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DOES ASEAN5+3 NEED COMMON CURRENCY? (ANALYSIS OF OPTIMUM CURRENCY AREA INDEX 2008-2016)

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ABSTRACT

The purpose of this study is to analyze the benefit-cost of currency union in ASEAN5 + 3 countries. The analysis was conducted by calculating OCA index by using Bayoumi and Eichengreen model. The estimation of the bilateral index shows that the lowest OCA index for ASEAN5+3 relationship exist in the relationship of Singapore-China, China-Philippines and China-Thailand. Currency unification can be start from Singapore-Thailand-Philippines, followed by Chinese Renminbi currency. Then, it can continue to integrate Korean and Malaysian currency. Meanwhile, Indonesia and Japan are least suitable for adopting common currency due to the high cost that reflected in the high OCA index. The result of Fixed Effect panel regression shows that trade intensity, size of economy and export dissimilarity significantly influence exchange rate volatility in ASEAN5+3 countries. Meanwhile, in terms of dissimilarity of export commodities, the result shows different relationship direction from expectation. Thus, this study recommends the need for further research involving variables of intra-industry trade and global value chain.

Keywords: *ASEAN5+3, AEC, Currency Union, Exchange Rate, OCA Index.*

1. INTRODUCTION

Since 2015, ten ASEAN member countries was integrated into ASEAN Economic Community (AEC). This integration is expected to boost ASEAN as single market and production based region with free flow of goods, services, capital and labor. (ASEAN, 2009). Before reaching this current phase, ASEAN has passed through several integration phases. The first phase began in 1977 with Preferential Trading Area agreement where several countries agreed to reduce intra-ASEAN tariff on goods. Then, it proceeded to the phase of Free Trade Area in 1992 where six ASEAN member countries agreed to reduce tariff on goods to be zero percent.

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Furthermore, in 1995, ASEAN integration went into the Common Market phase. Unlike integration in the EU, ASEAN integration did not pass the Custom Union phase, but went directly into the Common Market phase. The ASEAN Common Market stage marked by the ASEAN frameworks Agreement on Services and ASEAN Investment Area.

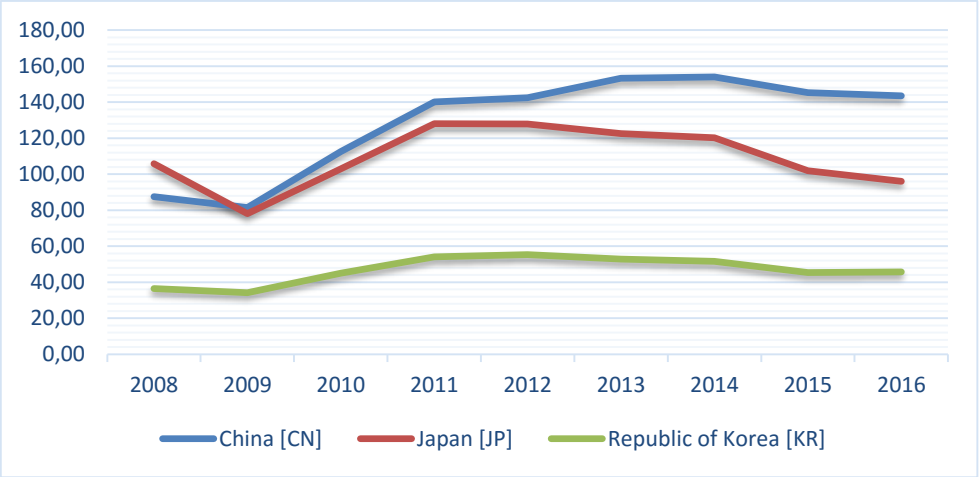
Finally, ASEAN will get into the phase of Economic Union by harmonizing the national economic policy of member countries. To achieve that goal, ASEAN has established ASEAN Single Window to facilitate trade in goods and made some Mutual Recognition Agreement (MRA) to facilitate the movement of services, labor and capital. However, until now, there is no agreement among member countries to enter total economic integration by adopting a single currency.

The unification of currencies in a region is predicted to give benefits. One of the most important benefit is to increase the trade of goods, services and investment across countries. In addition, currency union can potentially increase country's revenues due to the lower transaction costs (Alesina and Barro, 2002).

In terms of trade, in the last decade the progress of intra-ASEAN trade was not significant. The proportion of intra-ASEAN trade accounts for only 25% of total trade. However, trade between ASEAN and three East Asia countries namely China, Japan and Korea (ASEAN + 3) increased significantly, as shown in graphs 1 and 2.

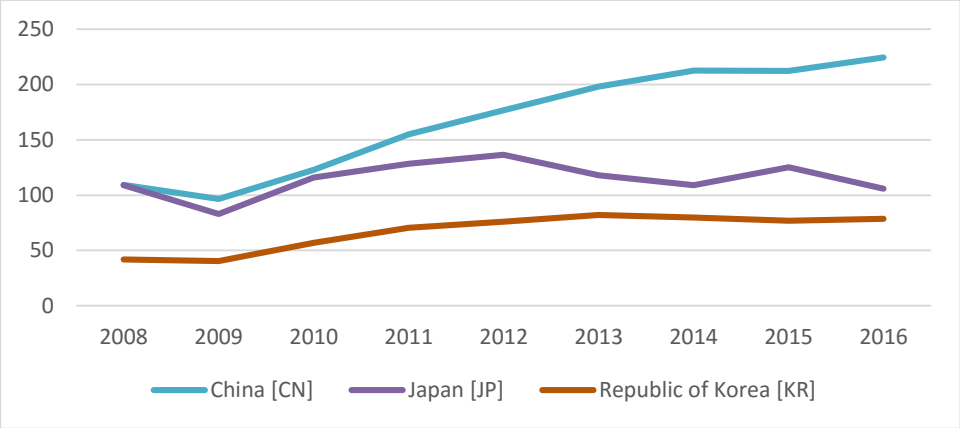
By 2016, ASEAN's export to China has increased to 12.5% from 9% in 2007, but the import has increased more significantly. In 2007 import from China only 12.4%, but in 2016 import from China reached 20.7%. Most of import goods from China are raw materials.

Figure 1. Trend of ASEAN's Exports to Japan, China and Korea (in Million USD)



Source: ASEAN Statistics, 2017

Figure 2. Trend of Japan, China and Korea Import to ASEAN (in Million USD)



Source: ASEAN Statistics, 2017

The proportion of ASEAN's trade with China, Japan and Korea is relatively large compared to other trading partners. ASEAN's total imports from those three countries reached 52.73%. Meanwhile, total exports of ASEAN to those three countries reached 46.85%. (ASEAN Statistics, 2017). That significant trade is the result of trade negotiations between ASEAN countries and RCEP (Regional Comprehensive Economic Partnership) member countries.

In addition, cooperation between ASEAN - Japan, China and Korea is quite intense in financial sector. Chiang Mai Initiative Multilateralisation (CMIM) in 2000 initiated this cooperation. The cooperation was motivated by the Asian financial crisis 1997/1998. After the crisis, a cooperation was established to provide currency exchange facilities to overcome short-term liquidity payments and to organize regional financing.

Recently, ASEAN has developed several Bilateral Currency Swap Agreement (BCSA) with Japan, China and Korea. Among them was BCSA between Indonesia-China and Indonesia-Korea and BCSA between Singapore-Japan. (BI, 2017). Cooperation in the financial sector has also emerged in developing local currency bond market (Asian Bond Market Initiative). The Credit Guarantee and Investment Facility between ASEAN - Japan, China and Korea has been provided to increase the issuance of corporate bonds

Cooperation in the financial sector between ASEAN and Japan, China and Korea is predicted to continue. By 2025, ASEAN will enter the phase of financial market integration. As states in the Roadmap for Monetary Financial Integration of ASEAN, ASEAN financial market integration will include liberalization of financial services, capital balance and the development of ASEAN capital market (ASEAN, 2017).

Integration in the financial sector is considered important for a region because the more open a country the more easy that country imposed by external shock. Thus, cooperation is needed to anticipate risks. The larger market integration will reduce costs, provide benefit of growth and reduce systemic risk (ADB, 2012).

By looking the description above, it is interesting to evaluate whether there is an optimum currency area (OCA) in ASEAN5+3 that allows countries to adopt common currency. This paper will explore the possibility of currency integration in ASEAN5+3 by using the exchange rate variability approach.

This paper will be organized as follows. The second section will discuss previous studies related to the OCA. The third section will discuss the data and methodology. In the fourth section, the interpretation of the estimation will be discussed. Finally, the fifth section contains the conclusions and limitations of the study.

2. LITERATUR REVIEW

Theory of Optimum Currency Area (OCA) was first discussed by Mundell (1961). Mundell argues that the main criteria of OCA is the high mobility of production factors. If there is an increasing demand in country A compared to country B, then a floating exchange rate will maintain the internal and external balance of both countries by decreasing unemployment in country A and decreasing inflation in country B.

However, if the shift of demand occurs in a region, the floating exchange rate will only produce an external balance between the two countries, but not between regions. External and internal balance can only occur when there is free movement of production factors, especially labor. Thus, the free movement of labor will replace a country's exchange rate system in a multi-regional currency area. The freer the movement of input factors, the lower cost of using common currency.

The unification of currencies in a region will imply a loss of exchange rate function as a tool to maintain country's balance if the asymmetric shock exists. Therefore, one country should have several properties before involved in unification of currency. The properties include ; the positive correlation of shock between countries and the mobility of production factor (Mundell, 1961), wages and prices are flexible (Friedman, 1953), size and economic openness (McKinnon, 1963), variations in production and consumption structure (Kenen , 1969), the level of development of financial markets (Stanoeva, 2001), integration of the factor markets (Scitovsky and Ingram, 1962), similar inflation rates (Fleming, 1971), fiscal integration (Kennen, 1969 and De Bandt & Mongelli, 2000) and the existence of political integration (Cohen, 1993 and Mintz and Harberler, 1970)

Since 1970, research related OCA has shifted from theoretical research to empirical research. Bayoumi and Eichengreen (1997) examines the relationship of bilateral exchange rate deviation to GDP shock, trade intensity, size of economy and export dissimilarity in Economic and Monetary Union (EMU) countries. The result shows three categories of countries: high readiness, medium readiness and not ready for monetary union. In case of French, OCA index is quite high. Therefore, the France's decisions to joined EMU is more likely a political reason.

In recent years, there are several studies examining the possibility of a unified currency in ASEAN. By using different methods and different period, all research conclude that ASEAN does not meet the optimum criteria of currency area. Nevertheless, each study has different conclusions regarding the group of countries that can adopt common currency.

Bayoumi, Eichengreen and Mauro (2000) used variables of trade intensity, economic shock, labor movement and monetary transition mechanism. The results show that compared to the EU prior to the Maastricht Treaty agreement, ASEAN is less suitable to enter monetary integration.

Furthermore, Kraiwinee and Eugene (2003) used a convergent model to determine whether OCA applies in ASEAN. The result shows that overall ASEAN is not suitable to adopt one currency due to the divergence of per capita income. This study only recommends the possibility of ASEAN6 to adopt common currency.

Falianty (2008) conducted comprehensive research on OCA properties in ASEAN-5 in the period 1971-2003. The pair wise result shows that bilateral relations of countries that meet OCA property was Malaysia-Thailand, Singapore-Thailand, Singapore-Malaysia. The countries that had lowest cost changing domestic currency to common currency was Singapore-Malaysia-Thailand, that represented by lower OCA index. Another result from endogenous tests shows that there is endogenity in asymmetric shock and labor wages.

Furthermore, Vu Tuan Khai (2008) examined the possibility of currency unification for 9 ASEAN countries (except Brunei) by conducting asymmetric shock analysis between

countries using SVAR and two OCA criteria namely CPI and GDP. The results show that Indonesia, Malaysia, Philippines, Singapore and Thailand have high correlation in term of structural shock. The high speed of shock adjustment in those relationships made them possible to adopt common currency.

Thiumsak (2014) measures the readiness of ASEAN-5 to adopt one currency using Dynamic conditional correlation (DCC) model in 2001-2013 period. The results shows that there is a structural breaks in all conditional correlations in bilateral relationships between production indices and short-term interest rates after the ASEAN integration policy has been implemented in 2008. Almost all conditional correlations decreased over time. Thus, ASEAN feasibility to adopt one currency also declined.

Other studies tested the OCA condition between ASEAN countries and their trading partner. Obiyatullah Ismath Bacha (2008) examines whether it is possible to establish OCA between ASEAN-5 countries with Japan, Korea, China, Australia and New Zealand. This study uses a VAR approach and correlation analysis on some OCA criteria. The results show that OCA are not suitable to be applied between ASEAN-5 and those trading partner countries. However, currency unification is still possible on bilateral relations between Malaysia-Singapore, Japan-Korea, Indonesia-Thailand and Australia-New Zealand.

Wiranata and Putranto (2010) tested the OCA property in ASEAN5+3 in the 1970-2008 period by performing a cointegration test between Exchange Rate volatility (ERV) and OCA. The results show that there is a positive impact of Aggregate Supply on ERV in ASEAN5+3. The result from Granger causality shows that causal relationship between OCA and ERV exist in Thailand, Taiwan, Japan, and China. As for Indonesia, Malaysia, and Philippines there is no causal relationship between OCA and ERV

Achsani and Partisiwi (2010) conducted a similar study. By using OCA and cluster analysis, this study examined the possibility of ASEAN5, Japan, China and Korea to adopt a single currency. The results show that the unification process of currency can be started from Singapore Dollars and Malaysian Ringgit, followed by Japanese Yen, RMB China and Korean Won. Indonesian Rupiah has a different behavior with other currencies in this region; therefore, Indonesia is not ready for currency unification. The strongest currency in ASEAN is Singapore dollar.

Taken as a whole, there are three research groups in currency union. *First*, research group evaluated the possibility of countries to adopt one currency by evaluate all property of OCA. *Second*, the research group focused on the benefit-cost analysis of currency unification by calculating OCA index. *Third*, the research group evaluated the presence of endogenity in the OCA indicator. This research is categorized into the second group which focusing on the benefit-cost of currency union.

Several literatures describe the benefits and costs of the currencies union in a region. At least, there are four main benefits of this unification. *First*, creates microeconomic efficiency due to the large coverage area of currency. *Second*, improves macroeconomic stability due to the present of price stability, larger and more transparent access to money markets, larger external financing, lower inflation and reduce fluctuations in output and unemployment. *Third*, reduce transaction costs and demand for foreign currency. *Fourth*, reduce the risk of speculative attack.

Beside create benefits; the unification of currency also has costs. *First*, in the short term it will reduce micro efficiency. The replacement of a new currency raises the administrative, legal and psychological costs. *Second*, decrease the country's opportunity to maintain macroeconomic stability. Country's economic policy will be replaced by policy at the regional level. Thus, a country with rigid price and wage will experience low inflation and frictional unemployment. *Third*, the emergence of negative externalities cost. A country with

a large budget deficit and debt will push regional interest rates to the higher level, lower confidence to the regional currencies and increase speculation on the currency. (Falianty, 2006)

3. DATA AND METHODOLOGY

3.1. Data

This study uses monthly data of 5 ASEAN countries namely Indonesia, Malaysia, Philippines, Singapore, Thailand and 3 East Asian countries namely China, Japan and Korea (ASEAN + 3). The analysis has covered period of January 2008 - December 2016, which included 96 total observations. The data is retrieve from International Financial Statistics (IFS), OECD, Intracen ITC and word bank databases. The monthly export-import data per product group retrieved from intracen ITC data.

3.2. Model

The analysis of exchange rates variability in ASEAN5+3 is conducted by calculating the OCA Index which is estimated by OLS. USD currency used as anchor currency. The lower value of OCA index, the more stable country's exchange rate. OCA indexes can also be used to measure the benefits and cost of currency unification. The lower OCA index, the greater the benefit (compared to cost) that will be received from unification of currency. Because high symmetrical shock and high trade linkage will stabilize the exchange rate. Therefore, it is easier (cheaper in term of cost) for countries, which has lower OCA index to adopt single currency.

The model of exchange rate variability was originally developed by Vaubel (1977) that using the model to evaluate OCAs in 9 EU countries. Hereafter, Bayoumi and Eichngreen (1977) calculated the exchange rate variability with the standard deviation of exchange rate fluctuations between the two countries. This research used OCA model of Bayoumi and Eichengreen (1997).

The overall relationship of variables is formulated as follows:

$$\boldsymbol{SD(e)_{ij} = \alpha + \beta_1 SD(\Delta y_i - y_j) + \beta_2 TRADE_{ij} + \beta_3 SIZE_{ij} + \beta_4 DISSIM_{ij}}$$

Where :

$\boldsymbol{SD(e)_{ij}}$ = standard deviation of bilateral exchange rate changes between countries (i) and (j)

$\boldsymbol{SD(\Delta y_i - y_j)}$ = standard deviation of the difference between logarithm real output between country (i) and (j) , called as a *business cycle*

$\boldsymbol{TRADE_{ij}}$ = average value of exports and imports ratio to the total bilateral trade between countries (i) and (j)

$\boldsymbol{SIZE_{ij}}$ = the average value of GDP ratio between countries (i) and (j), in logarithms.

$\boldsymbol{DISSIM_{ij}}$ = the absolute difference between the share of the agricultural, mineral and manufacturing sectors in trade between countries (i) and (j).

The expected relationship of variables in this study, as follows:

1. Business cycle has a positive relationship with the volatility of currency
2. Trade has a negative relationship with the volatility of currency
3. The size of the economy has a negative relationship with the volatility of currency
4. The absolute difference of export commodities has a positive with the volatility of currency

3.3. Data Processing/Estimation

To obtain OCA index, we conducted bilateral analysis between two countries. Thus, there are 28 combinations of bilateral relations in ASEAN5+3. Meanwhile, for the OCA analysis in

regional we estimated by using data panel regression which involved 8 countries (cross section) and 9 years' time series. Thus, there are 540 observations on the panel.

4. RESULT AND DISCUSSION

The Bilateral OCA index of ASEAN5+3 countries are shown in Table 1. In terms of ASEAN5 countries, three bilateral relations have the lowest index, namely: Singapore-Thailand, Thailand-Philippines and Singapore-Philippines. Meanwhile, for all ASEAN5+3 countries Singapore-China, China-Philippines and China-Thailand have the lowest index.

In ASEAN, the OCA index of Indonesia is the largest, especially in its bilateral relationship with Singapore, Thailand and the Philippines. OCA index Indonesia is relatively low in bilateral relationship between Indonesia-Malaysia. In relation to East Asia countries relationship, the smallest OCA index Indonesia was found from bilateral relationship of Indonesia-Japan. Meanwhile OCA index Indonesia-Korea and Indonesia-China was the largest ASEAN5+3 relationship.

Table 1: OCA Indices in Bilateral Relationship of ASEAN5+3

Negara	OCA Index	Negara	OCA Index
Singapore - Thailand	0.036	Japan-Indonesia	0.097
Thailand -Philippines	0.038	Malaysia-Japan	0.101
Singapore- China	0.043	Thailand-Japan	0.111
Singapore-Philippines	0.045	Malaysia-China	0.119
China-Philippines	0.057	Malaysia-Korea	0.122
China-Thailand	0.058	Singapore-Japan	0.126
Philippines-Korea	0.064	Philippines-Japan	0.127
Singapore-Korea	0.065	Thailand-Indonesia	0.132
Thai-Korea	0.073	Philippines-Indonesia	0.140
China-Korea	0.079	China-Japan	0.150
Malaysia-Thailand	0.081	Singapore-Indonesia	0.156
Malaysia-Philippines	0.082	Japan-Korea	0.167
Malaysia-Indonesia	0.090	Korea-Indonesia	0.172
Singapore-Malaysia	0.097	China-Indonesia	0.181

Source: the author's calculations

Table 2 : Bilateral OCA Indices of ASEAN5

Negara	OCA Indeks
Singapore - Thailand	0.036
Thailand -Philippines	0.038
Singapore-Philippines	0.045
Malaysia-Thailand	0.081
Malaysia-Philippines	0.082
Malaysia-Indonesia	0.090
Singapore-Malaysia	0.097
Thailand-Indonesia	0.132
Philippines-Indonesia	0.140
Singapore-Indonesia	0.156

Source: the author's calculations

Table 3 : Bilateral OCA Indices of ASEAN-5 with Japan, China, Korea

Negara	OCA Indeks	Negara	OCA Indeks
Singapore-China	0.043	Thailand-Japan	0.111
China-Philippines	0.057	Malaysia-China	0.119
China-Thailand	0.058	Malaysia-Korea	0.122
Philippines-Korea	0.064	Singapore-Japan	0.126
Singapore-Korea	0.065	Philippines-Japan	0.127
Thai-Korea	0.073	China-Japan	0.150
China-Korea	0.079	Japan-Korea	0.167
Japan-Indonesia	0.097	Korea-Indonesia	0.172
Malaysia-Japan	0.101	China-Indonesia	0.181

Source: the author's calculations

From table 1,2,3 it can be concluded that unification of currency can be done by unifying the Singapore-Thailand-Philippines currency followed by Chinese Renminbi. Then, in the next stage, unification of currency Korea and Malaysia can be done. Meanwhile, Indonesia and Japan are not suitable to adopt common currency due to the high cost of unification that can be reflected by the high OCA index.

Table 4 provides additional information on the bilateral currency volatility with USD currency. China's currency is the most stable currency, followed by Thailand, Philippines and Singapore. Meanwhile, Japan and Indonesia have the highest volatility in ASEAN5+3 relationship.

Table 4 : Currency Volatility of ASEAN5+3, pegging with USD

Negara	Indeks
China-USD	0.0460
Thai - USD	0.0571
Philippines - USD	0.0580
Singapore-USD	0.0600
Korea -USD	0.0757
Malaysia - USD	0.1221
Japan-USD	0.1397
Indonesia-USD	0.1645

Source: the author's calculations

After looking at the bilateral index OCA relationship, a panel regression has conducted to evaluate the relationship across ASEAN5 + 3 countries. The result of estimation is shown in table 4. Trade intensity, economic size, and export inequality are significantly influenced exchange rate volatility in ASEAN5+3

The higher the trade intensity, the lower the exchange rate volatility. The larger GDP, the lower the exchange rate volatility. In addition, the greater the inequality of exports the smaller the exchange rate volatility. Estimated results in ASEAN + 3 indicate the greater the different types of exports the smaller the variability of the exchange rate. The estimation results are different from expectations. This is due to the increasing intra-industry trade and the influence of global value chain in the trade between ASEAN5 + 3 countries.

Meanwhile, output variability or business cycle does not significantly influence exchange rate volatility. However, the estimation shows positive relationship as expected.

Table 4: Estimation Result of Panel Regression

Variable	Coefficient	t-statistic
Constanta	0.593**	8.566
Business Cycle	1.950	0.008
Trade Ratio (TRADE)	-0.218*	-2.171
Size of Economy (SIZE)	-0.562**	-8.225
Export Dissimilarity (DISSIM)	-0.009*	-2.265
Number of Observations	540	
R-squared	0.215	
SSE	0.030	
F-statistik	18.15	

** = significant at α=1%, *= significant at α=5%
Source: author's calculations

5. CONCLUSION AND LIMITATIONS OF RESEARCH

The purpose of this study is to analyze the benefit-cost of currency union in ASEAN5 + 3 countries. The analysis was conducted by calculating OCA index by using Bayoumi and Eichengreen model. The estimation of the bilateral index shows that three bilateral relations namely: Singapore-Thailand, Thailand-Philippines and Singapore-Philippines have the lowest OCA index. Meanwhile, the lowest OCA index for ASEAN5+3 relationship exist in the relationship of Singapore-China, China-Philippines and China-Thailand.

Currency unification can be start from Singapore-Thailand-Philippines, followed by Chinese Renminbi currency. Then, it can continue to integrate Korean and Malaysian currency. Meanwhile, Indonesia and Japan are least suitable for adopting common currency due to the high cost that reflected in the high OCA index.

The result of Fixed Effect panel regression shows that trade intensity, size of economy and export dissimilarity significantly influence exchange rate volatility in ASEAN5+3 countries. The higher the intensity of trade, the ratio of GDP and the dissimilarity in export commodities, the less volatile the exchange rate.

Meanwhile, in terms of dissimilarity of export commodities, the result shows different relationship direction from expectation. The relatively large number of intra-industry trade and global value chain between ASEAN5 + 3 countries are suspected to be the reasons. Thus, this study recommends the need for further research involving variables of intra-industry trade and global value chain.

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Appendix A. Output of Panel Regression ASEAN5+3:

Dependent Variable: SD
Method: Panel Least Squares
Date: 11/30/17 Time: 10:39
Sample: 2008M01 2016M12
Periods included: 108
Cross-sections included: 5
Total panel (balanced) observations: 540

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.593213	0.069250	8.566265	0.0000
BCS	1.95E-05	0.002339	0.008346	0.9933
TRADE	-0.218110	0.100473	-2.170821	0.0304
SIZE	-0.561611	0.068283	-8.224723	0.0000
DISSIM	-0.008649	0.003819	-2.264677	0.0239

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.214683	Mean dependent var	0.010075
Adjusted R-squared	0.202852	S.D. dependent var	0.008457
S.E. of regression	0.007551	Akaike info criterion	-6.917758
Sum squared resid	0.030276	Schwarz criterion	-6.846232
Log likelihood	1876.795	Hannan-Quinn criter.	-6.889785
F-statistic	18.14503	Durbin-Watson stat	1.265036
Prob(F-statistic)	0.000000		

Appendix B. Trade Intensity Index ASEAN5+3

BILATERAL	INDEKS	BILATERAL	INDEKS
Mal-Sing	0.067	Ind-Thai	0.017
Jap-Chin	0.054	Ind-Kor	0.016
Ind-Sing	0.049	Mal-Chin	0.015
Chin-Kor	0.047	Phil-Sing	0.013
Jap-Kor	0.035	Phil-Jap	0.013
Mal-Jap	0.025	Thai-Cin	0.013
Thai-Jap	0.024	Phil-Thai	0.013
Ind-Mal	0.023	Ind-Cin	0.012
Mal-Thai	0.022	Mal-Kor	0.011
Ind-Jep	0.022	Ind-Fil	0.010
Sing-Thai	0.021	Fil-Kor	0.009
Sing-Kor	0.020	Mal-Fil	0.009
Sing-Cin	0.020	Thai-Kor	0.007
Sing-Jep	0.018	Fil-Cin	0.006