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Income Convergence in Presence of Liberalization Measures, Governance and Technology Adoption

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ABSTRACT

The study focuses on the examination of income-convergence or inequalities amid Asian economies in the presence of trade liberalization, foreign direct investment, governance, and technology adoption. The existence of clubs in the sample of 14 selected Asian countries for a large panel data set covering the 1999-2015 period facilitated us to examine the club-convergence. Unconditional and conditional income-convergence is explored by adopting Blundell and Bond's estimating technique. Findings reveal that income-convergence is taking place among Asian developed countries and ASEAN countries. However, there is income-divergence in SAARC countries and Asian least developed countries. Nevertheless, it is concluded that despite Asian countries having different economic structures and policy measures; they are on the track of conditional convergence in their respective clubs.

Keywords: income convergence; income divergence; trade liberalization; foreign direct investment, governance; technology adoption; economic integration, factor price equalization theorem

1. INTRODUCTION

The issue of income-convergence is gaining momentum in this era of globalization. The issue has been discussed in a closed economy setup but has become more imperative in the open economy outlook. The notion of income-convergence (equalizing disparities, etc.) was presented by (Solow, 1956) and also by (Swan, 1956).

The subject matter was explored more intensely across dissimilar economies,

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divergent regions, and also in sub-periods. By studying, nations and regions, (Ramsey, 1928) and (Samuelson, 1958) observed some growth differences. Some additional offerings to the growth work were familiarized by the works of (Romer, 1986)¹ and (Lucas Jr, 1988)².

The globalization can lead to positive outcomes in terms of economic development that result in economic integration and it is important to form secure prospects (Devasmita, 2018; Lange, Wodon, & Carey, 2018). In convergence route, due course of attention has been given to international linkages through trade, financial liberalization, foreign direct investment (FDI), transfer of technology (Gök, 2018; J.-W. Lee, 2018; Selvarajan, Ab-Rahim, & Md-Nor, 2018). It is important to study income-convergence as it allows assessing the existing income gap between countries. In fact, it provides platform for least developed countries (LDCs) for catching up, as LDCs get a chance to accomplish such development levels which reduce inequalities. Within the above viewpoint the developing nation tries to get closer to developed countries, and the study of convergence has significant conducts for global policymaking. If convergence is observed in some groups/blocs of economies, it notifies advances in policies.

Latter (Islam, 2003) develops an approach in 1995 to test for convergence using panel data. The benefit of panel data, relative to the cross-sectional approach, is the ability to control for country fixed effects permitting long-term differences in the growth path. The paper here implements an updated version of the panel data test using data over the period 1999-2015. Given the importance, the relationship between per-capita income-convergence, trade liberalization, technology adoption, governance, and foreign direct investment has been tested in this research. The main group of fourteen Asian countries includes: Japan, Korea, Singapore, Hong Kong, Malaysia, Thailand, Philippines, China, Indonesia, Sri Lanka, Pakistan, Indonesia, Bangladesh, and Nepal to measure whether countries included in sample are on path of income convergence or income-divergence. The structure of this paper is as follows: Section 2 explains objective of the paper; section

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¹ Long run endogenous growth theory was explained by (Romer, 1986) where economic growth is not previously set at the 'natural rate' as pointed out in Harrod-Domer models and Solow-Swan.

²Lucus model (Lucas Jr, 1988) explained growth of human capital is mainly due to training and learning by doing.

3 provides convergence related literature and policy review of Asian countries. Section 4 carries methodology, section 5 reveals the results. Section 6 provides discussion of results while section 7 concludes the paper.

1.1. The objective of the Study

The impact of club convergence on the Asian bloc included in the sample is examined as the paper applies tests from the empirical growth literature to identify whether these groups are converging toward one another (cross country convergence). The overall objective is to assess whether countries included in trade panels show income-convergence or income-divergence.

2. LITERATURE REVIEW

The review shows the origin of convergence from Solow, and evolving up to endogenous growth theory. Generally, two key forms are acknowledged in literature when the concept of convergence is explored. The regression approach that reflects numerous approaches to observe the convergence prospects of the old-style neoclassical growth model. The formative input was given by (Baumol, 1986) then polished by (Barro, 1991), and (Barro & Sala-i-Martin, 1992). Several works have worked out with cross-sectional (growth) reversion to reduce inequalities (in the direction of steady-state pathways) and they tried to see converging speed among various integrations. Some time-series techniques were also tested. Well ahead, the panel data techniques have been supported in order to regulate heterogeneities which may originate bias in standard regressions of cross-sectional convergence and to resolve endogeneity.

In the literature, three known concepts of convergence are found: β -convergence hypothesis (i.e., absolute (unconditional) convergence hypothesis³, and conditional convergence hypothesis⁴), σ -convergence and Club convergence hypothesis⁵. In growth literature, one can find the widely used tools for testing convergence hypothesis are β -

³ According to convergence hypothesis, per-capita incomes of economies converge with one and another regardless of their preliminary conditions. Deprived economies grow faster than rich ones.

⁴ According to conditional convergence, per-capita incomes of countries converge towards each other in the long-run when having similar structural characteristics, e.g., in terms of technology, population growth rates, human capital, institutions, etc.

⁵ Per-capita incomes of countries are identical in their basic features and also in primary conditions, e.g., GDP, capital labor ratio, human capital, etc.

convergence⁶ and σ -convergence⁷. " β -convergence" occurs when deprived economies progress at a faster pace as compared to wealthier ones and deprived economies catch up with wealthy economies in terms of level of per-capita income. The conception of idea is based on regression in the direction of mean as pointed out by several studies (Barro, 1991; Baumol, 1986; De Long, 1988). In studying β -convergence, two main concepts are originated specifically conditional and absolute convergence. Absolute convergence occurs when the differences in per-capita income are short-term among countries and only due to preliminary conditions. While conditional convergence occurs if these dissimilarities are lasting and due to cross-country structural heterogeneity (Bangura, 2019; Durlauf, Johnson, & Temple, 2005).

It is also important to observe that the concept of convergence, when tested by (Barro, 1991), involved regressing growth in terms of per-capita GDP (on preliminary level) for a certain cross-sections of states. This method receives criticism by (Friedman, 1992) and (Quah, 1993) as they have believed that in estimating β -convergence these regressions may cause biased outcomes. Besides (Sala-i-Martin, 1996) tried to explain difference between conditional β -convergence and absolute β -convergence, where underprivileged economies are expected to grow faster than wealthy ones. Further to this (Boyle & McCarthy, 1999) has introduced trend in rank concordance (trend in coefficient of variation) of per-capita GDP. A contribution by (Islam, 2003) has compared the two approaches and points out that the β -convergence methodologies offer information on structural parameters of growth models. The work by (Aiyar, Duval, Puy, Wu, & Zhang, 2018; Chenery, Robinson, Syrquin, & Feder, 1986; Kant, 2019) showed divergence or slowdown of poor countries and middle income countries while showing the convergence of rich countries as they combined time-series and cross-sectional data of several countries. (Baumol, 1986) has found that countries showing industrial progress are in same convergence club.

Latter on (Slaughter, 2001) has pointed out that many research on convergence like (Barro & Sala-i-Martin, 1992), etc., failed to analyze the international trade because they are based on Solow model that moves on with assumption that countries produce

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⁶Growth related preliminary level regressions.

⁷Over time, dispersion of levels of per-capita income across economies.

only one aggregate good independently and convergence actually arises from capital stock convergence. Equally on the other front in the trade theory some arguments have been formulated to give appropriate justifications for factor price equalization theorem, e.g., Heckscher-Ohlin model. These arguments propose another prediction, whether adoption of trade liberalization measures will be able to result per-capita incomes to converge or diverge. (Slaughter, 2001) also explained “as a statement about free-trade equilibria, however, the FPE theorem does not have clear dynamic predictions for the process of trade liberalization. Many studies have examined whether liberalization tends to bring factor prices closer together. The general answer is maybe, as with the FPE theorem, whether factor prices convergence depends on cross-country tastes, technology, and endowments”.

As the issue of income-convergence is associated with some preconditions, few studies (Ahmad, Naz, & Ali, 2000; Islam, 2003; J. Lee, 2012; McCoskey, 2002; Neumayer, 2003; Rahman & Hossain, 2009) have addressed the issues of convergence and trade. Different methodologies are used and they are classified as time series approach, cross-section approach, and panel approach.

Another dimension of research has shown a link between international trade and factor prices (micro-economic convergence). Macro and micro-convergence with international trade were studied by (Rassekh & Thompson, 1998). They have shown that Factor price equalization theorem (FPE)⁸ provides grounds for micro-economic convergence, however neoclassical growth models provide foundation for macro-economic convergence. The experts have studied FPE by means of Heckscher-Ohlin trade model and per-capita income equality while they exposed that FPE is neither obligatory nor sufficient form to observe income equality through economies which are trading with each other.

Primarily (Samuelson, 1948, 1949) has specified that trade policy instruments are responsible for goods and services flow among various countries and if countries are having free trade there can be convergence in factor prices in those countries.

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⁸FPE theorem: Wages of homogenous labor are same in trading nations. International trade results, return to homogenous capital, are same in trading economies so relative and factor prices are aligned.

Endogenous growth models permit trade as steady-state growth rates become focal point. Instead, the traditional growth literature (Cass, 1965; Solow, 1956) put forward the idea that “ in the absence of internationally mobile goods and factors, convergence to a steady-state path should occur between countries provided that they have identical production technologies, population growth, savings rates, etc”.

Trade liberalization can influence incomes, up to the extent of achieving convergence results in the integrated economies. The work of (Ben-David, 1993) pointed out that FPE offers a good outline for relating trade impact on income-convergence. During trade liberalization, the convergence of per- capita income can be described on the grounds of FPE. The observation is that FPE theorem is also supported by (Helpman & Krugman, 1985; Samuelson, 1948, 1949, 1953) and it offers a structure for involving effect between trade and income-convergence: in the presence of free trade between two countries, FPE mechanism equalizes wages on one hand and per-capita income (per worker) equalizing, on the other hand, depending on relative per-capita resource endowment. Some other studies explain FPE is done by (Francois & Shiells, 2008; Leamer, 1995; Slaughter, 1997) while study by (Rassekh, 2004) does not support FPE theorem as it has not been addressed well in explaining the phenomena of income-convergence. The theorem shows that “under Heckscher-Ohlin-Samuelson conditions free trade would equalize prices of identical factors across countries. Per-capita income is weighted average of factor prices (weights are relative factor endowments)”.

Economic theory provides evidence about convergence or divergence of per-capita income levels in the presence of some specific factors. A large body of literature discusses the development of convergence and trade theories (Ben-David, 1996; Slaughter, 1997, 2001). Some studies that discussed the issue in this context are: (Choi, 2004, 2009; Cyrus, 2004; Darku & Yeboah, 2018; Hakro & Fida, 2009; Rassekh, 2004; Stroomer & Giles, 2008),and (Khan & Daly, 2018). This is more attainable through imports and exports and may become a reason for an increase in economic growth (Frankel, Romer, & Cyrus, 1996; Grossman & Helpman, 1991).Further to this (Hsiao & Hsiao, 2006) examined eight rapidly developing Asian economies and tried to develop a link among GDP, exports, and FDI.

Economists have since long highlighted the standing of technical innovation, and technology adoption/diffusion for explaining the growth performance of nations. There is some research available, which explicitly addresses the issue and process of technology/innovation diffusion. Technology diffusion can be studied and observed at country level, regional level and also on sectoral level as done by (Padoan, 1999), (Ben-David, 1996). Some of the works on internet diffusion pattern are done by (Oeppen, 2019), and (Klobas & Clyde, 1998).

Some of the studies consider governance is a measure that can speed up the international growth process and may reduce regional inequality. In recent work, (Ito, 2017) intends to explain convergence in Asia in three path scenario which is a low-income group, middle income group, and high income group. Similarly (Derviş & Kharas, 2014) pointed out some factors like improved macroeconomic policies, openness to trade and capital flows, and improved governance can show conditional convergence. Moreover (Hakro & Fida, 2009) discuss that poor governance can deteriorate the continued growth. As pointed out by (Barrios, Flores, & Martínez, 2019; Iqbal, 2006) various regional groups like European Union, NAFTA, ASEAN dealt with state-driven integration policies in alluring challenges of international dealings (Vujović, 2019; Zhao & Serieux, 2019). Similarly the concept has been currently studied in various groups / clubs in world economies (Barrios et al., 2019; Cabral & Castellanos-Sosa, 2019; Díaz Dapena, Rubiera-Morollon, & Paredes, 2019; Palma & Reis, 2019; Pipień & Roszkowska, 2019) showing the importance of economic integration.

2.1. Policy Review and Income-Based Ranking of Asian Countries:

The income disparity around the globe has been in constant consideration since the intensification of trade liberalization, the upsurge of technology accumulation, improvement in governance and attracting FDI are gaining rapid attention. These economic activities contribute to global economic environment. The overall policy review of Asian countries shows an improvement in the performance of these countries since adoption of liberalization policies. With the focus on regional economic-integration of Asian countries and subgroups ASEAN and SAARC, it is seen that the growth returns may differ for groups and depend upon policies advocated by the countries existing in

that group. The workout of convergence of real income of counties is effected when different policy guidelines are adopted. Without introducing reforms, economies are unable to converge from their respective income traps. Currently, the growth rates in Asian economies are at slow down if compared with advanced economy levels and due to some preconditions, economies may find it easy/hard to catch up with the income goals of advanced economies.

Table 1 presents the per-capita income-based rankings of fourteen Asian economies included in the sample. Countries are carefully selected and GDP per capita has been considered to assess position of countries to be placed in higher-income groups or lower-income groups. Results show Japan stands at the highest rank among fourteen Asian countries. Singapore has attained second highest place on income level while Hong Kong is ranked as third. It is observed from the results that Bangladesh and Nepal have low-income levels in the selected group of Asian countries. It is remarkable to note that Asian tiger countries (Hong Kong, Taiwan, Singapore, and South Korea) are at the middle level and South Asian countries (Bangladesh, India, Nepal, Pakistan, and Sri Lanka) are at the bottom.

Table 1. Income-based Rankings of Asian Countries		
Country	GDP per capita	Ranking
Japan	29058.15	1
Singapore	19437.36	2
Hong Kong	18723.42	3
Korea, Rep.	11293.65	4
Malaysia	3879.59	5
Thailand	1814.05	6
Philippines	1090.83	7
China	1012.65	8
Indonesia	950.61	9
Sri Lanka	907.09	10
Pakistan	543.13	11
India	524.02	12
Bangladesh	331.27	13
Nepal	260.92	14

*Author's own calculation based on data drawn from WDI, GDP per capita, constant 2005 US \$.

3. RESEARCH METHODOLOGY

This section discusses the foundations of the growth model in context of convergence and allows for empirical testing of β -convergence. This study considers the growth equation (neo-classical growth model) which incorporates the growth rates between two periods. Following (Sala-i-Martin & Barro, 1995) and (Sala-i-Martin, 1996), unconditional β -convergence is tested using Eq 1:

$$y_{it} = \alpha_i + \beta y_{it-1} + \mu_{it} \quad \dots (1)$$

y_{it} log form of per-capita income, α_i is country i 's constant, Numeral of countries is revealed by i . and error is μ_{it} . Altering, Eq. (1), in panel data form, for conditional-convergence, which comprises a vector of control variables.

$$\ln\left(\frac{y_{it}}{y_{i,t-1}}\right) = \alpha_i + \beta \ln(y_{i,t-1}) + \theta X_{i,t} + \eta_t + v_i + \mu_{it} \quad (2)$$

$Y_{i,t-1}$ is previous year's income per-capita in country i , $Y_{i,t}$ is final year's income per capita in the country i , α , β are parameters, $X_{i,t}$ is the vector of control variables, η are country specific effects, v are time-specific effects, and μ_{it} is error term. Control variables used in model are trade liberalization, foreign direct investment, governance, and technology adoption. The existence of income convergence will be confirmed by significantly negative coefficient β .

In a broad perspective, this study considers the Asian region⁹. It is important to see convergence phenomena in Asian countries as a heterogeneous group of countries with high population growth is available. The study here implements an updated version of the panel data test using data over the period 1999-2015 from fourteen Asian economies taken as the main group (having all categories of developed, under developed and least developed countries (LDCs) from Asia). Along with the main group (14 Asian Countries), some subgroups are also selected to carry on analysis: Asian

⁹ Asia is the largest continent, and has economies which exist in varying income domains. In Asian region almost all developed countries, developing countries and least developed countries have adopted liberalization policies.

developed countries (Japan, South Korea), Asian least developed countries (Bangladesh, Nepal), SAARC (Bangladesh, India, Nepal, Pakistan, Sri Lanka), and ASEAN (Indonesia, Malaysia, Philippines, Singapore, Thailand)¹⁰. The formation of subgroups is done to include different income groups.

To meet the objectives of this research data have been taken in the form of various panels based on: “Income per-capita, trade liberalization, technology accumulation, governance, and foreign direct investment”¹¹. Based on these panels some necessary indexes (trade openness, and technology accumulation) are developed and incorporated in empirical analysis. Ranking of main fourteen countries has been done on income’s basis as this ranking has supported to visualize income per-capita based position of countries. To find β -convergence, the objectives of research require incorporating the control variables as role of trade openness, technology accumulation, government effectiveness and foreign direct investment in the convergence processes, as data for patents grants are not available before these years. Variables are taken as follows:

GDP Per-Capita: For all countries, the data source of GDP per capita (US dollars) is WDI.

Capital Labor Ratio: Data on capital and labor are selected from Penn World Tables. The capital-labor ratio is worked out by dividing data of “capital stock” (constant 2011) with the “number of persons engaged” (in millions).

Trade Liberalization: Based on WDI data, an index of trade openness is made as representative of trade liberalization. “Data of imports of goods and services” (current US \$) and “exports of goods and services” (current US \$) of all individual economies included in the sample are summed up and latter divided by each country’s GDP (current US\$).

Technology Adoption: For technology adoption, statistics of patents (granted by year) are taken in cumulative sense from the WIPO database. Only data for Hong Kong is taken from USPTO.

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¹⁰To check club convergence, we need such trade groups.

¹¹ Based on (Zia & Mahmood, 2019).

Governance: For governance indicator, data of government effectiveness, is taken from WDI.

Foreign Direct Investment: Net foreign direct investment (FDI) (current US \$) is divided by the GDP deflator. It was also taken by WDI.

Panel unit root method introduced by (Im, Pesaran, & Shin, 2003), (Levin & Lin, 1993; Levin, Lin, & Chu, 2002) is used to check stationarity while the test of (Im et al., 2003) is applied for heterogeneous patterns. To resolve the problem of multi-collinearity, Variance Inflation Factor (VIF) test is used for all groups/clubs. This study is based on macro panel data¹².

4. RESULTS AND ANALYSIS

This study focuses on the empirical testing of intra group β -convergence¹³ (unconditional and conditional income-convergence) of Asian countries/groups. “Conditional-convergence is tested by considering preconditions of trade liberalization (indicated by openness indicator) and technology accumulation (indicated by patent grants), governance (indicated by government effectiveness), and foreign direct investment” (Zia & Mahmood, 2019).

A GMM procedure (Blundell & Bond, 1998) is found appropriate to apply. In case of conditional beta convergence (Barro & Sala-i-Martin, 1992) and (Sala-i-Martin, 1996) indicate that countries with similar structural characteristics tend to congregate themselves in the long regardless of their preliminary level of output. The choice of

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¹² With the availability of large time-series macro panels are getting importance. As this study is based on growth model, hence on this type of data, the dynamic panel approach is preferred to the OLS approach in a multiple way. First, the pooled cross-section and time series data allows to estimate the growth-openness relationship over a long time period. Second, country-specific effects are controlled by using an appropriate GMM technique. Thirdly, panel estimation technique may control for any potential endogeneity that may emerge from set of explanatory variables.

¹³ In studying β -convergence, two main concepts are originated specifically unconditional/absolute and conditional convergence. Unconditional convergence occurs, when the differences in per-capita income are short-term among countries and are due to preliminary conditions. While conditional convergence occurs if these variations are lasting and due to cross-country structural heterogeneity (Durlauf et al., 2005). Conditional β -convergence (Barro & Sala-i-Martin, 1992) describes economies' experience with β -convergence that is conditional on other variables but is held constant.

models of random effects and fixed effects is established after applying (Hausman, 1981) test. Due to the expected problem of endogeneity, GMM-technique is found to be most suitable. The methods that could be applied on panel are the first-difference GMM estimator advanced by (Arellano & Bond, 1991) and system GMM estimator advanced by (Blundell & Bond, 1998). The GMM procedure (instrumental variable procedure) is an information efficient way of attaining reliable coefficient estimates of the dynamic income-convergence equation.

GMM estimator by (Blundell & Bond, 1998) offers noteworthy progress over the first-difference GMM estimator (Arellano & Bond, 1991). By means of Monte Carlo simulations, (Blundell & Bond, 1998) demonstrated that including the feeble tools in the first-difference GMM may cause huge finite-sample partialities. The system GMM estimator embodies the lagged first-differences as instruments at level, along with the typical lagged levels as tools to be used in first-difference equations. Hence, System GMM technique is superior to difference GMM. To confirm the validity of the tools, the Sargan over-identifying restrictions test is applied.

Table 2. Un-conditional/Absolute β-Convergence				
Group	B	T statistics	DW	J-Stat
All Countries	0.49**	(2.91)	1.7	0.05
Asian Developed Countries	-0.15	(-0.46)	2.1	0.37
Asian Least Developed Countries	0.71***	(4.02)	1.5	0.05
ASEAN	0.29	(1.17)	2.1	0.27
SAARC	0.82***	(3.57)	1.6	0.42

*** Significant at 1% level, ** significant at 5% level.

A test of unconditional/absolute income-convergence is applied and the empirical results show evidence of significant non-convergence in the main group: “All Countries”, and in the two sub-groups: “Asian Least Developed Countries”, and “SAARC countries”.

The results in Table 2 are not significantly supporting the income-convergence hypothesis for any group. It is observed that in “Asian Developed Countries” group the negative sign of convergence is not significant. Unconditional/absolute β -convergence

offers strong convergence indication but our empirical results in table 2 didn't show unconditional/absolute β -convergence. These outcomes offer a footing for testing conditional convergence (weak convergence). The results are consistent with (Wilhelmsson, 2009) that initial conditions are not same across countries and it is difficult to find absolute convergence in shorter time span.

Group	β	KL	OPN	T	GN	FDI	Policy mix	Policy mix	R2	P-J
All Countries	0.33 (2.20)**	0.002 (0.006)	0.08 (1.37)	-0.35 (-2.19)**	-5.09 (-2.35)**	-2.85E-10 (-3.28)***	0.75 (2.40) GN*T**	6.46E-10 (3.27) GN*FDI**	0.83	0.06
Asian Developed Countries	-1.52 (-9.35)***	0.05 (0.22)	3.67 (4.38)***	0.07 (2.05)**	0.16 (3.47)***	3.89 (3.94)***	0.08 (3.64)*** OPN*GN	-	0.95	0.05
Asian Least Developed Countries	0.18 (0.82)	0.05 (0.55)	0.135 (2.45)**	-0.01 (-2.18)**	-0.23 (-4.23)***	5.72 (2.36)**	0.04 (6.88)*** GN*FDI	0.17 (2.46)** GN*T	0.70	0.48
ASEAN Group/Club ¹⁵	-0.452 (-2.52)**	0.51 (2.31)**	0.11 (2.80)**	0.03 (1.20)	0.31 (1.85)*	0.08 (2.11)**	0.02 (1.63)* OPN*T	-	0.17	0.03
SAARC Group/Club ¹⁶	0.96 (4.16)***	2.47E-05 (3.98)***	0.571 (6.34)***	-0.64 (-3.12)***	-5.88 (-2.38)**	-3.60E-10 (-5.40)***	0.84 (2.46)** GN*T	8.62E-10 (5.22)*** OPN*FDI	0.65	0.56

T values in parenthesis, **significant at 5%, *Significant at 10%. Interaction policy variables: GN*T (Governance & technology), GN*FDI (Governance & foreign direct investment), OPN*GN (openness & governance), OPN*T (openness & technology), OPN*FDI (openness & foreign direct investment).

Results in Table 3 reveal that the main group of “All countries” and a sub-group of SAARC countries show a significant income divergence (positive coefficient β). Whereas significant income-convergence is found (negative sign of β) in “Asian Developed Countries” and in ASEAN countries respectively.

Group	Unconditional Income-Convergence	Conditional Income-Convergence
All Countries	0.49** (2.91)	0.33** (2.20)
Asian Developed Countries	-0.15 (-0.46)	-1.52*** (-9.35)
Asian Least Developed Countries	0.46** (3.81)	0.18 (0.82)
ASEAN Group/Club	0.29 (1.17)	-0.45** (-2.52)
SAARC Group/Club	0.82*** (3.57)	0.96*** (4.16)

T values in parenthesis, ***significance at 1%, **significance at 5%

In Table 4 unconditional/absolute income-convergence and conditional income-convergence (GMM approach), results are presented for comparison. Unconditional /absolute income-convergence shows evidence of non-significant income-convergence in case of “Asian Developed Countries” and with the inclusion of openness, technology adoption, governance, and foreign direct investment it is clearly seen that “Asian Developed Countries” are converging showing negative sign and highly significant t value.

Similarly, “ASEAN countries” are favouring conditional income-convergence. SAARC countries show positive significant coefficient and show income-divergence. It is evident that in case where Asian Developed Countries and ASEAN countries have opted for liberalization and other harmonized policies, the income disparities are reduced in their respective groups.

5. DISCUSSION

Income-convergence findings of “Asian Developed Countries” and “ASEAN countries” are supported by (Ben-David, 1993) that FPE delivers an association to relate trade bearings on income-convergence. FPE theorem is also supported by (Helpman & Krugman, 1985; Samuelson, 1948, 1949, 1953) and it offers a structure concerning impact of trade on income-convergence: In the existence of free trade between two countries, FPE mechanism equalizes wages on the one hand while (per-worker) per-capita income on the other, of course depending on the relative per-capita resource endowment. Likewise, it is important to observe a part of the Stolper-Samulson theorem, which effects inland income distribution, as the theorem crushes redistribution of income in presence of international trade, from scarce factors to abundant factors in each country. Distribution of income within economy may influence global income distribution, therefore weak support to the convergence process is observed.

The “Asian Least Developed Countries”, and the “SAARC countries” show positive but significant income divergence. The results may get support from the outcome of (Khan & Daly, 2018) and from the EBRD report¹⁴ of 2012 that regional economic

¹⁴ *Transition Report: Integration Across Borders*. European Bank for Reconstruction and Development. Available at: www.ebrd.com/downloads/research/transition/tr12d.pdf. 2012

integration is encountered with numerous challenges while it minimizes adverse effects on economic relations with outer world. In case of observed divergence of per-capita income in “SAARC countries” and “Asian Least Developed” countries, it is noted that FPC & FPE individually focus on factor prices only. However, it is important to see that per-capita income is a merger of factor prices along with factor quantities. If factor prices across countries are different then there is a possibility of Per-capita income divergence.

The case of “All Countries” shows a positive sign of the coefficient of β and it is significant, which shows overall income of all countries is diverging as the selected countries belong to heterogeneous groups. Although, all Asian countries exposed their economies to liberalization policies, and adopted patent filing procedures. In case of “All countries”, of course, a part of representation is by “Asian Developed Countries” and “ASEAN countries” are reinforced by the results of (Gassler, Frohlich, & Kopcsa, 1996) where patents data measure an innovative activity and these groups have shown income-convergence evidence. On the other hand, a part of representation is by “Asian Least Developed countries”, and “SAARC countries” were due to lack of policy coordination income-divergence is observed. As indicated by (Thapar, 2006), in spite of adjacent locations, trade-in SAARC countries remained insufficient. The reason is that per-capita incomes of SAARC economies are not identical in terms of their operational features as well as preliminary conditions and therefore the SAARC club demonstrates income divergence.

Another essential feature is, when technology is adopted by another country, it contributes significantly to output. As indicated in (Eaton & Kortum, 1996) Asian countries (developed countries, ASEAN countries) are reducing income gaps due to technology adoption. In a nutshell, Asian developed countries and ASEAN countries are on convergence path with adoption of liberalization policies and reform measures.

6. CONCLUSION

This study extends the traditional growth model to explore unconditional and conditional income-convergence across Asian countries. The case of “All Countries” shows overall incomes of Asian countries (included in sample) are diverging given the

heterogeneous economic structures and conditions of the selected Asian countries. Although, all Asian countries exposed their economies to liberalization policies and adopted technology (patents), yet it is evident that they have shown mixed results of convergence and divergence. This is mainly because differing income levels, differing economic structures, and variations in adopting liberalization measures.

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