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The Economic Integration of ASEAN+3

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The Economic Integration of ASEAN+3:
Stationarity, ECM and Cointegration Analysis[1]

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Abstract

The ASEAN wide economic cooperation under the 'ASEAN umbrella principle' is fitting the ASEAN's 'open and soft regionalism' character. It helps ASEAN to achieve a comprehensive trade and investment integration in the short to medium-run and financial integration in the long-run. In Southeast Asia, this wide-regionalism has been reflected in the ASEAN Plus framework. Among one of them is the ASEAN+3, which covers ten ASEAN member states and three East Asian countries (China, Japan and South Korea). This paper attempts to analyze the stability and sustainability of economic integration of the ASEAN+3. It adopts the 'inflation rate similarity among observed countries' as a proxy variable of regional economic integration and implements a time-series analysis of Stationarity Test to observe whether inflation rate similarity is the most appropriate variable for assessing the both short and long-run economic integration of the ASEAN+3. As for the short-run economic integration, this paper implements the ECM (Error Correction Mechanism) to identify whether pair inflation rate similarity among observed countries is stable and whether it is has dynamic or static relations. As for long-run economic integration, this paper implements Cointegration Test and its result has been utilized as the benchmark to select the observed countries for a further relation analysis between inflation and exchange rate. This relation is a proxy to describe long-run trade relations of the observed countries either they do compete or complement among each other.

Keywords: economic integration; inflation rate similarity; regional economic enlargement; exchange rate and trade relation; ASEAN+3
JEL classification: F15; E31; R11; O24

1. Background

ASEAN promotes an 'open-regionalism' principle in order to enhance intra-trade and investment integration in Southeast Asia. This effort requires at least two steps: firstly, to ensure trade liberalization among members. Secondly, to have an open-regionalism of intra-trade and investment integration with particular non-members that has strong interests in investing their Foreign Direct Investment (FDI) in the region. The latter will succeed if such non-members gain trade creation benefits from the region thus receiving a trade account surplus. They will be prompted to re-invest their current-account surplus into the region in order to fulfill the region's domestic demand, to reduce service-link costs (shipping, insurance, custom clearance, other administrative and local transportation cost), to avoid currency volatility costs, transaction costs of trade and to increase benefits from the investment (FDI) itself.

ASEAN members mainly consider the enlargement of AFTA through an ASEAN+ framework as a better way in enlarging ASEAN's regional cooperation with non-members as opposed to direct Bilateral Free Trade Agreement (BFTA) between individual member states and non-member states. This paper takes an illustration from Christopher Huhne in his book "The Real World Economics", 1990 that describes the relationship between individual BFTA and ASEAN Plus as follows: imagine a group of people who are watching a show. If the person sitting in the front row suddenly stands up, the view of spectators in the back will be blocked, especially if the standing person is tall. This action will provoke people who are sitting at the back to also stand up. Finally, all the spectators in the group will stand up. This condition is worse than before when all the spectators had sit orderly. If all spectators are standing, the comfortable view will depend on the height of each audience, which causes the smallest audience to suffer the most.

The height of the spectator illustrated above represents the economic level e.g. annual GNP per Capita. Adopt this illustration into ASEAN's condition. Standing audiences are not prohibited in ASEAN. This means each ASEAN member is free to have direct bilateral agreements with non-ASEAN member countries. Therefore when one of the ASEAN members starts to open direct bilateral trade with non member states - sooner or later the other members will do the same. No member state wants to be left behind because if she does not do the same then she loses while other member state gains. This is a typical 'prisoner's dilemma' effect from individual direct BFTAs of one member to another. For instance when Singapore opened a direct bilateral agreement with Japan in 2002, Malaysia followed suit with Japan in 2005, Thailand in 2007 and Indonesia in 2008.

Unfortunately the fate of most member states which are not prepared for a bilateral agreement is equal to the small audience illustrated above. In fact, Indonesia, Thailand and most ASEAN members have lower economic levels than Singapore and Malaysia. The latter members would likely have balanced negotiations while others may end up being a "spoke" when partnering with non-ASEAN members that are economically advanced. Non members will gain much benefit from being a "hub". This is known as a "hub and spoke" problem of direct bilateral free trade agreement. Direct BFTA generates unequal outcomes among ASEAN's member states though the weaker members have no choice except to follow if the stronger country members establish individual BFTAs with non-members.

In line with the illustration above, the best way for ASEAN's enlargement is when all member states remain seated. *"If spectators want to view while standing up this must be done together and arranged in a way so that the tallest stand at the back" (*Huhne 1990). The expansions of trade agreements between ASEAN members and non-members should be done together through the ASEAN umbrella. The most advance member in ASEAN need to tolerate the aspirations of other weaker members.

As economic levels of ASEAN countries are so diverse, economically-advanced members such as Singapore and Brunei and medium-level ones such as Malaysia must be patient in accommodating the interests of its lower-middle income members such as Thailand, Indonesia, Philippines, Vietnam, Cambodia and give more tolerance to its low-income members such as Laos and Myanmar.

ASEAN is known to have a 'soft' decision-making approach named 'consultation and consensuses'. Taking into account the divergence of trade competitiveness among members as well as this soft decision-making approach, consequently, the enlargement ASEAN's economic cooperation to non-members under the ASEAN umbrella (ASEAN+ or AFTA+) will require more time than individual members having direct individual bilateral agreements. Nevertheless, a regional enlargement is much more secure and gives more equal benefits to all members.

WTO data 2006 shows that Asian regional trade depends more on the Asian region itself than any other region. This can be seen through Asia's intra export in which 50% of Asian total trade goes to Asian countries while the remaining 50% goes to the rest of the world. As described in **Table 1** below:

Table 1
Share of Regional Trade Flows (% of Export)
2006

Origin	North America	South and Central America	Europe	CIS	Africa	Middle East	Asia	World
North America	**53.9**	6.4	16.6	0.5	1.3	2.5	18.7	**100**
South and Central America	**31.4**	25.9	20.1	1.4	2.6	1.8	14.4	**100**
Europe	8.7	1.3	**73.6**	2.9	2.4	2.6	7.4	**100**
Commonwealth of Independent States (CIS)	5.7	1.8	**57.9**	18.9	1.3	3.1	10.7	**100**
Africa	22.0	3.1	**40.8**	0.4	9.0	1.7	20.0	**100**
Middle East	11.2	0.7	15.9	0.5	3.2	11.1	**52.6**	**100**
Asia	21.6	2.1	18.4	1.5	2.1	3.4	**50.0**	**100**

Source:http://www.wto.org/english/res_e/statis_e/its2007_e/its07_world_trade_dev_e.htm

This paper attempts to analyze ASEAN+3 as an economic integration enlargement of ASEAN. There are two main reasons for this: (1) ASEAN+3 was established in the late

1990s and includes China, Japan and Korea (CJK), is ASEAN's first attempt to enlarge its economic cooperation (2) ASEAN has had very long history and strong trade relations with these three East Asian countries since centuries ago. Urata and Okabe (2007) argue that free trade arrangements in East Asia such as ASEAN+3 tend to generate 'trade creation' instead of 'trade diversion'[3]. This finding supports the reasons why ASEAN need to invite non-members to join its economic cooperation. Having new members from donor FDI countries and taking into account that the trade creation effect is more than its trade diversion effect; ASEAN needs an ASEAN+ framework to further strengthen her trade and investment integration.

The ASEAN+3 is originally part of the ARF (ASEAN Regional Forum). The ARF itself is an extended idea of ASEAN's cooperation enlargement to non-ASEAN member states in Asia-Pacific. This idea was first proposed during the 1994 APEC (Asia Pacific Economic Cooperation) summit in Bogor, Indonesia. ASEAN is the focal point of APEC's economic forum. For some reasons ASEAN Plus is more effective than APEC, as the latter is too broad, with a vague economic focus and a very loose forum[4]. Consequently, the most effective forum in APEC organization is the ARF which core is the ASEAN+ in which the ASEAN+3, at least until now, is the most well defined model of ASEAN's economic enlargement.

ASEAN's economic performance attracts non-member states to join the ASEAN Plus framework. Some of ASEAN's appealing features are: (1) the discriminatory trade agreements between members and non-members. This agreement is known as the ASEAN Free Trade Area with Common Effective Preferential Tariff-Inclusion List (AFTA-CEPT IL) concept, which is complemented with service sector agreements (ASEAN Framework Agreement on Services or AFAS established in 1995) and co-investment agreements (ASEAN Investment Area or AIA, established in 1998); (2) ASEAN has the largest population in the world, after China and India. ASEAN has approximately 567.4 million people in which 80% of these are people in the productive age group (<40 y.o). In sum, ASEAN has a large potential market of demand and a large productive labor of supply (economies of scale condition); (3) Comparative advantage among ASEAN's member states open the opportunity to develop complementary production networks in Southeast Asia.

As ASEAN is attractive to non-members, it would be reasonable for ASEAN to leverage its bargaining position and expand its regionalism wings to other Asian countries outside East Asia. ASEAN continues to build common bilateral free trade arrangements with non-members. The first example is the Framework Agreement on Comprehensive Economic Cooperation (FACEC) between ASEAN and China. This ASEAN+1 is well known as AFTA+1, which was signed on 4 November 2002 in Phnom

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[3] This paper found a different story for EU, NAFTA and the Mercosur in which in these regions' 'trade diversion effect' is more dominant than its trade creation. This argument is also found in Urata, Shujiro (2007), Competitive Regionalism in East Asia: An Economic Analysis, *GIARI Working Paper*, Waseda University, pp.20

[4] In line with the APEC Bogor Declaration which states that the main purpose of the fourth APEC is "the commitment to complete the achievement of free trade and investment in the Asia-Pacific no later than the year 2020 ..."Not just for economic purposes, ASEAN +3 also emphasizes on politics, security, environmental, socio-cultural and education. However, APEC is also considered effective as quoted below: "…Since its establishment in 1989, APEC has made major contributions to the liberalization and facilitation of trade and investment. APEC has also helped support some of its members to convert to market-economies. Its basic principle is to support the elimination of trade restrictions, voluntary liberalization and non-exclusive regionalism..." (T.S. Seng, Ralf Emmers, Mely Caballero-Anthony, Amitav Archarya, Barry Desker, Kwa Chong Guan (2002), *A new Agenda for the ASEAN Regional Forum*, IDSS, Singapore, NTU)

Penh. In order to balance China's influence in Southeast Asia, the US formed the Enterprise for ASEAN Initiative (EAI). EAI cooperation is expected to shift the role of APEC (Yang Razali Kassim, The Paradox of Asia's FTA, 2003). In addition to this, ASEAN is currently enlarging cooperation with other large-populated countries such as India. The ASEAN-India Free Trade Area (AIFTA) is expected to be achieved in 2012. It preparation takes around 10 years (2002 to 2012) similar to ASEAN's preparation with China under the ASEAN-China Free Trade Area framework (2001-2010).

The ASEAN+3 is the only institution in Southeast Asia that arranges a comprehensive economic integration enlargement from trade, investment to financial integration[5].

This study limits its observed countries to ASEAN's five founding members (Indonesia, Malaysia, Thailand, Philippines and Singapore) and three East Asian countries (China, Japan and South Korea). The reason to select the five founding members is because of their path and deadline for trade and investment liberalization in group of the ASEAN-6 (original members: Indonesia, Malaysia, Thailand, Singapore, Philippines and Brunei Darussalam) are faster than those in the ASEAN-4 (Vietnam, Cambodia, Laos, Myanmar). Brunei is not selected because its contribution to the ASEAN+3 (Chiang Mai Initiative Multilateralisation) is very small (0.03%) while the selected countries (Indonesia, Malaysia, Singapore, Thailand and Philippines) share similar contributions (3.79%). As described in **Table 2** below:

Table 2
Chiang Mai Initiative Multilateralization
Member States Contribution (%) 2010

Members	Financial Contributions		Borrowing arrangements		Voting Power			
	$ billion	% share	multiplier	quota ($ billion)	No. of basic votes	No. of votes based on contributions	Total no. votes	% share
China	38.40	32.00					40.00	28.41
PRC	*34.20*	*28.50*	*0.50*	*17.10*	*1.60*	*34.20*	*35.80*	*25.43*
Hong Kong, China	*4.20*	*3.50*	*2.50*	*10.50*	*0.00*	*4.20*	*4.20*	*2.98*
Japan	38.40	32.00	0.50	19.20	1.60	38.40	40.00	28.41
Republic of Korea	19.20	16.00	1.00	19.20	1.60	19.20	20.80	14.77
Plus-three Countries	**96.00**	**80.00**			**4.80**	**96.00**	**100.80**	**71.59**
Brunei Darussalam	0.03	0.03	5.00	0.20	1.60	0.03	1.63	1.16
Cambodia	0.12	0.10	5.00	0.60	1.60	0.12	1.72	1.22
Indonesia	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Lao PDR	0.03	0.03	5.00	0.20	1.60	0.03	1.63	1.16
Malaysia	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Myanmar	0.06	0.05	5.00	0.30	1.60	0.06	1.66	1.18
Philippines	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Singapore	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Thailand	4.55	3.79	2.50	11.36	1.60	4.55	6.15	4.37
Viet Nam	1.00	0.83	5.00	5.00	1.60	1.00	2.60	1.85
ASEAN	**24.00**	**20.00**			**16.00**	**24.00**	**40.00**	**28.41**
ASEAN+3	**120.00**	**100.00**			**20.80**	**120.00**	**140.80**	**100.00**

Source: Capannelli,the 3ʳᵈ Summer Institute, Waseda University, 2010

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[5] ASEAN+3 is designed to achieve financial integration through financial cooperation based on Chiang May initiative. ASEAN+3 is the future of ASEAN financial integration. This argument is adopted from a lecture given by Professor Geovanni Cappanelli and Professor Takeshi Terada during Summer Institute, GIARI, Waseda University, 2-6 August 2010.

3. Objective

This study attempts to observe (1) Short-run and long-run ASEAN+3's economic integration equilibrium (2) Trade relations among its selected countries.

4. Research Question

There are four research questions related to ASEAN+3 economic integration issues:

(1) Does inflation rate significantly represent economic integration of the ASEAN+3?

(2) Is ASEAN+3's economic integration stable?

(3) Does ASEAN+3 have a long-run integration equilibrium? Is it static or dynamic?

(4) How is the relation between the inflation rate and exchange rate among the observed countries as a proxy for their pair trade relations?

5. Theoretical Background and Methodology

5.1. Theoretical Background

This paper selects the most appropriate economic variables to be analyzed. Based on some previous researches, the following variables meet the objectives of the study:

(1) Optimum Currency Area (Mundell,1961)

(2) Financial Integration (Stitovsky and Ingram, 1962)

(3) Monetary Integration (Friedman,1963)

(4) Fiscal Integration (Kennen, 1969)

(5) Similarity in Rates of Inflation (Fleming, 1971)

This study chooses 'similarity in rates of inflation'[6] because it describes economic equilibrium among the observed countries, both in the short and long run equilibrium. There are two forms of it: (1) 'Similarity in rate of inflation' in pair relations. This is to find the short and long run economic integration between observed countries in pair relations. (2) The relations of inflation rate similarity and the exchange rate describes trade relations among the observed countries.

Time series analysis of Stationarity of inflation rate is adopted in this paper to assess the reliability of inflation rate as a chosen variable; Error Correction Model of inflation similarity is applied to analyze short-run equilibrium while Cointegration is implemented to observe long-run equilibrium and to describe trade relations among the observed countries. This paper uses a 21 year-period of analysis from 1988-2008.

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[6] J.Marcus Fleming in his paper titled "On Exchange Rate Unification" published in *The Economic Journal* in 1971 explains that the unification is affected by seven disequilibria sources: (1) wage and price flexibility, (2) factor mobility, (3) product similarity, (4) degree of trade interpenetration, (5) inflation rate similarity, (6) money illusion in wage determination, (7) degree of economic and policy integration. He mentioned three essential factors affecting inflation rate similarity: (a) similarity in national employment goals, (b) similarity in rates of productivity growth and (c) similarity in degree of trade union aggressiveness. He wrote *"It is not necessary that similarity in all of these respects; it will do if differences in one respect are offset by differences in another"* (p.476).

Theoretically, inflation rate is selected as it is the essential element of both sectors: real and monetary. This is an appropriate variable to describe comprehensive economic integration from trade and investment (real sector) to financial integration (monetary sector). By theory, inflation rate affects both important variables of monetary sectors: nominal interest rate and exchange rate.

Inflation rate (Δp) affects nominal interest rate (i). The formulation can be seen as follows:

$$(1 + r_{t1}) = (1 + i_{t1}) . \frac{P_{to}}{P_{t1}} \qquad (1)$$

$$(1 + r_{t1}) = \frac{(1+i_{t1})}{1 + Pt1 - Pt0/Pt0} \qquad (2)$$

$$r_{t1} = i_{t1} - \frac{P_{t1} - P_{t0}}{P_{t0}} \qquad (3)$$

$$i_{t1} = r_{t1} + \frac{P_{t1} - P_{t0}}{P_{t0}} \qquad (4)$$

This formulation shows that inflation rate affects nominal interest rate especially if the country attempts to maintain the value of its real interest rate (r).

In the real sector, inflation rates not only affects nominal interest rate but also the exchange rate, a symbol of external equilibrium for each country. This formula is originally derived from 'law of one price' which is explained as follows:

$$E_t = \frac{P_{t1} - P_{t0}/P_{t0}}{P*_{t1} - P*_{t0}/P*_{t0}} \qquad (5)$$

This formula shows that if one country has inflation rates higher than its counter part, for example the USA, and then its domestic currency will overvalue. If that country adopts 'crawling peg exchange rate system' then the monetary authority faces pressure to devaluate its currency and if she adopts 'flexible market exchange rate system' then the market will force the domestic currency to be depreciated. It is important to keep the inflation rate at the average level, in other words not too volatile, to avoid pressure from exchange rate depreciation or devaluation because of capital outflows will generate overvaluation of its exchange rate.

Exchange rates affect the interest rate parity between domestic and foreign countries. This proves that inflation rates affects interest rates indirectly through exchange rates. The formulation can be seen as follows:

$$(1 + i*_t) = (1 + i_t) . \frac{E_{to}}{E_{t1}} \qquad (6)$$

$$(1 + i*_t) = \frac{(1+i_t)}{1 + Et1 - Eto/Eto} \qquad (7)$$

$$i*_t = i_t - \frac{E_{t1} - E_{t0}}{E_{t0}} \qquad (8)$$

$$i_t = i*_t + \frac{E_{t1} - E_{t0}}{E_{t0}} \qquad (9)$$

$i*_t$: nominal interest rate of anchor currency. Example: the interest rate of US$

i_t : nominal interest rate of domestic currency. Example: the interest rate of Rupiah

E_{t1} : exchange rate in domestic currency to foreign anchor currency in the time t1. Example: Rupiah per US$

E_{t0} : exchange rate in domestic currency to foreign anchor currency in the time t0. Example: Rupiah per US$

r_t : real interest rate

P_{t1} : CPI rate at t1

P_{t0} : CPI rate at t0

These series of equations show that in the real sector under an open market system, inflation is the most essential variable affecting both the exchange rate and interest rate. The stability of inflation rates is important to keep the real sector works well.

In monetary sector, inflation rate is related to money supply. It can be seen from the formulation of Irving Fischer as follows:

$$\Delta M_t . \Delta V_t = \Delta P_t . \Delta Q_t \qquad (10)$$

ΔM_t : Change in money supply. In general this variable is represented by M1

ΔV_t : Change in velocity of money circulation

ΔP_t : Inflation rate

ΔQ_t : Quantity rate which represent economic growth

The formula assumes that V is constant therefore ΔV_t is 1. This means that only money supply is shifting and the effect is distributed to inflation rate and economic growth. Economic growth and inflation rate are always together. Considering that economic growth expresses the productivity of the 'supply side' while inflation rates expresses excess of the 'demand side', therefore all countries will attempt to increase economic growth while keeping its inflation rate stable. The condition when economic growth is higher than inflation rates shows that the economy is productive and excess demand is fulfilled. It indicates that employment creation is being generated while unemployment rate has decreased. A stable inflation rate with high economic growth also specifies that the workers' prosperity increases because the economy's value added has increased. Economic productivity will increase the nominal wage (W) and if the inflation rate is stable or slightly increase yet not as much as that of the nominal wage, then real wages will increase. In general, workers will have better prosperity levels.

Inflation rate is an essential element for both real and monetary sector. It is a valuable variable in expressing the economic stability in short run and more importantly, in the

long run. Therefore inflation rate is a vital component in regional economic integration. This is the main reason why the European Union (EU) places inflation rate stability as the basic condition among its members in achieving the ultimate objective of regional economic integration, which is a single currency and attempts to maintain stability of inflation rate in her stability and growth pact/SGP policy framework. European Monetary Union (EMU)'s main objective is to achieve non-inflationary growth and to reduce unemployment rates in the EU. The EU implements a single currency policy with fixed ER system and maintains free capital mobility controlled by the EMI (European Monetary Institute) – currently known as the ECB (European Central Bank). This makes members of the Euro zone lose its domestic fiscal independency. In order to avoid high fiscal deficit that can potentially generate 'crowding-out effects' on investment, governments of Euro members must design a sound fiscal policy, the SGP (Stability and Growth Pact) policy also well known as the 'no-bailout clause'. SGP is part of the Maastricht Criteria.

Maastricht criteria regulates four types of macroeconomic standards that must be complied by the members of Euro currency, which are: (1) Annual budget deficit at around 3% of GDP, (2) Total budget debt around 60% of GDP, (3) Maximum inflation of 1.5% above the average of the three lowest member-states' inflation and (4) Maximum nominal interest rate at 2% above the average of the three lowest member-states' interest rates. Point one and two are part of the fiscal policy (SGP) while point three and four are part of the monetary policy. Previous descriptions illustrate that nominal interest rate is affected by the inflation rate. Maastricht criteria demonstrate that nominal interest rate is higher than inflation rate. In the case of Euro, nominal interest rate is 0.5% above inflation rates in order to maintain positive real interest rates.

The Euro zone's experience shows that regional economic integration makes each member state lose her independence in executing policies of both fiscal and monetary as a consequence that each member must consider that the impact of her policies will not only affect her own domestic condition but also other members as well. In general, each member must take into account the impact of its economic policy to the region's economic stability. Again the essential factor for this regional economic stability is inflation rate. Therefore this paper chooses inflation rate variable. Inspired by Fleming's paper this study adopts inflation rate similarities among observed countries as an approach to describe ASEAN's economic integration in both: short-run and long-run equilibrium.

5.2. Methodology

5.2.1. Stationarity
This paper applies stationarity test on the inflation rate of each observed country. It uses CPI (Consumer Price Index) as the inflation rate variable. In total there are eight (8) stationarity tests. The stationarity test on the inflation rate is formulated as follows:

$$Pt = \alpha + \beta 1.P_{t-1} + e_t \; ; \; P_t : \text{CPI at t time}; P_{t-1} : \text{CPI at t-1 time}$$

$$\mu = \frac{\alpha}{1-\beta}; \; \beta \neq 1$$

If $\beta = 1$ then the variable is infinite. This contains random-walk that makes the variable become non-stationer. It means there is a unit root problem. Hypothesis for this stationarity test is H_0: $\beta = 1$ (non-stationer) and $\beta \neq 1$ (stationer). Stationarity condition is important in order to avoid spurious regression. For instance $Yt = \alpha + \beta.Xt + et$; if Y and X are non-stationer then the regression is spurious. This can be seen when R^2 is higher than D-W (Durbin Watson). Non-stationer problem can be solved by implementation of rejected unit root hypothesis. Each variable has a dissimilar lag and level of difference in rejecting unit root or non-stationer condition. Statistic test for this objective is Augmented Dickey Fuller (ADF) test and is described as: $ADF = \dfrac{\theta - 1}{se\theta}$ with the hypothesis that H_0: $\theta = 1$ (non-stationer) and $\theta \neq 1$ (stationer). Rejecting H_0 is the objective of starionarity test but power of the test in rejecting this hypothesis is different for each variable. Two other important indicators are AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion).

$$AIC = \ln(\sigma^2{}_u) + \frac{2.K}{n} \quad \text{and} \quad SIC = \ln(\sigma^2{}_u) + \frac{K.\ln(n)}{n}$$

5.2.2. Short-Run Equilibrium Analysis: Error Correction Mechanism (ECM)

This paper implements ECM (Error Correction Mechanism) in analyzing short-run equilibrium relations. This is expressed as follows:

$$\Delta Inf_{it0} = b_0 + b_1.\Delta Inf_{jt0} + U_{t0} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(11)$$

$$U_{to} = b_0 - \Delta Inf_{it0} + b_1.\Delta Inf_{jt0} + b_2.(U - 1_{t0}) + \varepsilon_{t0} \dots\dots(12)$$

$$t_{stat}(b_2)\dots\dots\dots Significancy$$

$$b_2 \langle 1 \dots\dots\dots\dots Stability$$

Since the number of observed country is eight (8) then the running model for ECM in total follows binomial distribution $_8k_2 = 28$ equations. According to ECM principle, if the $t_{stat}(b_2)$ is statistically significant then there is a difference between short and long run equilibrium which reflects a "dynamic" relation. If $b_2 \langle 1$ then the relation between short and long run is "stable".

5.2.3. Long-Run Equilibrium Analysis: Cointegration

If stationarity tests show that all observed countries have a stationer inflation rate in the time period of the study thus the next test is cointegration. This test is applied to know the long-run relation of inflation rates among the observed countries. The formulation is described as follows: $P_t = \alpha + \beta.P_t*+e_t$; P_t : Domestic inflation rate; P_t *: Partner's inflation rate.

This paper uses 'Johansen Cointegration Procedures' to test cointegration. This needs eight (8) CPIs combined with two (2) countries in each test (pair form). Thus it brings:
$8K2 = \dfrac{8!}{(8-2)!2!} = \dfrac{6!.7.8}{6!.2!} = \dfrac{56}{2} = 28$ tests.

This paper uses cointegration test results to select countries to be analyzed in the form of exchange rate and inflation rate relations. This analysis is based on the basic equation of external economic relation between inflation rates and exchange rates which described as follows:

$$E_t = \frac{{P_{t1} - P_{t0}}\big/{P_{t0}}}{{P^*_{t1} - P^*_{t0}}\big/{P^*_{t0}}}$$

$$ER_t = {P_t}\big/{P_t^*}$$

$$LogER_t = \alpha + \beta_1 \log P_t + \beta_2 \log P_t^* + e_t \quad (13)$$

This relation is used as an approach to describe pair long-run trade relations between the observed countries.

6. Analysis

The complete result for stationarity test of each inflation rate variable (CPI) for each observed countries is described in **Table 3** below:

Table 3
Stationarity Test on Pair Inflation Rate (CPI) ofASEAN-5 Founding Members and East Asian Countries (China, Japan and Korea)
1988-2008

Country	ADF Statistic Test	Rejected Unit Root Hypothesis (Stationarity Test) 1% critical value- Lag 1	Probability on t-stat
Indonesia	-4.78	1st Difference	0.38
Malaysia	-4.13	1st Difference	0.07
Philippines	-5.03	1st Difference	0.09
Singapore	-4.94	2nd Difference	0.001
Thailand	-5.62	2nd Difference	0.24
China	-4.10	1st Difference	0.001
Japan	-4.64	2nd Difference	0.0002
Korea	-5.17	1st Difference	0.04

Source: Author's calculation based on ADB Statistic Data, 2010

CPI variables in all of the observed countries are stationer throughout the observation period. This means that regression tests with CPI as inflation rate variable will not generate spurious regression. The stationarity test for the inflation rate fluctuation in the observing period shows that China, Korea, Indonesia, Malaysia and Philippines have higher power of the test at 1% critical value in rejecting unit-root or random walk compare to that of Japan, Singapore and Thailand. Japan, China and Singapore have significant probability of t-statistic for its parameter at 1% (rejecting area), Korea at 5%, while Malaysia and Philippines at 10%. Yet if power of the test is to be considered then

only China has very strong power of the test and t-statistic. This empirical finding supports the fact that China has significant and dynamic relations in pair of inflation similarity with the other observed countries.

The stationarity test shows that inflation rate is the most appropriate variable for time-series analysis to describe short-run and long-run economic relations of the ASEAN+3. This also shows a non-spurious regression of using CPI as inflation rate variable giving strong reasons to continue time-series tests for both: short-run (ECM) and long-run equilibrium (cointegration).

The result of ECM as the short-run analysis approach is described in **Table 4** below:

Table 4
Error Correction Mechanism Pair Inflation Rate (CPI) of ASEAN-5 Founding Members and East Asian Countries (China, Japan and Korea)
1988-2008

ECM	China	Japan	Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand
China		Insignificant t-stat:0.19 Stability:0.3	Significant** t-stat:0.05 Stability:0.4	Significant** t-stat:0.03 Stability:0.4	Significant** t-stat:0.05 Stability:0.4	Significant* t-stat:0.06 Stability:0.4	Significant** t-stat:0.05 Stability:0.5	Significant* t-stat:0.07 Stability:0.4
Japan			Insignificant t-stat:0.8 Stability:0.06	Insignificant t-stat:0.76 Stability:0.08	Insignificant t-stat:0.8 Stability:-0.07	Insignificant t-stat:0.4 Stability:0.2	Insignificant t-stat:0.36 Stability:0.25	Insignificant t-stat:0.89 Stability:0.03
Korea				Insignificant t-stat:0.76 Stability:-0.07	Insignificant t-stat:0.12 Stability:-0.4	Insignificant t-stat:0.7 Stability:-0.1	Insignificant t-stat:0.19 Stability:-0.3	Insignificant t-stat:0.85 Stability:-0.04
Indonesia					Insignificant t-stat:0.75 Stability:0.09	Insignificant t-stat:0.82 Stability:0.06	Insignificant t-stat:0.79 Stability:0.06	Insignificant t-stat:0.69 Stability:0.15
Malaysia						Insignificant t-stat:0.97 Stability:-0.01	Insignificant t-stat:0.94 Stability:0.01	Insignificant t-stat:0.29 Stability:0.3
Philippines							Insignificant t-stat:0.42 Stability:-0.19	Insignificant t-stat:0.47 Stability:-0.16
Singapore								Insignificant t-stat:0.28 Stability:0.56
Thailand								

Stationarity Test & One Way Direction
Significant & Stable
Insignificant & Stable

Source: Author's calculation based on ADB Statistic Data, 2011

This table shows that all pair relations of inflation similarity have $b_2 \langle 1$ which means that all of the observed countries have stable pair relations of inflation rate. This result explains that all of the observed countries are in stable economic conditions for both short-run and long-run equilibrium. They are on the right track of the regional economic integration process. This is the strongest reason why all of the observed countries must maintain their economic integration in all stages: intra regional trade, investment creation and financial integration. From static or dynamic relation tests this paper finds that all of the observed countries have insignificant statistic indicator ($t_{stat}(b_2)$) except between China and Japan. This means that all of the pair economic relations among the observed countries, aside from that between China and Japan, are dynamic.

Test results on stability and static/dynamic from the ECM analysis explains three important things: (1) that all of these countries are on the right track of their economic integration. (2) Most of these countries' economic integration with China are dynamic, which shows that their concerted effort with China to transform ASEAN's economic integration from a comprehensive real-sector integration (intra regional trade and investment creation) to that of a financial integration. (3) Japan's economic integration with China and the other observed countries are static because of Japan's advanced economic level, showing Japan's leading role in ASEAN+3, moreover that ASEAN+3's main focus has been on financial integration. Japan is waiting for the other countries at the financial integration stage - economic integration's ultimate objective.

The result of the cointegration test as a long-run analysis is described in **Table 5** below:

Table 5

Cointegration Test on Inflation Rate (CPI) of ASEAN-5 Founding Members and East Asian Countries

(China, Japan and Korea)

1988-2008

Johansen Cointegration Test	Indonesia	Malaysia	Thailand	Singapore	Philippines	China	Korea	Japan
Indonesia								
Malaysia								
Thailand								
Singapore								
Philippines								
China								
Korea								
Japan								

	cointegrating
	not cointegrating

Source: Author's calculation based on ADB Statistic Data, 2011

This test shows that all countries are cointegrated in pair of inflation similarity with China. One ASEAN country (Philippines) shows cointegration relations with Japan. Among the East Asian countries, the inflation rate similarity is not cointegrated between Japan and Korea yet both are cointegrated with China. In sum, China plays as the center point for inflation rate similarity cointegration. This fact is similar to EU's experience at which economic regional integration needed a large country in terms of GDP and population size as an engine for its long-run regional economic integration process[7]. The process will succeed when this big country achieves a high GDP per Capita and is classified as a high-income country.

The observed countries are cointegrated with China and have dynamic economic relations in the long-run with her because both ASEAN and China's economic integration is still at the intratrade level which means it is in the short-run, and still centralized on

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[7] EU has Germany as a member state with the largest GDP and population size, acting as the center for EU's regional economic integration process. Yet, different from Germany which is one of EU's richest members (GDP Nominal/Capita), China in Asia is not. However it is likely that if China becomes a high-income country, the ultimate objective of economic integration in establishing a single currency can be successfully achieved. Similarly in ASEAN's case, if Indonesia were to become a high-income country.

real sector (industrial/manufacturing) liberalism. This can be seen in the Figure of each country economic sector. China is an industrial country as described in **Figure 1** below:

Figure 1
Value Added by Sectors ASEAN-5 Founding Members and East Asian Countries
(China, Japan and Korea)
2007
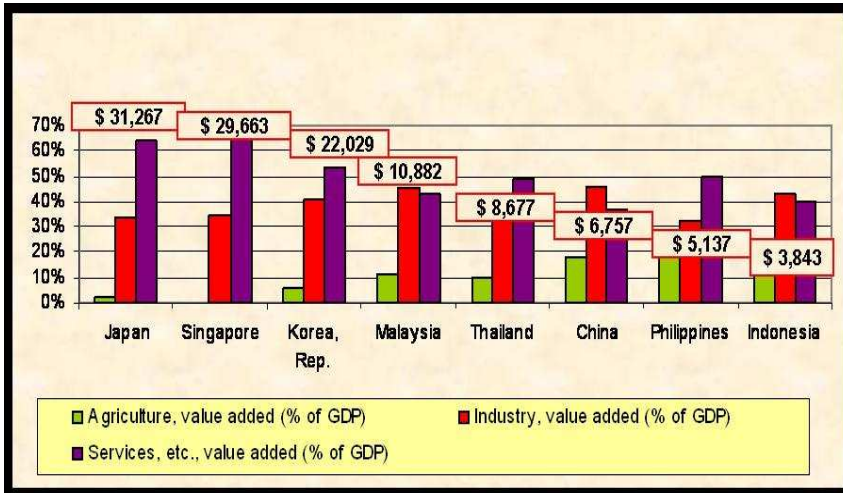
Source: Author's calculation based World Development Indicators, 2007

This supports the argument that FTA+1 (ASEAN China Free Trade Area) is most practical in matching with ASEAN's current condition. Most of these ASEAN countries are cointegrated with China is because of their horizontal integration. A study by Helpman and Krugman (1985) shows that the lower the difference of income per capita between countries, the higher is intra trade among them. A study by Antonuchi and Manzocchi (2005) shows that similar economic levels (GDP) between countries will increase trade motives among them due to the similar taste of products. Study of Kimura and Obashi (2009) proves that China and ASEAN have a similar level of economy (GDP per Capita). For instance Indonesia and Philippines have similar levels to Central China and Thailand has similar levels with East China.

Financial market integration requires comprehensive real sector integration. The absence of this will make financial integration in ASEAN+3 difficult to be achieved. Yet the enlargement of trade and investment relations as a comprehensive real sector economic integration between ASEAN and non-members such as ACFTA is an intermediate objective for the short-run goals. This comprehensive real sector integration is an essential stage to achieve the ultimate objective of regional integration that is a monetary or financial integration with single currency. Therefore the ASEAN financial integration under the ASEAN+3 frameworks are essential for the next stage: a long-run objective of financial integration in Southeast Asia[8]. Recalling the results of the cointegration test in which all the observed countries are cointegrated with China, this

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[8]The AFTA+ is the most suitable step for ASEAN as an open and soft regionalism instead of a Custom Union with its closed and hard regionalism. Here, ASEAN has two types of AFTA+: FTA+1 and ASEAN+3. This paper argues that FTA+1 e.g. ACFTA is more feasible for the short-run and ASEAN+3 for the long-run. ASEAN open regionalism is still in real market liberalization which covers intratrade and investment integration. Financial liberalism is ASEAN's long-run objective as it needs a 'common market' condition in which ASEAN attempts to achieve in year 2015.

paper selects the relation between Yuan and all of the observed countries' exchange rates as well as between Japan (Yen) and Philippines (Peso). The results are described in **Table 6** below:

Table 6
Exchange Rate and Inflation Rate Difference
Yuan China and All Observed Countries
1988-2008

	a	B1	b2	(P-P*) = (b1-b2)
Yuan/Rp	-6.79	0.34	-0.05	0.40
Yuan/RM	0.74	0.00	0.06	-0.06
Yuan/Baht	-1.71	0.02	0.12	-0.10
Yuan/Peso	-1.68	0.12	-0.06	0.19
Yuan/Sing$	1.56	-0.08	-0.06	-0.02
Yuan/Won	-4.69	0.06	-0.19	0.24
Yuan/Yen	-2.82	-0.07	-0.25	0.18
Yen/Peso	0.76	0.11	0.29	-0.19

Source: Author's calculation based on ADB Statistic Data, 2010. Local currency: Rp (Indonesia); RM (Malaysia); Baht (Thailand); Peso (Philippines); Sing$(Singapore); Won (South Korea); Yen (Japan); Yuan (PRC)

These tests show that some relations are negative and some others are positive. A positive relation indicates that increasing inflation rates will stimulate capital outflow and generate overvalue of domestic currency. This condition creates devaluation or depreciation pressures on domestic currency. Yet it shows that both pair countries have 'substitution' relation which indicates long-run 'competition' trade relations among them. This also explains why the rejection of the idea of China-ASEAN Free Trade Area (CAFTA) mostly comes from countries that have been indicated to have competing trade relations with China. On the other hand, a negative relation indicates that the countries are in 'complementary' relations. The results of trade relations among the observed countries in pair form relations are described in **Table 7**[9] below:

Table 7
Relationship Characters on Exchange Rate and Inflation Rate Difference to
Trade Relations
1988-2008

Nominal ER	P-P*	ER	Character
Yuan/Yen	0.18	overvalue	substitution
Yuan/Peso	0.19	overvalue	substitution
Yuan/Won	0.24	overvalue	substitution
Yuan/Rp	0.40	overvalue	substitution
Yuan/Sing$	-0.02	undervalue	complementary
Yuan/Bath	-0.10	undervalue	complementary
Yuan/RM	-0.06	undervalue	complementary
Yen/Peso	-0.19	undervalue	complementary

Source: Author's calculation based on ADB Statistic Data, 2010

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[9] The sign is assessed based on the cross-elasticity of price theorem, Microeconomics

This paper finds that by using CPI as the inflation rate similarity approach, China is the center of economic cointegration among the ASEAN+3 members. From the last table this paper shows that for long-run relations, China will compete with Japan, Philippines, Korea and Indonesia and have complementary trade relations with Singapore, Malaysia, and Thailand.

7. Conclusion

Stationarity analysis shows that all of the observed countries have significance in pair inflation similarity relations. This indicates that no 'spurious regression' exists. Stationarity test using a ADF Test finds that each inflation rate has its own level in rejecting non-stationer hypothesis. Therefore a cointegration analysis on inflation similarity is feasible. These show that the inflation similarity is the appropriate variable choice for both short and long run analysis.

A short-run analysis with ECM finds that all of the observed countries have stability of pair inflation similarity relations. This means that all of them are on the right track in their economic regional integration process and may continue their economic regional integration from am intra regional trade and investment creation to that of a financial integration. This enlargement must be done through an 'open-regionalism' principle involving non-members, particularly the East Asian countries. This paper finds that in practice and in achieving the short-run intermediate objective, ASEAN should adopt the AFTA+1 framework (eg: ASEAN China Free Trade Area) while for the long-run ultimate objective ASEAN requires the ASEAN+3 framework that focuses on financial integration.

The ECM analysis finds that China has dynamic relations with all observed countries except Japan. This shows that China and the other members run together dynamically to achieve financial integration, whereas Japan is waiting at the 'finish-line', at the financial integration stage. This paper argues that other ASEAN members revealed in this study such as Brunei Darussalam, Cambodia, Laos, Myanmar and Vietnam in the short-run also have dynamic relations with China while in the long-run all of ASEAN member states will join Japan in establishing a financial integration.

Long-run analysis with Cointegration test using the Johansen Test proves that all the observed countries have cointegration relation of inflation rate similarity with China. This paper uses cointegration results to select pair relations among the observed countries. This is used to analyze the relation between inflation rate and exchange rate. This result is applied to find long-run trade relations among them. This paper finds that Japan, Korea, Philippines and Indonesia have substitution trade relations with China. This indicates a 'competitive' trade relation among them. This paper finds complementary trade relations exist between China and Singapore, Thailand and Malaysia. China has potential to build a regional production and trading network in these countries and at the same time must compete with Japan, Korea, Philippines and Indonesia.

Author Statement:

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