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Revisiting global income convergence: 1990-2018 A disaggregated analysis

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Abstract

A comprehensive global convergence of income based on β, σ, inequality (distribution sensitive) and club convergence (based on Markov process) across 187 countries over a period from 1990 to 2018 is studied here at the disaggregate level. We classify 187 countries into 5 geographical regions following United Nations Regional Groups. The β convergence is ensured globally as well as regionally but not σ convergence. Inequality based convergence highlights that global income inequality reduces after 2000; within(region) inequality is found higher than between (region) in lower and upper tail of the income distribution but middle of the distribution provides an opposite results. The club convergence of relative income clearly proves the existence of 'low level income trap' since majority of the countries are clustered around low and lower-middle income classes over time (viz. 1990-2018). This low level income trap is more pronounced in African and Asia-Pacific regions that pose a serious threat towards attaining inclusive growth globally.

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1
Introduction

The neoclassical growth theory developed by Solow (1956) is based on β (and σ) convergence; it is an average measure, it fails to detect intra-distributional dynamics of income. The non-linearity of data may generate multiple equilibriums with stratification, polarization and club convergence (Quah 1993; 1996, 1997; Fingleton 1997; Bartkowska and Riedl 2012; Eichengreen et. al. 2013; Im and Rosenblatt 2013; Han et al 2017; Hembram et al 2019a, 2019b, 2020). Thus, the theoretical predictions of low level trap or MIT can be supported by the empirical evidences. Moreover, recent findings on multidimensional poverty index (MPI)) clearly re-ignite the issue of the prevalence of global poverty trap or low level income trap. The global MPI in 2019 reports that 1.3 billion people are multidimensionally poor scattered around 101 countries, two-thirds of multidimensionally poor live in middle-income countries (OPHI 2019). The present study makes a few contributions on global convergence at the disaggregated level. Before highlighting our contributions, we must mention about the choice of our time period (1990-2018). Firstly, we objectively choose the initial time (viz. 1990) since the early 1990s fundamental changes in the world economy like intensification of economic integration, under the auspices of increasing globalization have taken place. Secondly, our objective of the present study is to include the maximum number of countries scattered around five regions in the world. Before 1990, the income data of 187 countries were not available. The present study is distinct from earlier studies in the following grounds:

Firstly, global convergence of income across 187 countries at the disaggregate level (viz. regional level) is not studied earlier. For disaggregate study, we classify 187 countries into 5 geographical regions following United Nations Regional Groups. Secondly, our convergence study is comprehensive that includes β, σ, inequality (distribution sensitive) and club convergence based on distribution dynamics. In this context, we shall explore the absolute and relative stagnation of countries over a period from 1990 to 2018 at the disaggregated level using Markov process of probability transition. Thirdly, we go beyond σ convergence, the inequality of income and its decomposition across different regions in the world is to be carried out using Generalized Entropy (GE) measure for clear understanding of the sources of income inequality. Recent micro-studies studies (at the household level across countries in the world) reveal that global income inequality reduces marginally during last two decades with a rise in inequality within countries but a fall in inequality between countries (Anand and Segal 2008; Lakner and Milanovic 2016; Davies and Shorrocks 2018). We can check the consistency of our results with the earlier findings of global inequality assuming country as unit of analysis. Unlike Gini, the GE measure of inequity captures different parts of the income distribution for different values of sensitivity parameter. Such type of analysis of convergence may have some policy implications at the disaggregate level. The present paper is structured as follows. Section-II discusses the methodological issues and data. The empirical analysis is carried out in Section-III. Concluding observations with policy options and limitations are mentioned in Section-IV.

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Methodology and Data

Following Barro and Sala-i-Martin (1992), we have used the least square panel regression model to examine the presence of absolute β convergence.

$$(\frac{1}{\tau})\ln\left[\frac{Y_{it}}{Y_{i(t-1)}}\right]=\alpha+\beta\ln(Y_{i(t-1)})+\mu_i+\eta_t+U_{it}. \qquad (1)$$, here, Y_{it} stands for income of the *i*-th country at time(*t*), τ is the time interval, μ and η stand for country-specific and time dummy respectively and *U* is error term which is assumed to be normally distributed; if β lies between -1 to 0, it shows absolute β convergence. The Sigma (σ) convergence occurs if dispersion of income falls over time. It can be proved that β convergence is necessary but not sufficient for σ convergence (Sala-i-Martin 1996).

Both β (and σ) convergence are descriptive measures and these are highly affected by extreme values or outliers. The sigma(σ) convergence is based on dispersion which considers the whole part of any distribution but in reality the rate of decline(or increase) of different parts of distribution might differ. This is uniquely captured by GE measure inequality as shown in equation (2).

$$GE(\alpha)=\frac{1}{n(\alpha^2-\alpha)}\sum\left[\left(\frac{Y_i}{\overline{Y}}\right)^{\alpha}-1\right] \qquad (2)$$

Where, α is the sensitivity parameter capturing different parts of the distribution; $\overline{Y}$ is the grand mean of *Y* and *n* stands for number of countries. Since, Gini coefficient is distribution insensitive and it is not perfectly sub-group decomposable, therefore, we objectively consider the GE measure. For lower values of α, *GE* is more sensitive to changes in the lower tail of the distribution and for higher values, GE is more sensitive to changes that affect the upper tail (Litchfield 1999, Cowell et al. 2003). It can be proved that GE(0), GE(1) and GE(2) correspond to mean log deviation(MLD), Theil Index and Coefficient of Variation(CV) respectively[1]. Following Mussard et al (2003), we decompose the *GE*(α) measures as follows:

$$GE(\alpha)=\frac{1}{n(\alpha^2-\alpha)}\sum_{j=1}^{k}\sum_{i=1}^{n_j}\frac{Y_{ij}}{\overline{Y}}\left[\left(\frac{Y_{ij}}{\overline{Y}}\right)^{\alpha}-1\right]=GE(\alpha)_W+GE(\alpha)_B \qquad (3),$$ where, *k* be the number of groups, n_j be the number of population in the j-th group, given that $\sum_{j=1}^{k}n_j=n$, $GE(\alpha)_W$ and $GE(\alpha)_B$ are within and between inequality respectively. The $GE(\alpha)_W$ and $GE(\alpha)_B$ are defined as follows where $\overline{Y_j}$ be the mean of income(*Y*) of *j*-th group.

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[1] If we directly insert α=0 and 1, the function will not exist. In order to find the limiting values for α=0 and 1, we apply L'Hospital's rule.

$$GE(\alpha)=\lim_{\alpha\to0}\frac{Z_1(\alpha)}{Z_2(\alpha)}=\lim_{\alpha\to0}\frac{Z_1'(\alpha)}{Z_2'(\alpha)}=\lim_{\alpha\to0}\frac{\sum\left(\frac{Y_i}{\overline{Y}}\right)^{\alpha}\ln\left(\frac{Y_i}{\overline{Y}}\right)}{n(2\alpha-1)}=\frac{\sum\ln\left(\frac{\overline{Y}}{Y_i}\right)}{n}$$ =Mean Log Deviation, similarly, for α=1, $GE(1)$=Theil Index= $\frac{\sum\frac{Y_i}{\overline{Y}}\ln\left(\frac{Y_i}{\overline{Y}}\right)}{n}$ and for α=2, $GE(2)=\frac{1}{2}.\frac{\frac{1}{n}\sum\left(Y_i-\overline{Y}\right)^2}{\overline{Y^2}}=0.5.CV^2$

$$GE(\alpha)_W = \sum_{j=1}^{k} \frac{n_j.\overline{Y}_j}{n.\overline{Y}} \left(\frac{\overline{Y}_j}{\overline{Y}} \right)^{\alpha} GE(\alpha)_{Wj} \text{ and } GE(\alpha)_B = \frac{1}{(\alpha^2 - \alpha)} \sum_{j=1}^{k} \frac{n_j.\overline{Y}_j}{n.\overline{Y}} \left[\left(\frac{\overline{Y}_j}{\overline{Y}} \right)^{\alpha} - 1 \right]$$

We have considered five regions or groups of countries like African (53), Asian and the Pacific (53), East Europe (23), Latin America (33) and Western Europe (25). The values in parentheses in each group represent number of countries. A Simple Box-Plot (with 45^o bisector) is sufficient to capture the absolute stagnation but relative stagnation involves distribution dynamics. The Markov process of probability transition (TPM) and kernel density may be used to capture distribution dynamics (Quah 1993, 1996; Fingleton 1997). However, graphically, we can guess about the absolute stagnation of relative values of Y of any country over time. The relative Y is normalized such that it lies between $10 \leq Y \leq 110$ for each time point. The Markov process is the best way to trace the distribution dynamics over time; since kernel and Markov's process of TPM act as complement to each other, therefore, we have considered only Markov process of TPM for exploring stagnation of countries at different income levels. Following the standard literature of Markov process (see, for example Geppert and Stephan 2008), we assume that the relative *Y* follows a finite first-order Markov chain with stationary transition probabilities. A group-space of *m* non-overlapping groups (or classes) is defined (*i* = 1, …*m*) and each group(or class) represents an interval of relative *Y* values. Let Y_r^t be the relative *Y* of a country viz. regional unit (r). If the sequence $\{Y_r^0, Y_r^1, \ldots\ldots Y_r^n\}$ satisfies the relation:

$$P\left\{Y_r^{t+1} = j \middle| Y_r^0 = i_0, Y_r^1 = i_1 \ldots\ldots\ldots\ldots Y_r^t = i\right\} = P\left\{Y_r^{t+1} = j \middle| Y_r^t = i\right\} = P_{ij} \quad (4)$$

for all intervals(groups or classes) and countries(viz. regional-level units), then it is defined as a discrete-time Markov chain process. If the transition probability, P_{ij} is independent of time (*t*), then it is called a time stationary Markov chain as denoted by ***P***, a square matrix of probability transition (TPM). Given that $\sum_{i=1}^{m} P_{1i} = 1; \quad \sum_{i=1}^{m} P_{2i} = 1; \quad \ldots \sum_{i=1}^{m} P_{mi} = 1;$ the elements of ***P*** is estimated as: $P_{ij} = \frac{n_{ij}}{\sum_{j=1}^{m} n_{ij}}$, where n_{ij} is the number of transitions from group *i* to group *j*, thus P_{ij} is the probability transition that a country will move from group *i* to group *j* in the next period. Mathematically, the Markov process can be described as:

$$M^{t+1} = P.M^t \quad (5)$$

M^{t+1} and M^t are the distribution of the variable(say, *Y*) at time (*t*+1) and *t* respectively. The generalized distribution (from equation (5)) for any time, (t+λ) can be written as: $M^{t+\lambda} = P^{\lambda}.M^t$ (6). Similarly, iterating the system up to infinity, we get the steady-state long-run (ergodic) distribution as follows:

$$M^* = \lim_{\lambda \to \infty} P^{\lambda} M^t \quad (7)$$

. Therefore, the M* (ergodic distribution) can be applied to predict the future distribution of any variable and to explore the possibility of stratification, polarization and convergence in the future. We can estimate the stability index (**SI**) which determines the probability that a country will remain in the same group over time (as shown in eqn. 8). The opposite of **SI** is mobility index (**MI**) which captures mobility of a country from one group to another over time (as shown in eqn. 9). The speed of convergence or half-life is shown in equation (10):

$$SI = \frac{tr(P)}{m} \quad (8) \qquad MI_p(P) = \frac{m - tr(P)}{m-1}) \quad (9) \quad Half - life = \frac{-\ln 2}{\ln|\lambda_2|} \quad (10)$$

Here, tr(P) is the trace of matrix (***P***) and λ_2 (the second Eigen value of matrix ***P***). Since, Markov chain analysis is based on discrete approach, it suffers from one limitation like arbitrary discretization; however, the Gaussian (stochastic) kernel can solve this problem (Quah 1993, 1996, 1997). The per capita income data across countries are drawn from United Nations Development Program (1990-2019) at 2011 base price measured in $PPP as shown in Appendix-A. The population data across countries are drawn from Population Reference Bureau (1990-2018).

3
Empirical Findings

During the last decade a very popular debate has been emerged towards the existence of 'middle income trap (MIT)', the term was introduced by Gill and Kharas (2007). It has been a buzzword in empirical growth literature. It is interesting to mention here that Han and Wei (2017) have found 3,680 research articles highlighting the term MIT from Google Scholar on 15th March, 2016. Therefore, it is extremely difficult to draw a definite conclusion from the current literatures regarding the existence of global convergence of income because of the diversity of the sources of income data, varying time periods and initial time point, number of countries and methodologies. Given this vast empirical backdrop, we first consider the simple descriptive statistics of income (PCGDP) of 187 countries over 4 time points. It reveals some interesting findings. The mean and dispersion of income is found rising and the degree of skewness reduces over time. Global inequality as measured by CV and Gini across countries is found declining over time.

Tabe-1 Descriptive statistics of the global income across 187 countries: 1990-2018

Income($PPP)	Max	Min	Range	Mean	SD(σ)	CoV(%)	Gini	Skewness
PCGDP(1990)	112350	386	111964	12330.89	16657.93	135.09	0.5851	3.0682
PCGDP(2000)	108287	573	107714	14223.61	18504.54	130.09	0.5882	2.4917
PCGDP(2010)	119974	660	119314	16734.86	18846.67	112.61	0.5426	2.1728
PCGDP(2018)	112532	660	111872	18444.42	19374.45	105.04	0.5238	1.8513

Source: Authors' estimation. Note: PCGDP is measured in 2011 PPP $

The relative positions of the countries over four time points are found to be more or less stable but few countries' position change since the rank correlation is less than 1(shown in Table-2).

Table-2 Rank Correlation (Spearman) of Income of 187 countries for four time points

Time	1990	2000	2010	2018
1990	1			
2000	0.9537[a]	1		
2010	0.9351[a]	0.9822[a]	1	
2018	0.9264[a]	0.9673[a]	0.9878[a]	1

Source: Authors' estimation. Note. [a] significant at 1 percent level.

From this aggregate picture, we should not draw any definite conclusion because disaggregate picture may give different results. Now, following the methodology as outlined earlier, we check the absolute β convergence at the global as well as regional levels. The following panel data

regression clearly supports absolute β convergence and our result is consistent with earlier findings of Subramanian (2011) and Roy et al (2016) in connection with unconditional global β convergence. Our disaggregated results also support absolute β convergence (in Table-3). It is observed that the speed of convergence in R1 (African region) and R3 (East European region) is found to be higher than other regions (including global level).

Table-3 Result of absolute Beta (β) convergence of Income: Global and Regional

Expla. Var.	Global	R1	R2	R3	R4	R5
Initial Y	-0.049[a]	-0.066[a]	-0.032[a]	-0.061[a]	-0.0174[a]	-0.0382[a]
	(0.0039)	(0.007)	(0.007)	(0.0139)	(0.0055)	(0.007)
Constant	0.196[a]	0.233[a]	0.136[a]	0.257[a]	0.0764[a]	0.180[a]
	(0.015)	(0.023)	(0.027)	(0.056)	(0.022)	(0.031)
Within R^2	0.2897	0.4747	0.1686	0.2974	0.1296	0.3915
Between R^2	0.0124	0.0037	0.1161	0.0581	0.0007	0.2030
Overall R^2	0.0253	0.0181	0.0853	0.1238	0.0056	0.2335
F(1,359)	152.15[a]	94.90[a]	21.29[a]	19.04[a]	9.68[a]	31.52[a]
Hausman Test	134.52[a]	92.37[a]	13.06[a]	10.28[a]	7.76[a]	6.91[a]
No. of obs.	561	159	159	69	99	75

Source: Authors' estimation. Note: [1 &2] significance at 1 & 5 percent level respectively. Values in parentheses represent standard error. R1=African Group, R2= Asia-Pacific Group, R3=East-European Group, R4= Latin America, R5=West European Group.

We find σ divergent globally as well as regionally (as reported in Table-4) since the standard deviation (σ) is not found falling continuously over time. If we compare Table-4 with Table-1, it is clear that global inequality and global dispersion move in the opposite direction though there exists global beta (β) convergence. We need a serious study to explain this phenomenon; consequently, we go for analyzing the results of Generalized Entropy(GE) measures of inequality at the aggregate and regional level since the GE measures of inequality capture the inequality of different parts of the distribution of income (as shown in Table-5).

Table-4 Result of Sigma (σ) convergence of Income: Global and Regional

Year	Global	R1	R2	R3	R4	R5
1990	16657.93	4980.063	22897.39	5020.137	5580.48	16255.33
2000	18504.54	4795.982	25263.76	5754.022	6341.806	14081.32
2010	18846.67	6961.669	24316.38	7030.719	7019.163	14625.17
2018	19374.45	6176.073	23917.01	8761.95	7171.962	14453.88

Source: Authors' estimation. Note: R1 to R5 are defined in footnote of Table-3.

The inequality of countries belonging to lower and middle of the income distribution is found to be low in all four time points but it is high among the countries belonging to upper tail though the inequality is found to be declining in all three parts. This is noticed in all five regions. The decomposition of aggregate inequality among five regions suggests some interesting findings. Inequality in all parts of the distribution starts declining after 2000; within(region) inequality is found higher than between (region) in lower and upper tail of the distribution but middle of the distribution provides an opposite results in 1990, 2000, 2010; in 2018 between and within inequality coincides as shown in Fig1A, 1B, 1C and in Table-6.

Tabe-5 Global and Regional Inequality measured by GE (α) over time: 1990-2018

$GE(\alpha)_T$	Global	R1	R2	R3	R4	R5
$GE(0)_{1990}$	0.30085	0.214745	0.386175	0.064797	0.070523	0.03372
$GE(1)_{1990}$	0.26626	0.234274	0.372093	0.046289	0.069496	0.038943
$GE(2)_{1990}$	0.912479	0.882383	1.40613	0.098819	0.192894	0.120641
$GE(0)_{2000}$	0.306188	0.212829	0.375337	0.070781	0.070852	0.021061
$GE(1)_{2000}$	0.264224	0.212918	0.351926	0.061867	0.066571	0.022953
$GE(2)_{2000}$	0.846266	0.680603	1.238445	0.14570	0.175369	0.062888
$GE(0)_{2010}$	0.266421	0.209027	0.295835	0.045732	0.070924	0.019077
$GE(1)_{2010}$	0.218094	0.202166	0.28044	0.039645	0.060525	0.020766
$GE(2)_{2010}$	0.634155	0.809347	0.936497	0.089395	0.14484	0.056788
$GE(0)_{2018}$	0.251387	0.238255	0.261109	0.045242	0.06448	0.017419
$GE(1)_{2018}$	0.200467	0.240266	0.242646	0.039803	0.05352	0.018126
$GE(2)_{2018}$	0.551694	0.605109	0.765509	0.090150	0.122501	0.04734

Source: Authors' estimation. Note: R1 to R5 are defined in footnote of Table-3.

Table-6 Decomposition of GE (0), GE(1) and GE(2): 1990- 2018

Year	GE(0)			GE(1)			GE(2)		
	T	W	B	T	W	B	T	W	B
1990	0.30085	0.195191	0.10566	0.26626	0.101178	0.165083	0.912479	0.6561806	0.2506173
2000	0.306188	0.190724	0.115464	0.264224	0.111102	0.153123	0.846266	0.556306	0.287723
2010	0.266421	0.172064	0.094356	0.218094	0.091072	0.127022	0.634155	0.401152	0.221174
2018	0.251387	0.152519	0.098868	0.200467	0.091888	0.108579	0.551694	0.322438	0.208556

Source: Authors' estimation. Note: T=Total, W=Within and B=Between.

Fig.1 Graphical presentation of decomposition of GE measures of inequality: 1990-2018

Fig.1A

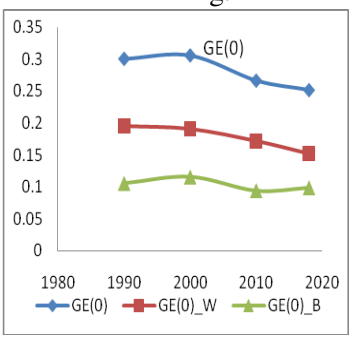


Fig.1B

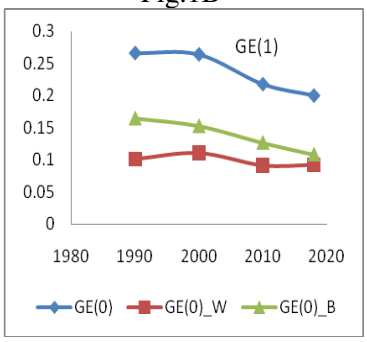
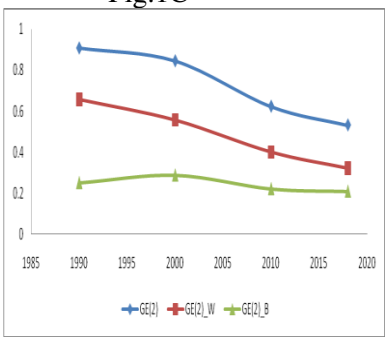


Fig.1C



Decomposition of GE clearly shows that at the lower level of income (viz. lower tail) between regions inequality persists if we consider the whole time period (1990-2018). As inequality starts falling (both within and between), we can now check transition of countries over time. A country is said to be stagnant if it lies on the 45° line; country improves if it lies above the 45° bisector and the opposite happens if it lies below the 45° line. This can be explained using absolute and relative incomes. This will help us to make an idea about the performance of countries overtime in a non-parametric way. Here, Fig.2A shows the global absolute income stagnation and the regional stagnations are shown in Fig.2R1 to Fig.2R5.

Fig.2A : Absolute Income Stagnation: Global Africa

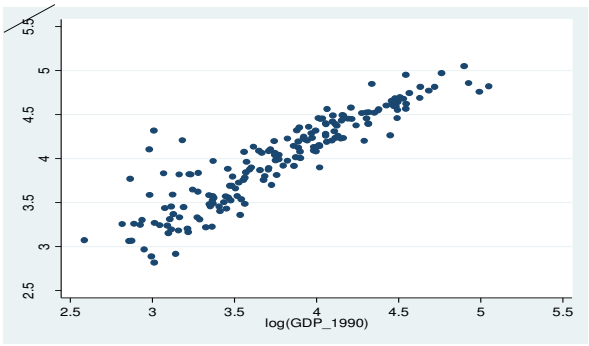


Fig.2R1: Absolute Income stagnation:

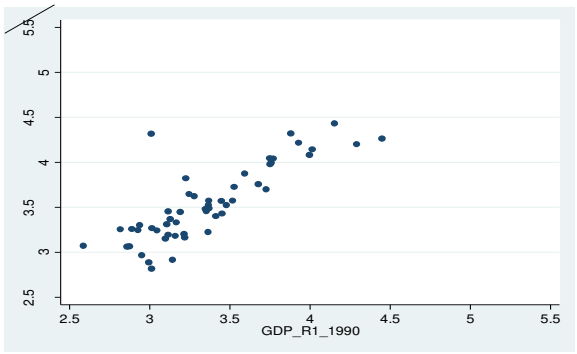


Fig.2R2: Absolute Income stagnation: Asia & Pacific

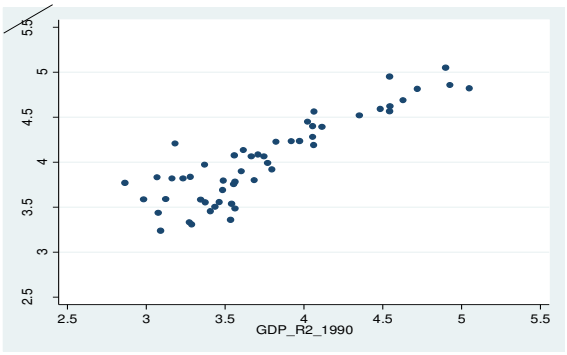


Fig.2R3: Absolute Income stagnation: East European

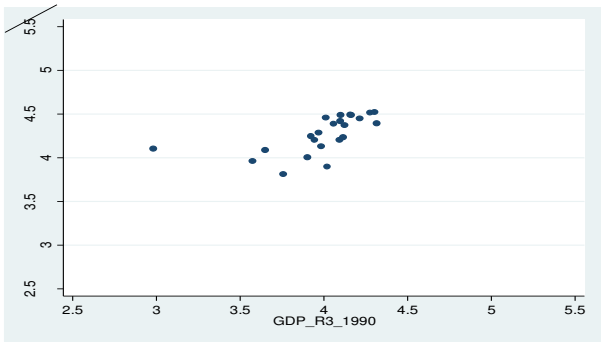


Fig.2R4:Absolute Income stagnation: L. America

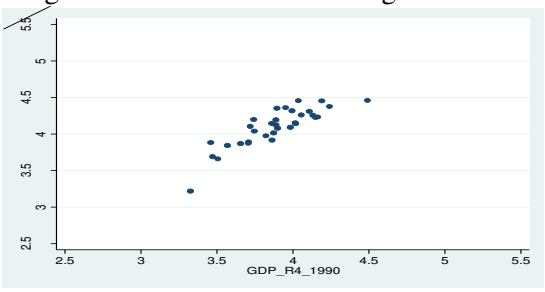
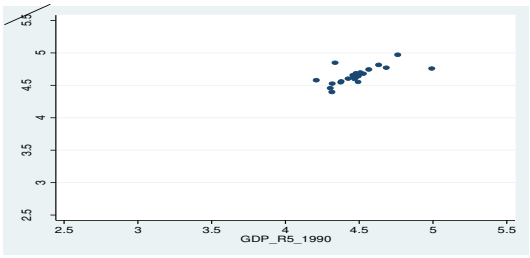


Fig.2R5:Absolute Income stagnation: W.Europe



From the above figures it is observed that out of 187 countries, very few countries are found to be stagnant over time. Figure 2A represents the aggregate picture whereas figures 2R1 to 2R5 represent the regional absolute income stagnation. But, it is clear that most of the countries experience an improvement in income in absolute sense. This is also observed from the results as given in Appendix A. Now, we can check the same in relative sense considering the normalized values of income. The study of relative stagnation is useful for policy intervention.

Following the principle of relative distance, the relative income of countries is shown in Fig.3A to Fig.3R1-R5 where the income of any country is normalized such that it ranges from 10 to 110 in each time point.

Fig.3A: Relative income stagnation: Global

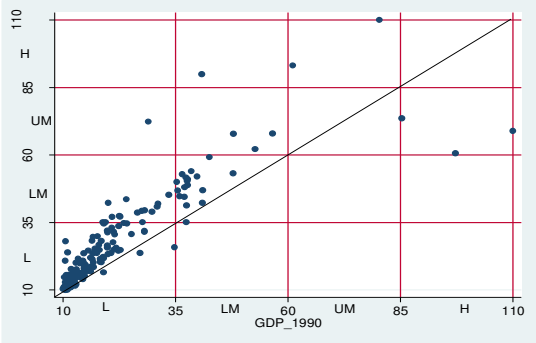


Fig.3R1: Relative income stagnation: Africa

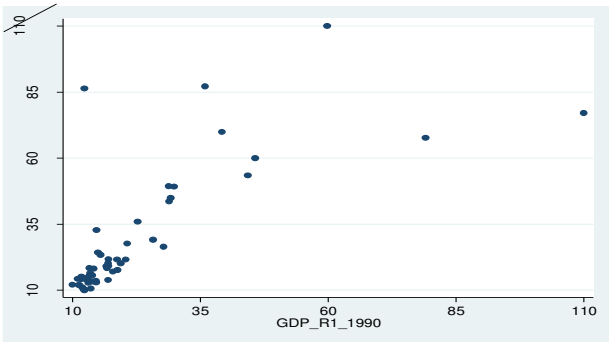


Fig.3R2 Relative income stagnation: Asia-Pacific

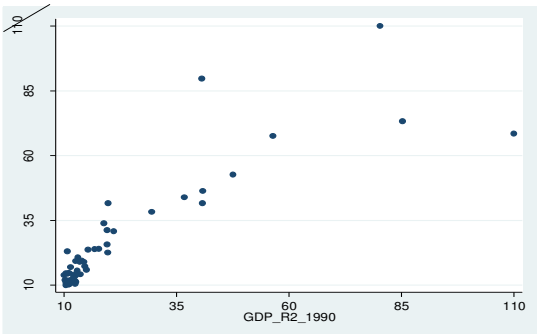


Fig.3R3 Relative income stagnation: East Europe

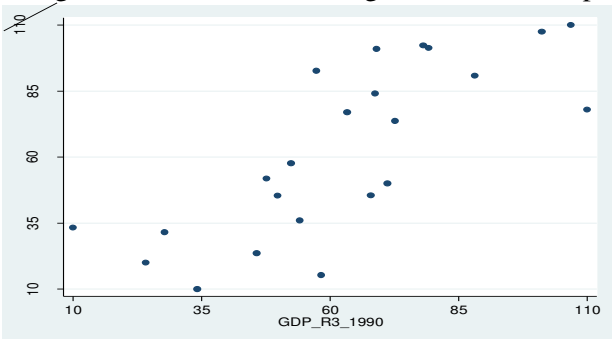


Fig.3R4 Relative income stagnation: Latin America

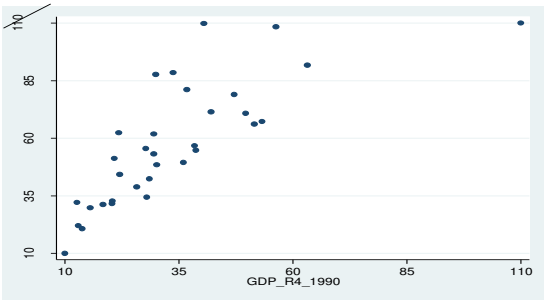
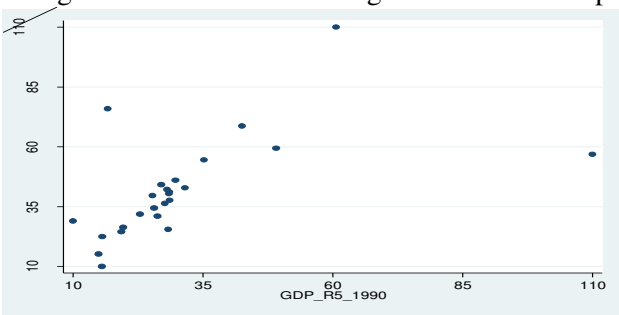


Fig.3R5 Relative income stagnation: West Europe



The relative income stagnation at the global level (as shown in Fig.3A) shows some interesting results. At aggregate level most of the countries are found to be stable in the lower class. Now, if we compare between Fig.3A and Fig.2A, we can easily identify the difference between absolute and relative stagnation of countries globally! Fig.2A shows that countries are improving overtime, whereas Fig.3A shows that a majority of countries are clustered around lower income class, thus the countries are still poor in relative sense. A county may be stagnant at any level of income range but a country is said to be stuck by 'low level income' if a country is found to be stagnant at the lower income class (over time). It is interesting to note that only 6 countries experience deterioration of relative ranking in respect of normalized income, these countries could not retain their earlier positions.

The disaggregated analysis (as shown in Fig.3R1 to Fig.3R5) clearly shows that countries beloning to African and Asia-Pacific regions are more vulnerable to be stuck by 'low level

income trap'. In order to clarify the analysis, we divide the whoe range of relative income into four equi-spaced classes like low(L), lower-middle (LM), upper-middle(UM) and high(H). We adopt World Bank's criteria of classification of countries based on PCNSDP ($PPP) in absolute term. The following income ($PPP of PCNSDP) ranges are used for classification: Lower group (L) if Y≤1025; lower middle (LM) group if 1026≤Y≤3995; upper middle (UM) group if 3996≤Y≤12375 and higher(H) group if Y>12375.

Most of the countries have improved in 2018 compared to 1990; however, in relative sense countries are found to be clustered around low (L) and lower middle income range (LM). It is found that 40 and 45 countries are in low level (L) trap in African and Asia-Pacific region respectively. However, it is found that absolute stagnation of relative income was not found in Latin America; only 4 countries are found to be stagnant in West Europe whereas 11 countries in East European region could not retain their earlier positions in respect of relative income. Thus, we can coroborate our analysis using Markov Process based on Transitional Probabaility Matrix(TPM). We have estimated two sets of TPMs globally as well as regionally based on absolute and normalized incomes of countries.

The global TPM for absolute income is shown in Table-7A and the regional TPMs are shown in Table-7R1 to 7R5. The Global TPM clearly shows that the maximum mobility is found among the countries who were in low income group(L) in 1990; though 15 percent countries could not move upward, remained in the same group over this period. These countries are trapped by extremely 'low level income'. In addition to this downward mobility is also found among the countries who were in lower middle income group(LM) in 1990; about 3 percent countries had witnessed such downward mobility from LM group to L in 2018. No such downward mobility is found among the countries belonging to upper middle (UM) and high (H) groups globally. The disaggrgate results (from Fig.7R1-7R5) clearly proves that countries belonging to African region is responsible for generating extremely 'low level income trap'. In African region, we find both way movement of countries belonging to LM group. More or less same resuts are found in case of TPM of normalized income.

Table-7A: TPM: Global (in absolute income)

		2018			
		L	L M	UM	H
1990	L	0.153	0.615	0.076	0.153
	L M	0.033	0.616	0.333	0.016
	UM	0	0	0.465	0.534
	H	0	0	0	1
SI = 0.559; MI= 0.588; Half-Life =1.65					

Table-7R1: TPM: African Region (in absolute income)

		2018			
		L	L M	UM	H
1990	L	0.2	0.7	0	0.1
	L M	0.066	0.766	0.166	0
	UM	0	0	0.7	0.3
	H	0	0	0	1
SI = 0.667; MI= 0.444; Half-Life = 3.98					

Table-7R2: TPM: Asia-Pacific Region (in absolute income)

		2018			
		L	L M	U M	H
1990	L	0	0.5	0.5	0
	L M	0	0.542	0.458	0
	UM	0	0	1	0
	H	0	0	0	0
SI = 0.385; MI= 0.819 ; Half-Life = 1.12					

Table-7R3: TPM: East European Region (in absolute income)

		2018			
		L	LM	UM	H
1990	L	0	0	0	1
	LM	0	0	1	0
	UM	0	0	0.364	0.636
	H	0	0	0	1
SI = 0.34 ; MI= 0.88 ; Half-Life = 0.68					

Table-7R4: TPM: Latin American Region (in absolute income)

		2018			
		L	LM	UM	H
1990	L	0	0	0	0
	LM	0	0.2	0.8	0
	UM	0	0	0.43	0.57
	H	0	0	0	1
SI = 0.41; MI= 0.79; Half-Life = 0.82					

Table-7R5: TPM: West Europe (in absolute income)

		2018			
		L	LM	UM	H
1990	L	0	0	0	0
	LM	0	0	0	0
	UM	0	0	0	0
	H	0	0	0	1
Stability Index(SI) = 0.25 ; Mobility Index= 1					

Source: Authors' estimation.

The normalized (viz. relative) income is split into four equi-spaced groups like lower (10-35), lower middle (35-60), upper middle (60-85) and higher (85-110) and are denoted by L, LM, UM an H respectively. The global TPM for relative income is shown in Table-8A and the regional TPMs are shown in Table-8R1 to 8R5

Table: 8ATPM of relative income: Global

		2018			
		L	L M	UM	H
1990	L	0.9	0.093	0.006	0
	L M	0	0.818	0.136	0.045
	UM	0	0	0	1
	H	0	0	1	0
	SI = 0.429 ; MI= 0.76; Half-Life = 6.58				

Table:8R1 TPM of relative income: R1(African Region)

		2018			
		L	LM	UM	H
1990	L	0.869	0.109	0	0.022
	LM	0	0.4	0.2	0.4
	UM	0	0	1	0
	H	0	0	1	0
	SI = 0.57 ; MI= 0.58; Half-Life = 4.94				

Table: 8R2TPM of relative value R2 (Asia-Pacific Region)

		2018			
		L	LM	UM	H
1990	L	0.95	0.05	0	0
	LM	0	0.6667	0.16667	0.16667
	UM	0	0	0	1
	H	0	0	1	0
	SI = 0.41; MI= 0.79; Half-Life = 13.51				

Table: 8R3TPM of relative income:R3 (East European Region)

		2018			
		L	L M	UM	H
1990	L	1	0	0	0
	LM	0.29	0.57	0	0.14
	UM	0	0.25	0.375	0.375
	H	0	0	0.25	0.75
	SI = 0.67; MI= 0.43; Half-Life = 13.51				

Table: 8R4 TPM of relative income: R4(Latin American Region)

		2018			
		L	LM	UM	H
1990	L	0.45	0.35	0.1	0.1
	LM	0	0.27	0.55	0.18
	UM	0	0	0	1
	H	0	0	0	1
	SI = 0.43; MI= 0.76 ; Half-Life = 0.87				

Table: 8R5TPM of relative income: R5(West European Region)

		2018			
		L	L M	UM	H
1990	L	0.5	0.45	0.05	0
	L M	0	0.667	0.333	0
	UM	0	0	0	1
	H	0	1	0	0
	SI = 0.29; MI= 0.94 ; Half-Life = Inderminate				

Source: Authors' estimation.

The global upward mobility of the countries is found higher than stability in respect of relative income in all the groups except H in which a downward movement is noticed (in Fig.8A). The low level income trap is clear from Table-8A; the probability of persistence of countries in low

level income (L) is 90 percent. Similarly, 81 percent countries remain in the same income group (viz. lower-middle) in both the time points, however, no downward mobility is found in this LM group. Only downward mobility is noticed in the higher group (H). Disaggregated analysis shows that downward mobility is found in higher income group (H) in all the regions except Latin America. The countries belonging to LM group in African region have performed well. The persistence low level income trap (in relative sense) found in Africa and Asia Pacific region has been a major concern because the two regions together constitute 106 countries!

Above discussion clearly shows the difference between absolute and relative income stagnation and trap and highlights the importance relative income in the context of distribution dynamics of our study. Now, we can identify the countries stuck by 'low level income'. In respect of absolute income, out of 13 countries only 2 countries are found in trap (estimated from the TPM-7A but the calculation is not shown here); all these countries belong to African region. But out of 187 countries, 144 countries are found in the low-level income class (L) measured in normalized value of income. A detail analysis of the countries belonging to low-level income trap is shown in Appendix-B. Therefore, we can argue that majority of countries have improved their positions in respect of absolute income but the opposite result is found if income is measured in relative terms (using normalized value). The present study supports absolute β convergence, σ divergent (with club convergence) and a marginal reduction of inequaly in income at the global level.

4
Concluding observations

The neoclassical β convergence is ensured globally as well as regionally but it does not ensure σ convergent. Rising trend of global dispersion of income across countries generates club convergence. Inequality based income convergence highlights that global inequality reduces after 2000; within(region) inequality is found higher than between (region) in lower and upper tail of the distribution but middle of the distribution provides an opposite results in 1990, 2000, 2010; but, in 2018 between and within inequality becomes equal. Thus, our income inequality findings are more or less consistent with the earlier results done by Milanovic (2016) and Davies and Shorrocks (2018). Asia-Pacific region is found to be more unequal compared to other regions.

The majority of the economies have improved their positions in absolute income over time but they remain in the same income class (measured in relative terms), therefore, our result strongly supports the existence of low level income trap. The number of countries caught by low level trap in each region is given in Appendix-B. The so called MIT is associated with growth of income but we examine the existence of low level income trap (both in absolute and relative measure) using Markov process of transition. It clearly shows the existence of chronic income trap at low (L) and lower-middle (LM) income ranges (based on normalized value). This low level income trap supports the presence of club convergence and it is more pronounced in four regions (viz. R1, R2, R3 and R4). Inclusive growth with economic prosperity within planetary boundaries that leaves no one behind is the prime objective of sustainable development goals (SDG) to be achieved by 2030. Therefore, the agenda of 2030 of SDG heavily depends on the

success of the poor, fragile and vulnerable economies mainly scattered around the African and Asian (especially South Asian) regions since this two regions constitute 106 countries out of 187. The problem of inclusive growth has been a serious challenge under the present global pandemic due to COVID-19; the pandemic is affecting African and South Asian countries differently, given varied strength and vulnerabilities. Till date (on 13th Jan, 2021), there are 2,210,137 confirmed COVID-19 cases in Africa, indeed it's a grave concern (WHO 2020). There is a small hope because many African countries have experienced the Ebola outbreak in 2014-16 and 2018-2019. The painful lessons learned from Ebola outbreaks of African nations may help to combat the COVID-19 pandemic.

The present study has identified the existence of 'low level income trap' mostly found in Africa and Asia-Pacific regions but could not identify the underlying reasons of trap. Therefore, country specific policy implication is difficult to suggest. The existing empirical research suggests that weak governance (comprising corruption, crime and lawlessness), lack of physical and social infrastructure, geo-spatial (like landlocked and extreme climatic conditions) and socio-demographic composition of the population (like higher fertility and mortality, lower life expectancy and unfavorable age structure of the aggregate population) are responsible for generating the existence of low level income trap (Woolcock and Narayan 2000; Gallup and Sachs 2000; Acemoglu et al 2001, 2008; Bloom et al 2003; Rodrik et al 2004; Agenor et al 2006; Fagerberg and Srholec 2008, 2010; Fujita 2012; Kar et al 2019, Azzarri and Signorelli 2020; Oken 2020). A country may suffer from one or multiple factors that inhibit the growth process Therefore, our study is partial in nature because it could not deal with conditional convergence. Considering the above factors (as explanatory), the probability of falling into 'low level income trap' could be explored using panel logistic regression.

The current study has some limitations. Firstly, the entire analysis is based on absolute income convergence along with inequality but the conditional convergence is not attempted here. Secondly, our income inequality study could not capture the inequality within a country. Thirdly, we have arbitrarily chosen 4 groups following UNDPs income classification (both absolute and relative) criterion; if more number of groups are added in Markov's TPM, the results might differ. Fourthly, the multiple equilibriums with stratification, polarization and club convergence could be shown graphically using kernel density but that was not presented here.

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Appendix: A Per Capita GDP ($PPP at 2011 base): 1990, 2000, 2010 and 2018. Numerical values in parentheses represent rank.

Appendix A.1: R1(African Region)

Country	PCGDP(1990)	PCGDP(2000)	PCGDP(2010)	PCGDP(2018)
Algeria	10298(69)	10258(75)	12921(81)	13886(84)
Angola	4761(109)	3892(122)	6360(118)	5725(130)
Benin	1463(159)	1666(161)	1819(167)	2152(163)
Botswana	8502(79)	10718(69)	13235(79)	16518(74)
Burkina Faso	844(181)	1075(175)	1423(175)	1756(171)
Burundi	1027(174)	718(184)	734(186)	660(187)
CÃ´te d'Ivoire	3286(125)	2989(133)	2673(151)	3733(143)
Cabo Verde	1676(154)	3897(121)	5943(120)	6662(122)
Cameroon	3004(129)	2564(144)	2876(148)	3352(149)
Central African Republic	983(176)	851(181)	982(183)	775(186)
Chad	1109(172)	992(177)	1915(164)	1746(172)
Comoros	2581(136)	2389(149)	2426(157)	2514(160)
Congo	5323(103)	4621(112)	5323(125)	5024(133)
Congo (Dem. Rep.)	1387(162)	573(186)	660(187)	827(185)
Djibouti	2252(144)	2095(155)	2666(152)	2867(154)
Egypt	5898(94)	7504(94)	10019(93)	11014(100)
Equatorial Guinea	1018(175)	10938(68)	33990(29)	20865(60)
Eritrea	1031(173)	2485(147)	1962(162)	1845(168)
Eswatini (Kingdom of)	5633(98)	6165(102)	8242(106)	9530(106)
Ethiopia	655(186)	621(185)	1075(182)	1794(170)
Gabon	19557(39)	17822(46)	15508(70)	15922(78)
Gambia	1445(161)	1449(167)	1552(172)	1517(178)
Ghana	1901(150)	2219(151)	3026(145)	4212(138)
Guinea	1343(163)	1519(165)	1666(170)	2338(161)
Guinea-Bissau	1634(156)	1411(169)	1431(174)	1596(176)
Kenya	2348(140)	2098(154)	2436(156)	3077(151)
Lesotho	1299(165)	1637(162)	2419(158)	2865(155)
Liberia	719(185)	1318(171)	1101(180)	1161(183)
Libya	28144(28)	21913(39)	29494(37)	18406(64)
Madagascar	1653(155)	1444(168)	1386(177)	1453(179)
Malawi	747(183)	884(180)	1078(181)	1163(182)
Mali	1274(167)	1466(166)	1875(165)	2056(165)
Mauritania	2801(134)	2834(138)	3426(139)	3724(144)
Mauritius	7581(87)	11282(65)	15938(68)	21075(58)
Morocco	3923(115)	4492(116)	6456(117)	7509(117)
Mozambique	386(187)	573(187)	945(184)	1180(181)
Namibia	5713(96)	6539(99)	8678(103)	9898(104)

Niger	893(179)	755(183)	812(185)	932(184)
Nigeria	3361(124)	3069(131)	5085(126)	5316(132)
Rwanda	868(180)	803(182)	1396(176)	2003(167)
Sao Tome and Principe	2219(145)	2171(152)	2560(153)	3033(153)
Senegal	2323(142)	2418(148)	2776(150)	3356(148)
Seychelles	14217(48)	18453(43)	20365(53)	27114(47)
Sierra Leone	1248(168)	909(179)	1208(179)	1425(180)
South Africa	9900(71)	9701(80)	11973(83)	12143(94)
South Sudan	2312(143)	2852(137)	4013(135)	1678(174)
Sudan	1762(152)	2319(150)	3397(140)	4436(137)
Tanzania	1546(157)	1565(163)	2228(159)	2809(157)
Togo	1298(166)	1235(173)	1242(178)	1565(177)
Tunisia	5608(99)	7567(92)	10441(90)	11096(99)
Uganda	773(182)	1067(176)	1585(171)	1807(169)
Zambia	2339(141)	2126(153)	3338(141)	3748(142)
Zimbabwe	2820(133)	2946(135)	1928(163)	2688(159)

Appendix: A.2: R2 (Asia-Pacific)

Country	PCGDP(1990)	PCGDP(2000)	PCGDP(2010)	PCGDP(2018)
Afghanistan	1233(169)	963(178)	1672(169)	1735(173)
Bahrain	35113(11)	44943(11)	40571(21)	41973(22)
Bangladesh	1326(164)	1692(160)	2518(155)	3879(139)
Bhutan	2354(139)	3433(125)	6814(114)	9348(108)
Brunei Darussalam	84693(3)	82068(3)	80556(3)	71802(4)
Cambodia	960(177)	1385(170)	2522(154)	3870(140)
China	1522(158)	3690(123)	9498(99)	16187(75)
Cyprus	22472(32)	29368(31)	33913(30)	33048(35)
Fiji	5892(95)	6676(98)	7353(111)	9781(105)
India	1906(149)	2710(141)	4451(130)	6899(120)
Indonesia	4626(110)	5807(105)	8458(105)	11606(98)
Iran (Islamic Republic of)	11364(63)	13237(59)	18139(59)	19098(63)
Iraq	11555(59)	12212(62)	13154(80)	15565(81)
Japan	30582(23)	33872(27)	35750(28)	39294(26)
Jordan	6285(93)	7220(96)	9386(100)	8309(110)
Kazakhstan	13050(52)	9952(76)	20097(54)	24738(52)
Kiribati	1944(148)	1989(157)	1752(168)	2035(166)
Korea (Republic of)	11633(58)	20757(42)	30352(34)	36777(29)
Kuwait	52517(6)	70112(6)	75360(4)	65515(7)
Kyrgyzstan	3475(122)	2075(156)	2790(149)	3447(147)
Lao People's Dem. Rep.	1708(153)	2488(146)	4217(133)	6614(123)

Lebanon	5584(100)	10617(72)	14406(73)	11607(97)
Malaysia	10557(65)	16304(47)	21036(50)	28176(46)
Maldives	4140(113)	9803(77)	11965(84)	13611(86)
Marshall Islands	2910(131)	2974(134)	3236(143)	3599(145)
Micronesia	2722(135)	3120(130)	3320(142)	3196(150)
Mongolia	5123(105)	4655(111)	7688(110)	12209(93)
Myanmar	730(184)	1289(172)	3688(138)	5922(129)
Nepal	1188(170)	1527(164)	1987(161)	2724(158)
Oman	35042(12)	43966(12)	45336(13)	36831(28)
Pakistan	3056(128)	3401(127)	4072(134)	4928(134)
Palau	9370.3(75)	12350(61)	13630(76)	17202(69)
Papua New Guinea	2218(146)	2616(142)	3103(144)	3821(141)
Philippines	4014(114)	4224(119)	5583(122)	7943(112)
Qatar	79164(4)	108287(1)	119974(1)	112532(1)
Samoa	3651(119)	4330(118)	5407(123)	6089(128)
Saudi Arabia	42700(9)	43281(13)	45428(12)	48996(13)
Singapore	34912(13)	52357(8)	73061(6)	90091(3)
Solomon Islands	1883(151)	1817(158)	1871(166)	2142(164)
Sri Lanka	3613(120)	5543(107)	8503(104)	11956(96)
Syrian Arab Republic	4840(108)	5948(104)	7008(112)	6296(126)
Tajikistan	3661(118)	1185(174)	2138(160)	3061(152)
Thailand	6653(92)	9190(82)	13489(77)	16905(72)
Timor-Leste	1174(171)	3265(129)	9005(102)	6796(121)
Tonga	3577(121)	4607(114)	4991(127)	5696(131)
Turkey	11400(61)	13862(58)	17959(60)	25287(49)
Turkmenistan	8317(81)	5333(109)	9942(95)	17129(71)
Tuvalu	2377(138)	3052(132)	2987(146)	3593(146)
United Arab Emirates	112350(1)	103318(2)	55363(9)	66616(6)
Uzbekistan	3089(127)	2520(145)	4240(132)	6240(127)
Vanuatu	2550(137)	2824(139)	2949(147)	2846(156)
Viet Nam	1458(160)	2574(143)	4433(131)	6609(124)
Yemen	3426(123)	3998(120)	4566(129)	2285(162)

Appendix: A.3: R3 (East Europe)

Country	PCGDP(1990)	PCGDP(2000)	PCGDP(2010)	PCGDP(2018)
Albania	4458(112)	5443(108)	9928(96)	12306(92)
Armenia	3742(116)	2925(136)	6703(116)	9178(109)
Azerbaijan	8790(78)	4604(115)	16216(66)	16011(77)
Belarus	8367(80)	7574(91)	16261(65)	17742(67)
Bosnia and Herzegovina	955(178)	6351(101)	9764(97)	12756(90)
Bulgaria	9297(76)	8833(83)	15283(71)	19321(62)

Croatia	13287(51)	15591(51)	20758(51)	23637(55)
Czechia	20023(38)	21194(40)	28353(40)	33414(34)
Estonia	12585(55)	15703(49)	22741(46)	30991(39)
Georgia	7984(82)	3527(124)	6981(113)	10152(103)
Hungary	16344(42)	17960(45)	22405(47)	28243(45)
Latvia	12530(56)	11175(66)	18252(58)	26437(48)
Lithuania	14571(46)	12190(63)	21071(49)	31065(38)
Moldova	5705(97)	2810(140)	4734(128)	6490(125)
Montenegro	12996(53)	10397(74)	14035(75)	17278(68)
North Macedonia	9633(73)	8621(84)	11355(87)	13483(87)
Poland	10277(70)	14733(54)	21771(48)	28752(40)
Romania	11446(60)	10419(73)	17469(61)	24544(53)
Russian Federation	20639(36)	14051(57)	23326(45)	24791(51)
Serbia	12360(57)	7937(90)	13367(78)	16035(76)
Slovakia	14369(47)	15605(50)	25159(43)	31326(37)
Slovenia	18899(40)	22723(37)	28678(39)	32743(36)
Ukraine	10464(66)	4797(110)	7824(109)	7907(113)

Appendix: A.4: R4 (Latin America)

Country	PCGDP(1990)	PCGDP(2000)	PCGDP(2010)	PCGDP(2018)
Antigua and Barbuda	17473(41)	20791(41)	20660(52)	23768(54)
Argentina	11373(62)	14975(53)	18912(56)	18282(65)
Bahamas	31006(20)	32973(29)	29707(35)	28705(41)
Barbados	14123(49)	15391(52)	16276(64)	16839(73)
Belize	5116(106)	6954(97)	7849(108)	7810(114)
Bolivia	3703(117)	4371(117)	5337(124)	6986(119)
Brazil	10342(68)	11403(64)	14620(72)	14283(82)
Chile	8970(77)	14241(56)	19363(55)	22874(56)
Colombia	7729(86)	8413(85)	10957(89)	13333(88)
Costa Rica	7744(85)	9786(79)	12909(82)	15685(80)
Cuba	12850(54)	10955(67)	18287(57)	20325(61)
Dominica	6658(91)	8230(87)	10278(91)	9467(107)
Dominican Republic	5516(102)	8289(86)	11365(86)	15821(79)
Ecuador	7463(88)	7357(95)	9305(101)	10412(102)
El Salvador	4512(111)	5612(106)	6281(119)	7393(118)
Grenada	7238(90)	9538(81)	11014(88)	13970(83)
Guatemala	5101(107)	6071(103)	6714(115)	7509(116)
Guyana	2875(132)	4617(113)	5825(121)	7617(115)
Haiti	2114(147)	1757(159)	1510(173)	1656(175)
Honduras	3208(126)	3303(128)	3913(137)	4560(136)
Jamaica	7301(89)	7940(89)	8018(107)	8266(111)

Mexico	13580(50)	16130(48)	16160(67)	18102(66)
Nicaragua	2973(130)	3416(126)	3969(136)	4910(135)
Panama	7855(84)	10625(71)	15631(69)	22674(57)
Paraguay	7933(83)	7984(88)	9741(98)	12063(95)
Peru	5254(104)	6428(100)	10075(92)	12794(89)
Saint Kitts and Nevis	15481(44)	21990(38)	24575(44)	28295(44)
Saint Lucia	9633(74)	10665(70)	11667(85)	12344(91)
Saint Vincent & Grenadines	5577(101)	7563(93)	10013(94)	10940(101)
Suriname	10417(67)	9801(78)	14131(74)	13776(85)
Trinidad and Tobago	10912(64)	18336(44)	31260(33)	28647(43)
Uruguay	9842(72)	12881(60)	17159(62)	20916(59)
Venezuela (Bol. Rep.)	14619(45)	14589(55)	16887(63)	17131(70)

Appendix: A.5: R5 (West Europe)

Country	PCGDP(1990)	PCGDP(2000)	PCGDP(2010)	PCGDP(2018)
Australia	28669(27)	35393(23)	41530(18)	45439(19)
Austria	31342(17)	38844(17)	43336(16)	46473(17)
Belgium	30648(22)	37189(19)	41086(19)	43218(21)
Canada	31386(16)	37534(18)	40700(20)	44051(20)
Denmark	33786(14)	42338(14)	43998(14)	47673(15)
Finland	28906(26)	34887(25)	39848(24)	41899(23)
France	29464(25)	34705(26)	36815(25)	39556(25)
Germany	31287(18)	36765(21)	40429(22)	45959(18)
Greece	20686(35)	24839(35)	28726(38)	25141(50)
Iceland	30066(24)	34950(24)	40137(23)	48606(14)
Ireland	21658(33)	39385(16)	43515(15)	70361(5)
Israel	20728(34)	26789(33)	29665(36)	33661(33)
Italy	31142(19)	36536(22)	36201(27)	35739(31)
Luxembourg	57618(5)	81690(4)	91743(2)	93734(2)
Malta	16162(43)	24602(36)	28340(41)	38147(27)
Netherlands	32305(15)	42017(15)	46102(11)	49804(12)
New Zealand	24038(30)	28102(32)	32233(32)	36355(30)
Norway	42814(8)	58045(7)	62350(7)	65441(8)
Portugal	20167(37)	25999(34)	27238(42)	28687(42)
San Marino	98042(2)	75557(5)	73581(5)	57297(10)
Spain	23759(31)	29967(30)	32507(31)	35056(32)
Sweden	30976(21)	36902(20)	42989(17)	47194(16)
Switzerland	48182(7)	50776(9)	55866(8)	59019(9)
United Kingdom	26675(29)	33152(28)	36509(26)	40158(24)
United States	36813(10)	45661(10)	49479(10)	55681(11)

Appendix B: Countries in Low- Level Income Trap based on normalized value of income.

African Region	Asia and Pacific	East Europe	Latin America	West Europe
Algeria, Angola, Benin, Botswana Burkina Faso, Burundi, CÃ´te d'Ivoire, CaboVerde, Cameroon, Central African Republic, Chad, Comoros, Congo, Congo (Democratic Republic of the), Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini , Ethiopia ,Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Sudan, Tanzania , Togo, Tunisia, Uganda, Zambia, Zimbabwe	Afghanistan, Bangladesh, Bhutan, Cambodia, China, Fiji, India, Indonesia, Iran Iraq, Jordan, Kazakhstan, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Malaysia, Maldives, Marshall Islands, Micronesia , Mongolia, Myanmar, Nepal, Pakistan, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Syrian Arab Republic, Tajikistan, Thailand, Timor-Leste, Tonga, Turkey, Turkmenistan, Tuvalu, Uzbekistan, Vanuatu, Viet Nam, Yemen	Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Latvia, Moldova, Montenegro, North Macedonia, Romania, Russian Federation, Serbia, Ukraine.	Antigua and Barbuda, Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Uruguay, Venezuela .	Greece