ V^{W}_{2K,t}\Big/\sum_{i} V^{W}_{iK,t} \\ \vdots \\ V^{W}_{nK,t}\Big/\sum_{i} V^{W}_{iK,t} \end{bmatrix} - \left[\frac{V^{A}_{1K,0}}{V^{W}_{1K,0}} \quad \frac{V^{A}_{2K,0}}{V^{W}_{2K,0}} \quad .... \quad \frac{V^{A}_{nK,0}}{V^{W}_{nK,0}}\right]\begin{bmatrix} V^{W}_{1K,0}\Big/\sum_{i} V^{W}_{iK,0} \\ V^{W}_{2K,0}\Big/\sum_{i} V^{W}_{iK,0} \\ \vdots \\ V^{W}_{nK,0}\Big/\sum_{i} V^{W}_{iK,0} \end{bmatrix} \end{aligned} \tag{15}$$

If either the Laspeyres or Paasche indices are employed for the whole calculation, a third (residual) term necessarily appears since neither Laspeyres nor Paasche index passes the factor reversal test[6]. Therefore, the residual term appears as shown bellows (Laspeyres index is used):

$$\Delta S^{AK} = \Delta S^{AK}_{\alpha} + \Delta S^{AK}_{\beta} + \Delta S^{AK}_{\alpha\beta} \tag{16}$$

where:

$$\begin{aligned} \Delta S^{AK}_{\alpha} &= \left(\alpha^{AK}_{t} - \alpha^{AK}_{0}\right)\beta^{AK}_{0} \\ &= \left(\left[\frac{V^{A}_{1K,t}}{V^{W}_{1K,t}} \quad \frac{V^{A}_{2K,t}}{V^{W}_{2K,t}} \quad .... \quad \frac{V^{A}_{nK,t}}{V^{W}_{nK,t}}\right] - \left[\frac{V^{A}_{1K,0}}{V^{W}_{1K,0}} \quad \frac{V^{A}_{2K,0}}{V^{W}_{2K,0}} \quad .... \quad \frac{V^{A}_{nK,0}}{V^{W}_{nK,0}}\right]\right)\begin{bmatrix} V^{W}_{1K,0}\Big/\sum_{i} V^{W}_{iK,0} \\ V^{W}_{2K,0}\Big/\sum_{i} V^{W}_{iK,0} \\ \vdots \\ V^{W}_{nK,0}\Big/\sum_{i} V^{W}_{iK,0} \end{bmatrix} \end{aligned} \tag{17}$$

[6] The factor reversal test requires that multiplying a price index and a volume index of the same type should be equal to the proportionate change in the current values.

$$\Delta S_{\beta}^{AK} = \alpha_0^{AK}\left(\beta_t^{AK} - \beta_0^{AK}\right)$$

$$= \left[\begin{array}{cccc} \frac{V_{1K,0}^{A}}{V_{1K,0}^{W}} & \frac{V_{2K,0}^{A}}{V_{2K,0}^{W}} & \cdots & \frac{V_{nK,0}^{A}}{V_{nK,0}^{W}} \end{array}\right]\left(\left[\begin{array}{c} V_{1K,t}^{W} \Big/ \sum_i V_{iK,t}^{W} \\ V_{2K,t}^{W} \Big/ \sum_i V_{iK,t}^{W} \\ \vdots \\ V_{nK,t}^{W} \Big/ \sum_i V_{iK,t}^{W} \end{array}\right] - \left[\begin{array}{c} V_{1K,0}^{W} \Big/ \sum_i V_{iK,0}^{W} \\ V_{2K,0}^{W} \Big/ \sum_i V_{iK,0}^{W} \\ \vdots \\ V_{nK,0}^{W} \Big/ \sum_i V_{iK,0}^{W} \end{array}\right]\right) \quad (18)$$

$$\Delta S_{\alpha\beta}^{AK} = \left(\alpha_t^{AK} - \alpha_0^{AK}\right)\left(\beta_t^{AK} - \beta_0^{AK}\right)$$

$$= \left(\left[\begin{array}{cccc} \frac{V_{1K,t}^{A}}{V_{1K,t}^{W}} & \frac{V_{2K,t}^{A}}{V_{2K,t}^{W}} & \cdots & \frac{V_{nK,t}^{A}}{V_{nK,t}^{W}} \end{array}\right] - \left[\begin{array}{cccc} \frac{V_{1K,0}^{A}}{V_{1K,0}^{W}} & \frac{V_{2K,0}^{A}}{V_{2K,0}^{W}} & \cdots & \frac{V_{nK,0}^{A}}{V_{nK,0}^{W}} \end{array}\right]\right)\left(\left[\begin{array}{c} V_{1K,t}^{W} \Big/ \sum_i V_{iK,t}^{W} \\ V_{2K,t}^{W} \Big/ \sum_i V_{iK,t}^{W} \\ \vdots \\ V_{nK,t}^{W} \Big/ \sum_i V_{iK,t}^{W} \end{array}\right] - \left[\begin{array}{c} V_{1K,0}^{W} \Big/ \sum_i V_{iK,0}^{W} \\ V_{2K,0}^{W} \Big/ \sum_i V_{iK,0}^{W} \\ \vdots \\ V_{nK,0}^{W} \Big/ \sum_i V_{iK,0}^{W} \end{array}\right]\right) \quad (19)$$

The first term (ΔS_{α}^{AK}) is the effect of changes in micro shares (micro share effect), the second term (ΔS_{β}^{AK}) is the commodity composition effect. The third (residual) term ($\Delta S_{\alpha\beta}^{AK}$) is the inner product of a vector of changes in micro shares and a vector of changes in commodity composition. Fagerberg and Sollie (1987) argued that the residual term has economic meaning since its sign and value depend on the correlation between the changes in micro shares of the country and the change in commodity composition of the market. A formal proof on this matter is given below (for simplicity reason, the superscripts of country A and market K are omitted):

$$\Delta S_{\alpha\beta} = \left(\alpha_t - \alpha_0\right)\left(\beta_t - \beta_0\right) \quad (20)$$

The correlation coefficient between the changes in micro shares $\left(\alpha_t - \alpha_0\right)$and the changes in commodity shares $\left(\beta_t - \beta_0\right)$, which is symbolized by $r_{\alpha\beta}$, is formulated as[7]:

[7] From the standard statistics, correlation between two variables X and Y with n observations is formulated as: $r_{XY} = \frac{\sum\left(X - \overline{X}\right)\left(Y - \overline{Y}\right)}{\sqrt{\sum\left(X - \overline{X}\right)^2 \sum\left(Y - \overline{Y}\right)^2}}$ where $\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$ and $\overline{Y} = \frac{\sum_{i=1}^{n} Y_i}{n}$.

$$r_{\alpha\beta} = \frac{\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)\left(\beta_t - \beta_0 - \bar{\beta}_t + \bar{\beta}_0\right)}{\sqrt{\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)'\left(\beta_t - \beta_0 - \bar{\beta}_t + \bar{\beta}_0\right)'\left(\beta_t - \beta_0 - \bar{\beta}_t + \bar{\beta}_0\right)}} \quad (21)$$

The symbol (') denotes transposition operation, while $\bar{\alpha}_t, \bar{\alpha}_0, \bar{\beta}_t$ and $\bar{\beta}_0$ are vectors of means, defined by:

$$\bar{\alpha}_t = (1/n)\alpha_t uu' \quad (22)$$

$$\bar{\alpha}_0 = (1/n)\alpha_0 uu' \quad (23)$$

$$\bar{\beta}_t = (1/n)u'\beta_t u = (1/n)u \quad (24)$$

$$\bar{\beta}_0 = (1/n)u'\beta_0 u = (1/n)u \quad (25)$$

where u is vector of one , $\begin{bmatrix} 1 \\ \vdots \\ 1 \end{bmatrix}$; and u' denotes transposition of u. It follows from equations (21)-(25) that:

$$r_{\alpha\beta}\sqrt{\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)'\left(\beta_t - \beta_0\right)'\left(\beta_t - \beta_0\right)} = \left(\alpha_t - \alpha_0 - (1/n)\alpha_t uu' + (1/n)\alpha_0 uu'\right)\left(\beta_t - \beta_0\right) \quad (26)$$

By rearranging, equation (26) can be simplified as follows:

$$r_{\alpha\beta}\sqrt{\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)'\left(\beta_t - \beta_0\right)'\left(\beta_t - \beta_0\right)} = \left(\alpha_t - \alpha_0\right)\left(\beta_t - \beta_0\right) - (1/n)\left(\alpha_t - \alpha_0\right)uu'\left(\beta_t - \beta_0\right) \quad (27)$$

Since the sum of the commodity shares is always equal to one, it follows that:

$$u'\left(\beta_t - \beta_0\right) = 0 \quad (28)$$

Therefore, it is:

$$r_{\alpha\beta}\sqrt{\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)\left(\alpha_t - \alpha_0 - \bar{\alpha}_t + \bar{\alpha}_0\right)'\left(\beta_t - \beta_0\right)'\left(\beta_t - \beta_0\right)} = \left(\alpha_t - \alpha_0\right)\left(\beta_t - \beta_0\right) \quad (29)$$

By substituting equation (29) into equation (20) the residual can be expressed as the product of the correlation between the changes in micro shares and the change in commodity shares, and two terms which are necessarily non-negative. The first of these terms is a measure of the spread of the changes in micro shares, while the second is a measure of the changes in commodity shares (superscript are reintroduced):

$$\Delta S_{\alpha\beta}^{AK} = \left(\alpha_t^{AK} - \alpha_0^{AK}\right)\left(\beta_t^{AK} - \beta_0^{AK}\right)$$
$$= r_{\alpha\beta}^{AK}\sqrt{\left(\alpha_t^{AK} - \alpha_0^{AK} - \bar{\alpha}_t^{AK} + \bar{\alpha}_0^{AK}\right)\left(\alpha_t^{AK} - \alpha_0^{AK} - \bar{\alpha}_t^{AK} + \bar{\alpha}_0^{AK}\right)'\left(\beta_t^{WK} - \beta_0^{WK}\right)'\left(\beta_t^{WK} - \beta_0^{WK}\right)} \quad (30)$$

Therefore, the third effect shows to what degree a country has succeeded in adapting the commodity composition of its exports to the changes in the commodity composition of the market. Fagerberg and Sollie (1987) named it as the 'relative commodity adaptation effect' or just simple 'commodity adaptation effect'. A zero commodity adaptation effect does not necessarily means that no adaptation takes place, but that the country adapts its export structure at exactly the same rate as the average of all countries exporting to the market in question.

The 'several commodities – several markets' case

This sub-part explains the CMS method in the case of 'several commodities – several market' case. For example, we want to analyze country A which export n commodities to all k countries (export destinations) as depicted in Figure 1. The market share of country A in world export (S^A) can be written as the inner product of the vector of its macro share (s^A) and the vector of country shares of world exports (δ^{Wj}):

$$S^A = s^A \delta^{Wj} = \left[\frac{\sum_i V_{i1}^A}{\sum_i V_{i1}^W} \quad \frac{\sum_i V_{i2}^A}{\sum_i V_{i2}^W} \quad \cdots \quad \frac{\sum_i V_{iK}^A}{\sum_i V_{iK}^W}\right] \begin{bmatrix} \sum_i V_{i1}^W \Big/ \sum_i \sum_j V_{ij}^W \\ \sum_i V_{i2}^W \Big/ \sum_i \sum_j V_{ij}^W \\ \vdots \\ \sum_i V_{i1}^W \Big/ \sum_i \sum_j V_{ij}^W \end{bmatrix} \quad (31)$$

The change in (ΔS^A) between time 0 and t is:

$$\Delta S^A = S_t^A - S_0^A \quad (32)$$

or

$$\Delta S^{A} = \Delta\left(s^{A}\delta^{Wj}\right)$$

$$= \left[\frac{\sum_i V^{A}_{i1,t}}{\sum_i V^{W}_{i1,t}} \quad \frac{\sum_i V^{A}_{i2,t}}{\sum_i V^{W}_{i2,t}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,t}}{\sum_i V^{W}_{iK,t}}\right] \begin{bmatrix} \sum_i V^{W}_{i1,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \\ \sum_i V^{W}_{i2,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \\ \vdots \\ \sum_i V^{W}_{iK,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \end{bmatrix} - \left[\frac{\sum_i V^{A}_{i1,0}}{\sum_i V^{W}_{i1,0}} \quad \frac{\sum_i V^{A}_{i2,0}}{\sum_i V^{W}_{i2,0}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,0}}{\sum_i V^{W}_{iK,0}}\right] \begin{bmatrix} \sum_i V^{W}_{i1,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \sum_i V^{W}_{i2,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \vdots \\ \sum_i V^{W}_{iK,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \end{bmatrix} \quad (33)$$

The change in the market share can be split into three effects:

$$\Delta S^{A} = \Delta S^{A}_{s} + \Delta S^{A}_{\delta} + \Delta S^{A}_{s\delta} \quad (34)$$

where:

$$\Delta S^{A}_{s} = \left(s^{A}_{t} - s^{A}_{0}\right)\delta^{Wj}_{0}$$

$$= \left(\left[\frac{\sum_i V^{A}_{i1,t}}{\sum_i V^{W}_{i1,t}} \quad \frac{\sum_i V^{A}_{i2,t}}{\sum_i V^{W}_{i2,t}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,t}}{\sum_i V^{W}_{iK,t}}\right] - \left[\frac{\sum_i V^{A}_{i1,0}}{\sum_i V^{W}_{i1,0}} \quad \frac{\sum_i V^{A}_{i2,0}}{\sum_i V^{W}_{i2,0}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,0}}{\sum_i V^{W}_{iK,0}}\right]\right) \begin{bmatrix} \sum_i V^{W}_{i1,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \sum_i V^{W}_{i2,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \vdots \\ \sum_i V^{W}_{iK,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \end{bmatrix} \quad (35)$$

$$\Delta S^{A}_{\delta} = s^{A}_{0}\left(\delta^{Wj}_{t} - \delta^{Wj}_{0}\right)$$

$$= \left[\frac{\sum_i V^{A}_{i1,0}}{\sum_i V^{W}_{i1,0}} \quad \frac{\sum_i V^{A}_{i2,0}}{\sum_i V^{W}_{i2,0}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,0}}{\sum_i V^{W}_{iK,0}}\right] \left(\begin{bmatrix} \sum_i V^{W}_{i1,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \\ \sum_i V^{W}_{i2,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \\ \vdots \\ \sum_i V^{W}_{iK,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \end{bmatrix} - \begin{bmatrix} \sum_i V^{W}_{i1,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \sum_i V^{W}_{i2,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \vdots \\ \sum_i V^{W}_{iK,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \end{bmatrix}\right) \quad (36)$$

$$\Delta S^{A}_{s\delta} = \left(s^{A}_{t} - s^{A}_{0}\right)\left(\delta^{Wj}_{t} - \delta^{Wj}_{0}\right)$$

$$= \left(\left[\frac{\sum_i V^{A}_{i1,t}}{\sum_i V^{W}_{i1,t}} \quad \frac{\sum_i V^{A}_{i2,t}}{\sum_i V^{W}_{i2,t}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,t}}{\sum_i V^{W}_{iK,t}}\right] - \left[\frac{\sum_i V^{A}_{i1,0}}{\sum_i V^{W}_{i1,0}} \quad \frac{\sum_i V^{A}_{i2,0}}{\sum_i V^{W}_{i2,0}} \quad \cdots \quad \frac{\sum_i V^{A}_{iK,0}}{\sum_i V^{W}_{iK,0}}\right]\right) \left(\begin{bmatrix} \sum_i V^{W}_{i1,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \\ \sum_i V^{W}_{i2,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \\ \vdots \\ \sum_i V^{W}_{iK,t} \Big/ \sum_i \sum_j V^{W}_{ij,t} \end{bmatrix} - \begin{bmatrix} \sum_i V^{W}_{i1,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \sum_i V^{W}_{i2,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \\ \vdots \\ \sum_i V^{W}_{iK,0} \Big/ \sum_i \sum_j V^{W}_{ij,0} \end{bmatrix}\right) \quad (37)$$

The first effect is the changes in the macro shares weighted by the initial year country shares, while the second effect is the changes in the country shares weighted by initial year macro shares. Thus, the second effect measures the effect on the market share of a country in the world market of changes in the composition of the market. It is named

the market composition effect. The third effect can be interpreted as the degree of success of the country in adapting the market composition of its export to the changes in the country composition of world imports. Therefore, following the argument of the previous sub-part, it is named the market adaptation effect. A formal proof on this matter is given below. Let $r_{s\delta}^{A}$ denotes the correlation coefficient between the changes in macro shares and the changes in country shares, and let $\bar{s}_0^{A}$, $\bar{s}_t^{A}$, $\bar{\delta}_0^{A}$ and $\bar{\delta}_t^{A}$ be vectors of means. The correlation coefficient between the changes in micro shares $(s_t - s_0)$ and the changes in commodity shares $(\delta_t - \delta_0)$, which is symbolized by $r_{s\delta}$, is formulated as:

$$r_{s\delta} = \frac{(s_t - s_0 - \bar{s}_t + \bar{s}_0)(\delta_t - \delta_0 - \bar{\delta}_t + \bar{\delta}_0)}{\sqrt{(s_t - s_0 - \bar{s}_t + \bar{s}_0)(s_t - s_0 - \bar{s}_t + \bar{s}_0)'(\delta_t - \delta_0 - \bar{\delta}_t + \bar{\delta}_0)'(\delta_t - \delta_0 - \bar{\delta}_t + \bar{\delta}_0)}} \quad (38)$$

The symbol $\bar{s}_t, \bar{s}_0, \bar{\delta}_t$ and $\bar{\delta}_0$ are vectors of means, defined by:

$$\bar{s}_t = (1/n)s_t uu' \quad (39)$$

$$\bar{s}_0 = (1/n)s_0 uu' \quad (40)$$

$$\bar{\delta}_t = (1/n)u'\delta_t u = (1/n)u \quad (41)$$

$$\bar{\delta}_0 = (1/n)u'\delta_0 u = (1/n)u \quad (42)$$

It follows from equations (38)-(42) that:

$$r_{s\delta}\sqrt{(s_t - s_0 - \bar{s}_t + \bar{s}_0)(s_t - s_0 - \bar{s}_t + \bar{s}_0)'(\delta_t - \delta_0)'(\delta_t - \delta_0)} = (s_t - s_0 - (1/n)s_t uu' + (1/n)s_0 uu')(\delta_t - \delta_0) \quad (43)$$

By rearranging, we get:

$$r_{s\delta}\sqrt{(s_t - s_0 - \bar{s}_t + \bar{s}_0)(s_t - s_0 - \bar{s}_t + \bar{s}_0)'(\delta_t - \delta_0)'(\delta_t - \delta_0)} = (s_t - s_0)(\delta_t - \delta_0) - (1/n)(s_t - s_0)uu'(\delta_t - \delta_0) \quad (44)$$

Since the sum of the country shares is always equal to one, it follows that:

$$u'(\delta_t - \delta_0) = 0 \quad (45)$$

Therefore

$$r_{s\delta}\sqrt{\left(s_t - s_0 - \bar{s}_t + \bar{s}_0\right)\left(s_t - s_0 - \bar{s}_t + \bar{s}_0\right)'\left(\delta_t - \delta_0\right)'\left(\delta_t - \delta_0\right)} = \left(s_t - s_0\right)\left(\delta_t - \delta_0\right) \qquad (46)$$

And

$$\Delta S^A_{s\delta} = r_{s\delta}\sqrt{\left(s^A_t - s^A_0 - \bar{s}^A_t + \bar{s}^A_0\right)\left(s^A_t - s^A_0 - \bar{s}^A_t + \bar{s}^A_0\right)'\left(\delta^{Wj}_t - \delta^{Wj}_0\right)'\left(\delta^{Wj}_t - \delta^{Wj}_0\right)} \qquad (47)$$

By taking into account equation (15)-(19) and the definition of s^A, ΔS^A_s may be written as the sum of three effects:

$$\Delta S^A_s = \Delta S^A_\alpha + \Delta S^A_\beta + \Delta S^A_{\alpha\beta} \qquad (48)$$

$$\Delta S^A_\alpha = \sum_j \left(\alpha^{Aj}_t - \alpha^{Aj}_0\right)\beta^{Wj}_0\delta^{Wj}_0 \qquad (49)$$

$$\Delta S^A_\beta = \sum_j \alpha^{Aj}_0\left(\beta^{Wj}_t - \beta^{Wj}_0\right)\delta^{Wj}_0 \qquad (50)$$

$$\Delta S^A_{\alpha\beta} = \sum_j \left(\alpha^{Aj}_t - \alpha^{Aj}_0\right)\left(\beta^{Wj}_t - \beta^{Wj}_0\right)\delta^{Wj}_0 \qquad (51)$$

The first effect (ΔS^A_α) is the effect of changes in the micro shares of county A in each market weighted by the commodity composition of each market and the country composition of total world exports in the initial year. Following the argument of the previous section, this is labeled the market share effect. By the same token, the second effect (ΔS^A_β) is labeled the commodity composition effect and the third ($\Delta S^A_{\alpha\beta}$) the commodity adaptation effect. Since the proof and interpretation in the latter case is quite analogous to the previous cases, the result of the proof is simply stated here:

$$\Delta S^A_{\alpha\beta} = \sum_j r^j_{\alpha\beta}\ \delta^{Wj}_0\sqrt{\left(\alpha^{Aj}_t - \alpha^{Aj}_0 - \bar{\alpha}^{Aj}_t + \bar{\alpha}^{Aj}_0\right)\left(\alpha^{Aj}_t - \alpha^{Aj}_0 - \bar{\alpha}^{Aj}_t + \bar{\alpha}^{Aj}_0\right)'\left(\beta^{Wj}_t - \beta^{Wj}_0\right)'\left(\beta^{Wj}_t - \beta^{Wj}_0\right)} \qquad (52)$$

To sum up, the change in country's market share in total world exports may be split into five effects:

ΔS^A_α = the market share effect;
ΔS^A_β = the commodity composition effect;
ΔS^A_δ = the market composition effect;

$\Delta S^A_{\alpha\beta}$ = the commodity adaptation effect;
$\Delta S^A_{s\delta}$ = the market adaptation effect;
so that

$$\Delta S^A = \Delta S^A_\alpha + \Delta S^A_\beta + \Delta S^A_c + \Delta S^A_{\alpha\beta} + \Delta S^A_{s\delta} \quad (53)$$

6. The Two Different Points of View: a New Version of CMS

After describing comprehensively the two fundamental methods of CMS proposed by Leamer and Stern (1970) and Fagerberg and Sollie (1987), this paper argues that the concepts have different focuses. Leamer and Stern focused on factors underlying the changes in exports $\left(V^{At}_{\bullet\bullet} - V^{A0}_{\bullet\bullet}\right)$ which also may be represented as the growth of exports, either using Laspeyres index $\left(\frac{V^{At}_{\bullet\bullet} - V^{A0}_{\bullet\bullet}}{V^{A0}_{\bullet\bullet}}\right)$ or Paasche index $\left(\frac{V^{At}_{\bullet\bullet} - V^{A0}_{\bullet\bullet}}{V^{At}_{\bullet\bullet}}\right)$. They concluded that the change (growth) in exports may be caused by (a) the general rise in world exports; (b) the market distribution of country A's export; (c) the commodity composition of country A's export; and (d) an unexplained residual (the competitiveness effect). Meanwhile, Fagerberg and Sollie examined factors causing the changes in shares of export or the change in market share $\left(\frac{V^{At}_{\bullet\bullet}}{V^{Wt}_{\bullet\bullet}} - \frac{V^{A0}_{\bullet\bullet}}{V^{W0}_{\bullet\bullet}}\right)$. They concluded that the change in market share can caused by (a) the market share effect; (b) the commodity composition effect; (c) the market composition effect; (d) the commodity adaptation effect; (e) the market adaptation effect. Since the market share shows the competitiveness this paper argues that Fagerberg and Sollie (1987) actually focused on factors underlying the change in country's competitiveness, not the change in export as described by Leamer and Stern (1970).

This paper derives a new method of the CMS by Leamer and Stern (1970) based on the change in share of exports proposed by Fagerberg and Sollie (1987). Paragraphs below explain the derivation of the proposed method. Increasing in the market share implies increasing competitiveness. The share of exports of a given country is a function of the country's relative "competitiveness" (Richardson 1971a):

$$S^A \equiv \frac{V_{\bullet\bullet}^A}{V_{\bullet\bullet}^W} = f\left(\frac{c}{C}\right) \tag{54}$$

where $f'(\ ) > 0$, s^A is the export share of the focus country A; $V_{\bullet\bullet}^A$ and $V_{\bullet\bullet}^W$ are total exports of the focus country A and the world, respectively; c and C are "competitiveness" of the focus country and the world, respectively. Taking the derivative with respect to time (t) of equation (54) will result:

$$\frac{dV_{\bullet\bullet}^A}{dt} = S^A \frac{dV_{\bullet\bullet}^W}{dt} + V_{\bullet\bullet}^W \frac{dS^A}{dt} = S^A \frac{dQ}{dt} + V_{\bullet\bullet}^W \frac{df\left(\frac{c}{C}\right)}{dt} \tag{55}$$

or

$$\begin{aligned} \overset{\circ}{V}_{\bullet\bullet}^A &= S^A \overset{\circ}{V}_{\bullet\bullet}^W + V_{\bullet\bullet}^W \overset{\circ}{S}^A \\ &= S^A \overset{\circ}{V}_{\bullet\bullet}^W + V_{\bullet\bullet}^W df'\left(\frac{\overset{\circ}{c}}{C}\right) \end{aligned} \tag{56}$$

(a) (b)

A doted $\left(\overset{\circ}{\ }\right)$ variable represents that the derivative of the variables with respect to time (t). In this simplest CMS model, a country's total export growth ($\overset{\circ}{V}_{\bullet\bullet}^A$) is explained by (a) world growth effect ($S^A \overset{\circ}{V}_{\bullet\bullet}^W$) and (b) competitive effect ($V_{\bullet\bullet}^W \overset{\circ}{S}^A$). The former exhibits the country's growth in exports would have been if it had maintained its export share and the later represents any additional export growth due to changes in relative competitiveness. In term of the discrete time, equation (56) can be written as:

$$\Delta V_{\bullet\bullet}^{A} = S^{A}\Delta V_{\bullet\bullet}^{W} + V_{\bullet\bullet}^{W}\Delta S^{A} \tag{57}$$

Substituting ΔS^{A} with equation (31), a new version of the CMS method is proposed:

$$\Delta V_{\bullet\bullet}^{A} = S^{A}\Delta V_{\bullet\bullet}^{W} + V_{\bullet\bullet}^{W}\left(\Delta S_{\alpha}^{A} + \Delta S_{\beta}^{A} + \Delta S_{\delta}^{A} + \Delta M_{\alpha\beta}^{A} + \Delta M_{s\delta}^{A}\right) \tag{58}$$

Where

$\Delta V_{\bullet\bullet}^{A}$ = change of country A's exports
$S^{A}\Delta V_{\bullet\bullet}^{W}$ = change in A's exports due to the general rise of world's export
$V_{\bullet\bullet}^{W}\Delta S_{\alpha}^{A}$ = the market share effect
$V_{\bullet\bullet}^{W}\Delta S_{\beta}^{A}$ = the commodity composition effect
$V_{\bullet\bullet}^{W}\Delta S_{\delta}^{A}$ = the market composition effect
$V_{\bullet\bullet}^{W}\Delta S_{\alpha\beta}^{A}$ = the commodity adaptation effect
$V_{\bullet\bullet}^{W}\Delta S_{s\delta}^{A}$ = the market adaptation effect

In the long form[8]:

$$\begin{aligned}\Delta V_{\bullet\bullet}^{A} = {} & S_{t}^{A}\Delta V_{\bullet\bullet}^{W} + V_{\bullet\bullet}^{W0}\sum_{j}\left(\alpha_{t}^{Aj} - \alpha_{0}^{Aj}\right)\beta_{0}^{Wj}\delta_{0}^{Wj} \\ & \text{(a)} \qquad\qquad \text{(b)} \\ & + V_{\bullet\bullet}^{W0}\sum_{j}\alpha_{0}^{Aj}\left(\beta_{t}^{Wj} - \beta_{0}^{Wj}\right)\delta_{0}^{Wj} + V_{\bullet\bullet}^{W0}s_{0}^{A}\left(\delta_{t} - \delta_{0}\right) \\ & \text{(c)} \qquad\qquad \text{(d)} \\ & + V_{\bullet\bullet}^{W0}\sum_{j}\left(\alpha_{t}^{Wj} - \alpha_{0}^{Wj}\right)\left(\beta_{t}^{Wj} - \beta_{0}^{Wj}\right)\delta_{0}^{Wj} + V_{\bullet\bullet}^{W0}\left(s_{t}^{A} - s_{0}^{A}\right)\left(\delta_{t}^{A} - \delta_{0}^{A}\right) \\ & \text{(e)} \qquad\qquad \text{(f)}\end{aligned} \tag{59}$$

[8] As stated by Baldwin (1958) and Spiegelglas (1959), this is the case only as long as initial (0) and final year (t) are used in the calculation. If the first effect is calculated by using initial year (0) then the second effect must necessarily be calculated by using final year (t), vice versa. This implies $V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} = \frac{V_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{w0}}\left(V_{\bullet\bullet}^{wt} - V_{\bullet\bullet}^{w0}\right) + V_{\bullet\bullet}^{wt}\left(\frac{V_{\bullet\bullet}^{At}}{V_{\bullet\bullet}^{wt}} - \frac{V_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{w0}}\right)$ or $V_{\bullet\bullet}^{At} - V_{\bullet\bullet}^{A0} = \frac{V_{\bullet\bullet}^{At}}{V_{\bullet\bullet}^{wt}}\left(V_{\bullet\bullet}^{wt} - V_{\bullet\bullet}^{w0}\right) + V_{\bullet\bullet}^{w0}\left(\frac{V_{\bullet\bullet}^{At}}{V_{\bullet\bullet}^{wt}} - \frac{V_{\bullet\bullet}^{A0}}{V_{\bullet\bullet}^{w0}}\right)$.

Accordingly, Equation (59) alternatively can be written as:

$$\begin{aligned}\Delta V_{\bullet\bullet}^{A} = {} & S_{0}^{A}\Delta V_{\bullet\bullet}^{W} + V_{\bullet\bullet}^{Wt}\sum_{j}\left(\alpha_{t}^{Aj} - \alpha_{0}^{Aj}\right)\beta_{0}^{Wj}\delta_{0}^{Wj} \\ & \text{(a)} \qquad\qquad \text{(b)} \\ & + V_{\bullet\bullet}^{Wt}\sum_{j}\alpha_{0}^{Aj}\left(\beta_{t}^{Wj} - \beta_{0}^{Wj}\right)\delta_{0}^{Wj} + V_{\bullet\bullet}^{Wt}s_{0}^{A}\left(\delta_{t} - \delta_{0}\right) \\ & \text{(c)} \qquad\qquad \text{(d)} \\ & + V_{\bullet\bullet}^{Wt}\sum_{j}\left(\alpha_{t}^{Wj} - \alpha_{0}^{Wj}\right)\left(\beta_{t}^{Wj} - \beta_{0}^{Wj}\right)\delta_{0}^{Wj} + V_{\bullet\bullet}^{Wt}\left(s_{t}^{A} - s_{0}^{A}\right)\left(\delta_{t}^{A} - \delta_{0}^{A}\right) \\ & \text{(e)} \qquad\qquad \text{(f)}\end{aligned}$$

Equation (59) implies that the change in country A's exports can be caused by (a) the general changes in the world's export , (b) the market share effect, (c) the commodity composition effect, (d) the market composition effect, (e) the commodity adaptation effect, (f) the market adaptation effect. There are some main differences between the new version (59) and Leamer and Stern's (1970) version. *First,* the problem of subjectivity in the choice of which effects coming first – i.e. the market distribution effect or the commodity composition effect in the CMS version by Leamer and Stern(1970) – is avoided in this new version. *Second,* the new version gives six effects instead of Leamer and Stern's four effects. In the new version the market adaptation and commodity adaptation effects are introduced instead of Leamer and Stern's residual effect. Clear economic interpretation of the two effects is also given. *Third,* Laspeyres index were employed throughout the calculations. Therefore, lack of comparability due to differences in weighting procedures is avoided (Fagerberg and Sollie, 1987).

7. Empirical Results

The new version of CMS method proposed in the previous part is then employed to examine ASEAN countries' export performances. This paper uses data on exports 3-digit SITC Revision 2 by products and destinations published by the United Nations (UN) namely United Nations Commodity Trade Statistics Database (UN-COMTRADE). It applies the definitions of products by the Empirical Trade Analysis (ETA)[9]. On the

[9] See Empirical Trade Analysis (ETA) at http://people.few.eur.nl/vanmarrewijk/eta/ for further information. The is insignificant differences between the SITC Rev. 2 and the SITC Rev. 3 in the ETA's classification of products.

basis of the United Nations Conference on Trade and Development (UNCTAD) / World Trade Organization (WTO) classification using the SITC Rev. 3, the ETA distinguished the following products: (a) Primary products (83 SITC), (b) Natural resource-intensive products (21 SITC), (c) Unskilled labor-intensive products (26 SITC), (d) Technology-intensive products (62 SITC), (e) Human-capital intensive products (43 SITC), (f) Others (5 SITC).

This paper defines the export destinations consisting of the ASEAN5 (Singapore, Indonesia, Malaysia, Thailand and Philippine), the North East Asia (Japan, Mainland-China, Hong Kong-China and Korea), the European Union (EU: all 27 countries) and the North America Free Trade Area (NAFTA: the US, Canada and Mexico), and the rest of the world (Rest). The periods of analysis are 1980-1985, 1985-1990, 1990-1995, 1995-2001, and 2001-2006.

Table 1 and Figure 2 show the CMS analysis for the individual ASEAN countries i.e. Singapore, Indonesia, Malaysia, Thailand and Philippine. Some points could be made. *First*, the constant norm share strongly applies in the case of ASEAN countries since 1985. It means that export performance of ASEAN countries only follows the general trend in world exports since 1985. Only in the period 1980-1985, the constant share norm did not take place significantly. During this period, there were price declines in oil and primary products. Many countries including ASEAN countries had to restructure their exports. As result the market shares and market adaptation effects took greater portions in pushing ASEAN countries' exports. In contrast, the commodity composition, market composition and commodity adaptation effects have negative contribution upon ASEAN countries' exports. In the case of Indonesia, she had a decrease in exports during 1980-1985. This decrease mainly was caused by the commodity composition effect, since

Indonesian exports were strongly relied on oil sectors. For this reason, Indonesia is sometimes called 'oil economy' (Booth, 1998; Widodo, 2006, 2007).

Second, massive proliferation of regionalization and economic integration in the early 1990s caused the changes in direction of trade. It might be believed that regionalism and economic integration increases the intra-regional trade. The EU was established in 1993 under the Maastricht Treaty, the NAFTA came into effect in 1994. The ASEAN Free Trade Area (AFTA) was started in 1992 through the Common Effective Preferential Tariff (CEPT). Through trade creation and trade diversion, the establishments of economic integration – the AFTA in the case of ASEAN- have changed exports destinations which intra-regional trade may take place in the larger portion. As results during the period 1990-1995, the general rise in world exports had smaller portion in affecting regions' export performance compared with the previous period 1985-1990. In general, the decreasing portion of the effect of general rise in world exports was followed by the increasing portion of market share and market composition effects. However, the general rise in world export again have had greater portion since 1995 for all ASEAN countries except Philippine which seems to be closely related with the establishment of the NAFTA market. Whether the establishment of the AFTA through the Agreement on the Common Effective Preferential Tariff (CEPT) scheme has intensified the intra-ASEAN trades is still questionable. Elliott and Ikemoto (2002) found that trade flows were not considerably affected in the years soon after the signing of the AFTA agreement. In addition, the outward-looking policies conducted by the ASEAN countries were also not significantly affected but rather encouraged by the AFTA process. Trung and Hashimoto (2005) found that the AFTA has only produced the trade creation among its members.

Table 1 about here.

Figure 2 about here.

8. Concluding Remarks

This paper comprehensively discusses the CMS methods, especially proposed by Leamer and Stern (1970), Richardson (1971a, 1971b) and Fagerberg and Sollie (1987). This paper finds that there are different points of view between the two first and the third. Leamer and Stern (1970) as well as Richardson (1971a, 1971b) focuses their analysis on factors underlying a country's changes in exports. Meanwhile, Fagerberg and Sollie (1987) explain factors underlying country's changes in shares in the world export.

By combining the original concepts in country's change in exports and change in share in the world exports by Fagerberg and Sollie (1987), this paper proposes a new version of the CMS method which break down the change in a country's export into six effect instead of two effects by Tyszynki (1951)) or four effects by Leamer and Stern (1970) and Richardson (1971a, 1971b). The six effects are (a) general changes in world exports, (b) market share effects, (c) commodity composition effect, (d) market composition effect, (e) commodity adaptation effect, (f) market adaptation effect. This new version has corrected the shortcomings of the CMS version by Leamer and Stern (1970). *First*, the problem of subjectivity in the choice of which effects– i.e. the market distribution effect or the commodity composition effect– coming first is avoided. *Second*, the market adaptation and commodity adaptation effects are introduced instead of Leamer and Stern's residual effect and clear economic interpretation of the two effects is also given. *Third*, lack of comparability due to differences in weighting procedures is avoided.

When applied to a sample of ASEAN countries (Indonesia, Singapore, Malaysia, Thailand and Philippine) for the periods 1980-1985, 1985-1990, 1995-2001 and 2001-2006, several interesting results emerged. *First*, the constant norm share strongly applies in the case of ASEAN countries since 1985. *Second*, the proliferation of regionalism and economic integrations in the beginning 1990-s caused the change in trade pattern. As a result, the power of the constant share norm in explaining a country's exports performance decreased during 1990-1995. However, this paper finds that the change in trade pattern only happened in short term (in the beginning of economic integration) i.e. 1990-1995 in the case of ASEAN countries.

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Figure 1. Illustration of Exports Flows

Country A's Exports to World

	Exports Value		Total	
Commodity	0	t	0	t
1				
2			$V_{i\bullet}^{A0}$	$V_{i\bullet}^{At}$
⋮				
n				
Total	$V_{\bullet W}^{A0}$	$V_{\bullet W}^{At}$	$V_{\bullet\bullet}^{A0}$	$V_{\bullet\bullet}^{At}$

Country A's Exports to Country 1

	Exports Value	
Commodity	0	t
1		
2	V_{i1}^{A0}	V_{i1}^{At}
⋮		
n		
Total	$V_{\bullet 1}^{A0}$	$V_{\bullet 1}^{At}$

…… Country A's Exports to Country K

	Exports Value	
Commodity	0	t
1		
2	V_{iK}^{A0}	V_{iK}^{At}
⋮		
n		
Total	$V_{\bullet K}^{A0}$	$V_{\bullet K}^{At}$

⋮ ⋮ ⋮

Country Z's Exports to World

	Exports Value		Total	
Commodity	0	t	0	t
1				
2			$V_{i\bullet}^{Z0}$	$V_{i\bullet}^{Zt}$
⋮				
n				
Total	$V_{\bullet j}^{Z0}$	$V_{\bullet j}^{Zt}$	$V_{\bullet\bullet}^{Z0}$	$V_{\bullet\bullet}^{Zt}$

Country Z's Exports to Country 1

	Exports Value	
Commodity	0	t
1		
2	V_{i1}^{Z0}	V_{i1}^{Zt}
⋮		
n		
Total	$V_{\bullet 1}^{Z0}$	$V_{\bullet 1}^{Zt}$

…… Country Z's Exports to Country K

	Exports Value	
Commodity	0	t
1		
2	V_{iK}^{Z0}	V_{iK}^{Zt}
⋮		
n		
Total	$V_{\bullet K}^{Z0}$	$V_{\bullet K}^{Zt}$

World's Exports to World (Total world exports)

	Export Value		Total	
Commodity	0	t	0	t
1				
2			$V_{i\bullet}^{W0}$	$V_{i\bullet}^{Wt}$
⋮				
n				
Total	$V_{\bullet j}^{W0}$	$V_{\bullet j}^{Wt}$	$V_{\bullet\bullet}^{W0}$	$V_{\bullet\bullet}^{Wt}$

r = percentage increase in total world export

$$r = \frac{V_{\bullet\bullet}^{Wt} - V_{\bullet\bullet}^{W0}}{V_{\bullet\bullet}^{W0}}$$

r_i =percentage increase in world export of commodity i

$$r_i = \frac{V_{i\bullet}^{Wt} - V_{i\bullet}^{W0}}{V_{i\bullet}^{W0}}$$

World's Exports to Country 1

	Export Value	
Commodity	0	t
1		
2	V_{i1}^{W0}	V_{i1}^{Wt}
⋮		
n		
Total	$V_{\bullet 1}^{W0}$	$V_{\bullet 1}^{Wt}$

r_{i1} percentage increase in world export of commodity i to country 1:

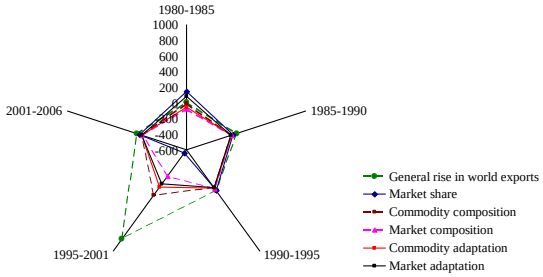
$$r_{i1} = \frac{V_{i1}^{Wt} - V_{i1}^{W0}}{V_{i1}^{W0}}$$

…… World's Exports to Country K

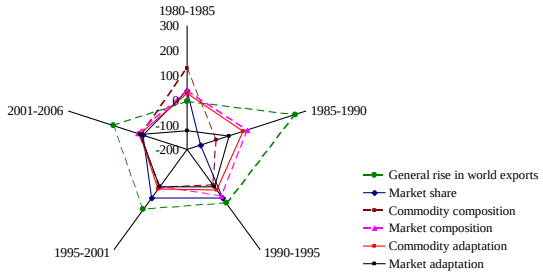
	Export Value	
Commodity	0	t
1		
2	V_{iK}^{W0}	V_{iK}^{Wt}
⋮		
n		
Total	$V_{\bullet K}^{W0}$	$V_{\bullet K}^{Wt}$

r_{iK} percentage increase in world export of commodity i to country j:

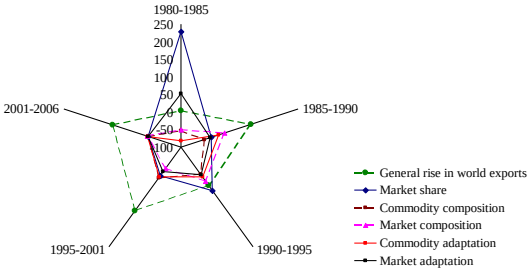
$$r_{iK} = \frac{V_{iK}^{Wt} - V_{iK}^{W0}}{V_{iK}^{W0}}$$



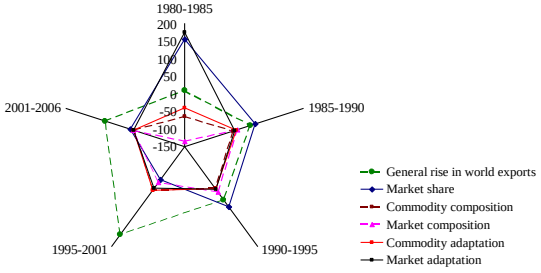
(a) Singapore



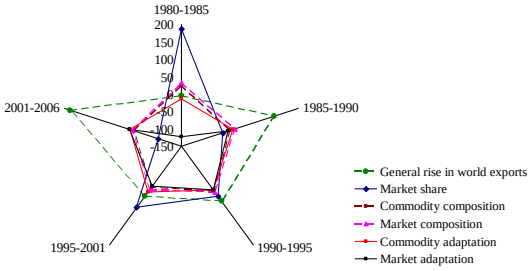
(b) Indonesia



(c) Malaysia



(d) Thailand



(e) Philippine

Source: 3-digit SITC Revision 2, UN-COMTRADE. *Author's calculation*

Figure 2. The CMS Analysis: ASEAN Countries

Table 1. The CMS Analysis: ASEAN Countries

Countries	Change in Export ($ US)	Due to (%)					
		General rise in world exports	Market share	Commodity composition	Market composition	Commodity adaptation	Market adaptation
Singapore							
1980-1985	3,470,348,201	5.1	146.0	-8.7	-75.3	-53.1	86.0
1985-1990	29,870,082,224	74.6	21.7	-2.2	8.5	1.0	-3.6
1990-1995	65,547,210,386	41.2	40.2	1.4	11.6	6.0	-0.3
1995-2001	3,490,635,025	804.9	-554.9	114.0	-187.6	-12.3	-64.1
2001-2006	150,047,157,087	70.5	25.3	0.8	2.6	0.1	0.7
Indonesia							
1980-1985	-3,322,178,480	-6.1	38.0	128.5	38.8	26.0	-125.2
1985-1990	7,088,612,816	255.8	-144.2	-76.7	53.9	35.1	-23.9
1990-1995	19,742,639,595	66.7	40.6	-26.0	31.0	1.7	-14.0
1995-2001	10,898,869,340	99.0	41.2	-10.1	-17.3	-0.8	-11.9
2001-2006	44,481,783,995	110.0	-14.4	-4.7	9.0	1.5	-1.4
Malaysia							
1980-1985	2,693,190,560	4.4	228.5	-52.7	-50.3	-82.0	52.2
1985-1990	13,815,331,786	110.4	-9.9	-30.6	30.4	12.8	-13.1
1990-1995	44,324,940,200	34.1	51.7	-5.5	18.8	4.0	-3.1
1995-2001	14,226,337,763	123.2	0.6	9.0	-23.8	4.5	-13.5
2001-2006	72,664,743,931	105.3	-2.3	-1.3	0.6	-0.1	-2.2
Thailand							
1980-1985	616,301,097	9.7	154.6	-63.8	-134.7	-40.5	174.7
1985-1990	15,947,077,204	43.6	58.7	-7.2	5.3	1.7	-2.1
1990-1995	33,370,621,437	35.4	61.4	-3.5	8.4	-1.5	-0.2
1995-2001	8,479,712,660	158.1	-33.5	2.6	-25.1	2.3	-4.4
2001-2006	65,660,993,411	85.9	10.6	-0.3	2.1	0.4	1.2
Philippine							
1980-1985	-1,158,833,071	-4.6	185.7	24.2	31.9	-13.8	-123.4
1985-1990	3,557,071,857	127.0	-26.0	-3.7	9.6	3.4	-10.2
1990-1995	9,261,155,978	45.3	27.6	8.5	12.2	3.2	3.2
1995-2001	14,703,023,842	28.2	67.7	-4.9	4.1	13.4	-8.6
2001-2006	15,259,914,748	183.1	-81.0	-7.3	-4.2	3.4	5.9

Source: 3-digit SITC Revision 2, UN-COMTRADE. *Author's calculation*