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SECTORAL GDP CONVERGENCE OF SELECTED RCEP COUNTRIES: LEAD OR LAGS?

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ABSTRACT

The study investigates sectoral value-added convergence in selected RCEP countries by applying the non-linear time-varying coefficients factor model suggested by Phillips and Sul (2007a) over the period of 1987-2015. Structural convergence occurs, if income convergence progress is associated with sectoral convergence or disaggregated level. Interestingly, this investigation finds income converge at the aggregate level. To investigate further, further clustering algorithm is applied and resulted in three clubs, indicating advanced countries (Japan, Singapore and Korea) lead club, Upper-middle income countries (Malaysia, China and Thailand) as second club, and finally lower middle income (Indonesia, Philippines and India) form another club. The three sector hypothesis states that, inter sectoral convergence is anticipated to appear whenever the less developed nations are capable of closing the income disparity with those advanced nations as Asian in this study. Convergence in Income per capita was quite rapid, indicating the highest level of convergence at sectoral level. For robustness, this application offered the measures of value added convergence in five sectors namely, agriculture, manufacture, service, construction and mining sectors. The study shows an obvious indication for Asian catching up countries to form large clusters that shall be useful in policy formulation for further integration of RCEP.

Keywords: GDP per Capita; Value Added; Sectoral Convergence; Non-Linear Method; RCEP Countries.

1. INTRODUCTION

The concept of economic convergence relates to a method by which internal economies display increasing similarities in the patterns of their performances. Structural convergence is defined as a situation in which there exists convergence of per capita income levels supplemented with the convergence of their inter-sectoral shares structure (Wacziarg, 2001). According to Imbs and Wacziarg (2003), the presence of structural convergence points out that nations adopt identical development stages and that nations may converge to a structural 'steady state' in which the sectoral process of production becomes similar within nations, which is represented by the up`s and down of

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similar sorts of sectors as income grows. The existence of structural convergence among the country groupings would also suggest that economies at the national and regional/industrial level are roughly similar and synchronized. Analysis at the disaggregated level is important as it shows the true scenario of similarity or dissimilarity of sectoral structure of the economy; ultimately to determine whether the shock is symmetric or asymmetric. In other words, the external shocks are also symmetrical, such that, in the occurrence of a negative demand shock, all the partner nations are influenced in more or less the similar extent (Martin, 2001). To be robust, this study presents the measures of structural convergence, namely value added share in agriculture, manufacturing, services, construction and mining sectors.

1.1. Regional Comprehensive Partnership Agreement (RCEP)

The Regional Comprehensive Partnership Agreement (RCEP) is a wide spread, high-class and reciprocally advantageous economic partnership treaty between ASEAN and other 6-ASEAN Free Trade Agreements, such as Australia, China, India, Japan, Republic of Korea and New Zealand. During the East Asian Summit in 2012, RCEP was introduced formally. With a total 3.5 billion people, five major drivers market growth that include China, Japan, Republic of Korea, India and ASEAN, the globe's largest free trade association will be formed by RCEP. The core objectives of RCEP to produce balanced economic growth and deeper integration between its participants beyond the traditional Free Trade Agreements within ASEAN According to Leal-Arcas (2013), 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. Given the dominating economic powers of ASEAN-5, their attitudes on regional co-operations and integrations, would be consequently crucial for the current and future developments of the entire ASEAN. Due to the economic importance of ASEAN-5, this study has taken into consideration the ASEAN-5 and their 4-FTA countries, such as Japan, China, Korea and India.

Although the economies of ASEAN+ 6 FTAs have been shown to give the most welfare gain compared to ASEAN, an important issue that needs to be addressed is whether these countries are likely to be suitable candidates for the RCEP. The development progress of inter sectoral GDP share of RCEP countries will be examined to find as to whether the industrial structure of economies show any similarities or are they persistently different. The inter-sectoral perspectives is analysed on Value Added shares for five major contributors sectors, agriculture, manufacturing, services, construction and mining. This focus is entwined with the questions as to whether all sectors of the potential candidates of RCEP show a similar converging process, i.e. to test for structural convergence for the RCEP countries. In other words, if two or more countries have shown a sufficient level of structural convergence, it can be beneficial to form an economic union. Proceeding from Krugman (1991) notable current literature has been concerned in studying similarities and dissimilarities in industrial structures within nations. With the omission of a rate of exchange or monetary policy, differences in industrial structure indicate the potential candidates of RCEP would be more sensitive to sectoral shocks. This will determine which sectors play a central role in aggregate convergence/divergence that drives the overall economic growth.

2. LITERATURE REVIEW

By using data from the period of 1970-2005 for selected Asian economies and applying the non-linear time-varying coefficients factor model recommended by Phillips and Sul (2007a), Dayang-

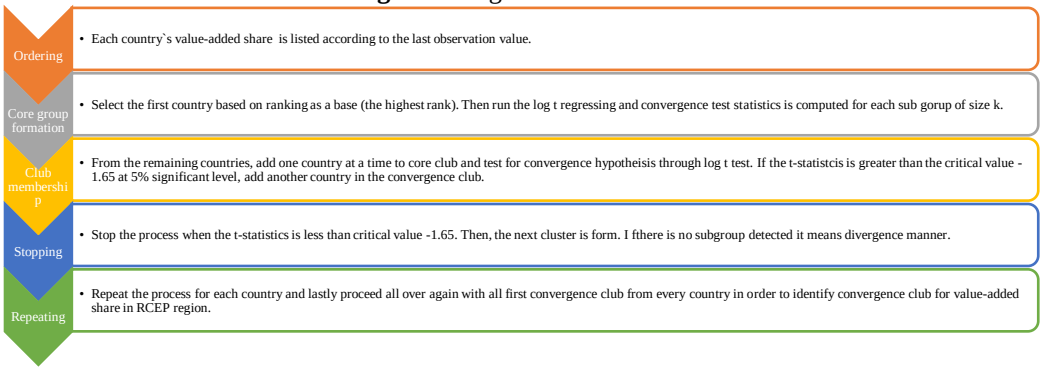
Affizah (2011), attempts to bridge the gap between the macroeconomic and micro economic matter. Substantial divergence at the aggregate level, in income convergence was found from the investigation and four clubs were shown by the clustering. For robustness, the application considers particularly productivity, 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. As well the study found, within the manufacturing sector in Asian, strong sectoral club convergence, but for services, agriculture, and construction also as for mining is comparatively poor convergence club. Finally, the author concluded regarding the candidates 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.

By using data from 1952-2008 and following Phillips and Sul (2007a) method, Herrerias and Ordonez (2012), examined per capita income convergence in five groups of provinces in China. Due to different levels of labour productivity and capital intensity of the provinces, three provinces formed a divergent subgroup. By utilizing data from 1968/69–2008/09, Ghosh et al. (2013), analysed income per capita at the aggregate and sectoral levels among fifteen major states of India. At the aggregate level, the authors' revealed three convergence sub-groups, both in the agriculture and services sectors found two convergence subgroups and in the industrial sector they identified three convergence subgroups. Following the Phillips-Sul (2007a, 2007b) methodology, during the period of 1990~2011, Vu (2015), determined that the APEC economies per capita GDP led to diverge, however, three sub-groups convergence are determined by analysing inter-country output differences between the APEC countries.

3. METHODOLOGY

In this study, the possibility of the selected ASEAN countries to constitute RCEP integration is tested using the new method suggested by Phillips and Sul (2007a). As to whether the countries are the right candidates for the RCEP integration, is by ensuring that there exists structural convergence within the sample. In other words value added shares (production structures) are similar across countries, the structural convergence will prevail, and thus shocks will be symmetrical among the countries involved. As Model Factor analysis provides for decomposing series 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.

Figure 1: Algorithm Procedure



1.2. The Log t test

By taking into consideration the time varying factor statement from equation (1) and depending on the log t convergence test that is depend 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.

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

$$H_t=\frac{1}{N}\sum_{i=1}^{N}(\hat{h}_{i1}-1)^2$$

H_0: $\delta_i = \delta$, where, for all i, $\alpha \geq 0$, which indicates convergence for all nations.
H_a: $\delta \neq \delta$ here, for some i and/or $\alpha < .0$ indicating that no convergence for some nation.

4. DISCUSSION

First, the analysis of convergence on the overall level is conducted on the RCEP countries per capita income by utilizing the log t test in the sampling period of 1987 to 2015. The log *t* test (Table 1) for Income per capita has shown full convergence with tb = 3.266259*. In other words, Income per capita of these countries exhibit common steady state path, with all of them are grouped in one big cluster. Having full convergence indicates that countries share similar sectoral structure, thus, economic integration and monetary union is feasible in this condition. These countries should have sufficient flexibility in the GDP per capita structure to be able to adjust to asymmetric shocks once they are in the union. The results are interesting, indicates that these countries are in the transformation stage by experiencing high degree of GDP share in different sectors. In other words, the industries are shifting from the primary sectors to secondary sectors, namely from agriculture to manufacturing and service sector.

Table 1: Results of Log *T* Convergence Test: Panel A: Income Convergence (GDP per capita)

Country	$\hat{b}$	Remarks
All Countries (RCEP)	3.266259*	Convergence

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 and Sul, 2007a). For the RCEP countries, period of 1996- 2015, the null hypothesis is accepted for absolute convergence. The next thing to examine is the clustering of the countries. Each country in the group is allowed to converge to a different equilibrium or even diverge individually from the rest of the countries. Under the assumption of the club convergence in which countries in the study is allowed to converge in different equilibrium, the comparative transitional paths of each club shall converge to a different constant. From the log t regressions, Table 2 comprise of all related t-statistics. The convergence test on GDP per capita has appeared in three convergence clubs (Table 2). A group of rich countries, namely Singapore, Japan and Korea comprised of the core clubs. Malaysia, China and Thailand as the newly industrialized economies clustered into a group. Finally, Indonesia, Philippines and India these lower middle-income countries form another group, converging with the

rest. Three clubs convergence implies that the RCEP countries in the investigation indicate moderate convergence among them which illustrate relatively similar in its economic structure as a whole. The transition path (Figure 1) likewise confirms the occurrence of the formation of three clubs convergence. We conclude that as RCEP economies experiences various stages of development, the path of transition in economic performance may be considerably similar across countries. Thus, testing for convergence using the non-linear framework is appropriate to detect convergence in transitional dynamic economies such as the RCEP nations.

Table 2: Results of Convergence Clubs for GDP per Capita

Last T Order	Country	Step 1	Step 2	Step 3	Clubs	Remarks
1	SGD	Base	Core		1	Convergence
2	JPN	1.883712**	Core		1	Convergence
3	KR	9.741390*	Core		1	Convergence
4	MYS	3.428124*	Base		2	Convergence
5	CHN		8.439799*		2	Convergence
6	THD		15.15100*		2	Convergence
7	IDN		12.88568*	Base	3	Convergence
8	PHP			-1.077074	3	Convergence
9	IND			-0.828168	3	Convergence

Next, on aggregate level, the panel convergence analysis is applied on GDP share on five sectors, namely, agriculture, manufacturing, service, construction and mining sectors within selected RCEP countries by applying the log t test as in Table 3. Figure 2, 3, 4, 5 and 6 the full panel for each sector resulted in divergence among the countries, hence there is no tendency to unity of the transition paths. However, the possibility of the existence of convergence clusters around the separate points of equlibra or steady state as can be seen from Figure 2, 3, 4, 5 and 6.

Table 3: Sectoral GDP Share Convergence at Aggregate Level

Sector	$\hat{b}$	Remarks
Agriculture	-74.33277*	Divergence
Manufacturing	-82.70741*	Divergence
Service	-14.12880*	Divergence
Construction	-28.57605 *	Divergence
Mining	-97.60868 *	Divergence

Transition Path for GDP Per Capita and GDP Share

Figure 1: Income Per Capita

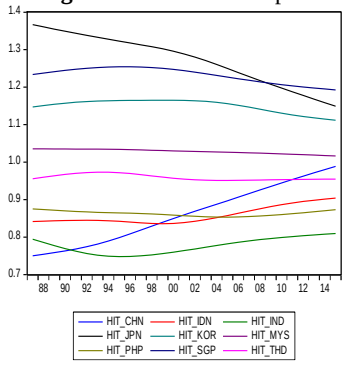


Figure 2: Agricultural

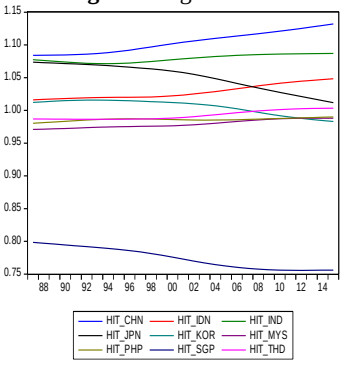


Figure 3: Manufacturing

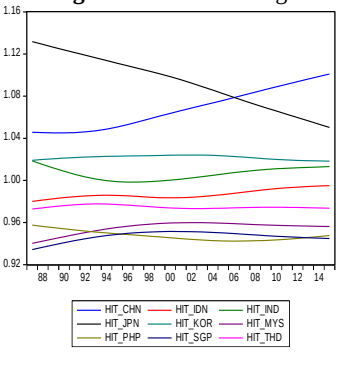


Figure 4: Service Sector

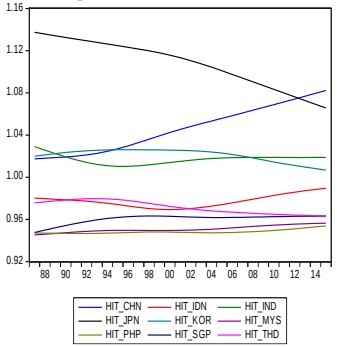


Figure 5: Construction

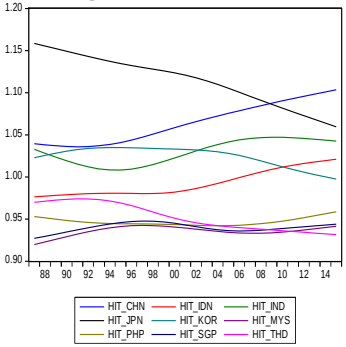
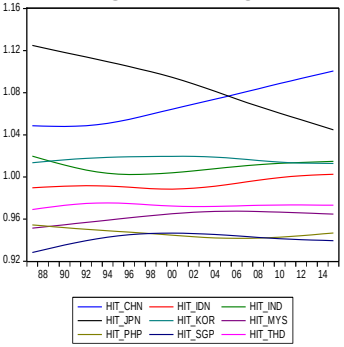


Figure 6: Mining



1.3. Convergence of Sectoral Value Added

Rejection of null hypothesis for the complete sample of convergence does not indicate, in the sub-group of the RCEP countries GDP share, there is no indication of convergence. Tables 4 to 8 show the clustering results in terms of the GDP share. Table 4 shows the analysis of Agricultural value added, the results show moderate signs of convergence for most of the nations in the sample. In the agricultural sector, China has become an outlier, particularly due to the shift of the economy to manufacturing and services sectors as in the three-sector hypothesis. For Manufacturing Sector GDP share convergence in Table 5, shows China and Japan converging to each other's and become the core countries. India is following Korea and form club-2. Indonesia, Malaysia, Thailand, has shown a diverging trend and finally Singapore converging with Philippines. From the manufacturing sector, the RCEP countries formed six clubs, which implied that weak convergence In Service Sector and construction sector GDP Shares (Table 6 and 7), all the countries converging towards their steady state. This is because the productivity growth process declines in the agriculture sector`s employment and in the following step reduced the manufacturing employment rate because of the increasing in the service sectors and construction share. Service and construction sector formed three clubs which implies moderate convergence tendency. Lastly, GDP Shares in Mining sector as in Table 8, China and Japan become the core countries and converging with each other's. India and Indonesia is following to Korea and Malaysia converging with Thailand to reach their steady state, except Singapore that has shown a diverging tendency with Philippines. Thus, the income levels convergence is supposed to contribute to structural convergence.

Table 4: Results of Convergence Clubs in GDP Shares -Agricultural Sector

Last T order	Country			Step 1	Clubs	Remarks
1	CHN	-35.954*	Outlier			Divergence
2	IDN		Base	Core	1	Convergence
3	IND		-0.22674*	Core	1	Convergence
4	JPN		-10.9462*	Base	2	Convergence
5	THD			7.2864*	2	Convergence
6	PHP			7.5174*	2	Convergence
7	KOR			8.9130*	2	Convergence
8	MYS			8.9197*	2	Convergence
9	SGP			-32.20*	2	Divergence

Table 5: Results of Convergence Clubs in GDP Shares -Manufacturing Sector

Last T order	Country	Step 1	Step 2	Step 1	Step 2	Step 1	Step2	Clubs	Remarks
1	CHN	Base	Core					1	Convergence
2	JPN	0.312*	Core					1	Convergence
3	KOR	-4.36*	Base					2	Convergence
4	IND		8.0988*					2	Convergence
5	IDN		2.5136*	Base				3	Divergence
7	THD			-30.27*	Base			4	Divergence
6	MYS				-4.90*	Base		5	Divergence
8	PHP					-2.429*		6	Convergence
9	SGP						0.70*	6	Convergence

Table 6: Results of Convergence Clubs in GDP Shares -Service Sector

Last T order	Country	Step 1	Step 2	Step 1	Clubs	Remarks
1	JPN	Base	Core		1	
2	CHN	5.835161*	Core		1	Convergence
3	IND	13.31503*	Core		1	Convergence
4	KOR	10.44008*	Base		2	Convergence
5	IDN		4.541263*		2	Convergence
7	THD		-0.407644	Base	3	Convergence
6	THD			6.866179*	3	Convergence
8	PHP			7.982012*	3	Convergence
9	MYS			9.848422*	3	Convergence

Table 7: Results of Convergence Clubs in GDP Shares - Construction Sector

Last T order	Country	Step 1	Step 2	Step 1	Clubs	Remarks
1	CHN	Base			1	Convergence
2	JPN	2.509*			1	Convergence
3	IND	6.386*			1	Convergence
4	IDN	9.935*			1	Convergence
5	KOR	3.161*	Base		2	Convergence
6	PHP		2.8308*		2	Convergence
7	MYS		2.3221*		2	Convergence
8	SGP		0.2335*	Base	3	Convergence
9	THD			1.042008	3	Convergence

Table 8: Results of Convergence Clubs in GDP Shares- Mining sector

Last T order	Country	Step 1	Step 2	Step 1	Step 2	Step 1	Clubs	Remarks
1	CHN	Base	Core				1	Convergence
2	JPN	-0.350*	Core				1	Convergence
3	KOR	-6.049*	Base				2	Convergence
4	IND		5.59407*				2	Convergence
5	IDN		5.187436	Base			3	Divergence
6	THD			-29.070*	Base		4	Convergence
7	MYS				0.0971*		4	Convergence
8	PHP				-8.23*	Base	5	Divergence
9	SGP					-2.474*	5	Divergence

5. CONCLUSION

In this study a new and flexible convergence test procedure was applied on selected RCEP countries for the period 1987-2015 with five major sectors in focus. Analysis at the disaggregated level is important as it shows the true scenario of similarity/dissimilarity of sectoral structure of an economy, ultimately to determine whether the shock is symmetric or asymmetric. When the economy shares similar sectoral structures, any external shocks will be resulted in symmetric/similar impact on the particular areas, thus fixed exchange rates or a monetary union, or one policy is appropriate (Mundell, 1961). Thus, the existence of sectoral convergence in the sample is crucial to enhance the economic integration between Asian nations, in achieving the objective of Regional Comprehensive Partnership Agreement (RCEP) and Asian Economic Community (AEC). In this study, structural convergence does not exist, but, instead club convergence exists in most of the sectors indicating the different level of convergence progressing to its own distinguished common path. The respective authorities should pour more effort in enhancing the structural industrial relationship inter and industry within RCEP countries to spur more growth and expedite economic integration of RCEP and AEC. Interesting results show that convergence in Income per capita was quite rapid, indicating the highest level of convergence at sectoral level. There is a clear evidence for a catching up countries to form large clusters. Thus, the questions remained, as to whether the selected ASEAN countries is an appropriate group of countries to create a regional economic block. Past experience has taught us that economic integration is a very slow and scrutinized process, for example, the establishment of European Union took 50 years to materialise with only 12 members as a start. The progress of integration is under way though seems to be rather slow. For the sub-group of Asian countries that exhibit moderate convergence or divergence, more intense growth policies are required to facilitate closer integration with the rest of the members.

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