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The Convergence Clubs of Regional Comprehensive Economic Partnership (RCEP) Countries: A Wise Choice?

(Kelab Penumpuan bagi Perkongsian Ekonomi Komprehensif Negara-Negara Serantau (RCEP): Satu Pilihan yang Tepat?)

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ABSTRACT

This investigation used the non-linear approach on the income convergence issues of the Regional Comprehensive Economic Partnership (RCEP) countries to empirically evaluate the income convergence during the 1997-2015 period. Alternatively, if two or more nations showed some degree of income convergence, it can be useful to identify the uniformity in economic performance. Because of the excessive output inequalities between members and regions, a full aggregate convergence failed to be established, yet the study further facilitates the endogenous decision of clubs convergence (sub groups). Evidence from income convergence indicated that a group of developed nations, particularly Singapore, Japan, New Zealand and Brunei comprised of the core clubs, Malaysia, China, Thailand and Indonesia, known as newly industrialised economies (NIES's) clustered into a group. Finally, the remaining countries, converged to form another club. Seven clubs convergence implied that the RCEP members experience weak convergence between themselves which illustrated relatively substantial dissimilarity in its economic structure as a whole. Despite the dissimilarity, the speed of convergence indicated possible catching up within member countries, in converging towards a similar transition path of economic growth. Thus, indicating further realisation of economic corporation and stronger integration amongst the RCEP members now and perhaps in the future.

Key words: RCEP; ASEAN; GDP per capita; convergence

ABSTRAK

Kajian ini menggunakan pendekatan non-linear terhadap isu konvergen pendapatan untuk negara-negara Perkongsian Ekonomi Komprehensif Serantau (RCEP) bagi menilai konvergen pendapatan secara empirikal pada tahun 1997-2015. Secara alternatif, jika terdapat dua atau lebih negara yang menunjukkan konvergen pendapatan pada mana-mana tahap, maka ia penting untuk mengenal pasti tahap keseragaman pencapaian ekonomi negara terbabit. Disebabkan ketidaksamaan tahap pengeluaran di antara negara dan serantaunya, konvergen secara agregat tidak dapat dicapai namun kajian selanjutnya menunjukkan wujudnya penentuan kelab konvergen (sub kumpulan). Bukti kajian menunjukkan bahawa negara-negara maju seperti Singapore, Japan, New Zealand and Brunei telah membentuk kelab utama. Manakala,kelab yang kedua terdiri daripada Malaysia, China, Thailand dan Indonesia, yang dikenali sebagai Ekonomi Perindustri Baru (NIE's). Negara-negara selebihnya pula, membentuk, kelab-kelab yang lain. Menurut kajian ini, terdapat tujuh kelab konvergen yang menunjukkan daya konvergen yang lemah di antara negara-negara RCEP. Ini secara kasarnya, menandakan perbezaan ketidaksamaan yang besar di dalam struktur ekonomi neara-negara RCE. Namun, tahap kelajuan konvergen menunjukkan terdapat kemungkinan untuk negara-negara ini saling mengejar untuk mencapai tahap konvergen ke arah laluan peralihan pertumbuhan ekonomi yang sama . Dengan ini, selanjutnya menunjukkan realisasi kerjasama ekonomi dan integrasi yang lebih utuh di masa sekarang dan hadapan.

Kata kunci: RCEP; ASEAN; GDP per kapita; Konvergen

INTRODUCTION

The economic convergence concept is defined as where the domestic economies display growing similarities in their performance patterns . The hypothesis of convergence specifies that in comparison with developed countries, impoverished nations with comparatively initial lower per capita, its GDP grow quicker so that income levels converge across nations over time. For policy direction of Regional Comprehensive Economic Partnership (RCEP) economies to be an exclusive advantage, it is essential to experience some sort of "convergence" among the participant nations. Economic convergence can be in many forms, for example in terms of GDP per capita, banking, financial and trade. Some level of similarity in its performance is essential as an

indication of possible policy union. In other words, if such economies are exposed to economic shocks, it shall however, move towards a similar path. This indicates some degree of convergence exists in the economies. Even though there are income performance variations, the economic growth of developing and developed economies will ultimately converge, as stated by the income convergence hypothesis. Asian economies faced many challenges during the 1990s. In the East Asian regions, the speedy progress of regional economic and various global trends had switched the country`s target into integrating its cooperation between economic and financial sectors. Due to the North American Free Trade Area (NAFTA) foundation in 1994; the Asian financial crisis in 1997; appropriation of a common currency of Euro in the European Union (EU) in 1999, the East Asian economies have become extremely vulnerable to trade policies and protectionism in the advanced nations. The incidence of the Asian financial crisis demonstrated the extreme susceptibility of the region to external influences, particularly the fluctuations of exchange rate. This is due to the expanded protectionism policies resulting from the formation of EU and NAFTA. In an attempt to deal with such external challenges, the East Asian economies has established their own regional association. Considering the possible convergence path amongst members, the study will introduce potential prospects for enhancing economic collaboration and integration between the Asian economies, specifically members of RCEP, for a sustainable economic growth in the long-run.

The Regional Comprehensive Economic Partnership Agreement (RCEP) is an economic agreement between ASEAN and 6 other FTAs, such as Australia, China, India, Japan, Republic of Korea and New Zealand, which is comprehensive, high-quality and mutually beneficial economic partnership. During the East Asian Summit in 2012, RCEP was formally introduced. With a total 3.5 billion people, five major market growth drivers that include China, Japan, Republic of Korea, India and ASEAN, the globe's largest free trade association, formed RCEP. The core objectives of RCEP is to produce a balanced economic growth and deeper integration between its participants beyond the traditional practise of free Trade agreements in ASEAN. The RCEP is accounted for approximately half of the global population with GDP of USD22.4 trillion or 30.6% of global GDP, also an overall trade amount of USD11.9 trillion and overall inflows of FDI amounting to USD329.6 billion. According to Leal-Arcas (2013) and Das (2014), RCEP is aiming to reinforce the ASEAN hub for further Asia-Pacific regional framework by strengthening on-going engagement that has already been obtained within ASEAN and its Free Trade Agreement participants. Lewis (1956) stated that, a country needs to concentrate on the (domestic) transformation of its economy as it is passing through a critical cycle or 'stages which is the structural transformation (or 'stage of development') models. Moreover, the consequences of gradual reform strategy, can lead to the determination of a non-linear economic growth. To strengthen the growth and liberalize the so-called 'financially repressed economy', a financial transformation was formulated by the government in these economies (Habibullah & Smith 1997). In fact, the GDP per capita of the East Asian economies in terms of data generating process are non-linear (Liew & Ahmad 2007; Liew & Lim 2005). The role of technological progress in growth is another non-linear growth model that is heavily emphasised. Lucas (2000) stated that the model concentrates on technologically developed countries to developing nations. Generally, without any obstacle to the technological diffusion, developed and developing nations would progressively converge in income per capita. The speed of adoptions of different countries in RCEP is distinct, which will lead to non-linear growth paths (Fiaschi & Lavezzi 2003). By applying such approaches, the fundamental concentration is to assess the circumstances under which developing nation's income catch up with developed countries or on the other hand, diverge. Having to look into the possible convergence path among the members will indicate promising prospects for deepening economic cooperation and integration amongst the Asian economies, specifically members of RCEP for their long-run sustainable economic growth.

Thus to provide meaningful outcomes, this investigation focuses to consider the presence of income convergence or divergence of ASEAN + 6FTAs by applying the non-linear methodology. Phillips and Sul (2007b) stated that by using standard panel stationarity tests, the investigation of either growth convergence or growth determinants, within technological heterogeneity is invalid. Firstly, when multiple equilibria occur, these experiments ignore to identify convergence. There are theoretical and empirical evidence in the growth literature to confirm the convergence club. Hobijn and Frances (2000) as well as Durlauf and Johnson (1995) contributed empirical confirmation of club convergence. Secondly, co-integration and unit-root tests may not 'capture' the convergence, if the applicable data come from a transitional dynamics period. Thirdly, by using co-integration and unit-roots analyses may contribute to misleading outcomes, if the investigator combines steady-state and transitional data, assuming that two nations appear to converge to the same steady state and that they are likewise near the steady state. Moreover, growth is non-linear, which has been revealed in the economic growth literature. In that sense, accepting and considering per capita GDP as linear may lead to misspecification error and false policy implications. As Asian economies experienced various phases of advancement, the transition path in economic achievement may be remarkably varied across countries. Hence, to identify convergence in transitional dynamic economies by using the standard time series

framework may not be convenient. Our investigation recommends that the essential character process of the growth is non-linear. This is a vital point to mention, as the investigation of either growth convergence or determinants of growth under technological heterogeneity, by standard panel stationarity tests is not accurate. Durlauf et al. (2005) contended, that growth econometrics is yet in its inception and it is required to establish modern econometric techniques to investigate the convergence hypothesis that can evaluate the transitional dynamics of growth paths as well as the long run convergence across countries. In line with this consideration, the investigation of convergence, contributed by Nahar and Inder (2002) and Phillips and Sul (2007a) contributed a resolution to the requirement of unit root and co-integration. The technique is powerful in time series stationarity properties within investigation. For instance, it does not depend on any specific expectations regarding trend stationarity or stochastic non-stationarity. It depends on a relatively simple formation of a non-linear time varying factor model that can group countries into clusters. Therefore, failure in identifying convergence may indicate club convergence instead of absolute divergence.

Although in comparison with ASEAN, the economies of ASEAN + 6FTAs have proven to gain more trade advantages, a vital issue that need to be resolved is whether these nations will possibly remain to be appropriate members of RCEP. Though there can be many criteria in determining the appropriateness of possible member for a regional block trade, is important to identify some level of similarity in terms of its economic performances. Therefore, the objective of the study is to provide a comprehensive view on income (per capita GDP) convergence of RCEP countries. Alternatively, it can be favourable to establish an economic union, if two or more nations reached a satisfactory degree of income convergence. Thus the specific objectives of this study is to identify any proof of convergence corresponding to the "log t" algorithm test. Secondly, is to detect convergence clubs (reject null hypothesis). By doing so, the study is able to find each particular countries that share the same economic characteristics that enable them to share the same impact of asymmetric economic shocks. With that, the government can accordingly design the economic policy.

LITERATURE REVIEW

In the convergence literature, the most utilised conceptions are: beta-convergence and sigma-convergence. Beta convergence states that the impoverished nations is supposed to expand quicker than developed countries, whereas sigma convergence expects a decline in income disparity between impoverished and developed countries. Relative convergence states that countries advance in steady state at the same percentage and the full convergence entails the identical steady-state income level. Evans and Karras (1996), Evans (1998), Kutan and Yigit (2005), Guetat and Serranito (2007), Siklos (2010), Lopez and Papell (2012) performed chronological sequence analysis of unit root and co-integration. Phillips and Sul (2003) contended that as countries may produce transitional divergence on their path towards a universal steady state so that cross-sectional divergence is likely a transitory circumstance. Moon (2006), did not find any confirmation of β-convergence of GDP per capita between 10 East Asian nations, namely China, Hong Kong, Indonesia, Japan, Malaysia, Singapore, South Korea, Taiwan, Thailand, and the Philippines. However, evidence of σ-convergence was determined which indicated that the disparity tendency was overturned after 1988, when most of the East Asian developing nations turned to catch up with Japan. The author applied two traditional methods: σ-convergence and β-convergence during the period 1960 and 2000. By employing data from 1967-2005, Jayanthakumaran and Lee (2013) found ASEAN-5 nation`s relative per capita income series were persistent with stochastic convergence and beta-convergence. The authors investigated income per capita disparity across ASEAN-5 founding nations by an analysis of time-series for stochastic convergence with unit-root tests in the existence of two endogenously-controlled structural breaks, and β-convergence.

Bernard and Durlauf (1996), explored two types of convergence testing which are the cross-section and time-series procedures. The cross-section procedure tests the correlation between primary levels of GDP per capita with growth rates of countries in the group. Convergence is suggested to appear if a negative correlation is formed between the average growth rate and the introductory income. Based on Galton's fallacy, the cross-country growth has been condemned by Quah (1993). Alternatively, the time series properties investigate the variations in GDP per capita between nations. Convergence in the time-series structure indicate that variations in income are consistently transitory and that the variations between any combination of countries converges to zero as the long-run forecast expands infinitely. In a time-series aspect corresponding to Bernard and Durlauf (1995), the so-called stochastic convergence asks whether permanent moving of one nation's income percapita are accompanied with stable moving of another nation's income, that is, it studies, whether common stochastic factors means, and how steady the variations across nations are. Therefore, stochastic convergence suggests that variations in income across nations cannot consist of unit roots. In this regard, Bernard and Durlauf (1995, 1996) recommended an analysis for convergence that relies on the assumption of unit root and co-integration in time-series.

By applying a one-sided log T-test, convergence of null hypothesis against the no convergence of alternatives hypothesis and convergence of club, between the period 1870 and 2001 to study inequality in per capita GDP, Phillips and Sul (2009) utilised three varies samples, such as, data from 48 U.S states, 18 western OECD nations, 152 nations published in the Penn World Tables. The outcomes for 48 U.S states pointed out that the paths of transition for every state show to converge, in terms of income per capita, the OECD sample showed divergence until World War II however, the paths of transition of per capita income turn out to converge around 1950. By applying the same method between the period 1970 and 2003 for 152 PWT nations, four club convergence and one divergence group were established by these nations but no proof of overall convergence as well. By applying Philips and Sul (2007) methodology for studying convergence of per capita real output across 14 European nations between the period 1980 and 2004, Apergis, Panopoulou, and Tsoumas (2010), discovered no proof of convergence of GDP per capita between these periods; nevertheless, the authors formed two club convergence. This was because of a considerable heterogeneity in the underlying growth influences. By using Phillips and Sul (2007a) and utilising data from 1952-2008, Herrerias and Ordonez (2012) analyses convergence in per capita income in China`s eight groups of provinces and found convergence in income per capita in five groups of provinces in China. Nevertheless, because of their various levels of labour productivity and capital intensity, three provinces, constituted a sub-group divergent. Similarly, Ghosh et al. (2013), performed per capita income convergence across 15 of India's major states both at the aggregate and sectorial levels during the period 1968–2008 and both at aggregate and sectorial levels, the authors found substantial divergence. However, three clubs in the industrial level and both the agriculture and services sectors, two club convergence were presented by the authors. Vu (2015) determined three club convergence between APEC member countries by analysing inter country output inequalities from 1990-2011.The authors applied the Phillips-Sul's technique and discovered that the countries' per capita GDP tended to diverge at aggregate level.

Zhang (2003) applying the model for assessment club convergence suggested by Chatterji and Dewhurst (1996), to investigate, "whether East Asian economies can catch-up with Japan?" for the period of 1960-1997. The author found the presence of multiple convergence equilibria with strong and robust evidence between the ASEAN5 and China, Korea, Hong Kong and Taiwan. Between two convergence clubs, the strong club including Japan, Hong Kong, Singapore, Malaysia, Taiwan and the Philippines and weak club consists of China, Indonesia, Korea and Thailand. By applying data from 1977-2004 and panel unit root method, Carmignani (2007) identified that the ASEAN5 nations diverged from the regional mean. At the same time, Alavi and Ramadan (2008) failed to identify convergence in income per capita across any of the ASEAN-10 participant nations. The authors applied the Johansen Multivariate Co-Integration Test for the period of 1970-2003. By applying both linear and non-linear unit root experiments, A.M. Dyg-Affizah (2011), examined the income convergence hypothesis. With two powerful experiments in which stationarity is not required in the data generating process recommended by Nahar and Inder (2002) and newly introduced by Phillips and Sul (2007a), further analysis was undertaken by applying tests for convergence. Within the Asian economies with Japan (except for Singapore), the outcomes from the Nahar-Inder test showed divergence, nevertheless, all other Asian countries converge towards Japan was found from the Phillips-Sul Test. The author concluded that the Phillips-Sul test for convergence is more convenient for such transition economies, since the Asian economies are in different phases of development. Therefore, utilizing the unit root and co-integration test for transitional dynamics in the sample may be inappropriate for convergence analysing. In another study, Dyg-Affizah (2011), attempts to bridge the gap between the macroeconomic and micro economic matter. The dissertation examined structural convergence at macro issues at the overall level of productivity convergence and at micro issues of the industry level convergence. Substantial divergence at the aggregate level, in income convergence was found from the investigation and four clubs were shown by the clustering. For robustness, the application considers particularly productivity, labour shares and value added structural convergence. Divergence was found on productivity and value added shares from the tests of convergence which contributes to possible formation of club convergence. Moreover, in three sectors, namely manufacturing, mining and construction, convergence in aggregate was achieved by the labour share. As well the study found, within the manufacturing sector in Asian, strong sectorial club convergence, but for services, agriculture, and construction also as for mining is comparatively poor convergence club. Finally, the author concluded regarding the candidate appropriateness for the AEC (Asian Economic Community) Japan, Korea, India, Taiwan, Hong Kong, and ASEAN is yet a controversial matter though the integration process is steadily regulated in Asian.

METHODOLOGY

In this investigation, the prospect of the ASEAN+6FTAs nations to establish RCEP was investigated by applying the innovative method recommended by Phillips and Sul (2007a, 2007b, 2007c). Based from many elements that can be concluded for the success of an economic

union, one of it is to ensure there are some degree of similar economic path and performance amongst the member countries. As to whether the participant nations of ASEAN+6FTAs are the proper candidates for the RCEP, it is essential to ensure that there exists income (per capita GDP) convergence within the sample. If there exist such convergence as said, thus we can conclude that shocks will be symmetrical between the member countries. The methodology by Phillips and Sul (2007a), which is on the basis of a non-linear time-varying factor model permits to identify convergence even in situation of transitional heterogeneity or transitional divergence, where alternative mechanisms such as stationary tests fail. The particular choice for this investigation was accustomed by the uniqueness of the applied region. In our study, we examined the possible club convergence for RCEP countries. Thus with individual heterogeneity and probable time path (components of countries in transition), the most appropriate approach for this situation is the method of nonlinear time varying factor model by Phillips and Sul (2007. This technique is preferred due to the following purposes: (i) no exact expectations regarding the involved variable stationarity and/or the presence of common factors are required although this analysis of convergence could be explained as an asymptotic co-integration analysis that does not rely on the inadequate sample issues of unit root and co-integration testing; (ii) this technique is on the basis of a relatively common type of a non-linear time varying factor model which has taken into account that nations experience transitional dynamics, while it withholds from the homogeneous technological progress hypothesis. (Apergis et al 2010).

THE NON-LINEAR FACTOR MODEL

As model factor analysis provides the series decomposing into common and country-specific factors in a particularly frugal manner, it is an essential mechanism for investigating data sets with considerable time series and cross-section measurements. Panel data are usually decomposed by:

$$X_{it} = g_{it} + a_{it} \tag{1}$$

In equation (1), X_{it} defined as log income per capita for nation I and at time t, where $i = 1 \ldots N$ and $t = 1 \ldots T$. It is common that X_{it} can be decomposed as systematic, g_{it} and transitory, a_{it} into two components. In equation (1), g_{it} and a_{it} may contain both common and idiosyncratic factors

$$X_{it} = \left(\frac{g_{it} + a_{it}}{\mu_t}\right) \mu_{it} = \delta_{it}\,\mu_t \text{ for all country, } i \text{ and time, } t \tag{2}$$[1]

By using Equation (2), the common and idiosyncratic factors in the panel can be separated by Phillips and Sul through factorising the common stochastic trend component. Equation (2) specifies that two time varying components; common, μ_t and idiosyncratic δ_{it} is created by decomposing X_{it}. Between X_{it} and the common component, μ_t, the factor δ_{it} represents a measurement of distance by which the error term and the unit specific component is dissolves and hence serves as the idiosyncratic component which is changing over time. μ_{it} represents as common trend component in panel and considered to possess various deterministic or stochastic trend attitude that influences the transitory element $a_{it,}$ as $t \to \infty$.

The non-stationary transitional nature of factor loadings is suggested in semi parametric form for specifying the null hypothesis of convergence, wherein every coefficient converges to some factor of a certain constant;

$$\delta_{it} = \delta_i + \frac{\sigma_{i\xi_{it}}}{L(t)t^{\alpha}} \tag{3}$$

Where δ_i is fixed, across I, ξ_{it} is iid (1, 0), idiosyncratic scale parameters is denoted by σ_i, slowly varying function is represented by $L(t)$, and $L(t)$ =logt that is why $L(t) \to \infty$ as $t \to \infty$.

The rate at which the cross-sectional differences decaying to 0 is denoted by the parameter α. For all $\alpha \geq 0$, δ_{it} converges to δ which is ensured from the formulation above.

THE TRANSITION PATH

Since the time-varying factor loadings δ_{it}, estimation provide fact about transition behaviour of specific panel units so that it is a necessary concern of the strategy recommended by Phillips and Sul (2007).

By applying its corresponding form, a smooth and effective method to obtain fact about δ it is as regard:

$$h_{it} = \frac{x_{it}}{\frac{1}{N}\sum_{i=1}^{N} x_{it}} = \frac{\delta_{it}}{\frac{1}{N}\sum_{i=1}^{N} \delta_{it}} \tag{4}$$

The loading coefficient δ_{it} is measured from equation (4), which is in association to the panel average. For the economy i, alike δ_{it}, h_{it} even traces out transition path though presently produces one is in association to panel average. Over time, corresponding to the average, a particular path for every i is traced by variable h_{it} for this reason it is denominated as path of transition. Together, from the common steady state growth path μ_t of country i's relevant deviation is as well measured by h_{it}.

Therefore, path of transition h_{it} reflect divergences from μ_t by forming, the average of cross-section of the corresponding path of transition of economy i equalise unity (Figure 1 Transition Path of per capita GDP). Moreover, the corresponding transition path, h_{it} converges to unity and the cross-sectional variation (H_t) of the

corresponding transition path converges to zero, if panel units converge and all the factor loading δ_{it} approximate to a fixed δ. Which is as follows:

$$H_t = \frac{1}{N}\sum_{i=1}^{N}(h_{it}-1)^2 \rightarrow 0 \text{ and } t \rightarrow \infty \quad (5)$$

When testing convergence approaches, it suggests that the application is according to long run behaviour in the macroeconomic phenomena. Thus, it is usually desirable to eliminate business cycle factor by using smoothing technique to obtain h_{it} from X_{it}. Accordingly, by incorporating a business cycle influence k_{it} equation (2) can be written as:

$$X_{it} = \delta_{it}\mu_t + k_{it} \quad (6)$$

Due to the adaptability and the point that Hodrick and Prescott (1997) smoothing filter quest simply the addition of expanding the above, the cross sectional averages in (4) showed to the assessed transition path computed as:

$$\hat{h_{it}} = \frac{\hat{x}_{it}}{\frac{1}{N}\sum_{i=0}^{N}\hat{x}_{it}} \quad (7)$$

Where $\hat{h_{it}}$ are the filtered income per capita series. Within the expectation, in small samples, the panel average $N^{-1}\sum_{i=0}^{N}x_{it}$ is positive also asymptotical that is performed for many related economic time series for instance, prices, GDP or different gross.

THE LOG T-TEST

By taking into consideration the time varying factor statement from equation (2) and depending on the log t convergence test that is depending on a simplistic time series regression, Phillips and Sul (2007a, 2007b, 2007c) proposed a unique convergence test and clustering algorithm. The null and alternative hypothesis can presently be established.

Null hypothesis, H_0: $\delta_i = \delta$, where, for all i, $\alpha \geq 0$, which indicates convergence for all nations.

Alternative hypothesis H_a: $\delta \neq \delta$ here, for some i and/or $\alpha < .0$ indicating that no convergence for some nation.

After estimating transition path, the variation ratio of cross section H_1/H_t is to be computed by acknowledging H_t as:

$$H_t = \frac{1}{N}\sum_{i=1}^{N}(\hat{h_{it}}-1)^2 \rightarrow 0 \text{ and } t \rightarrow \infty \quad (8)$$

The transition distance H_t has a limiting form which is showed by Phillips and Sul (2007):

$$H_t \sim \frac{A}{L(t)^2 t^{2\alpha}} \text{ as } t \rightarrow \infty \quad (9)$$

Where, positive constant is denoted by A, slowly varying function is explained by $L(t) = \log(t+1)$, and the speed of convergence is α. Usually, after removing a fraction (r) of the sample, equation (10) is run. Phillips and Sul suggest at some point,t become (rT) ,where (rT) represents the integer part of (rT), and $r = 0.3$.For examining the convergence null hypothesis discussed above, log T-test is carried out as regards:

$$\text{Log}\,(H_1/H_t) - 2\log L(t) = \hat{c} + \hat{b}\log t + \hat{\mu_t} \quad (10)$$

Here, variation of cross-section is H_t, at the beginning of the sample, variation ratio of cross-section is explained by H_1/H_t, over the corresponding difference for each stage of period t, H_1 (i.e. H_t at $t = 1$), which means, H_t (t,...,T), from the common limit the distance of the panel is measured by H_t/H_1.

At the same time, $L(t)$ = log (t) and $r > 0$. The regression presented in equation (10) is regarded as log t regression due to the log t regressor.

By applying the traditional t-statistic, if, $t_b < -1.65$, we reject the H_0 of convergence. It can be concluded panel convergence, when the t-statistic, t_b recommends that is else positive otherwise equals to 0. On another side, we reject the H_0 of convergence, when t-statistic, t_b recommends that is negative and significant.

DATA

In this investigation, we concentrate on ASEAN+6FTAs nations, namely Brunei, Cambodia Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore and Thailand, Vietnam and six FTAs of ASEAN community, including Australia, India, Japan, China, South Korea, New Zealand. Data for per capita GDP for each country are collected from the World Development Indicator (World Bank). In this application, we applied annual data from 1997 to 2015, as in 1997, Association of Southeast Asian Nations and the three leading economies, particularly, China, Japan and South Korea established ASEAN+3 grouping and when the ASEAN Australia-New Zealand Free Trade Agreement (AANZFTA) in 2010, the ASEAN-India FTA took place, a step further to foster closer economic collaboration and promote the economic integration process within ASEAN. All variables were transformed into logarithm for investigation.

EMPIRICAL RESULTS AND DISCUSSTIONS

The empirical findings of this study is presented in this section. To decide whether there is income convergence for the RCEP members in the investigation, the convergence test was executed for per capita GDP. To suggest that there prevails structural convergence in the RCEP nations, per capita income should converge. In the existence of structural convergence, the member exhibits identical development stages and may converge to a structural 'steady state' .The presence of structural

convergence amongst the country groupings would likewise recommend that economies at the domestic and regional/industrial level are approximately identical and synchronised.

FULL PANEL CONVERGENCE

Initially, the overall convergence test on the aggregate level is executed on the RCEP countries per capita income by applying the log T-test. In Table 1 and Table 2, Panels A and B present the outcomes of the panel convergence for two main analyses in the investigation. For the absolute test of convergence in the period of sampling of 1997 to 2015, with tb = –2.900239, the per capita income appears divergence. Based on time series data, empirical regression of log t test ignored r% of the data (Phillips & Sul, 2007a: 2007b: 2007c). Therefore, arrangement of data concentrates on the following portion of the sample data. In terms of both sizes and power, $r = 0.311$ is set apart as a suitable option (Phillips & Sul 2007a). For the RCEP countries, period of 2003-2015, rejection of null hypothesis occurred for absolute convergence. The outcome supports prior conclusions that present divergence between wide groups of nations consisting of both advanced and emerging nations (Aldy 2006; Nguyen-Van 2005; Stegman & McKibbin 2005).

Panel A: Per capita GDP (Income convergence)

TABLE 1. Results of Convergence (Log T test)

Country	$\hat{b}$	Remarks
RCEP member countries (Full)	–2.900239*	Divergence

Rejection of null hypothesis for the complete sample of convergence does not indicate, in the sub-group of the RCEP countries, there is no indication of convergence. In investigating the behaviour of per capita income of nation is related to the average of the panel, Figure 1, illustrates the relevant transition path of each nation's GDP per capita. Path of Transition h_{it}, occupies the growth course for each nation, related to the average of the sample, indicate the related nation's GDP per capita is above cross sectional average and contrarily, if the h_{it} line is above one. The relevant path of transition leads to unity for all nations, within the convergence assumption of the entire panel of nations. Furthermore, the slope of each curve can be represented as the rate of growth of per capita GDP for the related nation, corresponding to the cross sectional averages. From Figuire-1, the overall panel appeared to divergence across the participant nations, hence there is no tendency to unity of the transition paths .However, the opportunity of the presence of convergence clusters around the separate stages of equlibra or steady state as can be determined from Figure 1. By indicating that the overall convergence test for GDP shows divergence, the subsequent object to consider is the country clustering. Find out the core countries, number of clusters in the selected RCEP countries per capita income and are there any economies that diverge from the remaining of the groups? Alternatively, each member in the group is allowed to converge to a particular equilibrium or even diverge independently from the rest of the participant nations. Under the assumption of the convergence club in which members in the investigation is allowed to converge in particular equilibrium, the comparative transitional paths of each club shall converge to a particular constant.

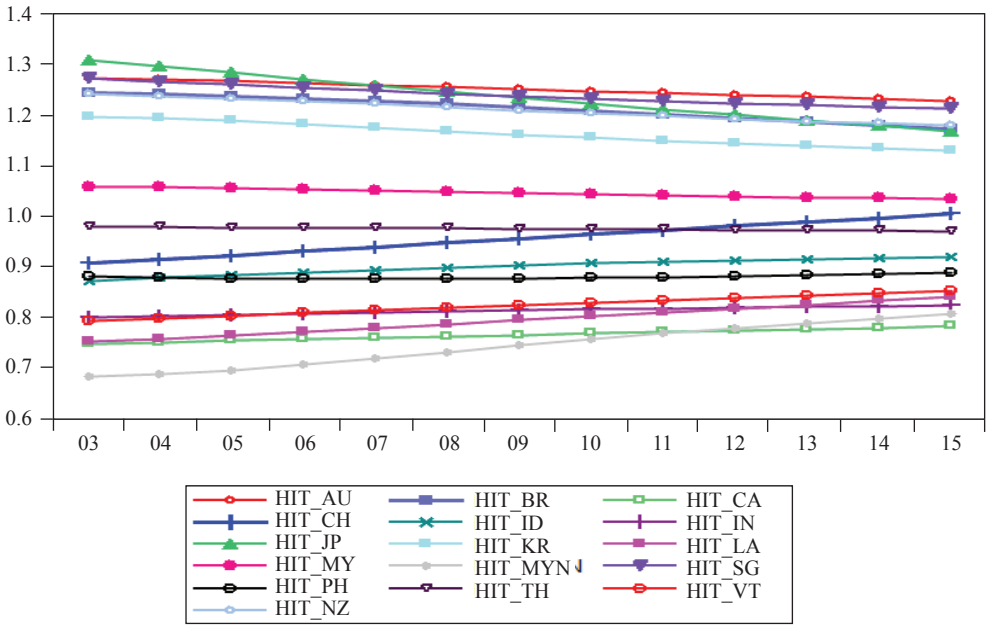

FIGURE 1. Transition Path of GDP, 1997-2015

From the log t regressions, Table 2 comprise of all related t-statistics. The test of convergence on per capita GDP has appeared in seven club convergence (Table 2). A group of rich countries, namely Singapore, Japan, New Zealand and Brunei comprised of the core club. These nations are the industrialised countries. Malaysia, China, Thailand and Indonesia as the newly industrialised countries clustered into a group. Finally, Vietnam, Laos, India, Myanmar and Cambodia, these developing countries form another group, converging to each other's. Seven convergence clubs implies that the RCEP economies in the investigation yet indicate weak convergence among them which illustrate relatively substantial dissimilarity in its economic framework as an entity. The path of transition (Figure 1) likewise confirms the occurrence of the formation of seven clubs convergence. We can summarise that as RCEP economies experiences different development stages, the transition path in economic behaviour may be remarkably dissimilar among the participant nations. Therefore, analysing for convergence applying the non-linear structure is convenient to identify convergence in transitional dynamic economies, such as the RCEP nations.

CONCLUSION

In enhancing economic partnership and integration between the ASEAN+6FTAs, the findings of convergence indicated that these countries made the right move in joining RCEP. Even though, they were experiencing different level of catching up processes, yet exhibited possible chances of convergence at its level. Convergence was the most prominent economic approach being investigated by economists and researchers for the last two decades, however, with mix results. Government around the globe is concerned about the growing income inequality and huge gap between the lower income countries and the advanced nations. Therefore, the challenge is to investigate on how and what pace shall the developing nations converge with the advanced nations. These could lead to significant policy implications for both nations, particularly the developing nations. The challenges continued, as to whether the RCEP member are the suitable candidates to establish a regional economic block Previous history has demonstrated that economic integration is a gradual and scrutinised procedure. For example, the formation of European Union took 50 years to materialise with only 12 representatives at the beginning of its establishment. It is gradually adding each representative at a time as it fulfils the Maastricht Criteria. The development of RCEP integration is under progress even though its shows to be relatively slow. For the sub-group of RCEP members that show weak convergence or divergence, further comprehensive growth policies are required to stimulate stronger integration with other participant. The outcomes are remarkably significant to the policy makers as to suggest the degree of economic similarity/dissimilarity across the participant nations.

The ASEAN+6FTAs economies had encountered various phases of economic advancement and the economic integration process experienced by the ASEAN is a long and winding pathway. The convergence analysis encourages us to suggest more economic endeavours

Panel B: Club Convergence

TABLE 2. Results of Clubs Convergence for Per Capita GDP

Rank	Member	Step1	Step2	Step3	Step 4	Step 5	Step6	Step7	Club	Remarks
1	AUS	Base							1	Diverge
2	SGD	–7.5	Base	Core					2	Converge
3	JPN		–0.6	Core					2	Converge
4	NZ		0.51	Core					2	Converge
5	BRN		0.93	Core					2	Converge
6	KR		–4.2	Base					3	Diverge
7	MYS			–2.4	Base				4	Diverge
8	CHN				6.54				4	Converge
9	THD				11.8				4	Converge
10	IDN				10.0	Base			4	Converge
11	PHN					–4.2	Base		5	Diverge
12	VNM						12.4		6	Converge
13	LAO						9.41	Base	7	Converge
14	IND							3.35	7	Converge
15	MYN							8.38	7	Converge
16	CAM							8.76	7	Converge

and potential economic policies as to diminish the disparity amongst new participants of the ASEAN and 6-FTAs members. The possible policies can assist in the declining of economic inequalities across RCEP regions. The regional redistribution is vital to cater for the shocks imposed by expanding economic integration. The presence of club convergence obtained in the study will facilitate RCEP in arranging the allocation for cohesion policy.

NOTE

[1] In standard neoclassical growth model, for heterogenous technology development, log income per capita, log y_{it} can be written as: Log y_{it} = log y^*_{it} + (log y_{io} – log y^*_i) $e^{-\beta_{it}}$ + log A_{it} .= a_{it} + log A_{it} (Phillip and Sul, 2007). Log A_{it} can be further decomposed by, log A_{it} = log A_{io} + γ_{it} log A_t.Where, in terms initial technology accumulation, A_{io} is current technology for country *I* and from available advance technology log A_t, γ_{it} log A_t capture distance of country *i* technology. If advance technology log A_t assume to grow a constant rate a;

$$\text{Log } y_{it} = \left(\frac{\alpha_{it} + \log A_{io} + \gamma_{it} A_t}{\alpha_t} \right) = \delta_{it} \mu_t.$$

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APPENDIX 1. Logarithms of GDP Per Capita

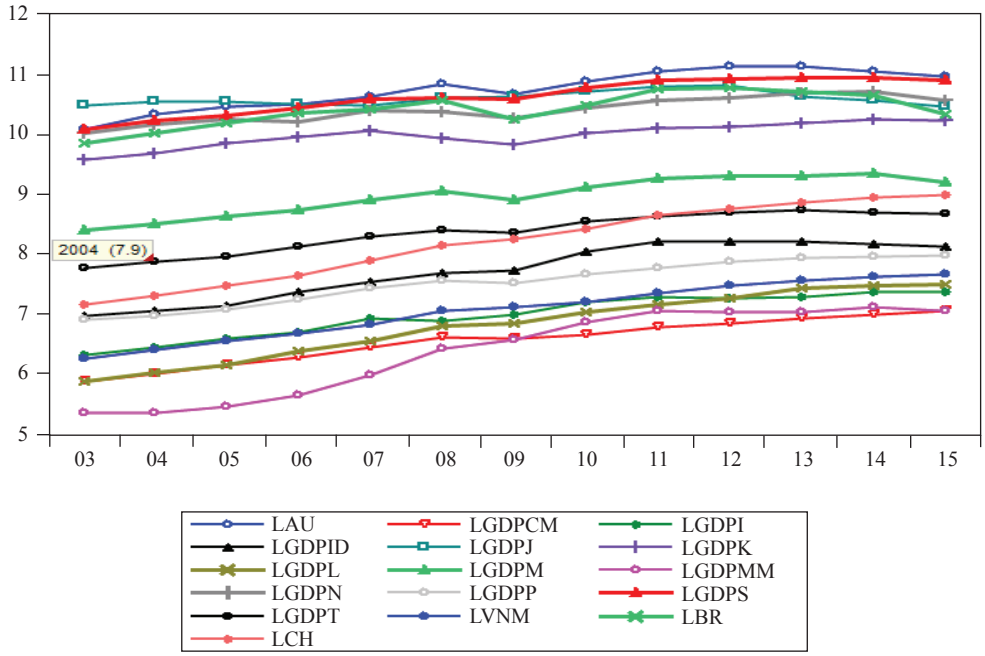

FIGURE 2. Logarithms of GDP per Capita 1997-2015

APPENDIX 2. Descriptive Statistics

Variables	Country	No of Obs.	Mean	Std.Dev	Minimum	Maximum	Jarque-Bera	Probability	Sum	Sum Sq. Dev
Log(GDP)	Japan	19	10.53927	0.120164	10.37045	10.79198	1.909418	0.384924	200.2461	0.259910
Log(GDP)	Australia	19	10.48694	0.461502	9.877921	11.12214	1.877544	0.391108	199.2518	3.833717
Log(GDP)	Singapore	19	10.43293	0.368602	9.979387	10.93324	1.944852	0.378164	198.2257	2.445616
Log(GDP)	Brunei	19	10.16572	0.422500	9.456010	10.75735	1.440993	0.486511	193.1487	3.213118
Log(GDP)	New Zealand	19	10.14907	0.405572	9.520843	10.70055	1.648017	0.438670	192.8324	2.960794
Log(GDP)	Korea	19	9.76156	0.369545	9.003775	10.23958	1.406943	0.494865	185.4697	2.458145
Log(GDP)	Malaysia	19	8.74246	0.433293	8.079559	9.333080	1.734829	0.420036	166.1068	3.379369
Log(GDP)	Thailand	19	8.12921	0.448434	7.526125	8.736337	1.964116	0.374540	154.4552	3.619681
Log(GDP)	China	19	7.76563	0.837375	6.661527	8.990651	1.828534	0.400810	147.5471	12.62154
Log(GDP)	Indonesia	19	7.37384	0.670964	6.139632	8.216230	1.323594	0.515923	140.1031	8.103480
Log(GDP)	Philippines	19	7.34365	0.420333	6.864860	7.973914	2.113088	0.347655	139.5294	3.180237
Log(GDP)	Vietnam	19	6.72658	0.636383	5.887772	7.654982	1.738582	0.419249	127.8051	7.289705
Log(GDP)	India	19	6.70128	0.510768	6.044582	7.376670	2.018533	0.364486	127.3245	4.695910
Log(GDP)	Lao	19	6.46899	0.700118	5.512835	7.505735	1.876139	0.391383	122.9110	8.822985
Log(GDP)	Cambodia	19	6.29288	0.510604	5.591148	7.055045	1.848150	0.396898	119.5647	4.692890
Log(GDP)	Myanmar	19	6.05023	0.795453	4.900865	7.112439	1.881474	0.390340	114.9545	11.38942

APPENDIX 3. Correlation analysis (Log GDP Per Capita)

	JP	AUS	SGP	BRN	NZ	KR	MY	THD	CHN	IDN	PHP	VNM	IND	LAO	CAM	MMN
JP	1.000															
AUS	0.7121	1.000														
SGP	0.6821	0.9893	1.000													
BRN	0.7381	0.9622	0.9439	1.000												
NZ	0.6131	0.9669	0.9508	0.9430	1.000											
KR	0.5767	0.9328	0.9339	0.9503	0.9622	1.000										
MY	0.6895	0.9859	0.9899	0.9669	0.9599	0.9545	1.000									
THD	0.6760	0.9892	0.9949	0.9445	0.9615	0.9417	0.9927	1.000								
CHN	0.6321	0.9698	0.9749	0.9205	0.9433	0.9308	0.9752	0.9790	1.000							
IDN	0.7081	0.9674	0.9764	0.9510	0.9504	0.9549	0.9902	0.9858	0.9659	1.000						
PHP	0.6325	0.9643	0.9842	0.8940	0.9114	0.8940	0.9694	0.9823	0.9762	0.9549	1.000					
VNM	0.6270	0.9704	0.9732	0.9264	0.9468	0.9396	0.9767	0.9782	0.9989	0.9670	0.9716	1.000				
IND	0.6575	0.9789	0.9810	0.9385	0.9618	0.9491	0.9789	0.9848	0.9914	0.9722	0.9667	0.9905	1.000			
LAO	0.6381	0.9734	0.9869	0.9215	0.9381	0.9329	0.9850	0.9890	0.9928	0.9777	0.9882	0.9923	0.9847	1.000		
CAM	0.6122	0.9747	0.9793	0.9306	0.9543	0.9492	0.9824	0.9860	0.9953	0.9725	0.9769	0.9967	0.9918	0.9937	1.000	
MMN	0.6850	0.9340	0.9469	0.8277	0.8636	0.7964	0.9152	0.9457	0.9260	0.9021	0.9674	0.9157	0.9239	0.9379	0.9204	1.000