Regionalism in East Asia: The Role of North East Asian Nations

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Abstract

Regionalism has now become a very popular phrase since this action has taken place into every inch of the World, East Asian region is no exception. For the past few years, regionalism has been progressing in East Asia in the form of Free Trade Agreements (FTAs) and Economic Partnership Agreements (EPAs). The likes of Japan, Korea and China, as the economic front runners, are regarded to be the key actors in stimulating regional economic growth through some opulent trade arrangements. In this sense, the triangular trade agreement between Japan, Korea and China will become a significant ingredient that can cope with the necessary condition in creating East Asian welfare. Unfortunately, in the absence of such agreement, the present trade scheme between Japan, Korea and China is not sufficient to meet the target. The inefficient intra regional trade scheme is uncovered through Engle-Granger Cointegration and Error Correction Mechanism which operate as long run and short run measurement respectively. In order to accelerate the phase of growth, the more institutionalized approach is needed. This triangular trade arrangement then become a major boost that come up with the spillover effect for the ASEAN4 which represents the South East Asian nations as whole. In measuring the spillover effect, a static fixed effect model is estimated using the Two Stage Least Squares (2SLS)

Key words: *Triangular Trade, Engle-Granger Cointegration, Error Correction Mechanism, Fixed Effect, Two Stage Least Squares*

A. Introduction

In this new millennium, regionalism has begun to emerge in East Asia. East Asian Countries have been focusing on ways to expand intra regional trade that include: the establishment of Regional Trade Agreements (RTAs) in the form of Free Trade Agreements (FTAs) and Economic Partnership Agreements (EPAs). The trend towards regionalism has created a profound regional and indeed global significance (Harvey and Lee, 2002). Japan, Korea and China are regarded as the key actors for such action in East Asia.

Being acknowledged as the economic front runners, Japan, China and Korea are assumed to have heavy responsibility for the economic welfare in the East Asian region. It is very obvious that East Asian regionalism cannot be put into practice without these countries' strong support. Unfortunately, the lack of institutional arrangements among these giant countries has stalled the overall welfare effect for the East Asian communities. The present driving force of the China-Japan-Korea (CJK) relationship is the market by which in some sense is not enough therefore the more institutionalized approach is needed to join these activities so that it can sustain the economic growth in the long run. The main focus of the institutionalization in trade is to make these countries grow together with which can make positive externalities throughout the East Asian region. In the long run it is expected that CJK will lead to regionalism in East Asia.

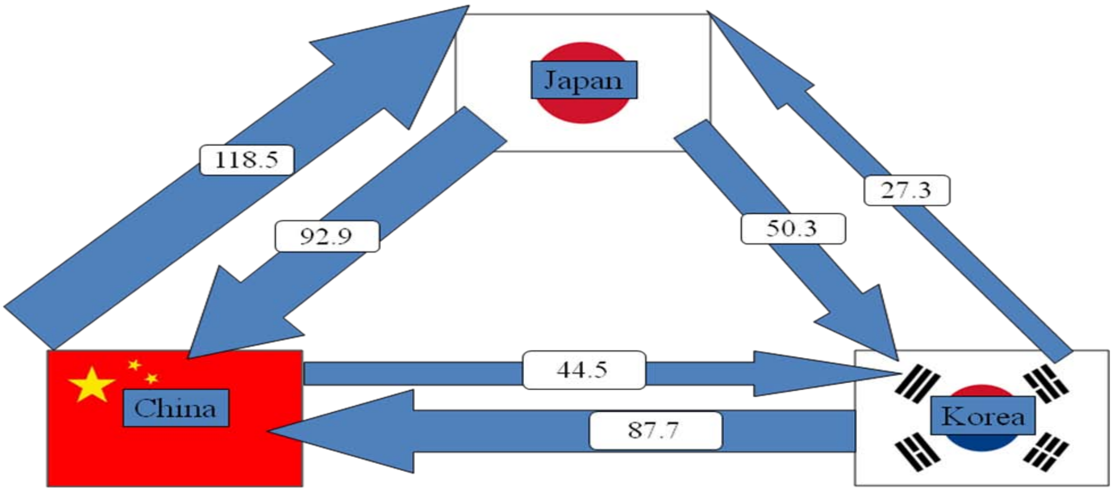
The structure of this paper proceeds as follows. The first section studies the economic structures and trade patterns in the CJK. The next section examines the effect of openness in the CJK to economic growth in these particular countries. The third section analyzes the prospects of the CJK increased welfare in creating spillover effect to ASEAN4, which in this paper serves as a proxy for ASEAN countries.

B. Japan, China and Korea Economic Relation

Tracing back the relations since the post war era, economic ties between Japan, Korea and China has evolved in somewhat gradual ways. The evolution of trade activities emerged from the likes of China, which has a substantial transformation of trade structures. In the early 90's, primary commodities accounted for more than one third of China's total export to Japan and Korea. In this new millennium, it is still top Chinese export to Japan and Korea, but it is persistently followed by the fast growth of machinery and transport (Chan and Chin Kuo, 2005). From this point of view, trade within the north East Asian region is deemed to have substantial movement as a result from the shift of trade towards a more industrialized structure. The emergence of China as a regional manufacturing center is a dominant factor that contributes the trade shift.

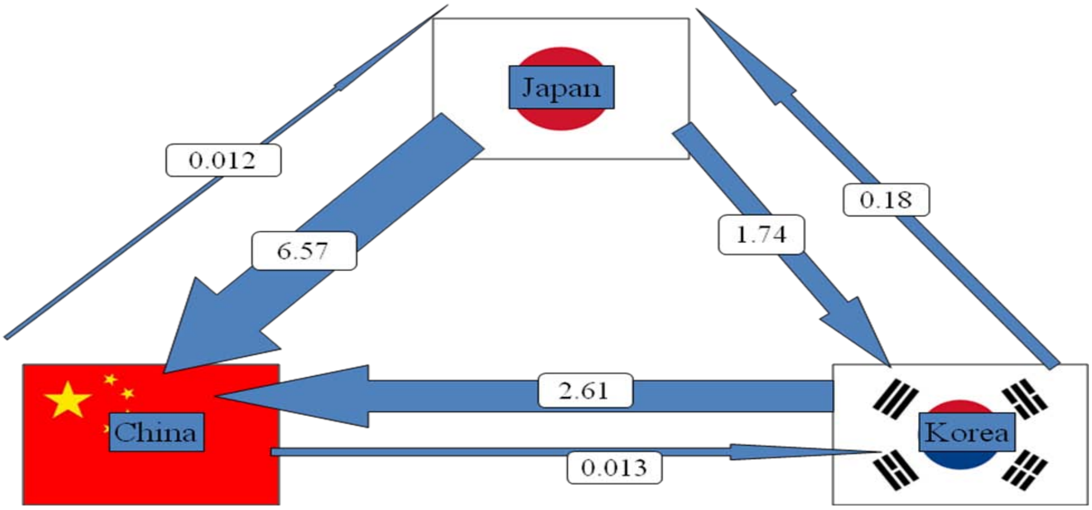
The overall picture of the trade amongst these countries is described in figure 1. It is clear that trade activity is very intense by which performs as the major contributing factor for economic growth in the region. The vast amount of trade has been very likely steered up by the amount of FDI flows among them with Japan as the sole leader of it (figure 2). In other words, the creation of economic transformation in China and Korea that geared up the trade was enchanted by Japan's role in making investment in those countries.

Figure 1. Trade among Japan, China and Korea(2006, $billion)



Source: Watanabe (2008)

Figure 2. Investment among Japan, China and Korea(2005, $billion)



Source: Watanabe (2008)

B.1. Measuring the short and the long run equilibrium of export to GDP

To some extent, trade is almost synonymous to a country's welfare. More specifically, some research pointed out export as an engine of economic growth. From this stand point, it is important to measure export sustainability to the economy, which in this section export among the CJK become the main focus.

As already explained earlier, Japan, China and Korea are experiencing golden period in doing export among them. Economic welfare is the most notable goal which links in this activity, but is it sufficient to boost the economy in the long run? A pure market driven activity without specific regional trade agreement might sometime create bias. It is clear that Japan, Korea and China are lacking of such agreement among them (Urata and Kiyota, 2003) as described in the table 1.

Table 1. Japan, China and Korea FTAs/EPAs

Countries	**Situation**	**Countries**
	Concluded	*Chile, ASEAN, Hong Kong, Macao*
China	*Under Negotiations*	*NZ, Australia, Pakistan, Singapore, GCC, SACU*
	Under Considerations	*Iceland, India, Japan-Korea-China, FTAAP, Switzerland*
	Concluded	*Chile, Singapore, EFTA, ASEAN, USA*
Korea	*Under Negotiations*	*India, Mexico, Canada, EU*
	Under Considerations	*FTAAP, China, Mercosur, NZ, South Africa, Japan-China-Korea, Australia, GCC*
	Concluded	*Singapore, Mexico, Malaysia, Philippines, Chile, Thailand, Brunei, Indonesia*
Japan	*Under Negotiations*	*India, Vietnam, Australia, Switzerland, Korea, GCC, ASEAN*
	Under Considerations	*FTAAP, Japan-China-Korea, South Africa*

Source: Japanese Ministry of Economy, Trade and Industry, 2007

To make an effective regionalism, Japan, China and Korea should support each other. Therefore, intra regional cooperation within the CJK must take place by which can create sustainable growth in East Asian region. The following sections serve to prove export sustainability to economic growth, in the absence of trade arrangements, for the short and the long run. Engle-Granger Cointegration and Error Correction Mechanism[1] test are then employed for this cause.

B.1.1. Defining the Long Run Equilibrium: Engle Granger Cointegration Test

In doing Engle Granger Cointegration test, this paper divides the export relationship in to three parts which are described in the following equations:

i. China and Japan Export Relationship

$$JPGDP = \beta_0 + \beta_1 ExportCH + u_t \quad (1)$$

$$CHGDP = \beta_0 + \beta_1 ExportJP + u_t \quad (2)$$

ii. Korea and Japan Export Relationship

$$KRGDP = \beta_0 + \beta_1 ExportJP + u_t \quad (3)$$

$$JPGDP = \beta_0 + \beta_1 ExportKR + u_t \quad (4)$$

iii. *China and Korea Export Relationship*

$$CHGDP = \beta_0 + \beta_1 ExportKR + u_t \quad (5)$$

$$KRGDP = \beta_0 + \beta_1 ExportCH + u_t \quad (6)$$

In these equations, JPGDP, CHGDP and KRGDP are Japan's GDP, China's GDP, and Korea's GDP respectively while Export JP, Export CH and Export KR are the variables of export destinations to Japan, China and Korea. It would be possible to cointegrate Export and GDP since the trend in export and GDP would offset to each other, creating a stationary residual. The residual is called a cointegration parameter. In the data, if we find that the initial regression of the residual (*ut*) gives stationarity it means that *ut* is stationary at order 0 (level) and it is notated as I(0). But if *ut* is stationer in first difference, the variables of Export and GDP will be cointegrated in the first

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[1] This test employs time series quarterly data of GDP and for Japan, China and Korea ranging from 1985 to 2004. The data is taken from CEIC database

difference which can be notated with I(1).

Table 2. Cointegration Parameters

Dependent Variables / Independent Variables	GDP (Japan)	GDP (China)	GDP (Korea)
Export to Japan	na	Stationer	Stationer
Export to China	Stationer	na	Stationer
Export to Korea	Stationer	Stationer	na

From table 2 we can see that, GDP and export relationship in the CJK yields stability in the long run. It is proven by the stationarity of the error term in each of the cases. The cointegration test that proves long run equilibrium describes that the model is not spurious. Export is proven to be the engine of economic advancement in these countries. It approves some previous research as the likes of Heller and Porter (1978), Feder (1983), Ram (1985), Dorasami (1996), Ghatak, Subrata, Milner, Utkulu (1997) and Ekanayake (1999) of export and economic growth relationship.

B.1.2 Defining the Short Run Equilibrium: Error Correction Model

We long run equilibrium is called Error Correction Mechanism (ECM). The model of ECM is as have seen the long run relationship between Export and GDP. However, in order to make it objective, we should also see the short run since it is still plausible to perceive disequilibrium. Thus, $U_t = GDPCountryX - \beta_0 - \beta_1 ExportCountryY$ could be noted as equilibrium error. This error then could be used to relate the behavior of the short run Japanese GDP to its long run. The technique to correct short-run disequilibrium to the follows:

$$\Delta GDPCountryX = \beta_0 + \beta_1 \Delta ExportCountryY + \beta_2 u_{t-1} + e_t \qquad (7)$$

u_{t-1} is a cointegrated error lag 1, or could be noted mathematically as:

$$U_{t-1} = GDPCountryX_{t-1} - \beta_0 - \beta_1 ExportCountryY_{t-1} \qquad (8)$$

In this equation, $\Delta GDPCountryX$ is the difference in GDP for Japan, Korea and China, while $\Delta ExportCountryY$ is the difference in export from country X to Country

Y. As for example, $\Delta GDPJapan = \beta_0 + \beta_1 \Delta ExportChina + \beta_2 u_{t-1} + e_t$ applies for the effect of Japan's export to China on Japan's GDP. From the above model we can see that the long run relation between Export and GDP in Japan, China and Korea would be balanced by the previous error. Below is the output for each country's regressions:

Table 3. Equilibrium Errors

Dependent Variables / Independent Variables	*GDP (Japan)*	*GDP (China)*	*GDP (Korea)*
Equilibrium error for Export to Japan	*na*	*-1.0 9 ****	*-0.23 **
Equilibrium error for Export to China	*-0.18 ****	*na*	*-0.48 ****
Equilibrium error for Export to Korea	*0.017773*	*-1.33 ****	*na*

Note: Statistical significance is indicated by *(10%), **(5%), and ***(1%)

i. Japan

In the short run, there is an equilibrium error for Japan's Export to China with its relation to Japan's GDP. The coefficient of residual gives negative sign (-0.18), which means that Japan's Export to China is below the long run equilibrium. This will only lead to a rise of export for the following periods. But it is important to note that the absolute value of the coefficient (adjustment rate) is very small (0.18). This suggests that Japan's Export to China is moving in a slow phase to reach the long run equilibrium.

As for the relationship between Japan and Korea, the equilibrium error of the export trend is not significant. These suggest that Japan's GDP is adjusting to the change in Japan's export to Korea in the same period of time. In other words, Japan and Korea relationship in terms of export has already reached steady state level.

ii. China

The residuals for the relationship between China's GDP with China's Export to Japan and Korea are significant. These suggest that there is an equilibrium error in the short run. The negative signs put the Export for a constant rise to reach the long run equilibrium. In China's case, the adjustment rate or the phase of acceleration for the long run equilibrium is very fast. It can be seen through the absolute value of the equilibrium error coefficients which are 1.09 and 1.33 for China's relationship to Korea and Japan respectively.

iii. Korea

Korea's case is somewhat similar to China. The residuals for the relationship between Korea's GDP with Korea's Export to Japan and China are significant. It yields similar explanation with China's case. However, the adjustment rate for the case of Korea is slower than China's but it is still faster than Japan's. It gives the absolute value of 0.23 and 0.48 for Korea's trade relationship to Japan and China respectively.

B.1.3. Interim conclusion

From the ECM, we can conclude that North East Asian region is not moving at the same phase to reach the long run equilibrium, which in this case Japan is the slowest one. The insignificant value of acceleration rate for the case of Japan trade relationship with Korea is also important point to note since it can be interpreted as an exhausted Korean market for Japanese products (steady state condition). These facts are very crucial since it diminishes Japan's role as the sole leader in the north East Asia. Although whoever the leader is not to important, but the stalled effect of a country's economic growth in these region will only serve as stumbling blocks in creating East Asian welfare. In order to strengthen regional welfare and accelerate the phase of adjusting, economic integration must take place.

C. The Openness in Trade

Greater economic interdependence between Japan, China and Korea will act well as the base of creating regionalism. In this sense, triangular trade agreements that dismantle trade barriers will smooth the progress of improved trade flows among these countries by means of greater market access. But unfortunately, this supporting environment only operates as fact in a sheet. The process of regionalism in this area is proven to be difficult.

These countries may have aggressively reached other countries in making FTA's and EPA's but none of which have been progressing among them (see table 1). The reason of it will be a subject for another research, while this section tries to focus on the effect of such agreement[2] to the economy. The lack of trade arrangements that

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[2] Regional trade agreement provides openness to some sectors of economy

liberalize the sector of economy is being noted as the main factor that contributes intra regional trade ineffectiveness in north East Asia. This hypothesis will be proved in the following sections to come.

C.1 Openness with customized RPL index

Export lead growth approach that has been done in the previous section with cointegration and error correction model has actually provided the basis to measure openness[3] of a country, but in some ways this alone is not enough. It only works for confirming the paradigm of trade as an engine of growth but it is not sufficient to measure a more robust pattern of openness. Therefore, we then may have to address Dollar's Relative Price Level (RPL index).

This index is a measure of outward orientation of an economy that is based on international comparisons of price levels compiled for 121 countries by Summers and Heston (1988). They price the same basket of consumption goods in domestic currency in different countries and then convert the measure into US dollars using the official exchange rate. Using the US as the benchmark country, the index of country i's relative price level (RPL) is:

$$RPL_i = 100 \text{ X } P_i/P_{us} \text{ X } 1/e \qquad (10)$$

Where e is the exchange rate (no. of units of domestic currency per unit dollar) and P_i is the consumption price index for country i and P_{us} is the consumption price index for US. Hence, one could use cross-country variations in these price levels to measure inward- or outward-orientation resulting from trade policy. With using the same analogy, this paper then customizes the RPL index into this formula:

$$RPL_i = 100 \text{ X } P_i/P_{tp} \text{ X } 1/e \qquad (11)$$

Where P_{tp} is the consumption price index for the trading partner and e is the exchange rate (no. of units of domestic currency per unit of trading partner currency). The customized RPL is then become a powerful tool to analyze trade openness between the trading countries.

C.2 Error Correction Mechanism (ECM) of RPL index and GDP

As already explained in the previous section, ECM provides the description of short

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[3] Several cross-country studies investigating outward orientation and growth have used export growth as a proxy for outward orientation. The main examples of this approach are Michaely (1977), Heller and Porter (1978), Feder (1983), Ram (1985) and more recently Levin and Raut (1997).

run shock. In this particular case[4], we examine the openness vis a vis trade liberalization trend in north East Asia region.

$$\Delta GDPCountryX = \beta_0 + \beta_1 \Delta RPLCountryY + \beta_2 u_{t-1} + e_t \qquad (12)$$

This equation mimics equation 7, but the previous dependent variable is substituted from export to RPL in order to suit the goal which is to measure the openness. $\Delta GDPCountryX$ is the difference in GDP from Japan, Korea or China, and $\Delta RPLCountryY$ is the difference in RPL from a country X to Country Y. $\Delta RPLCountryY$ measures the openness of trade from of country X towards Y. Below is the outputs for each country:

Table 4. Cointegration Parameters

Dependent Variables / Independent Variables	*GDP (Japan)*	*GDP (China)*	*GDP (Korea)*
Equilibrium error for Openness to Japan	*na*	*-1.23 ****	*-1.31 ****
Equilibrium error for Openness to China	*-1.15 ****	*na*	*-0.97 ****
Equilibrium error for Openness to Korea	*-0.72 ***	*-1.24 ****	*na*

Note: Statistical significance is indicated by *(10%), **(5%), and ***(1%)

From this particular test we can see that generally trade openness is affecting a country's GDP in a positive way. But in the short run, trade openness in the CJK is still below the equilibrium. This suggests that trade openness is still finding its form in this area. Although we might not see regionalism which liberalize trade in the short run, but the trend towards openness in trade vis a vis regionalism is progressing in a respectful manner. We can see this through the adjustment rate for the long run equilibrium (the coefficients of residuals) that yields an average of 1.1, consequently we might see regionalism in North East Asia happen in the future.

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[4] This test employs time series quarterly data of Exchange rate, CPI, Export for CJK ranging from 2001 to 2005, the data is taken from CEIC data base

D. The Spillover Effect from Japan-Korea-China Triangular Trade to ASEAN 4

As giants of Asia, the growth of Japan, Korea and China will most likely create positive effect to the neighboring countries. Regionally speaking, the growth of North East Asia will boost the East Asian growth as whole, in this sense we might want to exercise its effect to ASEAN countries. To simplify things, this paper limits the effect to ASEAN4 since these countries have the same economic characteristics. This paper employs static panel data[5] model for this purpose. The following sections provide the analysis.

D.1 Examining the spillover effect through panel data model

A static panel data model can be specified as follows:

$$Y_{it} = \mathbf{X}_{it}\beta + \lambda_t + \eta_i + \varepsilon_{it} \quad t=1,...,T \quad i=1,...,N \tag{13}$$

Where:

λ_t and η_i are time and individual specific effects respectively, $x\ it$ is a vector of the explanatory variables, (i) is the time component of the panel, (N) is the cross-section dimension (or the number of cross-section observations), and N x T is the total number of observations. The idea is to run the models in order to have a consistent estimator for the β coefficients, and the model (fixed or random) choice depends on the hypothesis assumed for the relationship between the error-term (εit) and the regressors ($x\ it$). The static panel data analysis developed in the empirical section of the paper was based on two basic panel models, the fixed (FE) and the random (RE) effect models. The FE estimator uses a transformation in order to remove the unobserved effects (αi) and any time-constant explanatory variable. A general representation of a FE model is:

$$y_{it} = \beta_i x_{it} + \alpha_i + \varepsilon_{it} \tag{14}$$

Where i= 1,...N and t= 1,...T , where (x) represents the explanatory variables, (y) is the dependent variable and (εit) the error term.

If we consider the average over time we have the following:

$$\overline{y}_{it} = \beta_i \overline{x}_{it} + \alpha_i + \overline{\varepsilon}_{it} \tag{15}$$

Subtracting (14) from (15) for each (t) we have:

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[5] The panel data is analyzed annually from 1989 to 2007 which consist of ASEAN 4's Export, Import, Consumption, Investment, Government expenditure, GDP, and GDP of Japan, China, Korea. The data is taken from WDI online database

$$y_{it} - \overline{y}_{it} = \beta_i (x_{it} - \overline{x}_{it}) + \varepsilon_{it} + \overline{\varepsilon}_{it} \quad (16)$$

or $$\hat{y}_{it} = \beta_i \hat{x}_{it} + \hat{\varepsilon}_{it} \quad (16a)$$

The FE transformation is called the within transformation and the FE estimator or the within estimator, which is the ordinary least square (OLS) estimation of equation (16a), the pooled OLS. Under the assumption of strict exogeneity for the explanatory variables $(E(\varepsilon_{it} / x_{it}, \alpha_i) = 0)$ the FE estimator is unbiased. If any explanatory variable is constant over time for all (i), it is swept away by the FE transformation $(\hat{x}_{it} = 0)$ the OLS estimation by FE also requires that the errors are homoskedastic and serially uncorrelated over time.

The RE estimator is more adequate if we think that the unobserved effect is not correlated with all the explanatory variables and the estimation is carried on by a generalized least square (GLS) estimation. The equation representing the RE model is:

$$y_{it} = \beta_0 + \beta_i x_{it} + \alpha_i + \varepsilon_{it} \quad (17)$$

If one thinks of the unobserved effect (α_i) as uncorrelated with each explanatory variable ($x\ it$) using a transformation (FE estimator) to eliminate (α_i) will result in inefficient estimators. Estimation of equation (17) for (α_i) uncorrelated with the explanatory variables is what we call the RE model. If one defines the composite error terms as ($\upsilon_{it} = \alpha + \varepsilon$), equation (17) can be written as:

$$y\ it = \beta 0 + \beta i\ x\ it + u_{it} \quad (18)$$

In this case we have to remember that (u_{it}) are serially correlated over time and the pooled OLS estimator is not the choice since it ignores the positive serial correlation and the idea is to use the GLS to take into account to resolve the serial correlation problem. The GLS estimation will be a pooled OLS estimation of the transformed model, which can be represented as follows:

$$y_{it} - \lambda \overline{y}_i = \beta_0 (1 - \lambda) + \beta_i (x_{it} - \lambda \overline{x}_{it}) + (u_{it} - \lambda \overline{u}_i) \quad (19)$$

Where $\lambda = 1 - \left[\sigma_\varepsilon^2 (\sigma_\varepsilon^2 + T\sigma_\alpha^2) \right]$ for $(\hat{x}_{it} = 0)$ $0 < \lambda < 1$

One of the advantages of using such transformation and the RE model is that it allows for explanatory variables that are constant over time. By examining equation (18) one can relate the RE estimator (pooled OLS known as POLS) and FE where the

POLS is obtained for the case where λ = 0 (the unobserved effect, αi is not important) while the FE is the estimator for λ = 1. The choice between the FE and the RE estimators is based on whether the unobserved effects (α*i*) can be considered as parameters to be estimated or as an outcome of a random variable, suggesting the use of a FE or a RE model respectively. Since the time periods (1989-2007) exceed the individual observations (Indonesia, Malaysia, Thailand, Philippines) therefore fixed effect model is considered as the most appropriate method (Nachrowi and Usman, 2008). The model is described as follows:

$$Y_{it} = \alpha + \beta X_{it} + \gamma_1 W_{1t} + \gamma_2 W_{2t} + \gamma_3 W_{3t} + ... + \gamma_N W_{Nt} + \delta_1 Z_{i1} + \delta_2 Z_{i2} + \delta_3 Z_{i3} + ... + \delta_t Z_{iT} + e_{it} \quad (20)$$

Where:

Y_{it} = GDP growth of ASEAN 4 for time t and country i

X_{it} = Independent Variables (ASEAN 4 consumption growth, investment growth, government expenditure growth, export-import growth and Japan-China-Korea[6] GDP growth for time t)

W_{it} and Z_{it} are dummy variables which are defined as follows:

W_{it} = 1 for country i, where i = Indonesia, Malaysia, Philippines, Thailand

= 0 for others

Z_{it} = 1 for Period t where t = 1989, 1990..., 2007

= 0 for others

The above structural equation is actually a simultaneous equation[7] in which employs causality relationship. To see the simultaneity, the above model can be decomposed into six parts:

$$Y_t = \beta_1 + \beta_2 C_t + \beta_3 I_t + \beta_4 G_t + \beta_5 X_t + \beta_6 M_t + \beta_7 JGDP_t + \beta_8 CGDP_t + \beta_9 KGDP_t \quad (21)$$

[6] Japan, Korea and China GDP are included in the structural equation referring to Tran Van Hoa's (2003) assessment in the model

[7] The model is simultaneous because we cannot determine C, I, G,X, M or Y without knowing the other

$$C_t = \beta_1 + \beta_2 C_{t-1} + \beta_3 Y_t \quad (22)$$

$$I_t = \beta_1 + \beta_2 r_t + \beta_3 Y_t \quad (23)$$

$$G_t = \beta_1 + \beta_2 Y_{t-1} + \beta_3 Y_t \quad (24)$$

$$X_t = \beta_1 + \beta_2 EX_t + \beta_3 C_t + \beta_4 JGDP_t + \beta_5 CGDP_t + \beta_6 KGDP_t \quad (25)$$

$$M_t = \beta_1 + \beta_2 EX_t + \beta_3 C_t + \beta_4 JGDP_t + \beta_5 CGDP_t + \beta_6 KGDP_t \quad (26)$$

Equation 21 describes the effects of ASEAN 4 consumption (C_t), investment (I_t), government expenditure (G_t), export (X_t), import (M_t) growth and the North East Asian GDP growth ($JGDP_t$, $CGDP_t$, $KGDP_t$) on ASEAN 4 GDP growth (Y_t). From the model, it is clear that consumption growth, investment growth, government expenditure growth, export growth and import growth have their own determinants that simultaneously form the structural equation. Consumption growth (C_t) is formed by last year's consumption growth (C_{t-1}) and the present GDP growth (Y_t), Investment (I_t) on the other hand is influenced by the interest rate (r_t) and the GDP growth (C_t). It is also expected that exchange rate (EX_t), consumption growth (C_t) and trading partners economic growth ($JGDP_t$, $CGDP_t$, $KGDP_t$) have some influences on trade flows (X_t and M_t) in ASEAN 4.

From the structural equation, we can divide the variables into two, endogenous and predetermined (exogenous). The first one is treated as stochastic while the latter as non stochastic. To see which simultaneous model that can satisfies the need, we have to address the identification process. If K is the number of exogenous variables within the model, k is the number of exogenous variables within the equation and M is the number of endogenous variable within the model, so the criteria to state whether an equation is unidentified, just identified, or over identified are describe as follows:

If K-k < M-1, so the equation is unidentified
If K-k = M-1, so the equation is exactly identified
If K-k > M-1, so the equation is over identified

Based form the above criteria, table 5 summarizes the order condition from the system:

Table 5. Order condition

No	Equation	Criteria	Conclusion
1	Y_t	11 > 5	Over Identified
2	C_t	13 > 1	Over Identified
3	I_t	13 > 1	Over Identified
4	G_t	13 > 1	Over Identified
5	X_t	10 > 1	Over Identified
6	M_t	10 > 1	Over Identified

For the case of over identified, we might want to employ two stage least squares (2SLS)[8] approach as an elegant way to deal with such problem. 2SLS regression analysis, as suggested by Angrist and Imbens (1995), assumes that there is a secondary predictor that is correlated to the problematic predictor but not with the error term. Given the existence of the instrument variable, 2SLS regression analysis uses the following two methods: In the first stage of the two-stage least squares 2SLS regression analysis, a new variable is created using the instrument. In the second stage of the 2SLS regression analysis, the model-estimated values from stage one are then used in place of the actual values of the problematic predictors to compute an OLS model for the response of interest. Below is the detailed procedure of 2SLS:

In stage one, least square regression on the reduced form equation has to take place by which it can yields C_{t-1}, Y_{t-1}, r_t, EX_t, $JGDP_t$, $CGDP_t$, $KGDP_t$ as the instrumental variables, therefore equation 21 up to 26 has to be transformed into reduced form equation as the followings:

$$Y_t = \Pi_1 + \Pi_2 C_{t-1} + \Pi_3 Y_{t-1} + \Pi_4 r_t + \Pi_5 EX_t + \Pi_6 JGDP_t + \Pi_7 CGDP_t + \Pi_8 KGDP_t \quad (27)$$

$$C_t = \Pi_9 + \Pi_{10} C_{t-1} + \Pi_{11} Y_{t-1} + \Pi_{12} r_t + \Pi_{13} EX_t + \Pi_{14} JGDP_t + \Pi_{15} CGDP_t + \Pi_{16} KGDP_t \quad (28)$$

$$I_t = \Pi_{17} + \Pi_{18} C_{t-1} + \Pi_{19} Y_{t-1} + \Pi_{20} r_t + \Pi_{21} EX_t + \Pi_{22} JGDP_t + \Pi_{23} CGDP_t + \Pi_{24} KGDP_t \quad (29)$$

[8] Two-stage least squares regression (2SLS) is a method of extending regression to cover models which violate ordinary least squares (OLS) regression's assumption of recursivity, specifically models where the researcher must assume that the disturbance term of the dependent variable is correlated with the cause(s) of the independent variable(s)

$$G_t = \Pi_{25} + \Pi_{26} C_{t-1} + \Pi_{27} Y_{t-1} + \Pi_{28} r_t + \Pi_{29} EX_t + \Pi_{30} JGDP_t + \Pi_{31} CGDP_t + \Pi_{32} KGDP_t \quad (30)$$

$$X_t = \Pi_{33} + \Pi_{34} C_{t-1} + \Pi_{35} Y_{t-1} + \Pi_{36} r_t + \Pi_{37} EX_t + \Pi_{38} JGDP_t + \Pi_{39} CGDP_t + \Pi_{40} KGDP_t \quad (31)$$

$$M_t = \Pi_{41} + \Pi_{42} C_{t-1} + \Pi_{43} Y_{t-1} + \Pi_{44} r_t + \Pi_{45} EX_t + \Pi_{46} JGDP_t + \Pi_{47} CGDP_t + \Pi_{48} KGDP_t \quad (32)$$

Note: Π is $\frac{\beta}{1-\beta}$

From stage one, we get $\hat{Y}_t, \hat{C}_t, \hat{I}_t, \hat{G}_t, \hat{X}_t, \hat{M}_t$ as the fitted values with which we can run for the second stage. In stage two, these fitted values are then plugged in to the main equation. The last step is to run least squares on each of the above equations to get 2SLS estimation as described below in table 6.

Table 6. Two Stage Least Squares Regression Output

Dependent Variables / Independent Variables	Y	C	I	G	X	M
C	0.386 **	na	na	na	-0.530 *	0.926 ***
I	0.069 *	na	na	na	na	na
G	0.173 **	na	na	na	na	na
X	0.065	na	na	na	na	na
M	0.03	na	na	na	na	na
Y	na	0.794 ***	-0.08	0.692 ***	na	na
Instrumental variables						
Y (Japan)	0.559 **	na	na	na	2.654***	3.084 **
Y (China)	0.352 **	na	na	na	1.174 ***	0.642
Y (Korea)	0.218 *	na	na	na	-4.765	0.394
C (-1)	na	0.01	na	na	na	na
r	na	na	0.138	na	na	na
Y (-1)	na	na	na	-0.268 **	na	na
EX	na	na	na	na	0	0

Note: Statistical significance is indicated by *(10%), **(5%), and ***(1%)

From the output above we can conclude that the North East Asian (Japan, Korea and China) economic growth boost the ASEAN4 economic growth, it confirms the proposition of this paper. Investment flows, in the form of FDI, has also operated as a dominant integrating power in East Asia as whole. Although we cannot find legitimate determinant for FDI[9] in the output, but it is clear that FDI is trade related in nature (Wong, 2004). With its essentially open and outward-looking economies, the region is highly dependent on foreign investment for its economic growth. But still, the boosting power is not as much as in the spillover effect from the giant countries of Japan, Korea and China. Japan, in terms of GDP growth, has the biggest influence towards ASEAN4 followed by China and Korea at the second and third place. This fact is described by the coefficient parameter that gives the value of 0.559, 0.352 and 0.218 for Japan, China and Korea respectively.

The ranking of influence is presumably caused by the number FDI inflows to ASEAN from these countries as described below in table 7. The only bias is on China and Korea, even though the cumulative FDI from Korea to ASEAN4 was bigger than China's, but it does not seem to be reflected on the ranking of influence. As for this, it is assumed that the high economic growth rate of China had been the major contributing factor (Urata, 2008) that overtook the influence of Korea's cumulative FDI flow to ASEAN4. However, such factor is not enough to surpass[10] Japan's influence to ASEAN4's economic growth since Japan's FDI contribution to ASEAN4 outweighed China's by more than one hundred folds.

Table 7. FDI flows to ASEAN 4 (US$ million)

Host country	*Indonesia*	*Thailand*	*Malaysia*	*Phillipines*	*Total Cummulative 1995-2003*
Source Country					
Japan	*288.06*	*8,096.02*	*4,761.11*	*3,055.68*	*16200.87*
Korea	*331.88*	*235.58*	*98.51*	*238.13*	*904.1*
China	*-36.78*	*50.16*	*120.72*	*4.07*	*138.17*

Source: ASEAN secretariat

[9] it is described by the insignificant value of interest rate and GDP growth towards investment (table 6)

[10] From the ECM simulation as confirmed earlier, I found that China has taken over Japan's role in East Asia. But this is true if we address the long run effect. This section only measures the present condition in the absence of the intertemporal problem.

The story goes hand in hand with the flying-geese hypothesis that was developed by Japanese economist, Kaname Akamatsu (1935). This model has beeen frequently proposed to examine the patterns and characteristics of East Asian economic integration. The premise of the flying-geese pattern suggests that a group of nations in this region are flying together in layers with Japan at the front layer (Xing, 2007). The layers signify the different stages of economic development achieved in various countries. In the flying-geese model of regional economic development, Japan as the leading goose leads the second-tier geese (China, Korea) which, in their turn, are followed by the third-tier geese (ASEAN4).

Another important thing to note is the insignificant value of trade flows within ASEAN4 in terms of creating GDP growth. These are intriguing facts since these variables, especially export are considered as the main determinant of GDP growth. In terms of export, it is suspected that the effect of rivalry between ASEAN4 members and China is the main factor which creates insignificant value. This point is supported by Roland-Host and Weiss (2004) that pointed out China's emergence for creating short and medium term direct and indirect competition between ASEAN and China. They argued that ASEAN and China are experiencing intensified export competition in prominent third markets. This can lead to painful domestic structural adjustments within the ASEAN in the short run.

E. Conclusion

We have made an interim conclusion that export leads the overall growth in North East Asia. However, it is important to note that Japan's phase of adjustment towards long run equilibrium is quite slow compared to the likes of Korea and China. This only yields as a stumbling block in forming regionalism in East Asia. The hard task is about making these countries move together in the same phase, which is why regionalism has to take place.

Since regionalism is an abstract term, the use of RPL index is essential. RPL index is a proxy of outward orientation of a country or in other words it is a representation of regionalism. Regionalism in this case goes hand in hand with openness in which it creates trade arrangements that liberalize some sectors in the economy. The ECM simulation gives a clear picture of the current form of openness which is below the equilibrium. It suggests that the trend towards regionalism is still far behind. It somewhat confirms the ineffectiveness of current triangular trade in North East Asia. It is expected that regionalism can eliminates such bias in trade.

Moreover, since North East Asian countries has a big scale of economy, its economic development will substantially affect the neighboring countries in East Asia specifically ASEAN4. It is demonstrated by the large share of China-Japan-Korea growth that affects ASEAN4's GDP.

In the short run, there is a rivalry competition between China and ASEAN. However, in the long run regionalism is expected to accommodate export growth for East Asia as whole. The growing significance[11] of China, Japan and Korea market for ASEAN4 will serve as the basis for regionalism. Thus, a unified East Asia could accelerate the momentum of overall trade liberalization, boost global economic growth, and contribute to international peace.

[11] It is shown from table 6 at export and import column equation in which ASEAN 4 trade tends to rely on the market size in North East Asia (Japan, Korea and China)

APPENDIX

Output 1- Engle Granger Cointegration test

i. China and Japan Export Relationship

Stationarity of ut (error term) in level (China's GDP and China's Export to Japan) :

ADF Test Statistic	-8.506548	1% Critical Value*	-3.5745
		5% Critical Value	-2.9241
		10% Critical Value -	2.5997

*MacKinnon critical values for rejection of hypothesis of a unit root.

Stationarity of ut (error term) in level (Japanese GDP and Japanese Export to China) :

ADF Test Statistic	-3.63403	1% Critical Value*	-3.5164
		5% Critical Value	-2.8991
		10% Critical Value	-2.5865

*MacKinnon critical values for rejection of hypothesis of a unit root

ii. Korea and Japan Export Relationship

Stationarity of ut (error term) in first difference(Korea's GDP and Korea's Export to Japan)

ADF Test Statistic	-4.495617	1% Critical Value*	-3.5778
		5% Critical Value	-2.9256
		10% Critical Value	-2.6005

*MacKinnon critical values for rejection of hypothesis of a unit root.

Stationarity of ut(error term) in first difference (Japan's GDP and Japan's Export to Korea)

ADF Test Statistic	-12.3212	1% Critical Value*	-3.5176
		5% Critical Value	-2.8996
		10% Critical Value	-2.5868

*MacKinnon critical values for rejection of hypothesis of a unit root.

iii. China and Korea Export Relationship

Stationarity of ut (error term) in level (China's GDP and China's Export to Korea) :

ADF Test Statistic	-8.527721	1% Critical Value*	-3.5745

	5%	Critical Value	-2.9241
	10%	Critical Value	-2.5997

*MacKinnon critical values for rejection of hypothesis of a unit root.

Stationarity of ut (error term) in first difference (Korea's GDP and Korea's Export to China)

ADF Test Statistic	-5.511553	1%	Critical Value*	-3.5778
		5%	Critical Value	-2.9256
		10%	Critical Value	-2.6005

*MacKinnon critical values for rejection of hypothesis of a unit root.

Output 2- Error Correction Mechanism- Export

i. Japan

Dependent Variable: D(JGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXPORT_CHINA)	79.34343	14.21718	5.580811	0.0000
RESIDCHINA(-1)	-0.188456	0.051381	-3.667828	0.0005
C	319.2721	601.0857	0.531159	0.5969

Dependent Variable: D(JGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXPORT_SKOREA)	24.36957	35.63698	0.683828	0.4962
D(RESIDSKOREA(-1))	0.017773	0.115652	0.153676	0.8783
C	687.5205	744.3848	0.923609	0.3587

ii. China

Dependent Variable: D(CHINA_GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CHINAX_KOREA)	8.115691	1.518337	5.345117	0.0000
RESIDCK(-1)	-1.095939	0.141987	-7.718576	0.0000
C	-299.6504	336.1793	-0.891341	0.3775

Dependent Variable: D(China_GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CHINAX_JAPAN)	3.115135	0.499213	6.240097	0.0000

RESIDCJ(-1)	-1.339769	0.136642	-9.804952	0.0000
C	-194.4002	311.7928	-0.623491	0.5361

iii. Korea

Dependent Variable: D(KOREA_GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(KOREAX_JAPAN)	0.013880	0.013709	1.012480	0.3168
D(RESIDKJ(-1))	-0.230808	0.121473	-1.900076	0.0640
C	2364.437	1908.209	1.239087	0.2219

Dependent Variable: D(KOREA_GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(KOREAX_CHINA)	0.011478	0.008709	1.317948	0.1943
D(RESIDKC(-1))	-0.480382	0.150663	-3.188459	0.0026
C	1597.449	1956.605	0.816439	0.4186

Output 3- Error Correction Mechanism-Openness

i. China

Dependent Variable: D(CGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RPL_CHINA_JAPAN)	-21.01026	15.83907	-1.326483	0.2075
RESIDCHINA_JAPAN(-1)	-1.237266	0.278334	-4.445251	0.0007
C	277.6646	891.3166	0.311522	0.7603

Dependent Variable: D(CGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RPL_CHINA_KOREA)	0.800948	2.017440	0.397012	0.6978
RESIDCHINA_KOREA(-1)	-1.246601	0.277345	-4.494771	0.0006
C	703.6690	1049.855	0.670254	0.5144

ii. Japan

Dependent Variable: D(JGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RPL_JAPAN_CHINA)	2829.407	2261.036	1.251377	0.2328
RESIDJAPAN_CHINA(-1)	-1.153234	0.252245	-4.571876	0.0005
C	188.6636	771.5965	0.244511	0.8107

Dependent Variable: D(JGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RPL_JAPAN_KOREA)	6.250816	29.32263	0.213174	0.8345
RESIDJAPAN_KOREA(-1)	-0.725212	0.291557	-2.487374	0.0272
C	451.0064	1067.183	0.422614	0.6795

iii. Korea

Dependent Variable: D(KGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RPL_KOREA_CHINA)	27746.39	89550.82	0.309840	0.7616
RESIDKOREA_CHINA(-1)	-1.313607	0.265966	-4.939012	0.0003
C	2663.265	2886.817	0.922561	0.3730

Dependent Variable: D(KGDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RPL_KOREA_JAPAN)	-2959.973	6915.377	-0.428028	0.6756

RESIDKOREA_JAPAN(-1)	-0.973663	0.265459	-3.667854	0.0028
C	2992.972	2971.181	1.007334	0.3322

Note: - The RPL_CountryX_CountryY is the openness of country X to country Y

- Resid is the equilibrium error

- JGDP, CGDP, KGDP stands for Japan's GDP, China's GDP and Korea's GDP respectively

Output 4- Two stage Least Squares with Fixed Effect

a. GDP growth equation

Estimation Method: Two-Stage Least Squares

Included observations: 18

Total system (balanced) observations 72

	Coefficient	Std. Error	t-Statistic	Prob.
C(9)	-4.442803	1.463603	-3.035523	0.0035
C(1)	0.386130	0.146251	2.640183	0.0105
C(2)	0.069554	0.036615	1.899605	0.0623
C(3)	0.172738	0.075332	2.293019	0.0254
C(4)	0.065033	0.100882	0.644643	0.5216
C(5)	0.030237	0.082119	0.368207	0.7140
C(6)	0.218533	0.110082	1.985188	0.0517
C(7)	0.559444	0.279331	2.002800	0.0497
C(8)	0.352340	0.146693	2.401888	0.0194
C(10)	-3.446255	1.383094	-2.491700	0.0155
C(11)	-4.479309	1.519311	-2.948250	0.0045
C(12)	-4.052083	1.455409	-2.784155	0.0072
Determinant residual covariance		82.57287		

Equation: OGDPG_INA = C(9) + C(1)*CEG_INA + C(2)*FDIG_INA + C(3)*GOVEX_INA + C(4)*OXGR_INA + C(5)*OIMG_INA + C(6) *KGDPG_INA + C(7)*JGDPG_INA + C(8)*CGDPG_INA

Observations: 18

R-squared	0.909899	Mean dependent var	4.930058
Adjusted R-squared	0.829809	S.D. dependent var	4.954718

S.E. of regression	2.044032	Sum squared resid	37.60262
Durbin-Watson stat	2.935520		

Equation: OGDPG_MALAY = C(10) + C(1)*CEG_MALAY + C(2)
*FDIG_MALAY + C(3)*GOVEX_MALAY + C(4)*OXGR_MALAY +
C(5)*OIMG_MALAY + C(6)*KGDPG_MALAY + C(7)
*JGDPG_MALAY + C(8)*CGDPG_MALAY

Observations: 18

R-squared	0.610977	Mean dependent var	6.515177
Adjusted R-squared	0.265180	S.D. dependent var	4.211082
S.E. of regression	3.609809	Sum squared resid	117.2765
Durbin-Watson stat	1.358905		

Equation: OGDPG_PHILP = C(11) + C(1)*CEG_PHILP + C(2)
*FDIG_PHILP + C(3)*GOVEX_PHILP + C(4)*OXGR_PHILP + C(5)
*OIMG_PHILP + C(6)*KGDPG_PHILP + C(7)*JGDPG_PHILP +
C(8)*CGDPG_PHILP

Observations: 18

R-squared	-0.015997	Mean dependent var	3.825081
Adjusted R-squared	-0.919106	S.D. dependent var	2.347669
S.E. of regression	3.252269	Sum squared resid	95.19526
Durbin-Watson stat	0.731796		

Equation: OGDPG_THAI = C(12) + C(1)*CEG_THAI + C(2)*FDIG_THAI
+ C(3)*GOVEX_THAI + C(4)*OXGR_THAI + C(5)*OIMG_THAI +
C(6)*KGDPG_THAI + C(7)*JGDPG_THAI + C(8)*CGDPG_THAI

Observations: 18

R-squared	0.860603	Mean dependent var	5.158724

Adjusted R-squared	0.736694	S.D. dependent var	4.858676
S.E. of regression	2.493150	Sum squared resid	55.94217
Durbin-Watson stat	1.420589		

b. Consumption growth equation

Estimation Method: Two-Stage Least Squares

Included observations: 18

Total system (balanced) observations 72

	Coefficient	Std. Error	t-Statistic	Prob.
C(3)	1.886302	0.966225	1.952240	0.0552
C(1)	0.010831	0.089199	0.121430	0.9037
C(2)	0.794404	0.098395	8.073635	0.0000
C(4)	1.452987	1.057763	1.373642	0.1742
C(5)	0.427812	0.865384	0.494361	0.6227
C(6)	0.469461	0.945216	0.496670	0.6211
Determinant residual covariance		2932.878		

Equation: CEG_INA = C(3) + C(1)*CEG_INA(-1) + C(2)*OGDPG_INA

Observations: 18

R-squared	0.635897	Mean dependent var	5.867054
Adjusted R-squared	0.587350	S.D. dependent var	4.787579
S.E. of regression	3.075439	Sum squared resid	141.8749
Durbin-Watson stat	2.413869		

Equation: CEG_MALAY = C(4) + C(1)*CEG_MALAY(-1) + C(2)
*OGDPG_MALAY

Observations: 18

R-squared	0.623171	Mean dependent var	6.702001
Adjusted R-squared	0.572927	S.D. dependent var	4.758304
S.E. of regression	3.109589	Sum squared resid	145.0432
Durbin-Watson stat	1.290308		

Equation: CEG_PHILP = C(5) + C(1)*CEG_PHILP(-1) + C(2)
*OGDPG_PHILP

Observations: 18

R-squared	-0.415674	Mean dependent var	3.507703
Adjusted R-squared	-0.604430	S.D. dependent var	3.707069

S.E. of regression	4.695600	Sum squared resid	330.7299
Durbin-Watson stat	2.146657		

Equation: CEG_THAI = C(6) + C(1)*CEG_THAI(-1) + C(2)
*OGDPG_THAI
Observations: 18

R-squared	0.847820	Mean dependent var	4.622024
Adjusted R-squared	0.827529	S.D. dependent var	4.562344
S.E. of regression	1.894723	Sum squared resid	53.84965
Durbin-Watson stat	1.173911		

c. Investment growth equation

Estimation Method: Two-Stage Least Squares
Included observations: 18
Total system (balanced) observations 72

	Coefficient	Std. Error	t-Statistic	Prob.
C(3)	-1.867181	8.790209	-0.212416	0.8324
C(1)	0.138560	0.408225	0.339420	0.7354
C(2)	-0.082525	0.503042	-0.164052	0.8702
C(4)	-7.199823	5.830350	-1.234887	0.2213
C(5)	0.070865	6.146088	0.011530	0.9908
C(6)	-0.320883	5.756789	-0.055740	0.9557
Determinant residual covariance		18020.15		

Equation: FDIG_INA = C(3) + C(1)*IRATE_INA + C(2)*OGDPG_INA
Observations: 18

R-squared	-0.059537	Mean dependent var	-0.008512
Adjusted R-squared	-0.200808	S.D. dependent var	2.449041
S.E. of regression	2.683694	Sum squared resid	108.0332
Durbin-Watson stat	2.567984		

Equation: FDIG_MALAY = C(4) + C(1)*IRATE_MALAY + C(2)
*OGDPG_MALAY
Observations: 18

R-squared	0.003674	Mean dependent var	-7.033585
Adjusted R-squared	-0.129170	S.D. dependent var	30.59956

S.E. of regression	32.51583	Sum squared resid	15859.19
Durbin-Watson stat	1.045501		

Equation: FDIG_PHILP = C(5) + C(1)*IRATE_PHILP + C(2)

*OGDPG_PHILP

Observations: 18

R-squared	-0.137349	Mean dependent var	1.055374
Adjusted R-squared	-0.288996	S.D. dependent var	3.508930
S.E. of regression	3.983827	Sum squared resid	238.0632
Durbin-Watson stat	1.993670		

Equation: FDIG_THAI = C(6) + C(1)*IRATE_THAI + C(2)*OGDPG_THAI

Observations: 18

R-squared	-0.451528	Mean dependent var	0.169909
Adjusted R-squared	-0.645065	S.D. dependent var	0.488997
S.E. of regression	0.627188	Sum squared resid	5.900473
Durbin-Watson stat	0.960616		

d. Government Expenditure growth equation

Estimation Method: Two-Stage Least Squares

Included observations: 18

Total system (balanced) observations 72

	Coefficient	Std. Error	t-Statistic	Prob.
C(3)	1.778940	1.293928	1.374837	0.1738
C(1)	-0.267646	0.133567	-2.003831	0.0492
C(2)	0.692052	0.140959	4.909603	0.0000
C(4)	4.107842	1.451289	2.830479	0.0062
C(5)	1.536244	1.193846	1.286802	0.2027
C(6)	3.014080	1.326933	2.271464	0.0264
Determinant residual covariance		43029.50		

Equation: GOVEX_INA = C(3) + C(1)*OGDPG_INA(-1) + C(2)
*OGDPG_INA

Observations: 18

R-squared	0.480215	Mean dependent var	3.830123
Adjusted R-squared	0.410910	S.D. dependent var	5.976912
S.E. of regression	4.587411	Sum squared resid	315.6651
Durbin-Watson stat	0.773085		

Equation: GOVEX_MALAY = C(4) + C(1)*OGDPG_MALAY(-1) + C(2)
*OGDPG_MALAY

Observations: 18

R-squared	0.238466	Mean dependent var	6.832606
Adjusted R-squared	0.136928	S.D. dependent var	5.753334
S.E. of regression	5.344942	Sum squared resid	428.5261
Durbin-Watson stat	2.470848		

Equation: GOVEX_PHILP = C(5) + C(1)*OGDPG_PHILP(-1) + C(2)
*OGDPG_PHILP

Observations: 18

R-squared	0.287284	Mean dependent var	3.174227
Adjusted R-squared	0.192255	S.D. dependent var	4.440049
S.E. of regression	3.990477	Sum squared resid	238.8586
Durbin-Watson stat	1.297934		

Equation: GOVEX_THAI = C(6) + C(1)*OGDPG_THAI(-1) + C(2)

*OGDPG_THAI

Observations: 18

R-squared	-0.241350	Mean dependent var	5.092879
Adjusted R-squared	-0.406863	S.D. dependent var	3.808766
S.E. of regression	4.517626	Sum squared resid	306.1341
Durbin-Watson stat	2.575608		

e. Export growth equation

Estimation Method: Two-Stage Least Squares

Included observations: 18

Total system (balanced) observations 72

	Coefficient	Std. Error	t-Statistic	Prob.
C(6)	-8.129106	6.062389	-1.340908	0.1848
C(1)	3.69E-05	0.000554	0.066615	0.9471
C(2)	-0.530424	0.309451	-1.714084	0.0914
C(3)	0.415795	0.343162	1.211660	0.2302
C(4)	2.654227	0.771437	3.440626	0.0010
C(5)	1.173756	0.387208	3.031330	0.0035
C(7)	-4.764901	4.531193	-1.051578	0.2970
C(8)	-9.535192	4.572898	-2.085153	0.0411

C(9)	-6.804976	4.534820	-1.500605	0.1385

Determinant residual covariance 2217709.

Equation: OXGR_INA = C(6) + C(1)*EXRATE_INA + C(2)*CEG_INA + C(3)*KGDPG_INA + C(4)*JGDPG_INA + C(5)*CGDPG_INA

Observations: 18

R-squared	0.262991	Mean dependent var	7.427942
Adjusted R-squared	-0.044097	S.D. dependent var	11.77837
S.E. of regression	12.03526	Sum squared resid	1738.169
Durbin-Watson stat	3.050610		

Equation: OXGR_MALAY = C(7) + C(1)*EXRATE_MALAY + C(2) *CEG_MALAY + C(3)*KGDPG_MALAY + C(4)*JGDPG_MALAY + C(5)*CGDPG_MALAY

Observations: 18

R-squared	0.296584	Mean dependent var	10.12617
Adjusted R-squared	0.003494	S.D. dependent var	7.252298
S.E. of regression	7.239618	Sum squared resid	628.9448
Durbin-Watson stat	1.430857		

Equation: OXGR_PHILP = C(8) + C(1)*EXRATE_PHILP + C(2) *CEG_PHILP + C(3)*KGDPG_PHILP + C(4)*JGDPG_PHILP + C(5)*CGDPG_PHILP

Observations: 18

R-squared	0.586774	Mean dependent var	7.051526
Adjusted R-squared	0.414596	S.D. dependent var	9.486591
S.E. of regression	7.258352	Sum squared resid	632.2041
Durbin-Watson stat	1.348059		

Equation: OXGR_THAI = C(9) + C(1)*EXRATE_THAI + C(2)*CEG_THAI + C(3)*KGDPG_THAI + C(4)*JGDPG_THAI + C(5)*CGDPG_THAI

Observations: 18

R-squared	-0.047590	Mean dependent var	9.190491
Adjusted R-squared	-0.484086	S.D. dependent var	6.274162
S.E. of regression	7.643377	Sum squared resid	701.0545
Durbin-Watson stat	1.815659		

f. Import growth equation

Estimation Method: Two-Stage Least Squares

Included observations: 18

Total system (balanced) observations 72

	Coefficient	Std. Error	t-Statistic	Prob.
C(6)	-11.91410	7.377299	-1.614967	0.1113
C(1)	0.000261	0.000674	0.386791	0.7002
C(2)	0.926809	0.376569	2.461192	0.0166
C(3)	0.393946	0.417592	0.943375	0.3491
C(4)	3.084096	0.938759	3.285290	0.0017
C(5)	0.642521	0.471192	1.363607	0.1775
C(7)	-9.104824	5.513992	-1.651222	0.1037
C(8)	-11.25835	5.564743	-2.023158	0.0473
C(9)	-10.06721	5.518407	-1.824296	0.0729
Determinant residual covariance		6956999.		

Equation: OIMG_INA = C(6) + C(1)*EXRATE_INA + C(2)*CEG_INA +
C(3)*KGDPG_INA + C(4)*JGDPG_INA + C(5)*CGDPG_INA

Observations: 18

R-squared	0.270711	Mean dependent var	8.773515
Adjusted R-squared	-0.033159	S.D. dependent var	15.67493
S.E. of regression	15.93270	Sum squared resid	3046.210
Durbin-Watson stat	2.824407		

Equation: OIMG_MALAY = C(7) + C(1)*EXRATE_MALAY + C(2)
*CEG_MALAY + C(3)*KGDPG_MALAY + C(4)*JGDPG_MALAY
+ C(5)*CGDPG_MALAY

Observations: 18

R-squared	0.691792	Mean dependent var	10.78023
Adjusted R-squared	0.563372	S.D. dependent var	12.19513
S.E. of regression	8.058278	Sum squared resid	779.2302
Durbin-Watson stat	1.699899		

Equation: OIMG_PHILP = C(8) + C(1)*EXRATE_PHILP + C(2)
*CEG_PHILP + C(3)*KGDPG_PHILP + C(4)*JGDPG_PHILP +
C(5)*CGDPG_PHILP

Observations: 18

R-squared	0.454302	Mean dependent var	5.675504
Adjusted R-squared	0.226928	S.D. dependent var	8.133494
S.E. of regression	7.151333	Sum squared resid	613.6987
Durbin-Watson stat	1.217869		

Equation: OIMG_THAI = C(9) + C(1)*EXRATE_THAI + C(2)*CEG_THAI
+ C(3)*KGDPG_THAI + C(4)*JGDPG_THAI + C(5)*CGDPG_THAI

Observations: 18

R-squared	0.579300	Mean dependent var	7.898078
Adjusted R-squared	0.404009	S.D. dependent var	12.06181
S.E. of regression	9.311773	Sum squared resid	1040.509
Durbin-Watson stat	1.532069		

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