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Measuring Pro-Poor Growth in Countries of Asia

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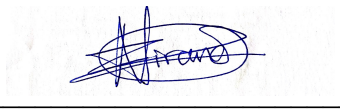
Declaration

I hereby declare that the master thesis entitled "Measuring Pro-poor Growth in Countries of Asia", submitted to GLODEP Consortium as a thesis graduation requirement, is my original work and any theoretical and empirical literature, as well as all other data used in the proceedings of the study, have been explicitly acknowledged in the text and the list of references provided in the document.



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Zásady pro vypracování

This study examines pro-poor growth in income dimension in countries of Asia. It focuses on achieving two main research objectives. First, it calculates pro-poor growth measures such as Poverty Equivalent Growth Rate (PEGR) and the Rate of Pro-poor growth (RPPG) across selected countries of Asia over comparable periods of time. These results will be used to assess the dynamics of pro-poor growth in the region. Secondly, through a panel data methodology, the study investigates possible determinants of pro-poor growth across countries of Asia. Data for income distributions will be sourced from the World Bank PovcalNet database.

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Abstract

This study examined the measures of pro-poor growth in twenty-one Asian countries with a particular focus on growth spells after the 2007/2008 global economic crisis. Using the latest available distributional data from the World Bank's PovcalNet database, five pro-poor growth measures were calculated: the pro-poor growth index, poverty-equivalent growth rate, rate of pro-poor growth, growth rate of the income of the poorest 20^{th} percentile of the population, and the growth incidence curve. The Distributive Analysis Stata Package (DASP) was used to decompose the data and compute the pro-poor growth measures. The results suggested that eleven countries (Armenia, Bangladesh, Bhutan, China (Urban), India, Indonesia, Lao, Pakistan, Sri Lanka, Tajikistan and Turkey) can be classified as having trickle-down growth while nine countries (Georgia, Kazakhstan, Malaysia, Maldives, Mongolia, Philippines, Thailand, Vietnam and China (Urban) were classified as having relative pro-poor growth. In addition, strong pro-poor growth was found in Iran while Israel was inconclusive. In summary, the study provided evidence in support of Asian countries' economic growth being pro-poor after the global financial crisis. The study suggested that a mixed approach to evaluating pro-poor growth be adopted such that the results from both absolute and relative measures are compared.

Keywords: Pro-poor Growth, Inequality, Poverty, Asian Countries, Growth Incidence Curve, DASP

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List of Abbreviations

ADB	Asian Development Bank
ADO	Asian Development Outlook
DASP	Distributive Analysis Stata Package
FGT	Foster-Greer-Thorbecke
g20	Growth rate of income of the poorest 20^{th} percentile
GDP	Gross Development Product
GIC	Growth Incidence Curve
IMF	International Monetary Fund
LAC	Latin America and the Caribbean Countries
PEGR	Poverty-equivalent growth rate
PPG	Pro-poor growth
PPGI	Pro-poor growth index
PPP	Purchasing Power Parity
RPPG	Rate of pro-poor growth

CHAPTER ONE: INTRODUCTION

Empirical studies of the link between economic growth and redistribution have received much attention in recent years. In the past few decades, development practitioners have increasingly discussed the relationship between economic growth and rising inequality (Hadnes & Klump, 2008), referring to this concept as "pro-poor growth". The idea behind growth pro-poorness entails allowing the poor to actively participate and enjoy the benefits of economic growth. More recently, the literature is still unable to agree on a single consensus that explains how higher growth rates can be achieved with varying poverty reduction rates (Klump & Miralles, 2006) even though the general concept refers to both high aggregate economic growth rate and reduction of poverty (Hadnes et al., 2008).

There are immense benefits to be derived from comparing empirical cross-country evidence investigating the impact of economic growth on the reduction of poverty since it reveals more about the causality[1] among these concepts. However, care should be taken in making general conclusions on the pro-poorness of growth solely on income data, since the poor are not only defined by their deprivation of income (Bourguignon, 2004).

It is important to note that even as the terms pro-poor growth and shared prosperity have been in existence since 1997[2], there is yet to be a consistent definition. Likewise on the empirical side, due to different measurement tools and specifications for poverty, inequality, and economic growth, comparison of the abundant research on the impact of growth on poverty is hindered (Hadnes et al., 2020). An empirical comparison of cross-country studies that investigate how and whether the poor have benefitted from growth is extremely helpful in learning more about different national policy responses; however, one should be aware that such conclusions drawn depend on the measure of pro-poor growth employed (Bourguignon, 2004).

[1] According to Granger (1969), causality entails a statistical relationship between variables in which the knowledge of the past of one variable is contained as information in the other.

[2] See the UK White paper on International Development 1997: "Eliminating World Poverty: A Challenge for the 21st Century"

1.1 Background to the Study

Asian countries have experienced a varying degree of per-capita growth rate, depending on which part of the continent is being viewed (McKay, 2007). For example, during the 1990s, East Asia experienced exceptionally high average growth rates causing poverty incidence to decline sharply (Asian Development Bank, 2021). Countries such as China had a decline in poverty incidence from about -0.8% annually in the 1970s to about -9.8% in the 1990s (Asian Development Bank, 2021) while in comparison, South Asian countries could not achieve similar feats of making positive redistribution from increasing per-capita growth rate (Hadnes et al., 2008). For example, within the same period, India experienced an increase in poverty incidence from about -1.7% to 2.9% annually (Ministry of Statistics and Programme Implementation, 2016). Although these two countries have significantly large economies and populations in Asia, it would be misleading to generalize on Asia based on just China and India, hence consideration of other countries in South, East, and Central Asia.

It is also important to understand the growth pattern of Asian economies in the periods before, during, and immediately after the global financial crisis of 2007 and 2008. In the past three decades, Asia's growth has been more dynamic compared to other regions of the global economy (Asian Development Bank, 2021). Given Asia's increasing economic power, it was able to directly influence the pattern of the global economic recovery efforts. Much credit is to be given to its sound macroeconomic management and socioeconomic reforms which made growth between 1998 and 2007 to an average of 6% per year (Son & Kakwani, 2008). Also, the remarkable nature of the Asian economy made it quickly recover such that in the first quarter of 2010, output, exports, and employment returned to pre-crisis levels (Asian Development Bank, 2021). During the initial phase of the global economic crisis, Asian economies were not particularly affected, however, when the effect began, the impact was widespread. GDP growth fell from about 10.6% in 2007 to 3.4% in 2009 (Asian Development Bank, 2012). The transmission mechanisms of this global crisis on Asian economies majorly went from a drop in global demand for Asian primary and secondary exports and a decline in net capital inflows to the emerging economies of Asia, particularly China and India (Asian Development Bank, 2012) . Likewise, due to lowering labor demand in the advanced economies, remittances to Asian economies declined (Asian Development Bank, 2016). On the other hand, the post-crisis growth recovery process was also led mostly by

emerging economies in Asia, much earlier compared to other economies. For example, while the global economy contracted by about 0.5% in the latter part of 2009, the Asian economy grew by about 3.5% (Asian Development Bank, 2016). This growth trajectory continued well into 2010 and the vital role which Asian economies played in this recovery is widely credited in the literature.

The aftermath of the global economic crisis and its effect on livelihoods can therefore not be overemphasized. With a decline in growth experienced during this crisis period, it is plausible to assume that poverty and inequality were likely worsened, and with the successful recovery efforts made by most Asian economies, it is also valid to explore and measure whether these growth patterns were pro-poor - that the poor people whose income and consumptions were affected during the crisis, became better off with the economic recovery policies adopted by Asian countries in the period starting from 2010.

1.2 Justification of the Research

This research is justified for two major reasons. Firstly, limited studies have been conducted in investigating pro-poor growth in Asia. The literature mainly contains studies focused on sub-Saharan Africa[3] and Latin America[4], with the emerging economies of Asia seemingly less investigated. Secondly, even for the few studies which measure pro-poor growth in Asia, there has not been a focus on how the global economic crisis of 2008 impacted poverty and inequality, and whether the recovery periods led to pro-poorness of growth

1.3 Research Objectives

This study examines the pattern and statistical significance of growth pro-poorness in 22 selected Asian countries and computes five measures: pro-poor growth index (PPGI), poverty-equivalent growth rate (PEGR), rate of pro-poor growth (RPPG), growth incidence curve (GIC) and the growth rate of the poorest 20th percentile of the

[3] See (Sboui, 2012); (Oyekale, 2015); (Harmácek, Syrovátka, & Dusková, 2017) for some of the studies on pro-poor growth in the sub-Saharan Africa region.
[4] Studies such as (Lustig, Lopez-Calva, & Ortiz-Juarez, 2013); (Iniguez-Montiel, 2014); (Zaman & Shamsuddin, 2018) have extensively explored the dynamics of growth pro-poorness within and among LAC countries.

population, hereafter called g20[5].

The broad objective of this research is to measure pro-poor growth in countries of Asia with a focus on the period after the global financial crisis of 2008. The specific objectives are to

- examine the trends of poverty, inequality, and per capita income in selected Asian countries between 2010 and 2019.
- compute four pro-poor growth quantitative measures for Asian countries between 2010 and 2019.
- graphically illustrate the pro-poorness of growth for Asian countries using the growth incidence curve (GIC) based on data from 2010 to 2019.

This research is divided into five chapters. The first chapter, the introduction, presents background information on the topic, the research objectives, and the justification for the research. The second chapter is dedicated to reviewing recent literature on pro-poor growth, definition, measurement of the indices, and theoretical framework. The third chapter presents the methodological framework, data sources, sample, population, data, and analysis techniques. In the fourth chapter, the results and findings are presented, including discussions. Finally, chapter five concludes, and makes policy recommendations and suggestions for further studies.

[5] The acronym g20 should not be confused with the list of the world's largest advanced and emerging economies.

CHAPTER TWO: LITERATURE REVIEW

2.1 The Interdependence of Growth and Inequality

One of the most popular definitions of pro-poor growth is according to Kakwani & Pernia (2000). Pro-poor growth is broadly defined as such which allows the poor to actively participate in, and significantly enjoy the benefits of an economic system. The outcome of any pro-poor growth is that's that no person is deprived of basic capabilities through which their living standards can be improved (Sen A. , 1987).

The analysis of the effect of growth on income distribution was expressed by Simon Kuznets in his 1955 article. Kuznets (1955) argued that, in the process of economic development, growth modifies the distribution of income- this concept which he termed the Kuznets Hypothesis. He explained that the relationship between growth and inequality followed an inverted U form. In the early stages of development, an economy first experiences worsening inequality. In the periods after this transitive experience, there is an adjustment in the return rates between the sectors[6], thereby reducing inequality. Kuznets identified that the inequality increase is attributed to two factors: firstly, the sectoral shift from agricultural to non-agricultural sectors and secondly, rural-urban migration.

For almost four decades after the publication of the Kuznets hypothesis, it remained one of the most cited and least countered theories in our understanding of the growth-inequality nexus (World Bank, 2011). However, even in recent times, the trade-off between growth and inequality is not decisively understood (Hadnes et al., 2008).

Although the Kuznets hypothesis promoted the analysis of distributional change, an emergent consensus is suggesting that the underlying assumptions about migration processes and sectoral developments do not hold for most developing countries[7].

Bourguignon (2004) considered a different approach to the growth-inequality nexus and suggested that there exists a two-way relationship between growth and distribution. The study stated that (i) economic growth does impact income distribution (as was previously described by Kuznets) and (ii) the prospects of economic growth are affected by country-specific conditions in terms of the initial distribution of production factors.

[6] Kuznets (1955) identified two major sectors in the economy: the agricultural sector and the non-agricultural sector.

[7] Wan (2004) and Wan et al., (2006) in a study conducted in China rejected the Kuznets hypothesis after discovering a "U" pattern during the period of strong growth.

According to Datt & Ravallion (2002), poverty will be more responsive to growth the more equal the initial distribution is. This is because distribution matters for poverty reduction. In a study conducted in India, Datt et al. (2002) authors found that higher initial inequality hinders how much economic growth benefits the poor. (Qiao, Martinez-Vazquez, & Xu, 2008) also found similar results in the case of China.
There are four mechanisms through which existing theories relate economic growth to inequality (Hadnes & Klump, 2008): (i) Increasing inequality is often accompanied by destabilization of the socioeconomic climate, which is of disadvantage to economic growth and foreign investment. (ii) Imperfect capital markets limit the prospective changes of growth since high inequality in access to capital restricts the investment decisions of the poor. (iii) Unequal distribution of income weakens local demand and leads to slower economic growth. (iv) In a democratic context, unequal initial income distribution and wealth leads to more redistribution and hence less private capital accumulation.

The concept of pro-poor growth has been broadly defined, as the type of growth which enhances the welfare of the poor by enabling their active participation in the economic system and allowing them to benefit significantly from the economic activities (Kakwani & Pernia, 2000). The understanding of this term entails that, as a result of an increase in the GDP of a country, if the poor become better off, then there is said to be a pro-poor growth, in the broad sense. The term gained much prominence in the literature during the early 2000s as a result of the international efforts to achieve the MDGs[8] (Grosse, Harttgen, & Klasen, 2008), becoming the main framework of donor's policy guidance, and later transitioning to the sustainable development goals (Shepherd, Mariotti, & Rodriguez-Takeuichi, 2016)

The literature is essentially divided as relating to the debate on the concept of pro-poor growth: concerning the appropriate definition of pro-poor growth, whether absolute or relative (Klasen, 2008). In using an absolute definition, only the end result of the growth process is in focus. In this case, the argument in favor of PPG is that all growth which benefits the poor, effectively reduces poverty incidence (Ravallion & Chen, 2003);

[8] The millennium development goals (MDGs) were developed out of several commitments set out in the Millennium Declaration of September 2000. There are 8 goals, 21 targets and a series of indicators.

(Ravallion, 2004). According to Duclos (2009), the main objective of the absolute PPG definition is on improving the living conditions of the poor. One disadvantage of this approach is that it disregards the underlying distribution of growth in the economy, and therefore classifies all positive growth patterns as pro-poor, even though the poor might have been worse off, compared to their non-poor counterparts (White & Anderson, 2001).

The other definition of pro-poor growth- the relative approach, is such that the poor benefit proportionately more in comparison to the non-poor (McCulloh & Baulch, 1999), (Kakwani & Pernia, 2000), (Son H. H., 2004). More specifically, when the income growth rate of the poor exceeds the average growth rate. This, therefore, implies a larger poverty decrease than it would have occurred had all incomes grown at the average growth rate, thereby, a subsequent reduction in the relative gap between the poor and non-poor (Klasen, 2008). This approach to PPG implies a distributional dynamic would need to be biased, in relative terms, in favour of the poor. It is also important to understand that both absolute and relative definitions of PPG vary in degree, as to whether it is a strong absolute PPG, strong relative PPG, weak absolute PPG and weak relative PPG.

It should also be noted that the above definitions of PPG are sensitive to whichever definition of "poor" is being used (Grosse et al., 2008), and how to define a bias towards them (Gasparini, Gutiérrez, & Tornarolli, 2007). Pro-poor growth definitions are therefore sensitive to the poverty line, and the measurement of poverty being adopted (Gasparini et al., 2007).

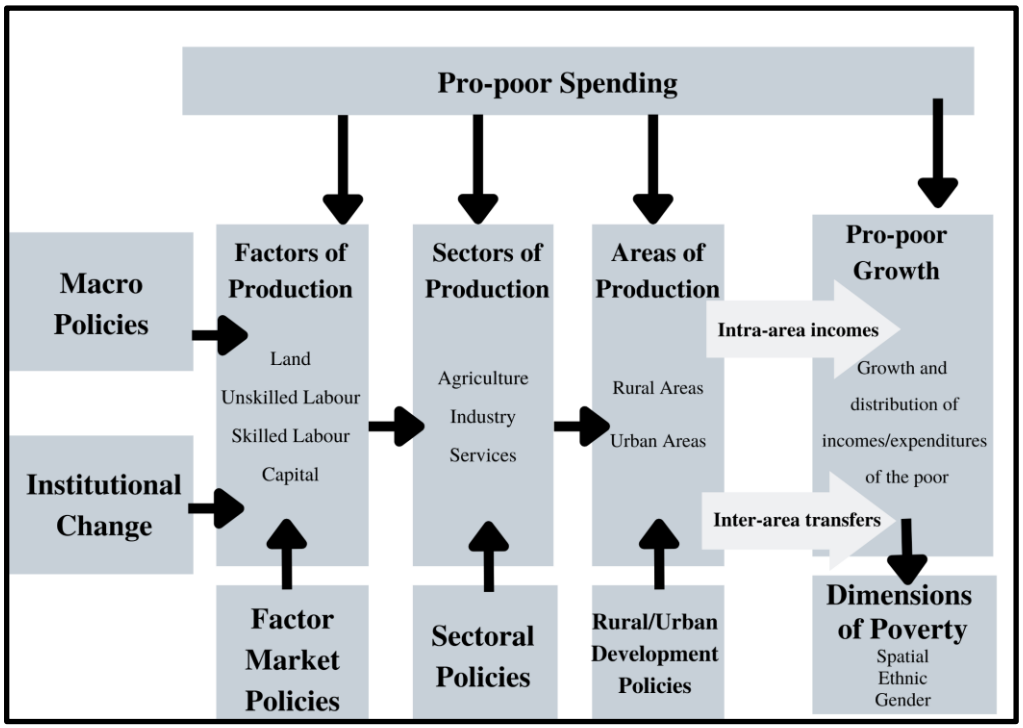
2.2 General conceptual framework for pro-poor growth analysis

The general conceptual understanding of the link among various factors which determine pro-poor growth is specified in (Klump & Bonschab, 2004). According to the authors, pro-poor growth may be attributed to specific ways of income generation and redistribution that favor the poor. The conceptual framework as shown in Fig. 1 reveals the macro and micro relationships which influence pro-poor growth. To identify the possibilities for policy intervention, there is a need to further decompose the process of pro-poor growth and distinguish different production stages, income generation, and income redistribution which impacts the outcome of growth propoorness (Klump et al.,

2004)[9].

Due to higher income and productivity in urban areas compared to rural areas (Lewis, 1954), internal migration and voluntary remittances cause resources to shift, thereby alleviating some poverty in the rural area. This entire cycle of production and income redistribution is affected by economic policies at each stage and by institutional frameworks. The framework, therefore, explains that pro-poor spending has an immediate impact on the well-being of the poor via the transmission mechanism of direct transfers, and investment in the health and education of the people. In summary, pro-poor spending, coupled with macro policies, sector-specific policies, factor-market policies, and institutional change, can lead to pro-poor growth.

Figure 1: General Conceptual Framework for Pro-poor Growth



Source: Adapted from Klump and Bonschab (2004)

[9] The factors of production include land, labor (skilled and unskilled), and capital which are used in different proportions in the production process.

2.3 Measuring Pro-poor Growth

In this section, we develop the general theoretical and conceptual idea behind the measurement of pro-poor growth. The evolution of the mathematical specification of some of these measures is presented as well. These measures of pro-poor growth include the pro-poor growth index (PPGI), rate of pro-poor growth (RPPG), poverty-equivalent growth rate (PEGR), Growth Incidence Curve (GIC) and the growth rate of income of the poorest 20th percentile (g20).

2.3.1 Pro-poor Growth Index (PPGI)

The PPGI is a relative approach to measuring whether growth patterns have been to the advantage of the poor when compared to the non-poor. According to the earliest conceptualizations of this measure[10], a change in an FGT[11] poverty measure between two time periods ($P_{21} = P_2 - P_1$) could be decomposed into two effects: a growth effect (GE) and an inequality effect (IE). One necessary condition in this measure is that P_{21}= GE+IE, i.e. the total proportional change in poverty is given by the summation of the growth effect and the inequality effect Harmácek et al., (2017). The growth effect is the effect of the mean income change on poverty when inequality remains constant while the inequality effect is the effect of a change in inequality on poverty when mean income remains unchanged.

If we know the mean income growth between the two time periods (g_{21}), it is possible to compute the total elasticity of poverty with respect to growth, identified as η i.e. η = P_{21}/g_{21}[12]. We can also express the growth elasticity of poverty (η_g), given as η_g=GE/g_{21}[13].

We define the inequality elasticity of poverty with the expression η_i=IE/g_{21}[14].

From the above expressions, it, therefore, holds true that the total elasticity of poverty is a sum of both the growth elasticity of poverty and inequality elasticity of poverty[15].

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[10] This measure was first developed and operationalized by Kakwani and Pernia (2000) in their paper titled *What is pro-poor growth?*

[11] The measure of poverty developed by (Foster, Greer, & Thorbecke, 1984). In its general form, the FGT measure: (insert FGT formula), where yi is the income of individual i, N is the total population and H is the number of people under the poverty line z

[12] This elasticity is interpreted as the percentage change in poverty as a result of a percentage-change in mean income.

[13] This is interpreted as the proportional change in poverty when the mean income changes by one percent while inequality remains constant

[14] This is the proportional change in poverty when inequality changes by one-percent and the mean income remains constant.

[15] η=η_g+η_i

In decomposing the total proportional poverty change into inequality and growth effects, there is a need to use a poverty measure (P) which is defined by a poverty line (z), a mean income (μ) and a Lorenz curve[16] (L(p)).

$$\text{In effect, } P = P(z, \mu, L(P)). \qquad (1)$$

Assuming poverty line (z) remains constant, we can express the total proportional change in poverty between two time periods as follows:

$$P_{21} = P_2 - P_1 = ln\, P(z, \mu_2, L_2(p)) - ln\, P(z, \mu_1, L_1(p)) \qquad (2)$$

.

The growth effect (GE) is expressed as follows:

$$GE = 0.5[ln\, P(z, \mu 2, L1(p)) - ln\, P(z, \mu 1, L1(p)) + ln\, P(z, \mu 2, L2(p)) - ln\, P(z, \mu 1, L2(p))] \qquad (3)$$

While the inequality effect (IE) is expressed as follows:

$$IE = 0.5[Ln\, P(z, 1, L2(p)) - Ln\, P(z, 1, L1(p)) + Ln\, P(z, 2, L2(p)) - P(z, 2, L1(p))] \qquad (4)$$

According to Kakwani & Pernia (2000), the growth effect (GE) is always negative because positive growth must lead to a reduction in poverty (inequality unchanged). On the other hand, the inequality effect may either be positive or negative. The negative inequality effect implies that growth leads to a change in inequality which benefits the poor - further leading to a reduction of poverty. This manner of growth is therefore termed pro-poor. If the inequality effect is however positive, it means that growth has led to a change in inequality that benefits the non-poor. The total effect of growth on poverty, therefore, depends on which effect is bigger between growth and inequality. If the growth effect is larger, poverty reduces despite increasing inequality - also known

[16] This measure developed by Lorenz (1905) is one of the prominent measures of income inequality. It describes the corresponding share of income and wealth for the bottom percentile (p) of a distribution.

as trickle-down growth. If the inequality effect is larger, poverty and inequality increase as a consequence of growth - also known as immiserizing growth. When there is a positive growth of the mean income, the pro-poor growth index (PPGI) is therefore expressed as

$$PPGI = \frac{\eta}{\eta_g} \quad (5)$$

Where: η = Total elasticity of poverty

η_g = Growth elasticity of poverty

When there is negative growth of the mean income, the pro-poor growth Index (PPGI) becomes an inversion of the above ratio:

$$PPGI = \frac{\eta_g}{\eta} \quad (6)$$

Interpretation of PPGI when the growth rate is positive

1. If PPGI>1 - in which case the inequality elasticity of poverty is negative, then there is a pro-poor growth. This indicates that the poor benefit more from growth compared to the non-poor.
2. If PPGI ≥0 and PPGI ≤1 - in which case poverty decreases despite increasing inequality as a result of growth in the mean income, then there is a trickle-down growth. This implies that the poor benefit from growth however in a smaller proportion when compared to the non-poor (who benefit at a greater level).
3. If PPGI <0 - in which case both poverty and inequality increase as a result of economic growth, then there is an immiserizing growth. In this case, positive growth leads to a very high inequality which is to the disadvantage of the poor as their income decreases.

Interpretation of PPGI when the growth rate is negative

1. If PPGI>1 - in which case poverty increases but the income of the poor declines less than the income of the non-poor, then the economic recession hits the poor less than the non-poor.
2. If PPGI<1, then the economic recession hits the non-poor less than the poor.

2.3.2 Rate of pro-poor growth (RPPG)

The RPPG is an absolute approach to measuring whether growth is pro-poor. According to Ravallion & Chen (2003), one cannot consider growth to be pro-poor if poor people benefit relatively from the economic process than the non-poor but become more impoverished in absolute terms (Harmacek et al., 2017). The authors, Ravallion and Chen (2003), therefore, argued that a pro-poor change occurs when the poor enjoy growth regardless of what happens to the non-poor. Pro-poor growth is therefore said to exist whenever the poor positively gain from growth, even if the non-poor benefit more than the poor. There are two necessary conditions of any pro-poor growth measure according to Ravallion and Chen (2003). Firstly, a positive (or negative) economic growth automatically leads to a poverty decline (or increase). Secondly, a poverty indicator must be involved in a pro-poor measure and this poverty indicator must satisfy the fundamental axioms of a poverty indicator[17]. For both conditions to be satisfied, firstly, a measure of pro-poor growth in a given quantile needs to be based on the mean growth rate and secondly, the Watts (1968) index should be used as the poverty indicator since it satisfies the fundamental axioms of a poverty indicator.

To develop and compute the RPPG, we first need to define the growth incidence curve (GIC)[18]. Considering Watts poverty index as defined above, and having satisfied the major five axioms of any poverty measure, the expression for the change in poverty is given as follows:

$$\theta_{01} = -\frac{dW_t}{dt} = \int_0^{H_t} \frac{d\ log Q_t(p)}{dt}\ dp = \int_0^{H_t} g_t(p)\ dp \qquad (7)$$

It is possible to conclude from the previous equation that the area bounded by the

[17] There are five key axioms of any poverty measure. Firstly, the monotonicity axiom - a decline in the poor's income must increase poverty. Secondly, the focus axiom - a poverty indicator should not depend on the income changes of the non-poor. Thirdly, the transfer axiom - if income is transferred from the non-poor to the poor, poverty should reduce. Fourth, the additive decomposability axiom implies that it is possible to calculate total poverty from a weighted average of poverty indicators for separate groups of the population. Direction - The measure should be consistent in direction with the direction of the poverty change. This means that any positive(negative) sign implies a reduction (increase) in the overall poverty rate.

[18] The GIC is a curve which links mean growth rates at each percentile of income distribution in a society

growth incidence curve (GIC) up until the headcount index $\int_0^{H_t} g_t(p)dp$is equal to minus one times the change in Watts index (Ravallion & Chen, 2003). Hence, the authors proposed that RPPG is defined as the area bounded by the GIC up to the headcount index divided by the headcount index.

The RPPG is expressed mathematically as follows:

$$RPPG = \frac{\int_0^{H_t} g_t(p)dp}{H_t} \quad (8)$$

Interpretation of RPPG

According to the World Bank (2011), the RPPG can be interpreted as the growth rate of the mean income scaled up or down based on whether the distributional changes were pro-poor.

1. RPPG>0 implies poverty reduction
2. RPPG<0 implies an increase in poverty
3. RPPG>g (growth rate of the mean income) - The distributional shift favours the poor
4. RPPG<g - The distributional shift is against the poor

It is also important to consider some studies in Asia in which the RPPG was calculated. Ravallion and Chen (2003) calculated the rate of pro-poor growth for China between 1990 and 1999 based on the average growth rate of the poorest 15% and found growth to be pro-poor. Also, this growth was found to mostly decrease inequality within this period.

2.3.3 Growth Incidence Curve (GIC)

As discussed in the previous section, the RPPG is closely linked to, and derived from the growth incidence curve (GIC). The GIC is defined as the growth rate of each centile of the distribution ranked by income. This measure uses as a base, for the inverse of the

cumulative distribution function of income[19] or the quantile function defined as

$$Qt(p) = Ft - 1(p) = L'(p)\mu t \qquad (Qt'(p) > 0) \tag{9}$$

Where: $F_t(p)$ = Cumulative distribution function

$L_t(p)$ = The Lorenz curve with the slope $L't(p)$

μ_t = The mean of the income distribution at time t.

Comparing income changes between time t and $t-1$

$$g(p) = \left[\frac{Q_t(p)}{Q_{t-1}(p)}\right] - 1 = dLn(Q(p)) \tag{10}$$

Where g(p) is the growth rate of income of the p-th quantile between time periods t and t-1.

By varying p from 0 to 1, we have the GIC which can be expressed in terms of the Lorenz curve:

$$g(p) = \frac{L'_t(p)}{L'_{t-1}(p)}(\Upsilon + 1) - 1 \tag{11}$$

where γ is the growth rate in the mean income (μ_t) such that $\gamma = (\mu_t/\mu_{t-1}) - 1$.

Interpretation of Growth Incidence Curve

1. If the entire GIC lies above 0 - meaning income growth is positive for all quantiles, then growth could be considered as pro-poor in the weak absolute sense.
2. If $g_t(p)$ is a decreasing function for all p, it would be pro-poor in a relative sense since it means there is a fall in inequality over time.

[19] The CDF defines the p-th probability of a random variable with the value ≤ x. The inverse of this function is called the quantile function Q(p) - CDF-1 which returns the value x such that there is a probability p that f(x) takes a value ≤ x (Gasparini et al., 2014).

2.3.4 Poverty Equivalent Growth Rate (PEGR)

Kakwani & Son (2003) proposed and developed a new relative measure of pro-poor growth which takes into account both growth and distribution of mean income.

Firstly, we assume the income of an individual (μ_i) as a random variable following a distribution function $f(\mu_i)$ and consider a general class of additive poverty measures[20]. The growth elasticity of poverty (δ) is defined as the ratio of proportional changes in poverty (θ) to the proportional changes in the mean income (μ) (Kakwani & Son, 2008).This is obtained by the total change in poverty divided by the mean growth rate, specified as:

$$\delta = \frac{\delta \mathrm{Ln}(\theta)}{\gamma} = \frac{1}{\theta\gamma}\int_0^z \frac{\partial P}{\partial \mu_i}\mu_i(p)\; g(p)\; dp \qquad (12)$$

Where:

$\gamma = dLn(\mu)$ is the growth rate in the mean income

g(p) is the growth rate of income at the p-th percentile

δ is the percentage change in poverty resulting from a growth rate of 1 per cent in the mean income (Kakwani & Son, 2008).

This can be decomposed, as shown in equation [5], into an inequality/redistribution component (ζ) and a pure growth component (η). This η or neutral growth elasticity was first derived by Kakwani as follows:

$$\eta = \frac{1}{\theta}\int_0^z \frac{\partial P}{\partial \mu_i}\mu_i(p)dp \qquad (13)$$

This is defined as the percentage change in poverty as a result of a 1% growth in mean income, relative inequality held constant. Growth is therefore considered pro-poor if the actual growth elasticity of poverty exceeds the neutral relative elasticity of poverty (Kakwani & Son, 2008).

Based on the previously defined properties of poverty elasticity, Kakwani and Son

[20] Son (2004) states the general class additive poverty measures as $\theta = \int P(z,\mu i)\; f(\mu i)\; d\mu i$

developed the idea of PEGR as the growth rate which would produce the same poverty reduction as the actual growth rate in the hypothetical scenario where inequality is held constant (Kakwani & Son, 2003). This expression is given as

$$PEGR = \left(\frac{\delta}{\eta}\right)\gamma \qquad (14)$$

This is the actual growth rate of the mean income γ that has been adjusted by the ratio of the total poverty elasticity (δ) to the neutral growth elasticity of poverty (η).

Interpretation of PEGR

1. If the PEGR>mean income (γ), then growth is relatively pro-poor.
2. If 0<PEGR<γ, there is a trickle-down
3. If PEGR<0. Such a situation is considered immiserizing growth (Kakwani & Son, 2003)

2.3.5 Growth rate of the average income of the poorest p-percentile G_p

This measure of pro-poor growth focuses on the growth rate of the average income of the poorest p-th percentile. Usually, the researcher decides on which percentile is to be studied, and for this study, we choose the 20th percentile[21]. This measure is therefore dubbed g20. The easiest way of calculating this is to examine the aggregate data from PovcalNet[22], and apply the following expression.

$$G_{20} = \frac{\chi}{\lambda} \qquad (15)$$

Where:

χ = Average income of the poorest 20th percentile in the final year

λ= Average income of the poorest 20th percentile in the starting year

Interpretation of $g20$

[21] Dollar & Kraay (2002) called it the growth rate of the poorest quintile. Some other studies used the poorest 15% population, the poorest decile and so on.

[22] This is the official World Bank Database for poverty data available as an open source and computed for most countries annually.

1. In absolute terms, if g20>0, there is absolute pro-poor growth
2. In absolute terms, if g20<0, there is an absolute anti-poor decline
3. In relative terms, if 0<g20<g, there is trickle-down growth
4. If g20>g, there is relative pro-poor growth
5. If g20<0, there is immiserizing growth
6. If 0>g20>g, there is a pro-poor decline
7. If g20<g, there is an anti-poor decline
8. If g20>0, there is strong pro-poor growth

For interpretations 3 to 5, the average growth rate has to be positive, and for 6 to 8, the average growth rate must be negative.

In this chapter was described five different measures of pro-poor growth which are mostly used in the literature. These measures all have their inherent advantages and limitations. For example, the growth incidence curve (GIC) is ideal for graphical representation and can easily be visually interpreted to understand income and inequality dynamics in any population distribution. However, the GIC is subject to errors at the extremes hence care should be taken when interpreting the first five to ten percentiles at both ends of the income distribution Son (2004). For RPPG and PEGR, these measures satisfy most of the axioms of poverty measures Kakwani and Son (2003) hence they are some of the best available measures to evaluate pro-poor growth. However, RPPG is still limited in its absolute weak approach interpretation.

2.4 Standardized Interpretation of Pro-poor Growth Measurements

It is important to distinguish between two approaches in the interpretation of pro-poor growth metrics. In the previous section, we present the general theoretical interpretations of pro-poor growth indices however in this current section and following from Harmáček (2019)**,** we explain how the different estimates and statistics calculated using the DASP can be interpreted in terms of relative and absolute pro-poor growth. These have been termed standardized interpretations of pro-poor growth indices and follow an empirical methodology. Tables 1 to 5 contain the properties and condition for statistical significance when interpreting quantitative pro-poor growth measures.

For the PPGI standardized interpretation, the most important factor is to confirm

whether growth rate of income is positive or negative. Once this is ascertained, then the type of pro-poor growth can be examined. For example, if the growth rate and PPGI are positive, then there is relative pro-poor growth, considering that the condition for statistical significance holds.

Table 1: PPGI Standardized Interpretation

g>0		Conditions for Statistical Significance
PPGI>1	Pro-poor growth	$(PPGI_{lb}\,; PPGI_{ub}) > 1$
0<PPGI<1	Trickle-down growth	$0 < (PPGI_{lb}\,; PPGI_{ub}) < 1$
PPGI<0	Immiserizing growth	$(PPGI_{lb}\,; PPGI_{ub}) < 0$
g<0		
0<PPGI<1	Pro-poor decline	$0 < (PPGI_{lb}\,; PPGI_{ub}) < 1$
PPGI<0	Strong pro-poor growth	$(PPGI_{lb}\,; PPGI_{ub}) < 0$
PPGI>1	Anti-poor decline	$(PPGI_{lb}\,; PPGI_{ub}) > 1$

Source: Harmáček (2019)

For the PEGR measure, it is compared with the average growth rate of income to determine the type of pro-poor growth. If for example, growth rate is negative and less than PEGR, then there is a pro-poor decline.

Table 2: PEGR Standardized Interpretation

g>0		Conditions for Statistical Significance
PEGR>g	Pro-poor growth	$PEGR_{lb} > g_{ub}$
PEGR<g	Trickle-down growth	$PEGR_{ub} < g_{lb}$
PEGR<0	Immiserizing growth	$PEGR_{ub} < 0$
g<0		
PEGR>g	Pro-poor decline	$PEGR_{lb} > g_{ub}$
PEGR>0>g	Strong pro-poor growth	$PEGR_{lb} > 0 > g_{ub}$
PEGR<g	Anti-poor decline	$PEGR_{ub} < g_{lb}$

Source: Harmáček (2019)

The g20 interpretation could either be in absolute or relative form. For there to be absolute pro-poor growth, g20 would be positive, and anti-poor decline if g20 is negative. For the relative interpretation, g20 is compared to g (the average growth rate). For example, if average growth rate is positive and less than g20, then there is trickle-down growth.

Table 3: g20 Standardized Interpretation

Absolute Interpretations		
Absolute pro-poor growth		$g_{20} > 0$
Absolute anti-poor decline		$g_{20} < 0$
Relative Interpretations		
g>0		Conditions for statistical significance
$0 < g_{20} < g$	Trickle-down growth	$(g_{20} > 0)^{\wedge} (g_{20} < g_{lb})$
$g_{20} > g$	Relative pro-poor growth	$g_{20} > g_{ub}$
$g_{20} < 0$	Immiserizing growth	$g_{20} < 0$
g<0		
$0 > g_{20} < g$	Pro-poor decline	$(g_{20} > g_{ub})^{\wedge} (g_{20} < 0)$
$g_{20} < g$	Anti-poor decline	$g_{20} < g_{lb}$
$g_{20} > 0$	Strong pro-poor growth	$g_{20} > 0$

Source: Harmáček (2019)

Like the g20, the growth incidence curve can also be interpreted in absolute or relative approach. There is absolute pro-poor growth if the GIC is positive for all poor percentiles[23], and absolute anti-poor decline if the GIC is negative for all poor percentiles. There is relative pro-poor growth if the GIC is positive and higher for all poor percentiles compared to the non-poor percentile, while average growth rate is positive.

[23] The poor percentile is determined beforehand. In this study, the 20th percentile is used.

Table 4: GIC Standardized Interpretation

Approach to PPG	Type of Growth	Condition
Absolute	Absolute pro-poor growth	GIC is positive for all poor percentiles
	Absolute anti-poor decline	GIC is negative for all poor percentiles
Relative	Pro-poor growth	GIC is positive and higher for all poor percentiles than for non-poor percentiles, while $g>0$
	Strong pro-poor growth	GIC is positive and higher for all poor percentiles than for non-poor percentiles, while $g<0$
	Pro-poor decline	GIC is positive but lower for all poor percentiles than for non-poor percentiles, while $g<0$
	Trickle-down growth	GIC is positive but lower for all poor percentiles than for non-poor percentiles, while $g>0$
	Immiserizing growth	GIC is negative and lower for all poor percentiles than for non-poor percentiles while $g>0$
	Anti-poor decline	GIC is negative and lower for all poor percentiles than for non-poor percentiles while $g<0$.

Source: Harmáček (2019)

The RPPG absolute interpretations are made by examining the sign of the upper and lower bounds of the RPPG measure. If both upper and lower bounds as calculated using DASP are positive, then there is absolute pro-poor growth. If both upper and lower bounds are negative, then there is absolute anti-poor decline. For the relative interpretation, the RPPG is compared with the average growth rate and based on this condition (in conjunction with the sign of the average growth rate), decision is made. As an example, there is immiserizing growth if RPPG is negative and average growth rate is positive.

Table 5: RPPG Standardized Interpretation

Absolute Interpretation		
Absolute pro-poor growth		$(RPPG_{lb}; RPPG_{ub}) > 0$
Absolute anti-poor decline		$(RPPG_{lb}; RPPG_{ub}) < 0$
Relative Interpretation		
g>0		Conditions for Statistical Significance
0<RPPG<g	Trickle-down growth	$RPPG_{lb} > 0)\text{^} (RPPG_{ub} < g_{lb})$
RPPG>g	Relative pro-poor growth	$0 < (PPGI_{lb}; PPGI_{ub}) < 1$
RPPG<0	Immiserizing growth	$(PPGI_{lb}; PPGI_{ub}) < 0$
g<0		
0<PPGI<1	Pro-poor decline	$RPPG_{lb} > g_{lb})\text{^} (RPPG_{ub} < 0)$
PPGI<0	Anti-poor decline	$RPPG_{ub} < g_{lb}$
PPGI>1	Strong pro-poor growth	$RPPG_{lb} > 0$

Source: Harmáček (2019)

2.5 Potential Determinants of Pro-poor Growth

Although pro-poor growth seems to be driven by a combination of micro and macroeconomic factors, it is important to examine and identify such potential PPG factors (Shepherd et al., 2016) since this could influence policy direction regarding poverty alleviation. Three potential determinants of pro-poor growth were identified in our current study: government size, trade openness and agricultural productivity.

Government size is a combination of the revenue and expenditure pattern of the government (Hage, 2003). According to Nyasha & Odhiambo (2019), government size could be measured in expenditure, revenue, and employment. However, the expenditure

approach is the most commonly used indicator. Through the understanding of government size, it is, therefore, possible to examine the relationship between economic growth and inequality. In the literature, there appear to be mixed findings concerning the relationship between growth, inequality and government size[24].

Examining the growth-inequality nexus in Argentina, Brazil and Mexico, Lustig et al. (2013) found that progressive government transfers have an important equalizing effect through their impact on both labor and transfer income. Anderson et al. (2018) also carried out a meta-analysis on 19 studies about the relationship between government spending and poverty reduction. They found an overall negative relationship and not negligible in size, especially with poverty. Although they concluded that a publication bias potentially magnifies it, after adding several controls, it was not overall statistically significant.

The positive and significant effect of trade openness[25] on economic growth has been well established in the literature (Barro, 2000), (Pasha & Palanivel, 2004).According to these studies, the transmission mechanism follows that: trade liberalization and higher trade openness enhance economic growth and increase average income in the country, also impacting poverty reduction (Dollar, Kleineberg, & Kraay, 2016).

Different studies have found diverse interactions between trade openness, growth, and poverty reduction. Barro (2000) stated that trade openness, although enhances economic growth, is correlated with an increase in inequality. When exploring the factors determining the bottom quintile's share of income, Dollar and Kraay (2002; 2016) determined that trade openness does not affect the poor's share of income. Similarly, White and Andersson (2001) stated that an increase in trade openness benefits growth with no apparent effect on the poor's share of income.

It has been argued that traditional sectors, such as agriculture, play a crucial role in determining the development pattern (Son & Kakwani, 2008). Since poverty is traditionally concentrated in rural areas, the evolution of poverty reduction could be closely related to agricultural progress (Pasha & Palanivel, 2004). In accordance with

[24] Barro (2000); Kraay (2002); Dollar & Kraay (2002) found negative or no direct correlation between economic growth and income changes in the bottom percentiles while studies such as Anderson et al., (2018) found positive correlation between government expenditure and inequality.

[25] Trade openness is defined as exports and imports as a percentage of the GDP.

this, several authors have tried to evaluate it by studying the relationship between general agricultural production and poverty reduction (Datt & Ravallion, 1992), agricultural productivity and growth and distributional changes (Dollar & Kraay, 2002; (Kraay, 2004) and agricultural growth and income of the poorest quintiles (White & Anderson, 2001).

The dominant argument in the literature emphasizes the overall performance of the agricultural sector for poverty reduction (Dollar et al., 2016; Pasha & Palanivel, 2004). Nevertheless, there have been conflicting results when testing this relationship. As early as 1992, Datt and Ravallion argued that India's negative growth episodes due to bad agricultural performance were associated with modest improvement in inequality. Similarly, Kraay (2004) found that relative productivity in agriculture was uncorrelated with growth and that higher relative productivity tended to be related to poverty-increasing changes. On the contrary, Pasha and Palanivel (2004), studying the experiences of Asian countries, determined that cases of rapid economic and agricultural surges were accompanied by sharp poverty decreases. Other studies have included either overall agricultural growth (White & Anderson, 2001), share (importance) of the agricultural sector in the economy (Son & Kakwani, 2008); Dollar et al. (2016) or measures of relative productivity (Dollar & Kraay, 2002) without finding any significant relationship.

2.6 Pro-poor growth studies in Asia

McKay (2007) conducted a study to examine the pro-poor growth pattern in Vietnam from 1992 to 2003 and found that during this period, there was absolute pro-poor growth however using a relative pro-poor growth measure for the same period, this growth pro-poorness was not evident, since people in high-income group benefitted significantly more than people in the low-income group. This author also conducted a similar study for Indonesia in the period after the financial crisis[26] and found contrasting evidence in comparison to Vietnam. In Indonesia, the economic decline was pro-poor relatively as there was a fall in inequality in which the poor suffered less compared to the non-poor. This could however not be classified as absolute pro-poor growth since the decline in growth caused poverty to increase.

[26] The period 1996-2002 in which several Asian countries experienced economic and financial crisis

The above empirical evidence shows how different pro-poor growth definitions can lead to varying conclusions and policy recommendations (Hadnes & Klump, 2008). Zepeda (2004) examined the pattern of pro-poor growth in Thailand between the period 1990 to 1996 using two measures, RPPG and PEGR[27]. The RPPG shows Thailand's growth to be pro-poor during this period however the PEGR shows only relative pro-poor growth from 1993 to 1996. Zepeda (2004) therefore states that RPPG sometimes overestimates pro-pro-poor growth and should ideally be used with other measures.
One of the most notable empirical works on pro-poor growth measures is Ravallion (2004) which examined the case of China's growth pattern and studied whether this was pro-poor between 1980 and 2001. Using RPPG, the study found China's growth pattern to be more anti-poor than pro-poor. Wan & Zhang (2006) also examined growth and inequality patterns in China and explained that inequality was worsened because farmers and businesses in poorer areas have more tax burden compared to the ones in richer regions who benefit from tax breaks and higher fiscal expenditure, better technology, and lower tax burdens. This, therefore, worsened the poverty situation and restricted pro-poor growth prospects, particularly for the poor in the rural areas. Findings from Qiao et al. (2008) also revealed how unequal distribution of fiscal resources works against economic growth in some regions in China.

Xiao, Zheng & Xie (2022) estimated the effect of infrastructure investments on the level and distribution of impoverished households' income in China, utilizing the exogenous investment shock from Targeted Poverty Alleviation projects in China. The study also examined whether income inequality increased or decreased as a result of these infrastructural programs. Using a comprehensive household-level administrative dataset, the authors found that electricity infrastructure significantly increases the agricultural income of poor households and that there is an equal distribution of the income benefits among the poor. Specifically, the study found that agricultural irrigation infrastructure significantly raises agricultural income thereby delivering more benefits to the households below the national poverty line. These findings, therefore, imply that by increasing the employment of labour and agricultural lands belonging to poor households, there is likely to be pro-poor growth and development.

[27] RPPG is an absolute pro-poor growth measure while PEGR is a relative approach to measuring pro-poor growth.

In a study conducted by Kakwani & Pernia (2000), the PPGI calculated for three Asian countries - South Korea, Laos and Thailand, revealed growth to be highly pro-poor in South Korea between 1980 and 1998 however studying the same period for Laos and Thailand, the results revealed a trickle-down pattern of growth.

In Bangladesh, Sen, Mujeri, & Shahabuddin (2007) examined the pro-poor growth patterns using data during the 1980s and 1990s and found that the urban-biased growth strategy which was beneficial to the non-agricultural sector increased the capacity for poverty reduction at the national level. The positive effects of the green revolution[28] which characterized the major socioeconomic policy in many Asian countries were able to achieve pro-poor reforms in the country. Sen et al. (2007) highlighted a policy mix[29] which led to pro-poor growth in Bangladesh over the last two decades.

Imran et al. (2021) examined the long-run relationship between ICT, poverty reduction and environmental degradation in Pakistan with the use of time-series data from 1975 to 2018 and the autoregressive distributed lag (ARDL) estimation method for robust inferences. Their findings confirmed an inverted-U Environmental Kuznets Curve relationship between per-capita income and CO2 emissions. The findings also revealed that ICT factors significantly affect poverty incidence with the mediation of in-bound FDI in a country. The authors concluded that poverty reduction can be achieved through the development of green ICT infrastructures.

Khan et al. (2019) in a study conducted in Pakistan examined pro-poor growth and sustainable development framework using a two-step GMM estimator and annual time-series data from 1975 to 2016. The results revealed higher economic growth lowers poverty incidence through social reforms however factors such as deforestation, under-5 mortality, trade openness and FDI-inflows largely increase poverty incidence in the country. The authors concluded that it is important to develop sustainable policies for mitigating emissions with cleaner production techniques and improve the quality of life through higher social expenditure which trickles down to the poor in comparison to the non-poor.

[28] According to Briggs (2009) the green revolution is the term applied to the major advances in crop breeding genetics of the 1960s and 1970s which significantly increased crop yields.

[29] This policy mix includes macroeconomic stability, inflation control, stable exchange rate, trade liberalization, and economic openness.

The case of India is also peculiar since almost one-third of the world's poor people live in the country[30] and successive administrations have made poverty reduction a major goal. In a study conducted by Besley & Cord (2007), it was found that economic growth has followed a trickle-down approach in India even though inequality has worsened. The authors emphasized about six policy propositions which can help translate economic growth to poverty reduction in India. Firstly, there should be an improvement in the investment climate so that the poor can be better impacted by economic policies. Secondly, there should be an improvement in equitable access to capital. Thirdly, regional newspapers should circulate to better give the poor a voice, fourthly, education and women empowerment must be emphasized and prioritized. Datt and Ravallion (2002) further explained why non-agricultural economic growth proves more effective in addressing poverty in Indian states with more developed initial conditions[31].

Acharya & Miah (2021) examined the nexus between inflation, poverty, and pro-poor growth in South Asian five major economies (India, Nepal, Pakistan, Sri Lanka and Bangladesh) for the period 1986 to 2014. The study concludes that inflation has a negative but insignificant effect on pro-poor growth. Trade openness was also not found to significantly affect pro-poor growth in these countries.

In Indonesia, Osmani (2004) conducted a research to examine the extent of pro-poor growth and found that the favorable environments such as the green revolution, proper oil wealth management and promotion of rice cultivation caused productivity and income of rural farmers to increase, thereby raising millions of people out of poverty.

Timmer (2007) in a similar study examined Indonesia's growth pattern and identified a trickle-down pattern, The study concluded that Indonesia's favorable pro-poor development included political, market-led, and institutional procedures, a combination of which has made the poor better-off, relative to the non-poor.

Sahoo & Paltasingh (2021) examined the growth elasticity of poverty and pro-poor growth of two Indian states during the post-reform period. Two periods before and after

[30] According to the Asian Development Bank Basic Statistics 2021 (April 2021)
[31] The authors identified conditions such as infant mortality, literacy rate and share of landless population.

2011 were compared and the results showed that the growth elasticity of poverty was high enough to cause a more rapid decline in poverty. In the second period, the results also showed that growth in both states was pro-poor due to high growth elasticities of poverty and lower income inequality.

In a study that examined pro-poor curves and pro-poor growth index in South Kalimantan province of Indonesia, Murjani (2021) used data from 2010 to 2020 and found that from 2010 to2016, most benefits of the growth were absorbed by the richer people (trickle-down) and in contrast, from 2016 to 2020, more of the benefits of growth were received by the poor (relative pro-poor growth).

These results from Asia show once again that no single pro-poor growth strategy can exist. However, it is important to learn from cross-country studies to what extent initial conditions and policy interventions could promote growth and poverty reduction simultaneously.

CHAPTER THREE: DATA AND METHODOLOGY

In the previous chapters, we have discussed various empirical and theoretical studies about pro-poor growth in some selected Asian economies and how the poverty-inequality-growth nexus is perceived in the literature. However, there still exists a gap in the literature concerning the post-crisis pro-poor growth pattern in the emerging economies of Asia. This chapter focuses on the research methodology and data frameworks which answer the main research question: what the pattern of pro-poor growth in countries of Asia in the period after the 2008 global financial crisis is. The literature has made it clear that so many Asian economies, like the rest of the global economy, embarked upon economic recovery policies as a result of the global financial crisis of 2007-2008 Hadnes et al. (2008) hence chapter outlines the methodology through which we examine whether these post-crisis growths were indeed to the relative or absolute advantage of poor people. Section 3.1 begins with the area of study, while section 3.2 includes the scope and research framework. In section 3.3, the data sources and main variables were elaborated on and finally, the measurements framework was defined in section 3.4.

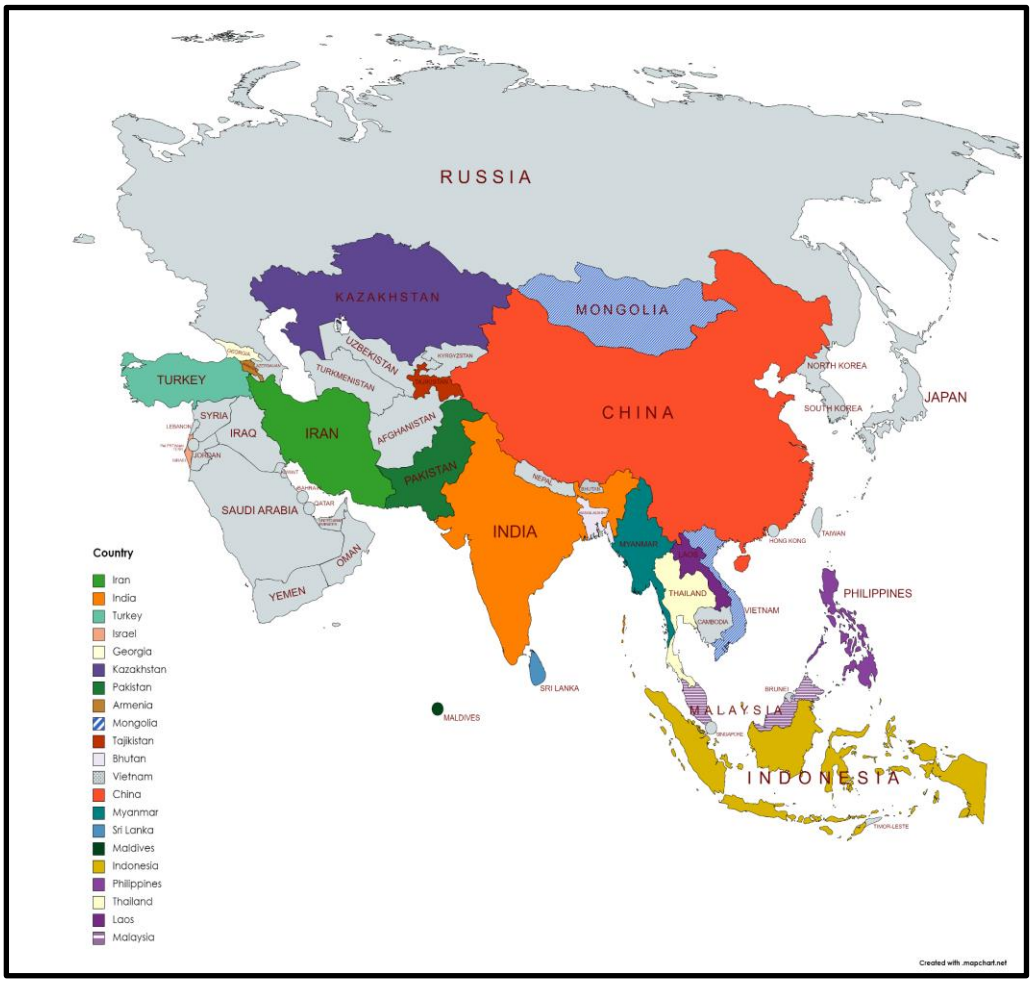
3.1 Area of Study

The population of this study is the Asian continent, which has 50 countries and territories according to the World Bank. Since this is a study of pro-poor growth, some countries were initially omitted because the average income and socioeconomic realities would make an extreme poverty study less important. Some of these countries omitted on such grounds include Qatar, Kuwait, and Saudi Arabia, The United Arab Emirates, and South Korea. Thereafter, some Asian countries were dropped from this study due to insufficient data on poverty and income distributions as reported by the PovcalNet (2022) database developed by the World Bank. Some of these countries omitted on data inadequacy grounds include Afghanistan, Bahrain, Cambodia, North Korea, Oman, and the Palestinian Territories.

After these initial filters were applied, the study was left with 21 countries. These countries have also been presented in Fig. 2 below as the area of the study map. The

countries include Armenia, Bangladesh, Bhutan, China[32], Georgia, India, Indonesia, Iran, Israel, Kazakhstan, Lao, Malaysia, Maldives, Mongolia, Pakistan, The Philippines, Sri Lanka, Tajikistan, Thailand, Turkey, and Vietnam. In summary, the population of the study is Asia while a sample of 21 countries, selected based on two criteria: average national income and data availability.

Figure 2: Area of Study Map



Source: Author's Computations from www.mapchart.net

3.2 Data

This study has covered a period from 2009 to 2019, for 21 Asian countries, varying across each country in what is known as growth spells. The data is sourced from the World Bank PovCalNet Database: the online tool for poverty measurement developed

[32] For China, the study examined Rural and Urban areas separately. Hence pro-poor measures were calculated for both Rural China and Urban China.

by the Development Research group of the World Bank. This database has an interactive computational tool allowing users to replicate the calculations made by World Bank's researchers in estimating the extent of absolute poverty in the world. In addition to the international poverty line of $1.9 per day, the PovcalNet has also been modified, starting from October 2017, to report global poverty at two higher rates $3.2 and $5.5 per day (Jolliffe & Prydz, 2016).In this study, two poverty lines were adopted. $1.9 per day and $3.2 per day. The reason for using a higher poverty line is because we believe that for so many emerging economies in Asia, using the lowest poverty line of $1.9 could grossly undermine the severity of poverty in these places, therefore making the empirical findings biased and conceptually unrealistic. The growth spells for the 21 Asian countries under study are as follows: Armenia (2010 and 2019), Bangladesh (2010 and 2016), Bhutan (2012 and 2017), Rural China (2010 and 2016), Urban China (2010 and 2016), Georgia (2010 and 2019), India (2009 and 2011), Indonesia (2010 and 2019), Iran (2009 and 2018), Israel (2010 and 2016), Kazakhstan (2012 and 2018), Lao (2012 and 2018), Malaysia (2011 and 2015), Maldives (2009 and 2015), Mongolia (2010 and 2018), Pakistan (2010 and 2016), The Philippines (2009 and 2015), Sri Lanka (2010 and 2016), Tajikistan (2009 and 2015), Thailand (2010 and 2019), Turkey (2010 and 2019), and Vietnam (2010 and 2018).

From the understanding of pro-poor growth measurements, there are three key variables in calculating most PPG measures as found in the PovcalNet database:

Table 6: Variable Descriptions

Variable Name	**Description**	**Source**
Cumulative Income Shares (L)	This is the income shares accrued to each percentile of the population, and cumulative of the total population	PovcalNet
Percentiles (P)	This is the entire population divided into cumulative increment points	PovcalNet
Mean Income (X)	This is the average income of the entire population.	PovcalNet

Source: PovcalNet Database

3.3 Empirical Analysis Framework

In measuring pro-poor growth for countries in Asia, this study made use of four indices and one graphical representation, making a total of five measures of pro-poor growth, which were calculated using the Distributive Analysis Stata Package (DASP). These measures include pro-poor growth index (PPGI), poverty-equivalent growth rate (PEGR), Rate of Pro-poor growth index (RPPG), Growth Incidence Curve (GIC) and finally the growth rate of the average income of the poorest 20th percentile of the population (g20). In the following sections, the mathematical expression for each of the five measures has been specified:

Table 7: Measurement Expressions

Pro-poor growth Measure	**Mathematical Expression**
Pro-poor Growth Index (PPGI)	$PPGI = \acute{\eta}_g / \acute{\eta}$
Poverty-Equivalent Growth Rate (PEGR)	$PEGR=(\delta/\eta)\gamma$
Rate of Pro-poor Growth (RPPG)	$RPPG = \frac{\int_0^{H_t} g_t(p)dp}{H_t}$
Growth Rate of Income of the Poorest 20th Percent (g20)	$G_{20} = \chi/\lambda$
Growth Incidence Curve (GIC)	$g(p) = \frac{L_t'(p)}{L_{t-1}'(p)}(\Upsilon + 1) - 1$

Source: Author's Compilations from the literature

3.4 Distributive Analysis Stata Package (DASP)

The main analysis technique used in this study is the Distributive Analysis Stata Package (DASP)[33]. According to Abdelkrim & Duclos (2007), the main purpose of DASP is to produce a comprehensive package for analyzing the distribution of living standards. The authors of this package aimed at creating a module for measuring and

[33] This package was developed by two researchers, Araar Abdelkrim and Jean-Yves Duclos in 2007 and is a freely distributed, freely available package on Stata.

analyzing distributional data of income, poverty, and welfare, which would also be useful for policy recommendations. The following are some of the key features of the DASP:

- It is a powerful tool for estimating the most popular statistics, indices and curves used for the analysis of poverty, inequality, equity and social welfare.
- It is also an ideal tool for estimating the differences in such indices and curves.
- It estimates the standard errors and confidence intervals by fully accounting for the survey design.
- The package supports distributive analysis on more than one database.
- It is a powerful tool in performing the most popular distributive decomposition procedures
- The tool examines the ethical robustness of distributive comparisons.

Indeed, the DASP is a powerful tool that helps researchers in conducting distributive analysis, however, the study also recognizes some of the DASP limitations such that:

- The package is limited to thirty variables
- It does not support data structures that have missing values in them
- It is not designed for providing basic data processing tools.

Still, we believe this is one of the most versatile tools for conducting distributive analysis, hence its adoption in this study.

3.5 Estimation Steps

In this section, we elaborate on all the stages through which the pro-poor measures were calculated, from the data collection to the final output.

Step 1: Data Collection: To begin with, from the World Bank's PovcalNet[34] database, we downloaded the data for the different countries and growth spells as listed in section 3.3. For example, working on Armenia 2010 and Armenia 2019, we extract the

[34] This is the database of the World Bank containing distributional data for most countries of the world. It allows for cross-sectional analysis and comparison of poverty, inequality, and pro-poor growth. And also, to simulate the distribution of individuals' income based on a mathematical function. The mean income is measured as the monthly mean income of households in per capita and in USD. It is also in purchasing power parity and at 2011 constant prices. It is however important to note that the income data is mostly based on consumption.

distributional data for Armenia in 2010 and 2019 separately, while specifying the poverty line[35]. This data is then saved in a spreadsheet form, and the process is repeated for all other countries and years in the study.

Step 2: Data Disaggregation: From the data collected in step 1, we have three important pieces of information, i - the observation, P- the percentiles, and L - The cumulative income shares or the Lorenz curve. Having installed the DASP package in Stata, we import the data, specify the important parameters, and most importantly, specify the size of the distribution to be generated[36]. We then save the generated distribution into a new datasheet. This creates a vector of incomes and not the actual income distribution.

Step 3: Actual Income Distribution: To get the actual income distribution, the vector of incomes generated in step 2 is multiplied by the mean income for that country and year. This means income is also available in the PovcalNet database. Save this new income distribution data for each country and time period.

Step 4: Pro-poor growth indices: From the DASP menu on Stata, we can calculate three pro-poor indices, by choosing the country under analysis and the two growth spells. We then specify some parameters such as the poverty measure[37] and the poverty line[38]. The poverty-equivalent growth rate (PEGR), pro-poor growth index (PPGI) and rate of pro-poor growth (RPPG) tables are generated including their estimates, standard errors, lower band and upper bands of the 95% (or any other) confidence intervals. The lower band (LB) and upper band (UB) are used for interpreting the statistical significance of these pro-poor measures.

In calculating the growth rate of the average income of the poorest 20th percentile, the study refers to the distributional data on PovcalNet, particularly the section titled "The average income or consumption of bottom X". The g20 is calculated by dividing the average income of the poorest quintile in the final year by the average income of the

[35] In this study, two poverty lines were used. $1.9 a day and $3.2 a day
[36] A total size of 10,000 generated distributions was chosen for this study.
[37] The Headcount Poverty ratio was used in this study hence the parameter alpha of 0 was chosen.
[38] Poverty line is specified monthly: $57.79 for $1.9 per day and $97.3 for $3.2 per day.

poorest quintile in the starting year. This growth rate is then compared to the average growth rate of the country, and a decision on whether there is pro-poor growth could be made.

The growth incidence curve (GIC) is also plotted with the help of DASP. From the DASP menu, the pro-poor curves: the dual approach is selected, the data chosen, and the necessary parameters specified[39].

[39] Parameters such as the reference period, the estimated curve (Q_2(p)-Q_1(p))/Q_1(p), the percentiles (minimum 0.01, maximum 0.99).

CHAPTER FOUR: RESULTS

In this section, the results of the empirical analyses are presented, following the research objectives stated in Chapter One and the methodology in the previous chapter. First, the key indicators of poverty and inequality in some selected Asian countries are presented in Table 3. Thereafter, trend analyses and bar charts of key variables such as the proportion of the population living on less than $3.2 per day, income share of the richest 20% to the poorest 20%, GDP per capita, GINI Index[40] and Headcount Poverty are presented. Furthermore, the measures of pro-poor growth are calculated and explained. The first table presents key indicators of poverty and inequality in selected Asian countries while the second and third table presents four pro-poor growth measures, the average growth rate and the statistical significance of these measures.

Following headcount poverty ratio in income dimensions, and using two different poverty lines, the $1.9/day while the second table uses the $3.2/day poverty line. The Growth Incidence Curves of some selected Asian countries are also presented and explained. Finally, the results are summarized and discussed in relation to previous and current literature. The chapter also presents a brief outlook to the Asian economy in the coming periods.

4.1 Key Indicators- Poverty and Inequality in Asia

This sub-section focuses on the evolution of poverty and inequality in selected countries of Asia. Countries in Central and West Asia such as Georgia, Kazakhstan, and Kyrgyzstan, have seen a steady decline in Gini Index over the years from 2010 to 2019, implying a decline in inequality. However other countries in the region like Armenia, Pakistan and Tajikistan have seen a slight increase in inequality as measured by the Gini index. In general, inequality in Central and West Asia appeared to be moderate. Looking at the inequality data from East Asia, China's Gini index has been declining significantly since 2010, indicating progress in terms of socioeconomic gains for the poor. Korea, Mongolia, and Taiwan also have similar success stories regarding the fall

[40] This is a measure of wealth and income distribution in a population, It ranges from 0 to 1. If Gini=0, it is a situation of perfect equality and if equals 1, there is perfect inequality of income and wealth in the population. It is derived from the Lorenz Curve (Lorenz, 1905)

in inequality.

The income ratio of the richest 20% to the poorest 20% of people calculates the pattern of income distribution in the population[41]. In 2009, the income pattern in China revealed that on average, the rich hold at least 9 times the income compared to the poor, and this is the largest ratio in Asian economies. In 2009 also, the richest 20% in Kazakhstan had four times the income of the poorest 20%. Many other Asian economies like Pakistan, Georgia, and Armenia also reported high levels of income inequality. As of 2016, this inequality pattern in China had only decreased to about 7 times[42]. The evidence, therefore, shows that inequality in Asia is high and has not been substantially reduced over the years, hence the importance of examining how it has affected poverty, and how economic growth can be made more pro-poor.

In terms of poverty, the proportion of the population living below $3.2 per day is also reported in the table below. In Central and West Asia, the population proportion in poverty has been steadily declining from 2010 to 2019. For example, in Armenia, this value fell from about 14% in 2010 to 9.9% in 2019. A similar decline in poverty is evident in Georgia, Kazakhstan, Pakistan, Tajikistan, and Kyrgyzstan. In East Asia, this poverty decline is even more pronounced in China where the proportion of people living below $3.2 per day fell from about 25% in 2010 to about 5.4% in 2016. A similar decline is also evident in Mongolia (from about 9.6% in 2010 to about 5% in 2018). The case of Taiwan is however different with little change in poverty, albeit of the lowest level.

[41] For an equal income distribution situation, this ratio should equal 1. The higher the ratio, the more income is accrued to the rich, and the more unequal is the distribution.
[42] This means that on the average, the rich have 7 times the income of the poor.

Table 8: Poverty and Inequality in Asian Countries

Country	Proportion of Population Living on Less than $3.2 a day (2011 PPP) (%)			Income Ratio of Highest 20% to Lowest 20%			Gini Coefficient		
	2010	2015	2019	2010	2015	2019	2010	2015	2019
Central and West Asia									
Armenia	14.10	9.50	9.90	4.30	5.00	4.30	0.30	0.32	0.30
Georgia	30.60	15.70	14.90	8.00	6.50	6.30	0.40	0.37	0.36
Kazakh Republic	1.50	0.30	0.2(2018)	4.00	3.70	3.9(2018)	0.28	0.27	0.278
Kyrgyz Republic	19.00	18.40	9.70	4.50	4.10	4.10	0.30	0.29	0.297
Pakistan	48.00	35.50	35.7	4.10	4.70	4.5	0.30	0.33	0.316
Tajikistan	22.5	17.80	...	4.7	5.60	...	0.308	0.34	...
East Asia									
China (PRC)	28.60	7.00	5.4	9.60	7.10	7.0	0.437	0.386	0.385
Korea, Republic of	0.80	0.5	0.2	5.40	5.2	5.2	0.32	0.312	0.314
Mongolia	9.60	3.0	5.0	5.30	5.0	5.2	0.33	0.320	0.327
Taipei	0.20	0.3	0.0	4.30	3.90	3.90	0.30	0.28	0.28

Source: World Bank. World Development Indicators.
The comprehensive table is available in Appendix II

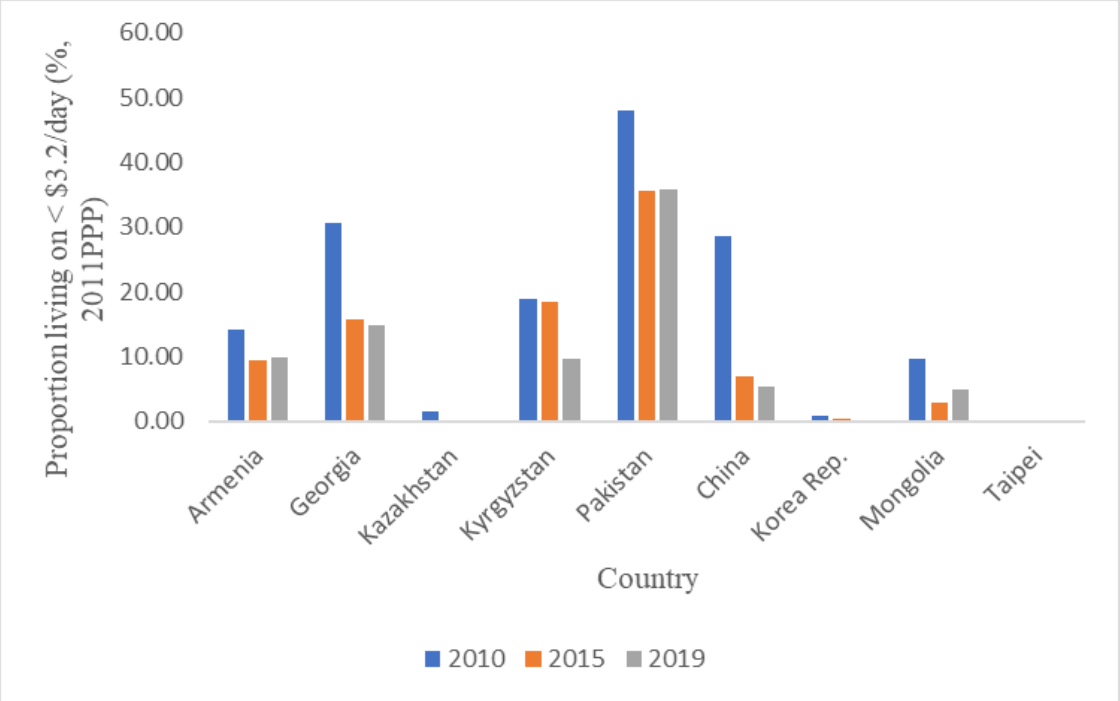
4.2 Trend Analysis of Key Variables

In this section, the description of trends of poverty, inequality, and GDP per capita of selected Asian countries are presented with the aid of bar charts and line graphs. Each bar chart is presented based on the three variables in the Table 8, the aim of which is to do a cross-country comparison of poverty and inequality measures.

4.2.1 Bar Chart of Population Proportion Living on Less than $3.2 a day

It can be observed from figure 3 that Pakistan has the highest proportion of its people living on less than $3.2 daily with the year 2010 being of the highest number, while 2015 and 2019 have been slightly lower. Armenia, Georgia, and Kyrgyzstan also were reported to have high poverty proportions. On the opposite, Kazakhstan, Korea Republic, and Taipei (Taiwan) were reported to have the least proportion living on less than $3.2 per day. This graph shows the diversity of Asian economies in relation to poverty metrics. For some countries, the proportion of the population living in poverty is around 20-30% while some other have as low as 2% living in poverty.

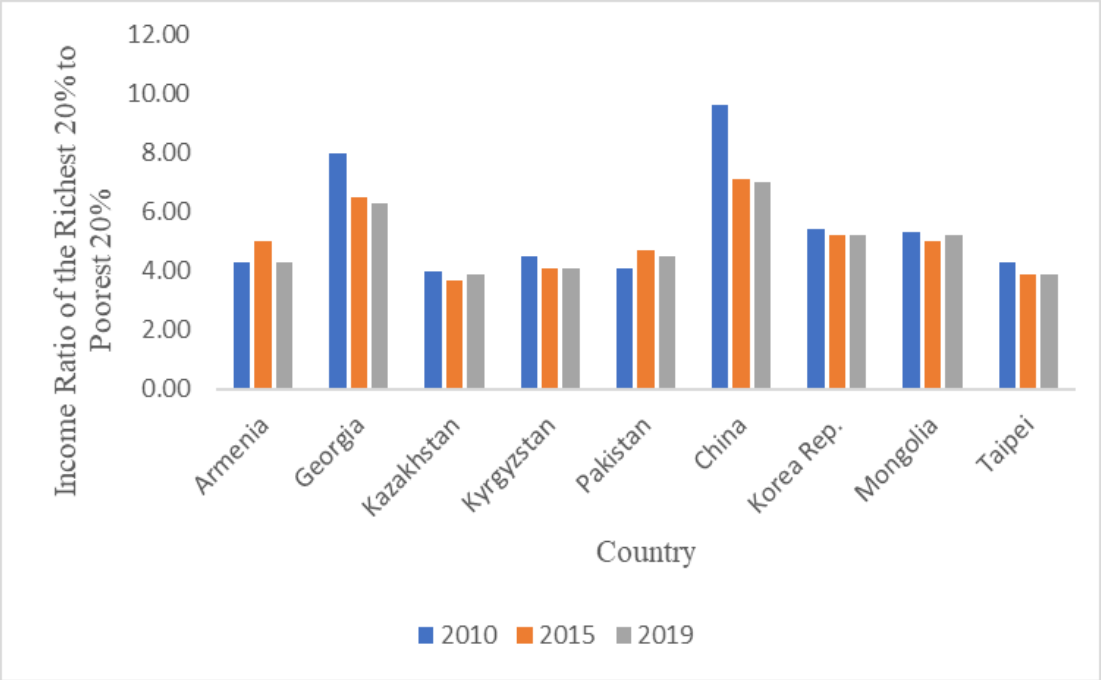
Figure 3: Population proportion living on < $3.2 per day



Source: Author's Computations

The income ratio of the richest 20% to the poorest 20% is presented in Figure 4. The data for China shows that in 2010, the richest 20% had about 9 times the income of the poorest 20%, a sign of high inequality. This inequality however fell slightly in 2015 and 2019. Other Asian countries such as Georgia, Korea, and Mongolia also had high income inequalities over the years, with Georgia in 2010 being one of the highest.

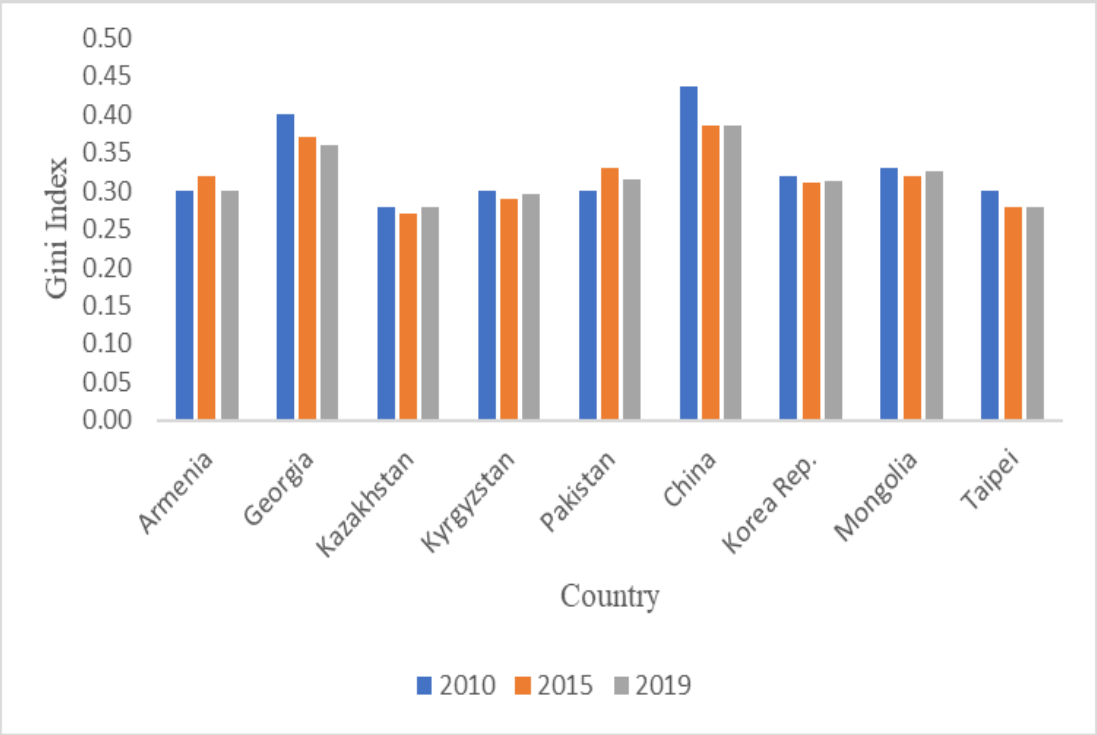
Figure 4: Income Ratio of the Richest 20% to the Poorest 20%



Source: Author's Computations

The Gini index is also presented in form of a bar chat in Figure 5. China and Georgia are reported to have the highest Gini index, signifying a high rate of inequality in these countries. Also in both countries, the Gini index slightly declined after 2010. Armenia, Kazakhstan, and Korea were also reported to have similar and low Gini indices, however, inequality in Armenia in 2015 slightly increased. In summary, the diagram reveals the varying nature of inequality among selected Asian countries.

Figure 5: Gini Index of Selected Asian Countries



Source: Author's Computations

4.2.2 Trends of GDP Per Capita (Current US$)

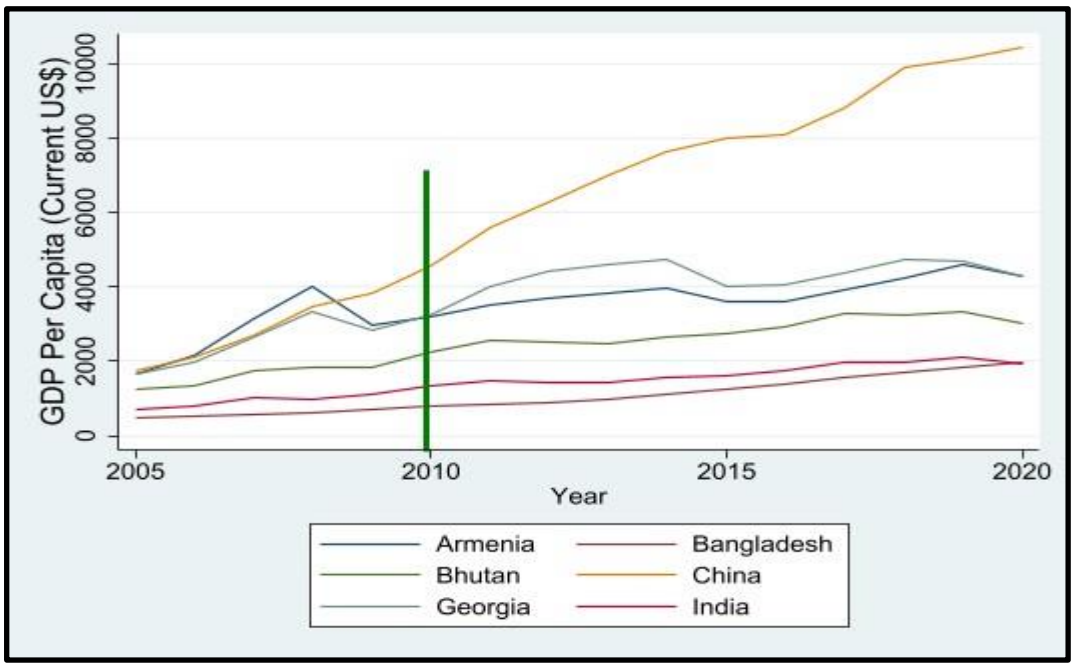
In fig 6 to fig 9 are line graphs of the evolution of GDP per capita in the current US$ from 2005 to 2020. As stated in the introduction, this study examines the pro-poorness of growth during the periods after the 2008 global financial crisis. In this graph, 2010 is selected as a focal period, and the trends before and after this period are presented and explained for all 21 Asian countries in review. The reason for using four different charts is to allow for more comparability and better visual description, as combining all countries under study in one frame would cause difficulty in observing all the details. There is however no particular reason behind why the countries are grouped as they are. It is possible to have grouped these countries in a different manner if it allows for an easier visualization.

In fig 6, there was a general upward trend in economic growth for these countries, with China having the highest per capita income while Bangladesh recorded the lowest. Also, there was a slight decline in per capita income in Armenia and Georgia in 2009. In the periods after 2010, these economies have experienced slightly increasing growth,

with China still outpacing the rest.

It is also important to note that in the periods before 2010, per capita GDP did not appear to rise sharply for Georgia, India, and Bangladesh. In summary, per-capita GDP in China began to outpace other countries after the global economic crisis of 2008, suggesting that the economic recovery plans of China could have been more efficient compared to other countries being observed.

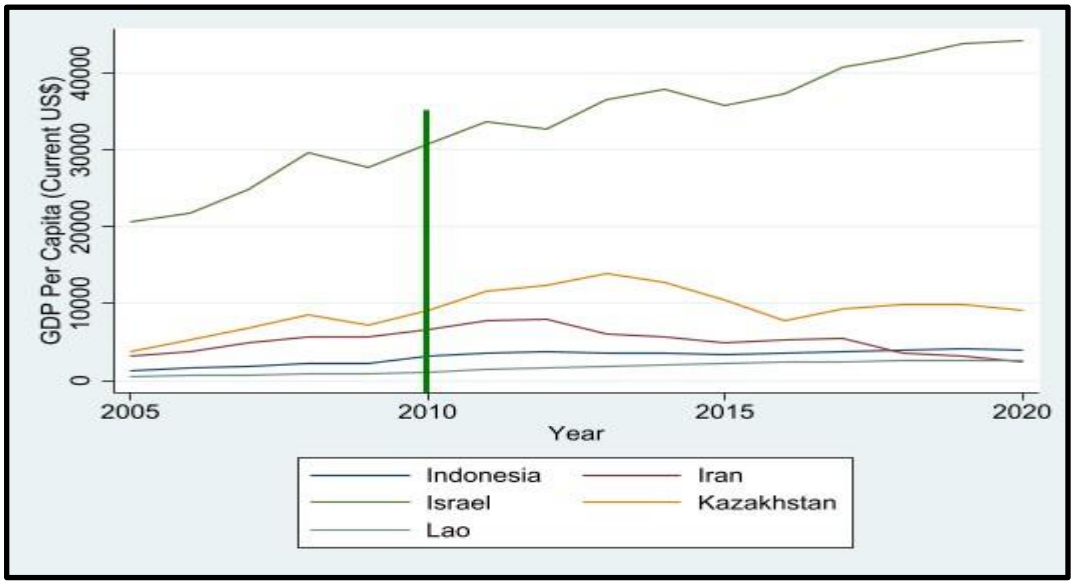
Figure 6: Line graph of GDP Per Capita - Armenia, Bhutan, Bangladesh, China, Georgia, and India



Source: Author's Computations

In fig 7, Israel generally outperformed other countries in the graph, with per capita income being significantly higher and generally upward trending, followed by Kazakhstan. We also see that these two countries (Israel and Kazakhstan) experienced a slight decline in per-capita income in 2009 which might be partly due to the global economic and financial crisis of that period. Per-capita income in Indonesia, Lao, and Iran appeared to be almost stable and linear over the years, with no significant fluctuations during the 2008-2009 period. In summary, Israel's GDP per capita outperformed other countries in the graph, while Indonesia and Lao have remained at the lowest level in comparison.

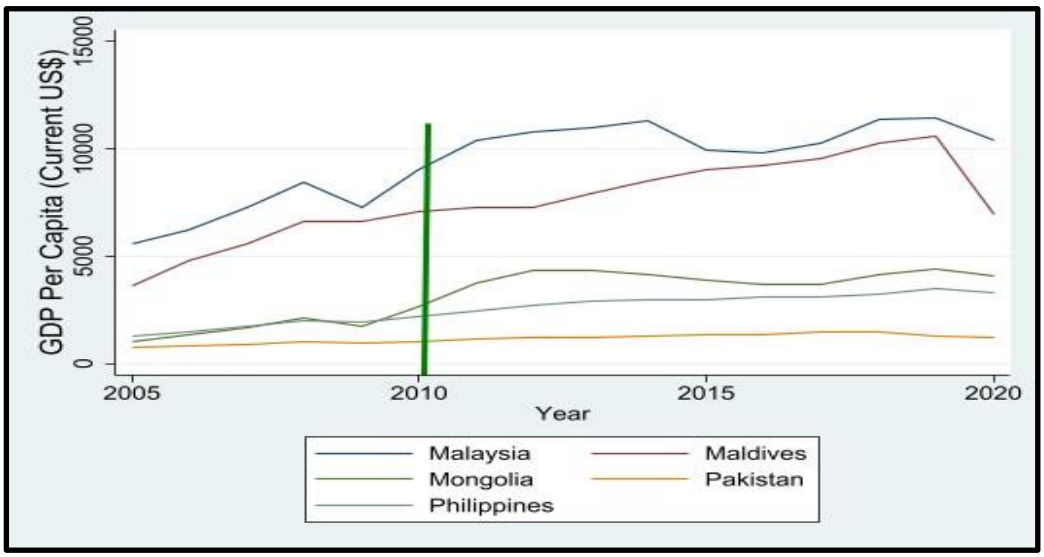
Figure 7: Line graph of GDP Per Capita - Indonesia, Iran, Israel, Kazakhstan and Lao



Source: Author's Computations

In fig 8, per capita income is highest in Malaysia followed by the Maldives while Pakistan recorded the lowest per capita income. In the 2008-2009 period, there was a decline in per capita income in Malaysia and Mongolia, probably due to the global financial crisis. It is also important to note that in the most recent years, growth has been declining in Malaysia and Maldives, although both economies are still outperforming the rest of Pakistan, The Philippines and Mongolia.

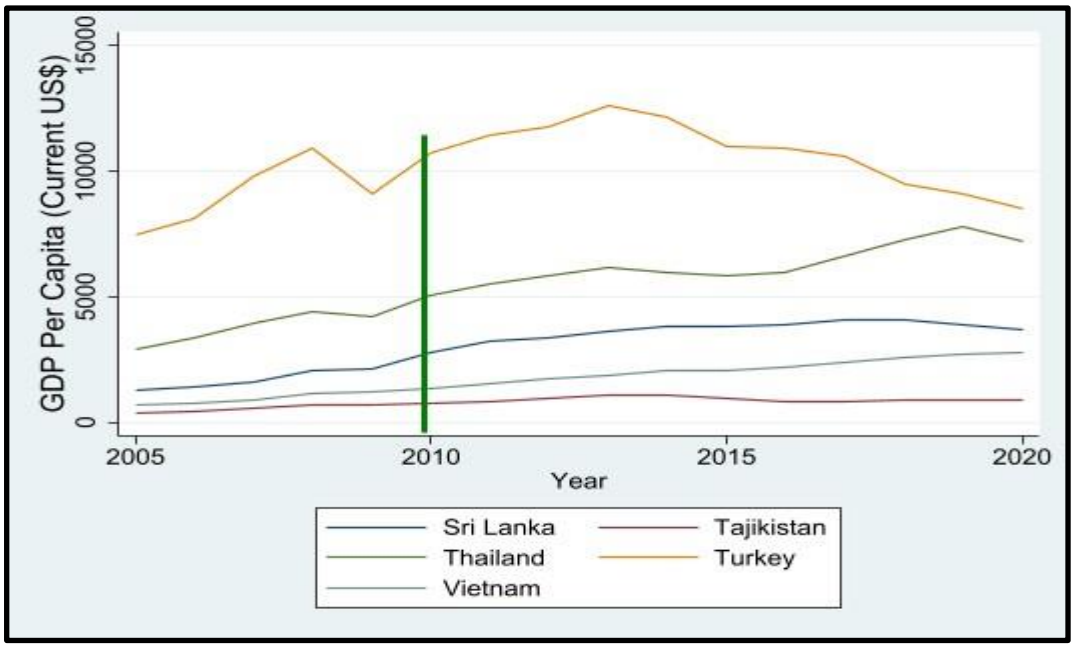
Figure 8: Line graph of GDP Per Capita - Malaysia, Maldives, Mongolia, Pakistan, Philippines



Source: Author's Computations

Finally, in fig 9, Turkey recorded the highest per-capita income while Tajikistan recorded the lowest. Also, Sri Lanka, Vietnam and Thailand experienced a slight increase in per-capita income however in Tajikistan, there appeared to be no significant change over the periods. It is also important to note that, of all five (5) countries in the diagram, Turkey's GDP per capita growth was mostly affected by the 2008 global financial crisis, as seen in the sharp decline. However, Tajikistan, Vietnam and Sri Lanka did not experience the expected economic growth decline in this period.

Figure 9: Trend Analysis of GDP Per Capita - Sri Lanka, Tajikistan, Thailand, Turkey, Vietnam



Source: Author's Computations

4.2.3 Trends of Headcount Poverty Ratio at $3.2/day (2011 PPP)

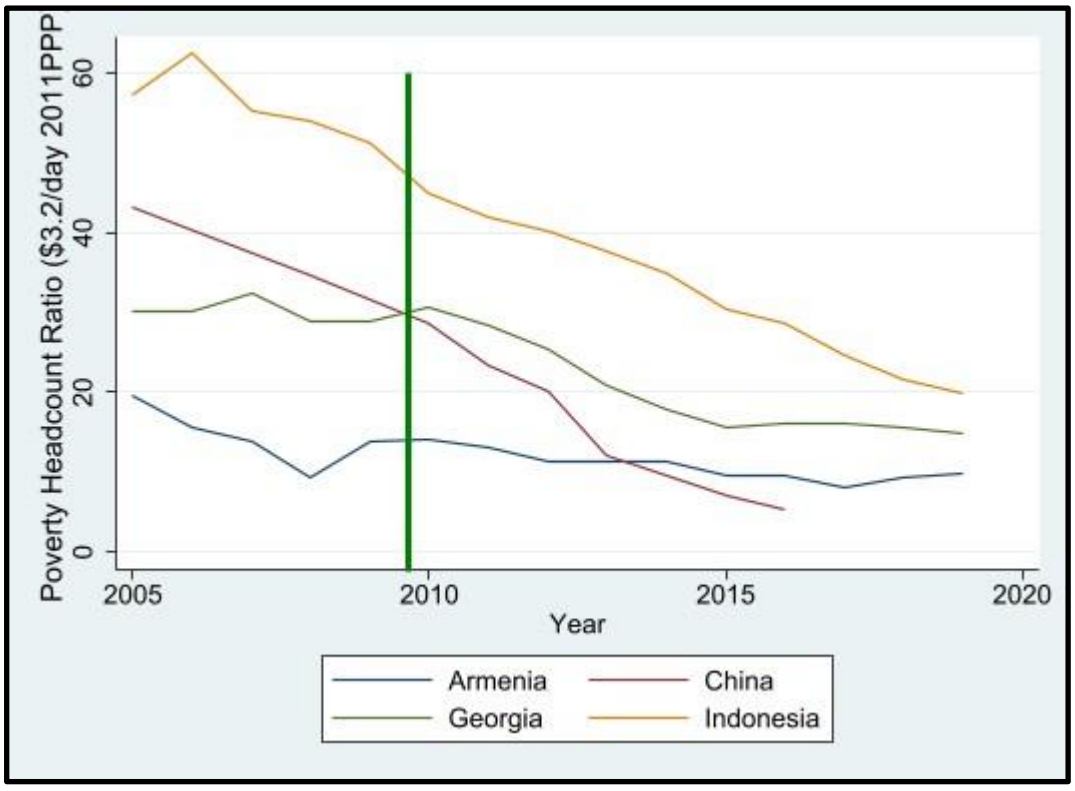
In fig 10 to fig 13 are line graphs of the evolution of headcount poverty ratio from 2005 to 2019. As stated in the introduction, this study examines the pro-poorness of growth during the periods after the 2008 global financial crisis. Therefore, also in this graph, 2010 is selected as a focal period, and the trends before and after this period are presented and explained for all 21 Asian countries in review. The reason for using four different charts is to allow for more comparability and better visual description, as combining all countries under study in one frame would cause difficulty in observing all the details. There is however no particular reason behind why the countries are

grouped as they are. It is possible to have grouped these countries in a different manner, as long as it allows for an easier visualization. Also, due to the differences in available time series data, some of the countries have been dropped from the descriptive analysis. This is also the reason why the countries were grouped differently compared to the previous section- Trends of GDP per capita.

The reason why $3.2 poverty line is used rather than $1.9 is because the former is a much recent revision of the poverty line according to the World Bank, hence it could provide much realistic estimation of the poverty incidence among Asian countries.

In Fig 10, Indonesia reports the highest headcount poverty ratio while Armenia reported the lowest. China and Georgia also have moderately high poverty rates. There is a similar and general declining trend of poverty in these countries, even beyond the period after the global financial crisis of 2007/2008. This could be an indicator that although poverty had been declining for so many years, this decline even continued throughout the recovery periods after the global crisis.

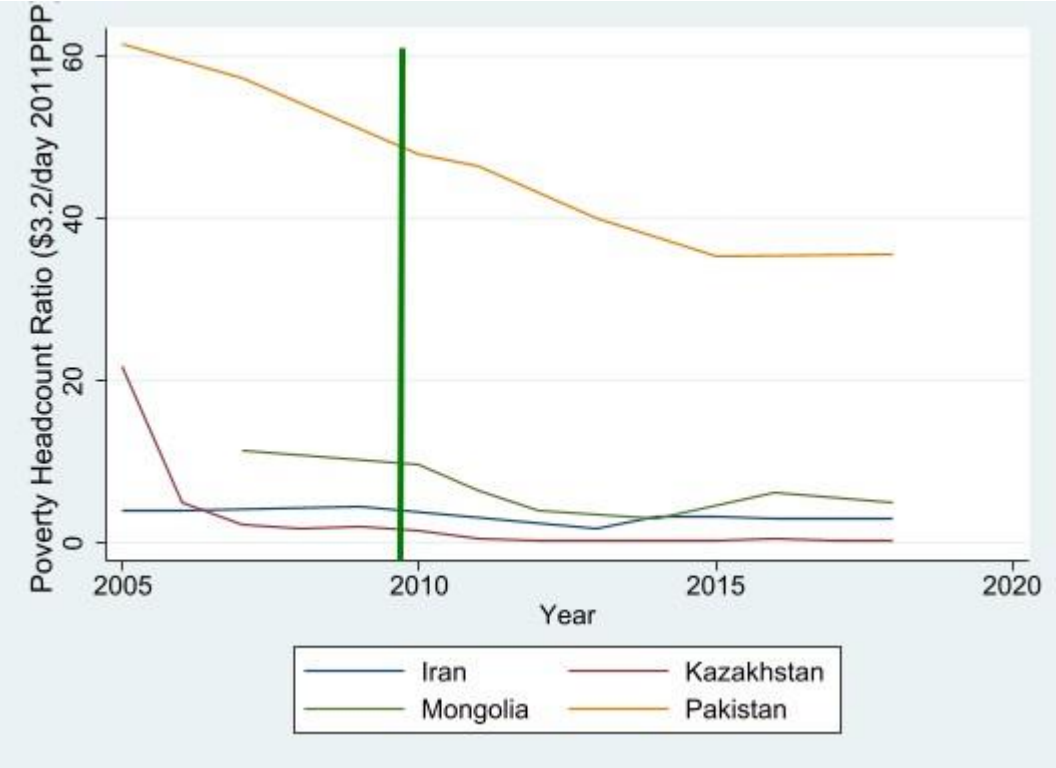
Figure 10: Line graph of Poverty Headcount Ratio in Armenia, China, Georgia and Indonesia



Source: Author's Computations

Fig 11 shows Pakistan to have a significantly higher poverty rate, while Iran, Mongolia and Kazakhstan have relatively lower and rather linear movements in poverty. Similar to the countries in Fig 3, poverty seems to be generally declining in these countries as well.

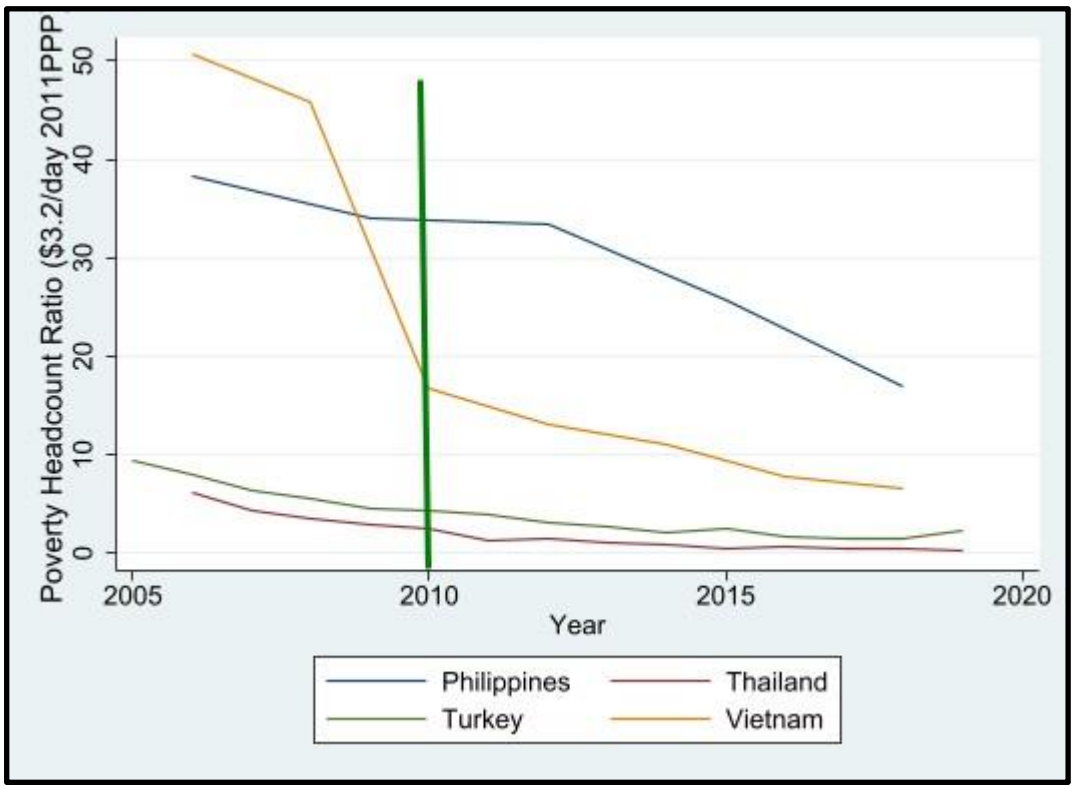
Figure 11: Line graph of Poverty Headcount Ratio in Iran, Kazakhstan, Mongolia and Pakistan



Source: Author's Computations

Figure 12 reports headcount poverty for the Philippines, Turkey, Thailand, and Vietnam. In the years before 2009, Vietnam had the highest poverty rate, but this sharply declined below the Philippines in the following years. This could indicate that the economic recovery process in Vietnam rather lifted more people out of poverty compared to the Philippines. In Turkey and Thailand, there were similarly low poverty rates, with a slight decline throughout the periods.

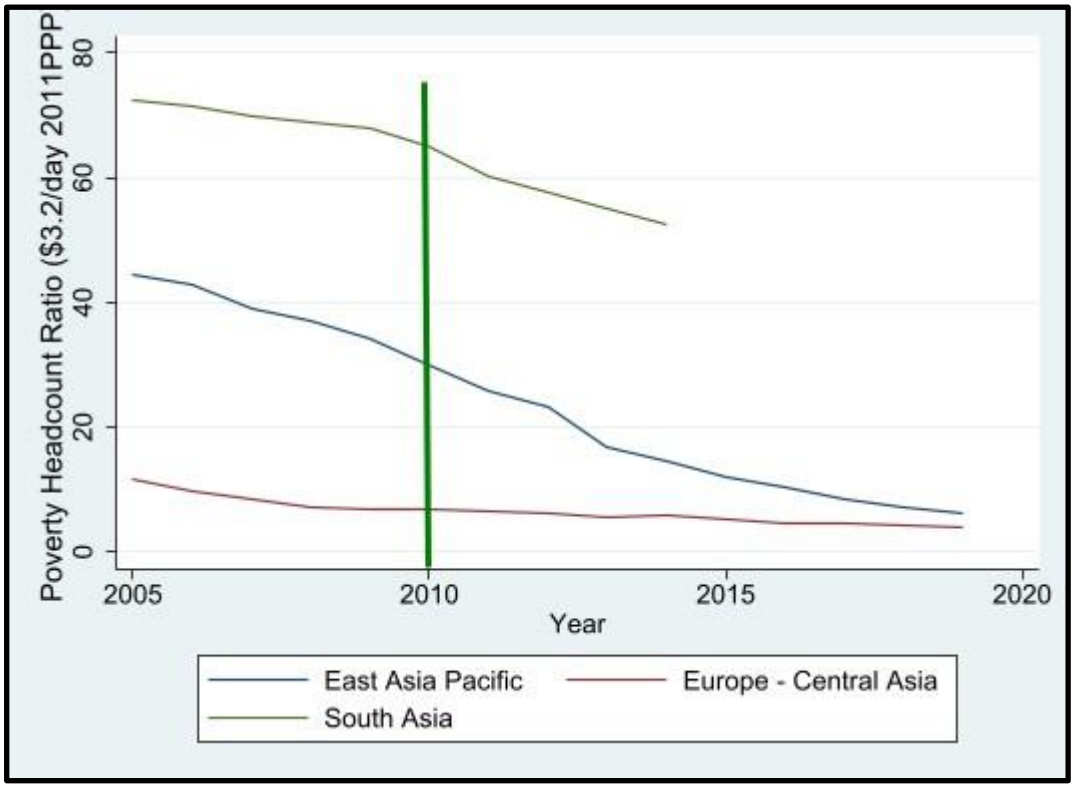
Figure 12: Line graph of Poverty Headcount Ratio in the Philippines, Thailand, Turkey, and Vietnam



Source: Author's Computations

Finally in fig 13, we examine the trend of different regions involving Asian countries, the aim of which is to have a better understanding of how poverty compares at a regional level. According to the graph, South Asia tops the trend, although with a declining poverty rate. The East Asia and Pacific region also show a sustained decline in poverty, while Europe and Central Asia show a rather linear flat trend, and with the lowest poverty rates compared to other regions.

Figure 13: Line graph of Poverty Headcount Ratio across selected regions



Source: Author's Computations

4.3. Pro-Poor Growth Measures

In this section, we present in Tables 9 and 11, four measures of pro-poor growth as already discussed in Chapter two, using $1.9 per day and $3.2 per day respectively as poverty line. The measures include the pro-poor growth index (PPGI), poverty-equivalent growth rate (PEGR), the Growth rate of the poorest 20th percentile of the population (g20) and the rate of pro-poor growth (RPPG). The next section presents the growth incidence curve (GIC), a measure of how the growth is distributed among percentiles of the income distribution.

4.3.1. Measuring Pro-poor growth at $1.9/day

From the results, there are varying conclusions on pro-poor growth, based on the measure used. For example, in Armenia, three out of the four measures seem to agree that growth follows a trickle-down pattern. This makes it more logical to conclude that the economic recovery process in Armenia after the global financial crisis has been pro-poor and that although the non-poor saw a rise in their income, this rise also trickled

down to the segment of the population below the poverty line.

The pro-poor growth was also examined in China, by comparing both pro-poorness patterns in rural and urban areas in the country. The results revealed that there is absolute and relative pro-poor growth in rural China. Comparing this with urban China, most of the measures showed that there is a trickle-down pattern of growth pro-poorness among persons living in the urban areas of China. In India, one of the largest emerging economies in Asia, the results reveal that most of the pro-poor growth patterns are trickle-down - meaning although the non-poor got richer due to the recovery process after the global financial crisis, some of these benefits were transferred positively to the poor. Other measures such as the g20 and RPPG show that the people in India below the poverty line were positively affected by the economic growth process in absolute terms.

In Iran, although the average growth rate declined heavily in the periods after the global financial crisis, most of the pro-poor measures still reported strong pro-poor growth. This implies that the poor were relatively less affected by the decline in growth rate, hence it still counts as pro-poor growth. In Israel, most of the measures reported relative and trickle-down pro-poor growth. Caution should however be taken in interpreting the pro-poor growth index (PPGI) since it does not fall into any of the different thresholds defined in the literature. In Tajikistan, most of the results revealed an immiserizing growth pattern.

Table 9: Pro-poor Growth Measures using $1.9/day poverty line

S/N	Country	g	PPGI	PEGR	g20	RPPG
1.	**Armenia**	0.107	0.313(Trickle down growth)*	0.033(Trickle down growth)*	0.089(Trickle down growth)*	0.026(Trickle down growth)*
2.	**Bangladesh**	0.096	0.590(Trickle down growth)*	0.133(Relative pro-poor growth)*	0.069(Trickle down growth)*	0.087(Trickle down growth)*
3.	**Bhutan**	0.086	1.400(relative pro-poor growth)*	0.121(Relative pro-poor growth)*	0.078(Trickle down growth)*	0.096(Trickle down growth)*

4.	**China (Rural)**	0.801	1.065(Relative pro-poor growth)*	0.854(Relative pro-poor growth)*	1.147(Relative pro-poor growth)*	0.289(Trickle down growth)*
5.	**China (Urban)**	0.439	0.831(Trickle down growth)*	0.365(Trickle down growth)*	0.363(Trickle down growth)*	0.144(Trickle down growth)*
6	**Georgia**	0.311	1.485(Relative pro-poor growth)*	0.461(Relative pro-poor growth)*	0.563(Relative pro-poor growth)*	0.335(Trickle down growth)*
7.	**India**	0.173	0.849(Trickle down growth)*	0.147(Trickle down growth)*	0.139((Trickle down growth)*	0.111(Trickle down growth)*
8.	**Indonesia**	0.556	0.933(Trickle down growth)*	0.519(Trickle down growth)	0.470(Trickle down growth)*	0.181(Trickle down growth)*
9.	**Iran**	-0.243	-7.125(Strong Pro-poor growth)*	0.173(Strong Pro-poor growth)*	0.065(Strong pro-poor growth)*	0.256(Strong pro-poor growth)*
10.	**Israel**	0.163	1.000 (Inconclusive)	0.164 (Relative pro-poor growth)*	0.270(Relative pro-poor growth)*	0.107(Trickle down growth)*
11.	**Kazakhstan**	0.252	1.167(Relative pro-poor growth)	0.294(Relative pro-poor growth)	0.293(Relative pro-poor growth)*	0.125(Trickle down growth)*
12.	**Lao**	0.205	0.671(Trickle down growth)*	0.138(Trickle down growth)*	0.122(Trickle down growth)*	0.099(Trickle down growth)*
13.	**Malaysia**	0.267	1.143(Relative pro-poor growth)*	0.306(Relative pro-poor growth)	0.423(Relative pro-poor growth)	0.149(Trickle down growth)*
14.	**Maldives**	1.202	1.012(Relative ro-poor growth)	1.216(Relative Pro-poor growth)	1.860(Relative pro-poor growth)	0.244(Trickle down growth)*
15.	**Mongolia**	0.161	0.696(Trickle down growth)*	0.113(Trickle down growth)*	0.186(Relative pro-poor growth)	0.049((Trickle down growth)*

16	**Pakistan**	0.210	0.772(Trickle down growth)*	0.162(Trickle down growth)*	0.139(Trickle down growth)*	0.096(Trickle down growth)*
17	**Philippines**	0.115	1.175(Relative pro-poor growth)*	0.135(Relative pro-poor growth)*	0.185(Relative pro-poor growth)	0.109(Trickle down growth)*
18	**Sri Lanka**	0.312	0.921`(Trickle down growth)*	0.288(Trickle down growth)*	0.202(Trickle down growth)*	0.155(Trickle down growth)*
19	**Tajikistan**	0.171	-0.110(Immiserizing growth)*	-0.119(Immiserizing growth)*	0.042(Trickle down growth)*	-0.063(Immiserizing growth)*
20	**Thailand**	0.165	1.500(Relative pro-poor growth)	0.248(Relative pro-poor growth)	0.356(Relative pro-poor growth)	0.143(Trickle down growth)*
21	**Turkey**	0.328	0.646(Trickle down growth)*	0.212(Trickle down growth)*	0.216(Trickle down growth)*	0.064(Trickle down growth)*
22	**Vietnam**	0.398	0.772(Trickle down growth)*	0.308(Trickle down growth)*	0.450(Relative pro-poor growth)	0.157(Trickle down growth)*

*Statistically Significant
Source: Author's computations from DASP on Stata

4.3.2 Summary of PPG by Measures ($1.9)

This section presents a summary of pro-poor growth measures and the frequency of each standardized interpretation, the aim of which is to calculate how frequent each of the six standardized interpretations occur in all four measures of PPG. From Table 10, it can immediately be seen that none of the measures were interpreted as having pro-poor decline or anti-poor decline. Furthermore, all four measures only reported one instance of strong pro-poor growth (Iran), while immiserizing growth was reported by three out of the four measures (Tajikistan had the immiserizing growth pattern). On further examination, Trickle-down growth had the highest frequency of occurrence (52 growth spells) followed by relative pro-poor growth (28 growth spells). In summary, the differences in results have the following pattern of occurrence: Trickle-down growth, Relative pro-poor growth, strong pro-poor growth and finally immiserizing growth.

One important point to note is that, of all four measures of PPG, the findings of RPPG appears to be divergent from the rest. For example, while other measures found similar evidence on relative pro-poor growth among Asian countries, the RPPG found no relative interpretation for PPG, rather most of its findings provided evidence on trickle-down growth.

Table 10: Summary of PPG by Measures and Frequency of Results ($1.9 Poverty line)

Standardized Interpretation	Measures of PPG				Total
	PPGI	PEGR	g20	RPPG	
(Relative) Pro-poor Growth	8	10	10	0	28
Strong pro-poor growth	1	1	1	1	4
Pro-poor decline	0	0	0	0	0
Trickle-down growth	11	10	11	20	52
Immiserizing growth	1	1	0	1	3
Anti-poor decline	0	0	0	0	0

Source: Author's Computations

4.3.3 Measuring Pro-poor growth at $3.2/day

The pro-poor growth indices have been recalculated in this section using a higher poverty line of $3.2 per day. The reason for this upward revision in the poverty line is two-fold. Firstly, to get closer to the most recent World Bank poverty line revisions and estimates based on 2011 purchasing power parity. Secondly, it is important to understand as well that for so many economies in Asia, using a lower poverty line of $1.9 could be conceptually false, as the level of poverty and poverty indicators would be underrepresented.

We would examine the growth pro-poorness pattern in some selected economies such as China, India, Iran, Pakistan, Indonesia, Tajikistan, and Thailand.

In terms of individual countries, comparing urban and rural China, trickle-down growth appears to be more prevalent among the urban poor compared to the rural poor where the growth pattern is mostly pro-poor in absolute terms. In India, most of the measures revealed that growth benefited the poor through a trickle-down pattern. This means that the economic growth recovery process after the global financial crisis was to the advantage of both the poor and non-poor, although the latter benefitted more.

For Iran, most of the measures revealed strong pro-poor growth however with the exception of the poverty-equivalent growth rate (PEGR). Although the average growth rate in Iran was negative, the poor were still less impacted as compared to the non-poor.

In Pakistan, Sri Lanka and Tajikistan, many of the results also identified trickle-down growth patterns but not relative pro-poorness of growth.

Table 11: Pro-poor Growth Measures using $3.2/day poverty line

S/N	Country	g	PPGI	PEGR	g20	RPPG
1.	**Armenia**	0.107	0.862(Trickle-down growth)*	0.092(Trickle-down growth)*	0.089(Trickle down growth)*	0.552(Relative pro-poor growth)*
2.	**Bangladesh**	0.096	0.530(Trickle-down growth)*	0.051(Trickle-down growth)*	0.069(Trickle down growth)*	0.051(Relative pro-poor growth)*
3.	**Bhutan**	0.086	0.827(Trickle-down growth)*	0.072(Trickle-down growth)*	0.078(Trickle down growth)*	0.071(Trickle-down growth)*
4.	**China (Rural)**	0.801	1.217(Relative pro-poor growth)*	0.974(Relative pro-poor growth)*	1.147(Relative pro-poor growth)*	0.433(Trickle-down growth)*
5.	**China (Urban)**	0.439	0.857(Trickle-down growth)*	0.376(Trickle-down growth)*	0.363(Trickle down growth)*	0.170(Trickle-down growth)*
6	**Georgia**	0.311	1.396(Relative pro-poor growth)*	0.434(Relative pro-poor growth)*	0.563(Relative pro-poor growth)*	0.338(Relative pro-poor growth)*

7.	**India**	0.173	0.976(Trickle-down growth)*	0.169(Trickle-down growth)*	0.139(Trickle down growth)*	0.132(Trickle-down growth)*
8.	**Indonesia**	0.556	0.985(Trickle-down growth)*	0.547(Trickle-down growth)*	0.470(Trickle down growth)*	0.290(Trickle-down growth)*
9.	**Iran**	-0.243	-4.896(Strong-pro-poor growth)*	0.119(*Pro-poor decline)	0.065(Strong pro-poor growth)*	0.165(Strong pro-poor growth)*
10.	**Israel**	0.163	1.000 (Inconclusive)	0.163 (Inconclusive)	0.270(Relative pro-poor growth)	0.120(Trickle-down growth)*
11.	**Kazakhstan**	0.252	1.247(Relative pro-poor growth)*	0.314(Relative pro-poor growth)*	0.293(Relative pro-poor growth)	0.162(Trickle-down growth)*
12.	**Lao**	0.205	0.686(Trickle-down growth)*	0.141(Trickle-down growth)*	0.122(Trickle down growth)*	0.105(Trickle-down growth)*
13.	**Malaysia**	0.267	1.133(Relative pro-poor growth)*	0.303(Relative pro-poor growth)*	0.423(Relative pro-poor growth)	0.163(Trickle-down growth)*
14.	**Maldives**	1.202	1.088(Relative pro-poor growth)*	1.308(Relative pro-poor growth)*	1.860(Relative pro-poor growth)	0.339(Trickle-down growth)*
15.	**Mongolia**	0.161	1.167(Relative pro-poor growth)*	0.189(Relative pro-poor growth)*	0.186(Relative pro-poor growth))	0.114(Trickle-down growth)*
16	**Pakistan**	0.210	0.716(Trickle-down growth)*	0.150(Trickle-down growth)*	0.139(Trickle down growth)*	0.113(Trickle-down growth)*
17	**Philippines**	0.115	1.321(Relative pro-poor growth)*	0.152(Relative pro-poor growth)*	0.185(Relative pro-poor growth)	0.125(Relative pro-poor growth)*
18	**Sri Lanka**	0.312	0.722(Trickle-down growth)*	0.226(Trickle-down growth)*	0.202(Trickle down growth)*	0.141(Trickle-down growth)*

19	**Tajikistan**	0.171	0.507(Trickle-down growth)*	0.087(Trickle-down growth)*	0.042(Trickle down growth)*	0.026(Trickle-down growth)*
20	**Thailand**	0.165	1.567(Relative pro-poor growth)*	0.259(Relative pro-poor growth)*	0.356(Relative pro-poor growth)	0.159(Trickle-down growth)*
21	**Turkey**	0.328	0.921(Trickle-down growth)*	0.303(Trickle-down growth)*	0.216(Trickle down growth)*	0.160(Trickle-down growth)*
22	**Vietnam**	0.398	1.082(Relative pro-poor growth)*	0.431(Relative pro-poor growth)*	0.450(Relative pro-poor growth)	0.213(Trickle-down growth)*

*Statistically Significant
Source: Author's computations from DASP on Stata

4.3.4 Summary of PPG by Measures ($3.2)

This section presents a summary of pro-poor growth measures and the frequency of each standardized interpretation, the aim of which is to calculate how frequent each of the six standardized interpretations occur in all four measures of PPG. From Table 12, none of the measures of PPG were interpreted as either anti-poor decline, pro-poor decline or immiserizing growth. Furthermore, trickle-down growth was mostly reported by these measures, with RPPG reporting the highest and the remaining measures reporting about 11 each except for PPGI which reported 10. There was also a high number of standardized interpretations of the measures as having relative pro-poor growth, the most of which was g20, and the least being RPPG. It is also interesting to note that all four measures agreed on strong pro-poor growth being the case of Iran between 2009 and 2018. In summary, most of the PPG measures have provided empirical evidence on the occurrence of trickle-down growth in Asian countries in the period of study, while the least evident pattern of pro-poor growth includes anti-poor decline, pro-poo decline, and immiserizing growth.

Table 12: Summary of PPG by Measures and Frequency of Results ($3.2 Poverty line)

Standardized Interpretation	Measures of PPG				Total
	PPGI	PEGR	g20	RPPG	
(Relative) Pro-poor Growth	9	8	10	4	31
Strong pro-poor growth	1	1	1	1	4
Pro-poor decline	0	0	0	0	0
Trickle-down growth	10	11	11	17	49
Immiserizing growth	0	0	0	0	0
Anti-poor decline	0	0	0	0	0

Source: Author's Computations

4.4 Comparison of PPGI and RPPG at different poverty lines

It is also important to examine whether the results of the pro-poor growth indices do significantly change when the poverty lines are varied: specifically, to answer the question, if poverty line is increased from $1.9 to $3.2, are the results of PPGI and RPPG changed for the Asian countries under study. To do this, the PPG differences are presented in the table below. Whenever there is a difference of results, it is represented by "Difference", and "No Difference" on the other hand. The reason behind choosing PPGI and RPPG measures is to have one relative measure (PPGI) and one absolute measure (RPPG) in the study.

From table 13, the findings have revealed that for most of the measures, there are no differences in the conclusion of pro-poor growth, of poverty line is increased from $1.9 per day to $3.2 per day.

Table 13: Comparison of PPG Measures across poverty lines

S/N	Country	Comparison of $PPGI_{\$1.9}$ and $PPGI_{\$3.2}$	Comparison of $RPPG_{\$1.9}$ and $RPPG_{\$3.2}$
1	Armenia	No Difference	Difference
2	Bangladesh	No Difference	Difference
3	Bhutan	Difference	No Difference
4	China (Rural)	No Difference	No Difference
5	China (Urban)	No Difference	No Difference
6	Georgia	No Difference	Difference
7	India	No Difference	No Difference
8	Indonesia	No Difference	No Difference
9	Iran	No Difference	No Difference
10	Israel	No Difference	No Difference
11	Kazakhstan	No Difference	No Difference
12	Lao	No Difference	No Difference
13	Malaysia	No Difference	No Difference
14	Maldives	No Difference	No Difference
15	Mongolia	Difference	No Difference
16	Pakistan	No Difference	No Difference
17	Philippines	No Difference	Difference
18	Sri Lanka	No Difference	No Difference
19	Tajikistan	Difference	Difference
20	Thailand	No Difference	No Difference
21	Turkey	No Difference	No Difference
22	Vietnam	Difference	No Difference

Source: Author's Computations

For the countries in which there are differences in measurements, it could be because a lower poverty line being used has grossly underestimated the poverty pattern in such country. The change in pro-poor growth result could also be because some of the PPG

measures are sensitive to the poverty line being used. In general, most of the results appear unchanged even when there is an upward review of the poverty line.

4.5 Summary of PPG Measures ($3.2/Day Poverty Line)

The previous three subsections have presented different measures of pro-poor growth including interpretations and their statistical significance where necessary. The importance of having several measures of pro-poor growth is such that it serves as a form of confirmation about the results. Table 14 presents a summary of growth pro-poorness in all 21 countries[43] under study. The criterion for making such a summary is as follows: Whenever three out of the four quantitative measures agree on a particular standardized interpretation, such interpretation is used and accepted, otherwise if less than three, the finding is inconclusive, as is the case in Israel.

The results reveal the following: (i) Eleven Asian countries experienced a trickle-down pro-poor growth pattern in the periods after the 2008 global financial crisis. These countries are Armenia, Bangladesh, Bhutan, China (Urban), India, Indonesia, Laos, Pakistan, Sri Lanka, Tajikistan, and Turkey. (ii) Nine Asian countries experienced a relative pro-poor growth pattern. These countries are China (Urban), Georgia, Kazakhstan, Malaysia, Maldives, Mongolia, Philippines, Thailand, and Vietnam. (iii) Iran experienced strong pro-poor growth within the period being studied (iv) The pro-poor growth pattern of Israel remained inconclusive and should be cautiously interpreted based on whichever measure selected.

These results, therefore, provide strong evidence that the economic recovery procedures of many Asian countries after the global financial crisis of 2008 were either trickle-down or relatively pro-poor. But in general, the growth pattern was indeed pro-poor, as shown in this empirical study.

[43] 22 considering that China was split into Rural and Urban.

Table 14: Country-Level Pro-poor growth summary

S/N	Country	Growth Pro-poorness
1	Armenia	Trickle-down growth
2	Bangladesh	Trickle-down growth
3	Bhutan	Trickle-down growth
4	China (Rural)	Relative pro-poor growth
5	China (Urban)	Trickle-down growth
6	Georgia	Relative pro-poor growth
7	India	Trickle-down growth
8	Indonesia	Trickle-down growth
9	Iran	Strong pro-poor growth
10	Israel	Inconclusive*
11	Kazakhstan	Relative pro-poor growth
12	Lao	Trickle-down growth
13	Malaysia	Relative pro-poor growth
14	Maldives	Relative pro-poor growth
15	Mongolia	Relative pro-poor growth
16	Pakistan	Trickle-down growth
17	Philippines	Relative pro-poor growth
18	Sri Lanka	Trickle-down growth
19	Tajikistan	Trickle-down growth
20	Thailand	Relative pro-poor growth
21	Turkey	Trickle-down growth
22	Vietnam	Relative pro-poor growth

Source: Author's Computations

*Caution in interpretation and generalization of the result from Israel since the pro-poor growth index (PPGI) does not fall into the defined threshold according to literature.

Similar findings have also been made in the literature. Xiao et al. (2022) found that infrastructural investments improved the distribution of household income in Rural China, thereby contributing to relative pro-poor growth among rural households. This similar relative pro-poor growth in Rural China is confirmed by this study. In Pakistan, Khan et al. (2019) found evidence of pro-poor growth, even though the authors used time series analysis rather than the distributive analysis methodology. In a study conducted for five Asian countries (India, Nepal, Pakistan, Sri Lanka, and Bangladesh), Acharya & Miah (2021) also made findings which supported pro-poor growth in all these five countries.

Murjan (2021) found mixed results of pro-poor growth in the post-2010 period in Indonesia. From 2010 to 2016, there was trickle-down growth while from 2016 to 2020, growth was relatively pro-poor.

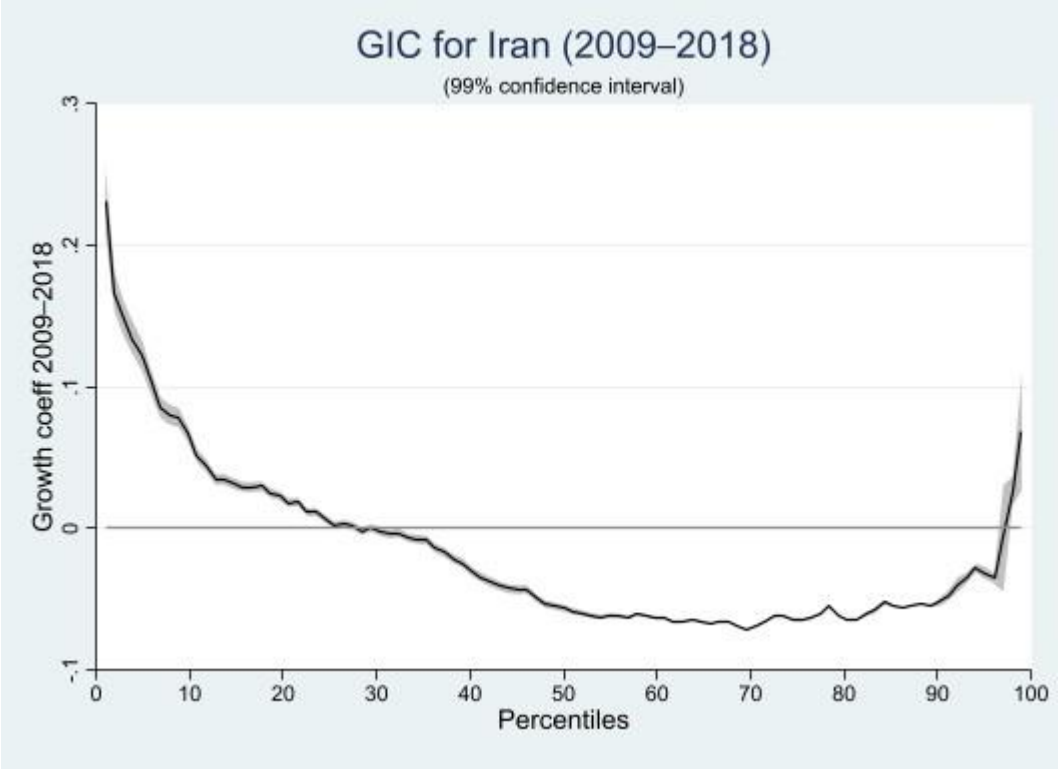
4.6 Computing Growth Incidence Curves

This section shows growth incidence curves (GIC) for selected Asian countries - Iran, Israel, and The Philippines. These countries were selected because they appear to have varying GIC shapes. The rest have been presented in the appendix to this chapter. The aim of this curve is to reveal how the growth is distributed among percentiles of the income distribution. In order to have a more relaxed interpretation of GIC, the standardized interpretation as used in the previous analysis, is also adopted in this case (See Table 3 of section 2.4 for a detailed standardized interpretation of the GIC). Similar to the g20 measure, the 20th percentile has been selected as the poorest section of the population

GIC for Iran (2009-2018)

The GIC is positive and higher for almost all the poorest percentiles when compared to the non-poor percentile. The average growth rate is also negative, hence there is existence of a strong pro-poor growth. This finding is also same as what was discovered in the previous PPG measures. For example, PPGI, g20 and RPPG all confirm that there is strong pro-poor growth in Iran at $3.2 per day poverty line. If the $1.9 poverty line is to be followed, all five measures confirm that there is strong pro-poor growth in Iran for the period 2009 to 2018.

Figure 14: GIC for Iran (2009-2018)

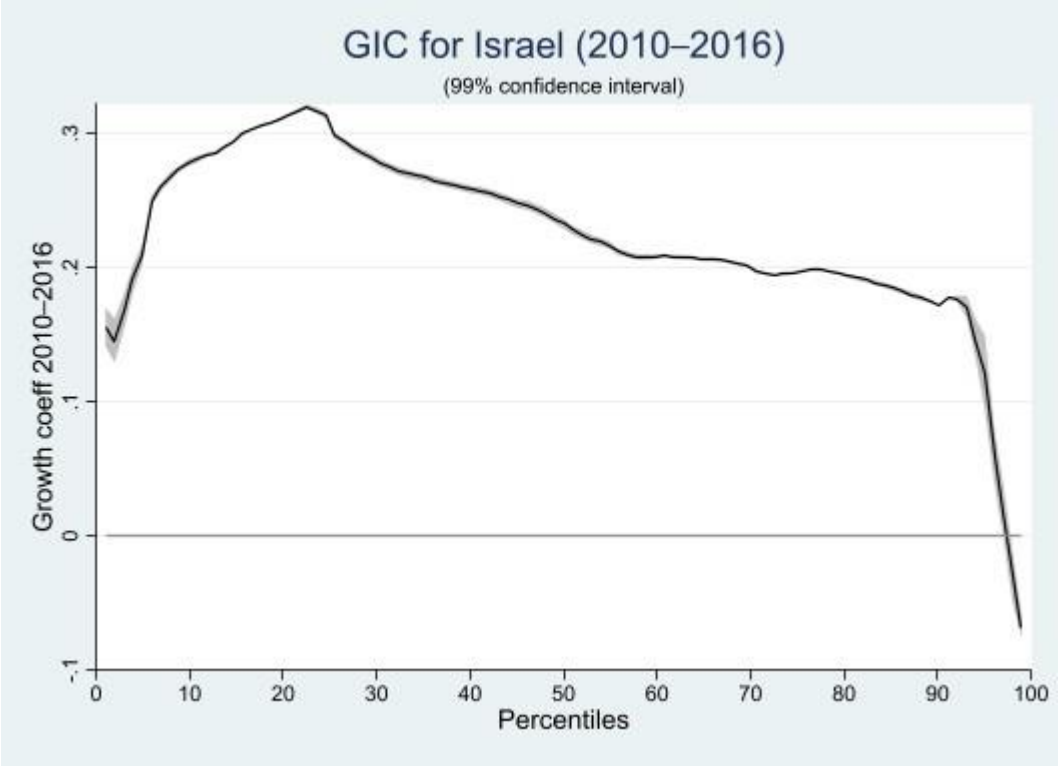


Source: Author's Computations from DASP in Stata

GIC for Israel (2010-2016)

The GIC for Israel between 2010 and 2016 shows a relative po-poor growth pattern. This is because the growth coefficient is positive and higher for all the poor percentiles in comparison to the non-poor percentile, even as the average growth rate is positive. In relation to findings from the other measures of PPG which have been a mixture of inconclusiveness, relative pro-poor growth and trickle-down growth, it is recommended that caution should be taken when interpreting the pro-poor growth pattern of Israel. Depending on the measure used, the conclusion could either be one of the following: Inconclusive, trickle-down growth, and relative pro-poor growth.

Figure 15: GIC for Israel (2009-2016)



Source: Author's Computations from DASP in Stata

GIC for Philippines (2009-2015)

For the Philippines, The GIC is positive and higher for all the poorest quintile in comparison to the non-poor percentiles of the population., even as the growth rate is positive. This, according to the standardized interpretation of PPG measures, is evidence of a relative pro-poor growth. The PPG measures such as RPPG, PEGR, g20, and PPGI also confirmed this result. It therefore implies that the economic recovery processes in the Philippines after the global financial crisis of 2008 relatively benefitted the poor more than the non-poor.

Figure 16: GIC for Philippines (2009-2015)

Source: Author's Computations from DASP in Stata

4.7 Asia's Growth Projections

It is also important to consider the economic outlook of Asia in the coming years. As pro-poor growth depends on sustained economic performance, and even more importantly on the distribution of growth benefits across the population structure, it is necessary to examine the prospects of the Asian economy and whether it would likely support this growth. The latest regional economic outlook (IMF, 2021) for Asia is summarized in table 15.

Table 15: Asia's Economic Outlook

Region/Country	2020	2021	2022
Asia	-1.3	6.5	5.7
Asia AEs	-2.7	3.7	3.4
Asia EMDEs	-0.7	7.2	6.3
China	2.3	8.0	5.6
Japan	-4.6	2.4	3.2
Korea	-0.9	4.3	3.3
India	-7.3	9.5	8.5
ASEAN	-3.3	2.6	5.5

Source: IMF World Economic Outlook
Note: AEs=Advanced Economies, EMDEs=Emerging Market and Developing Economies. ASEAN=Association of Southeast Asian Nations

Due to the new peaks in the COVID-19 pandemic, the Asian outlook for 2021 has been downgraded by more than 1 percent to 6.5 percent in comparison to the April 2021 world economic outlook (IMF, 2021). In the 2020 outlook, we see that virtually all economies in Asia experienced a negative growth rate with the exception of China, whose outlook was positive, but however way below economic expectations. In 2022, India, China and other emerging economies are expected to drive the Asian economic growth recovery process.

CHAPTER FIVE: CONCLUSION

In answering the research question as to whether growth in Asian economies have been pro-poor since the 2007/2008 global financial crisis, this study calculated and made comparison among five quantitative pro-poor growth measures. These measures were the rate of pro-poor growth (RPPG), the pro-poor growth index (PPGI), the poverty-equivalent growth rate (PEGR), the growth rate of income of the poorest 20^{th} percentile (g20) and finally the growth incidence curve (GIC). Firstly, the latest theoretical and conceptual studies behind pro-poor growth in Asia were analyzed. Thereafter, the evolution and equations behind the five PPG measures were developed and explained.

The methodology part of the paper majorly relied on the Distributive Analysis Stata Package (DASP), through which the distributional data available on PovcalNet were decomposed and all five PPG measures calculated and compared for all twenty-one countries. To further understand the dynamics of pro-poor growth, China was divided into rural and urban, thereby making a total of twenty-two growth spells. Following the standardized interpretation of PPG, the findings revealed that eleven countries have mostly experienced trickle-down growth while relative pro-poor growth was found for nine others. Of all the Asian countries studied, only Iran had a negative growth rate of income within the period, although findings still supported a strong pro-poor growth. For Israel, it was not possible to make a conclusion on pro-poor growth because most of the PPG measures were either inconclusive or statistically impossible.

Further examination also revealed that the country-level results on pro-poor growth do not significantly change when the daily poverty line is increased from $1.9 to $3.2.

Finally, it is important to note that there is no clear consensus in the literature on whether absolute measures (RPPG) are better than the relative measures (PPGI, PEGR) hence, for robust policy reasons, this study recommends that a combination of both absolute and relative approaches be adopted, if pro-poor growth is to be well understood.

This study suggested that other authors should examine pro-poor growth pattern in Asian countries using non-income data, while comparing the periods before and after the global financial crisis, since it has the possibility of providing more robust findings on whether Asian economies improved in non-income aspects during this period.

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Appendix A.

Full Table of Poverty and Inequality Statistics in Asia

Countries/Regions	Proportion of Population Living on Less than $1.90 a day (2011 PPP) (%)			Proportion of Population Living on Less than $3.2 a day (2011 PPP) (%)			Income Ratio of Highest 20% to Lowest 20%			Gini Coefficient		
	2010	2015	2019	2010	2015	2019	2010	2015	2019	2010	2015	2019
Central and West Asia												
Armenia	1.00	1.30	1.10	14.10	9.50	9.90	4.30	5.00	4.30	0.30	0.32	0.30
Azerbaijan	0.0(2005)	...	...	0.0(2005)	...	...	3.5(2005)	...	...	0.266(2005)	...	...
Georgia	12.00	3.70	3.80	30.60	15.70	14.90	8.00	6.50	6.30	0.40	0.37	0.36
Kazakhstan	0.10	0.00	0.0(2018)	1.50	0.30	0.2(2018)	4.00	3.70	3.9(2018)	0.28	0.27	0.278(2018)
Kyrgyz Republic	2.80	1.80	0.60	19.00	18.40	9.70	4.50	4.10	4.10	0.30	0.29	0.297
Pakistan	8.30	4.00	4.4(2018)	48.00	35.50	35.7(2018)	4.10	4.70	4.5(2018)	0.30	0.33	0.316(2018)
Tajikistan	4.0(2009)	4.10	...	22.5(2009)	17.80	...	4.7(2009)	5.60	...	0.308(2009)	0.34	...
Uzbekistan	61.6(2003)	...	...	86.2(2003)	...	...	5.9(2003)	...	...	0.353(2003)	...	...

Countries/Regions	Proportion of Population Living on Less than $1.90 a day (2011 PPP) (%)			Proportion of Population Living on Less than $3.2 a day (2011 PPP) (%)			Income Ratio of Highest 20% to Lowest 20%			Gini Coefficient		
East Asia												
China (PRC)	11.20	0.70	0.5(2016)	28.60	7.00	5.4(2016)	9.60	7.10	7.0(2016)	0.437	0.386	0.385(2016)
Korea, Republic of	0.50	0.2(2014)	0.2(2016)	0.80	0.5(2014)	0.2(2016)	5.40	5.2(2014)	5.2(2016)	0.32	0.312(2014)	0.314(2016)
Mongolia	0.70	0.2(2014)	0.5(2018)	9.60	3.0(2014)	5.0(2018)	5.30	5.0(2014)	5.2(2018)	0.33	0.320(2014)	0.327(2018)
Taipei, China	0.00	0.0(2013)	0.0(2016)	0.20	0.3(2013)	0.0(2016)	4.30	3.90	3.90	0.30	0.28	0.28
South Asia												
Bangladesh	19.2		14.3(2016)	60		52.3(2016)	4.7		4.8(2016)	0.321		0.324(2016)
Bhutan	8.2(2007)	2.2(2012)	1.5(2017)	30.6(2007)	14.7(2012)	12.2(2017)	6.7(2007)	6.9(2012)	6.6(2017)	0.381(2007)	0.388(2012)	0.374(2017)
India	22.5(2011)			61.7(2011)			5.5(2011)			0.357(2011)		
Maldives	35(2009)		0.0(2016)	16.6(2009)		0.2(2016)	7.0(2009)		4.8(2016)	0.384(2009)		0.313(2016)
Nepal	15.0			50.9			5.0			0.328		
Sri Lanka	2.8(2009)	1.9(2012)	1.0(2016)	19.9(2009)	16.2(2012)	11.0(2016)	5.7(2009)	6.4(2012)	6.6(2016)	0.361(2009)	0.387(2012)	0.393(2016)

Countries/Regions	Proportion of Population Living on Less than $1.90 a day (2011 PPP) (%)			Proportion of Population Living on Less than $3.2 a day (2011 PPP) (%)			Income Ratio of Highest 20% to Lowest 20%			Gini Coefficient		
Southeast Asia												
Indonesia	13.3	5.8	2.7	45.0	30.6	20.0	5.8	6.8	6.6	0.364	0.398	0.382
Lao PDR	25.7(2007)	14.5(2012)	10.0(2018)	64.1(2007)	46.6(2012)	37.4(2018)	5.5(2007)	5.8(2012)	6.6(2018)	0.345(2007)	0.360(2012)	0.388(2018)
Malaysia	0.1(2011)	0.0		1.2(2011)	0.3		9.5(2011)	8.2		0.439(2011)	0.411	
Myanmar		4.8	1.4(2017)		24.6	15.0(2017)		6.3	4.5(2017)		0.381	0.307(2017)
Philippines	10.5(2009)	7.8	4.7(2018)	37.0(2009)	31.9	25.5(2018)	9.9(2009)	9.1	7.9(2018)	0.463(2009)	0.446	0.423(2018)
Thailand	0.1	0.0	0.1	2.4	0.5	0.4	7.0	5.8	5.6	0.394	0.360	0.349
Timor Leste	15.0			50.9			5.0			0.328		
Vietnam	2.8(2009)	1.9(2012)	1.0(2016)	19.9(2009)	16.2(2012)	11.0(2016)	5.7(2009)	6.4(2012)	6.6(2016)	0.361(2009)	0.387(2012)	0.393(2016)

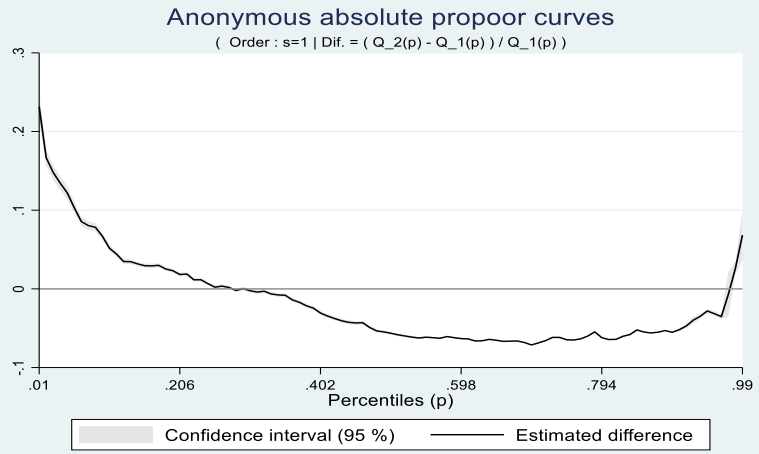
Source:

World Bank. World Development Indicators. http://data.worldbank.org/data-catalog/world-development-indicators (accessed 26 July 2021For Taipei, China's income ratio and Gini coefficient: Government of Taipei, China, Directorate-General of Budget, Accounting and Statistics

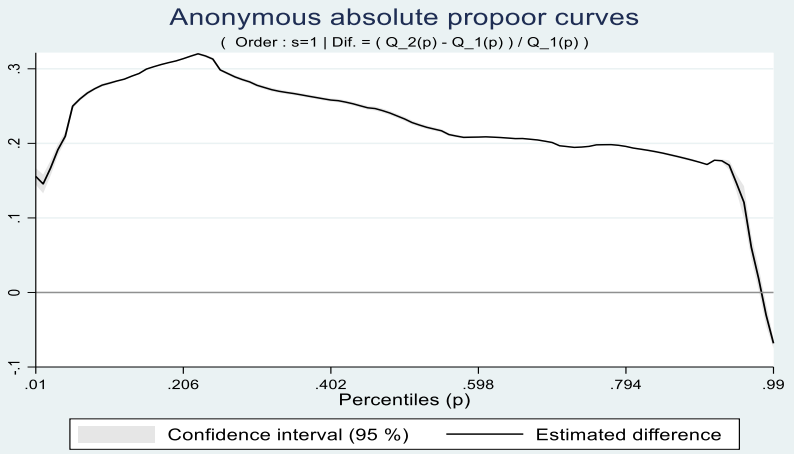
Appendix B.

Growth Incidence Curves for All Countries Under Study

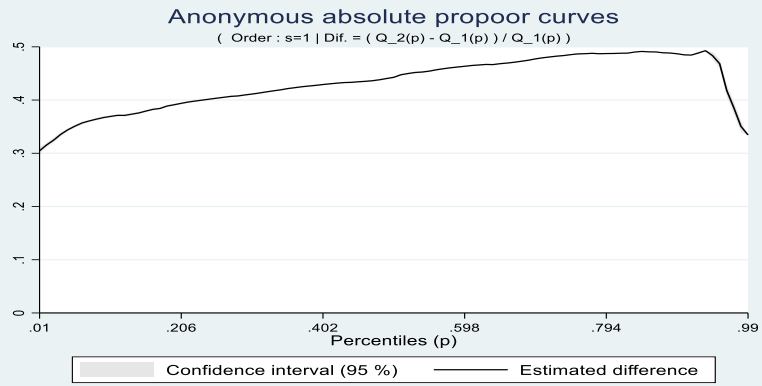
Iran



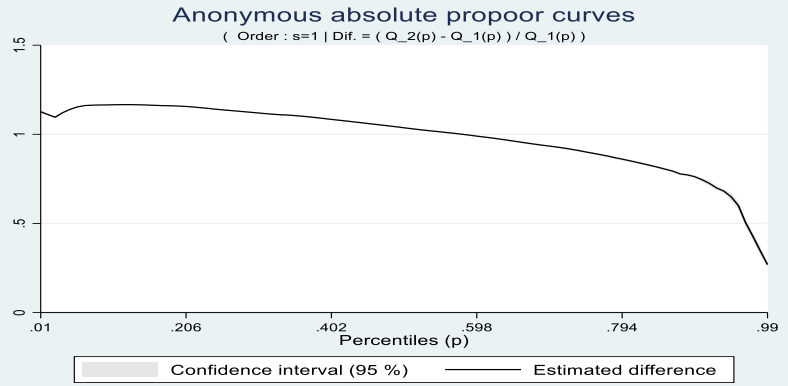
Israel



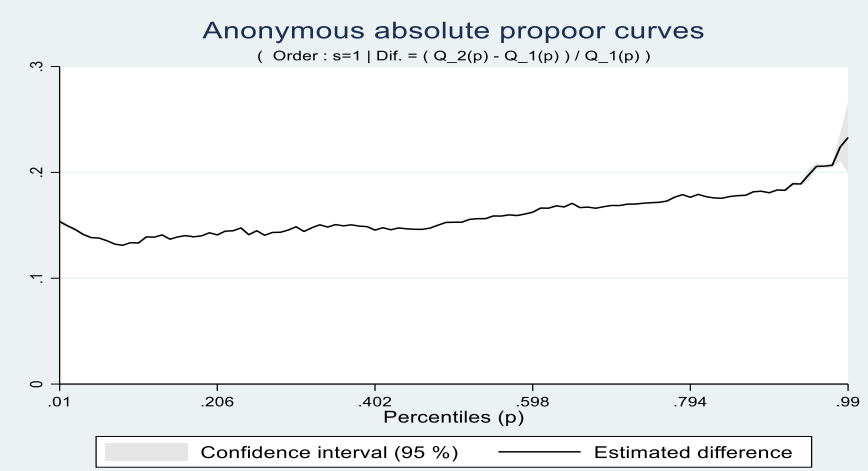
China (Urban)



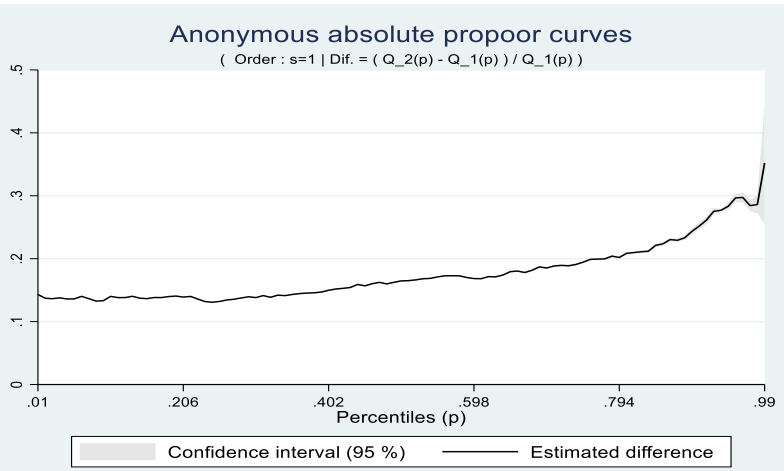
China (Rural)



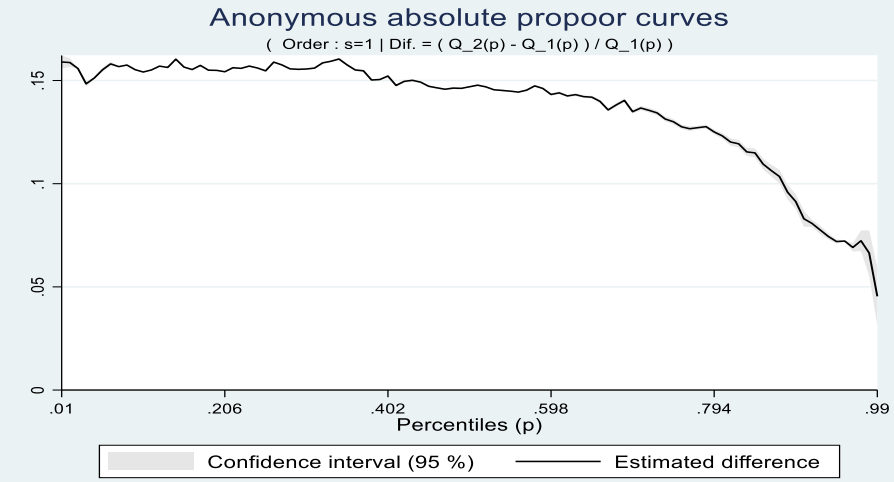
India



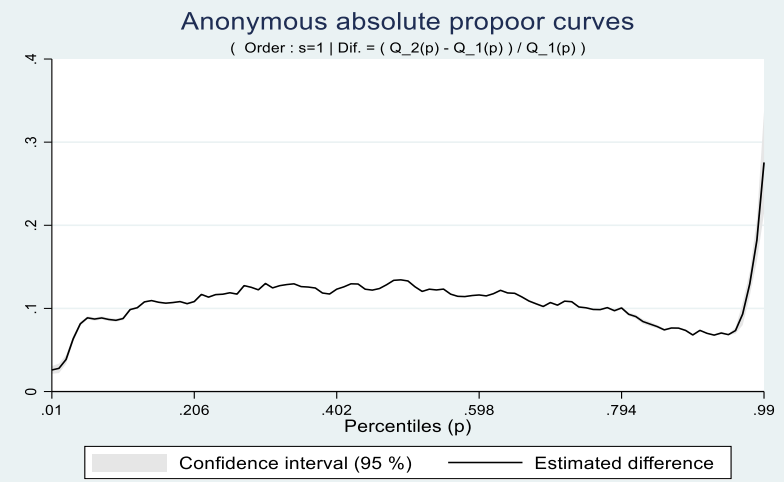
Pakistan



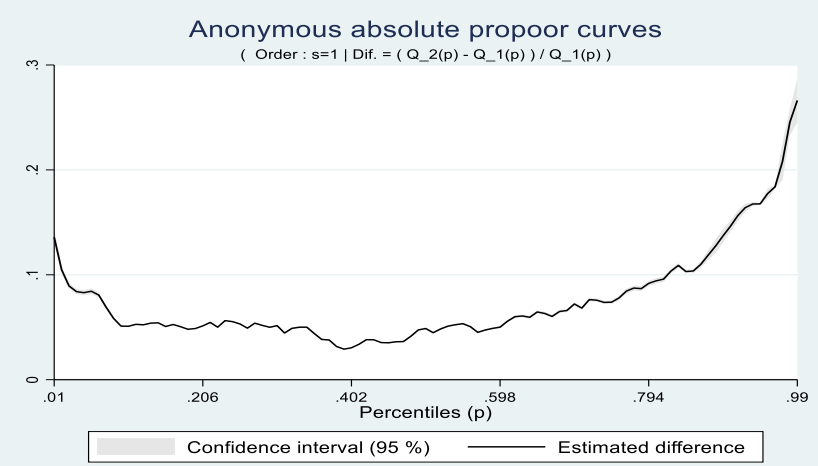
Philippines



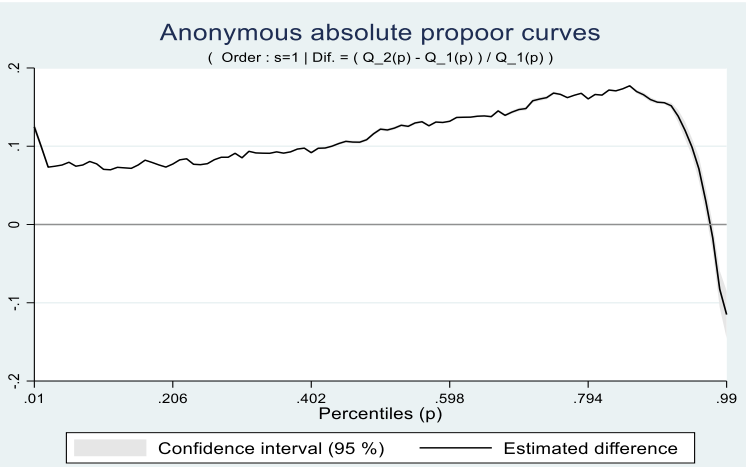
Armenia



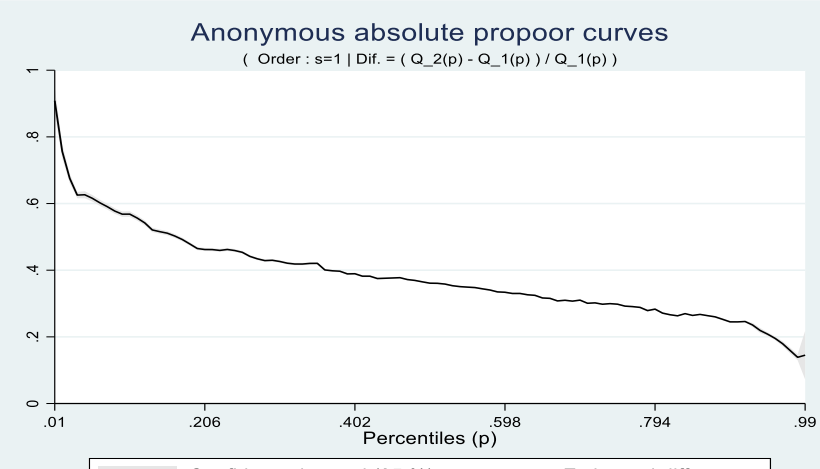
Bangladesh



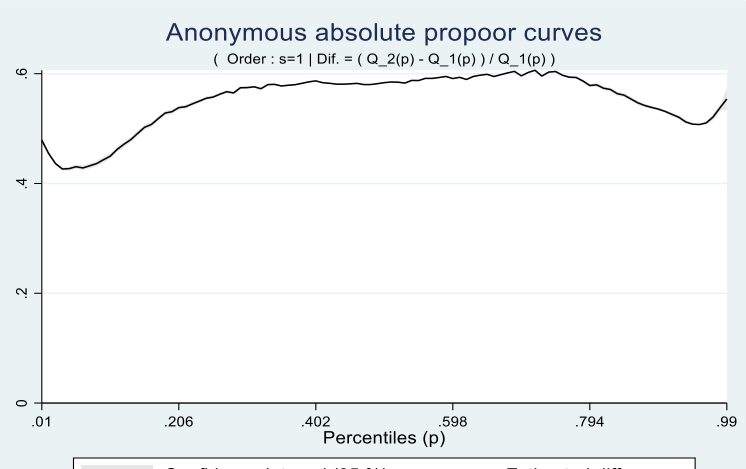
Bhutan



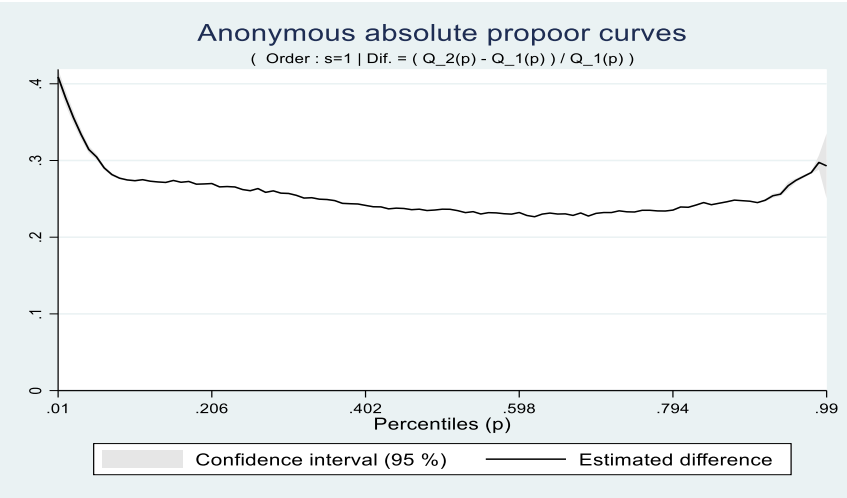
Georgia



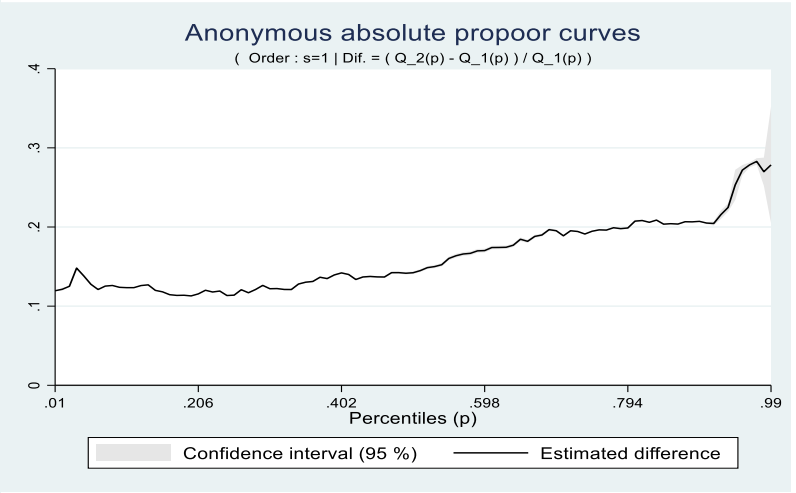
Indonesia



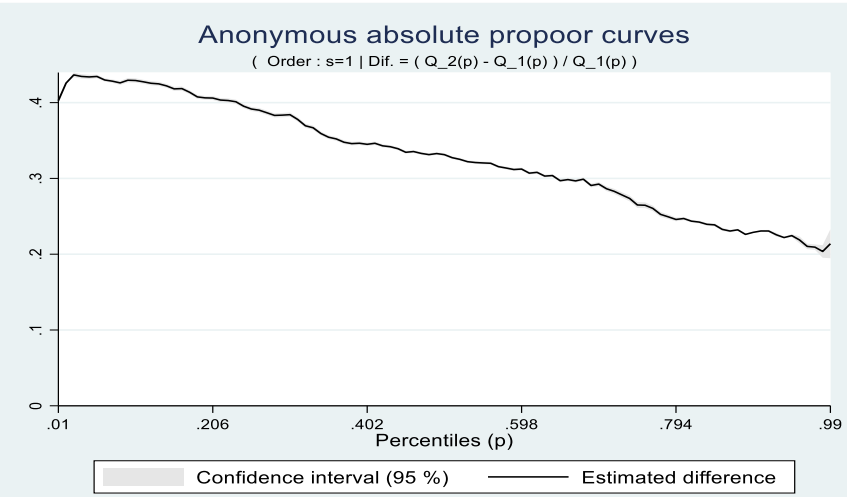
Kazakhstan



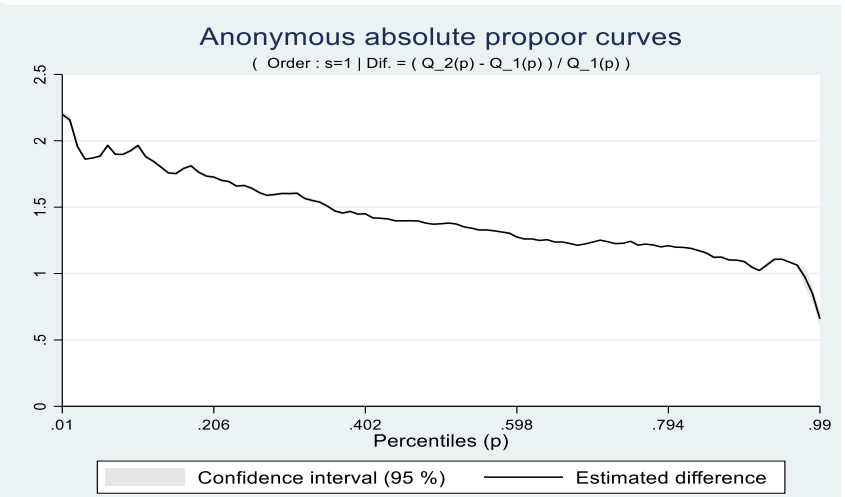
Lao



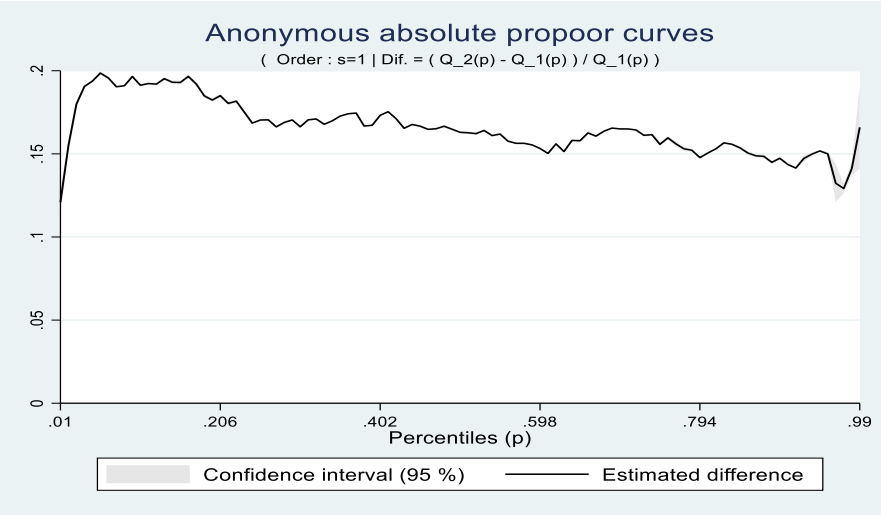
Malaysia



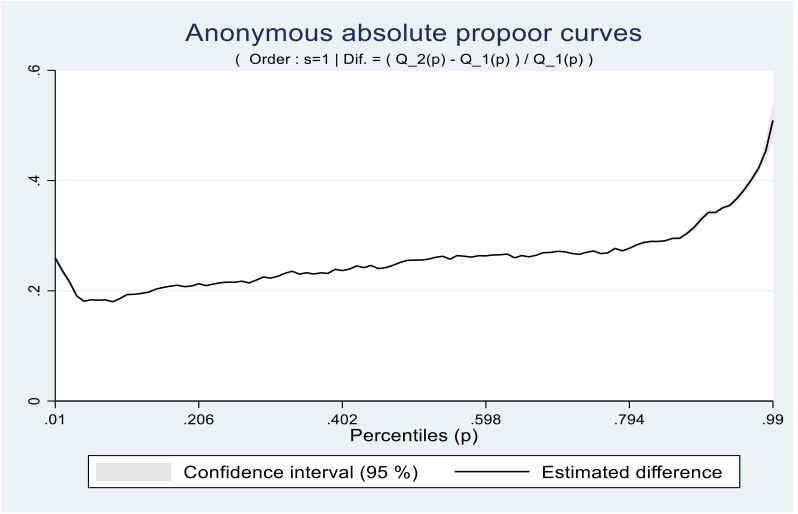
Maldives



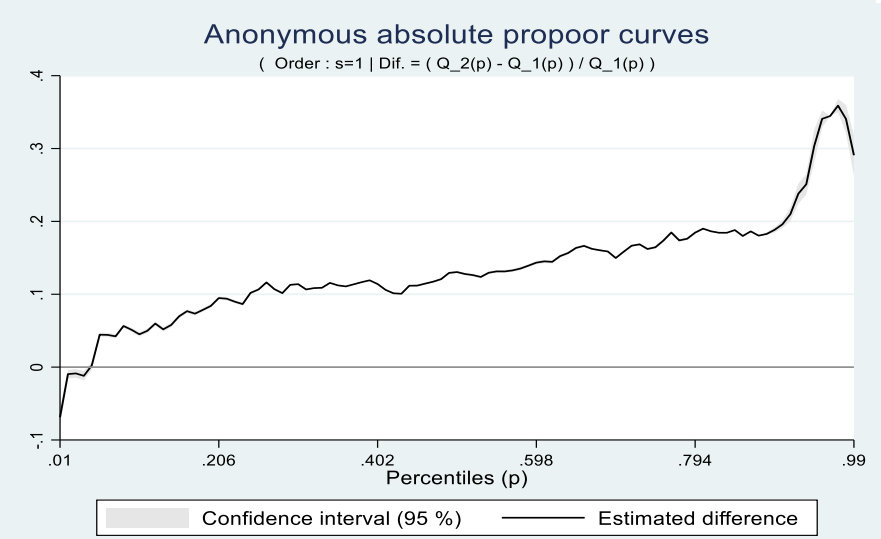
Mongolia



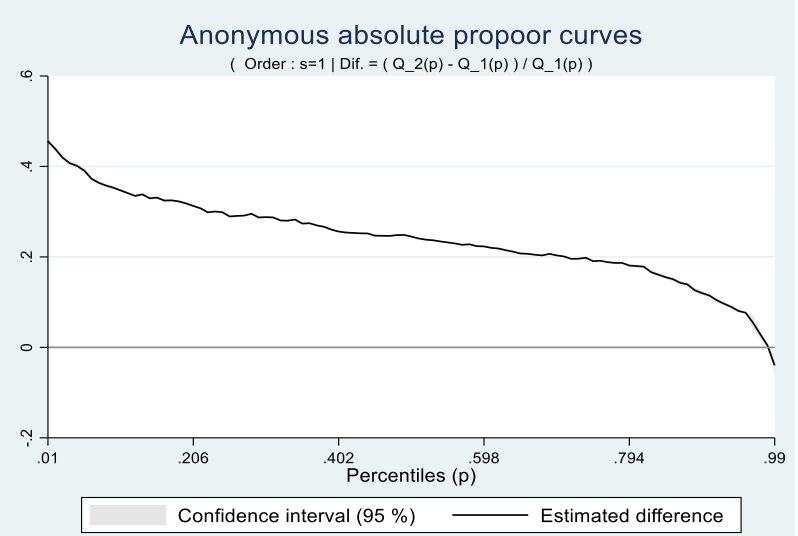
Sri Lanka



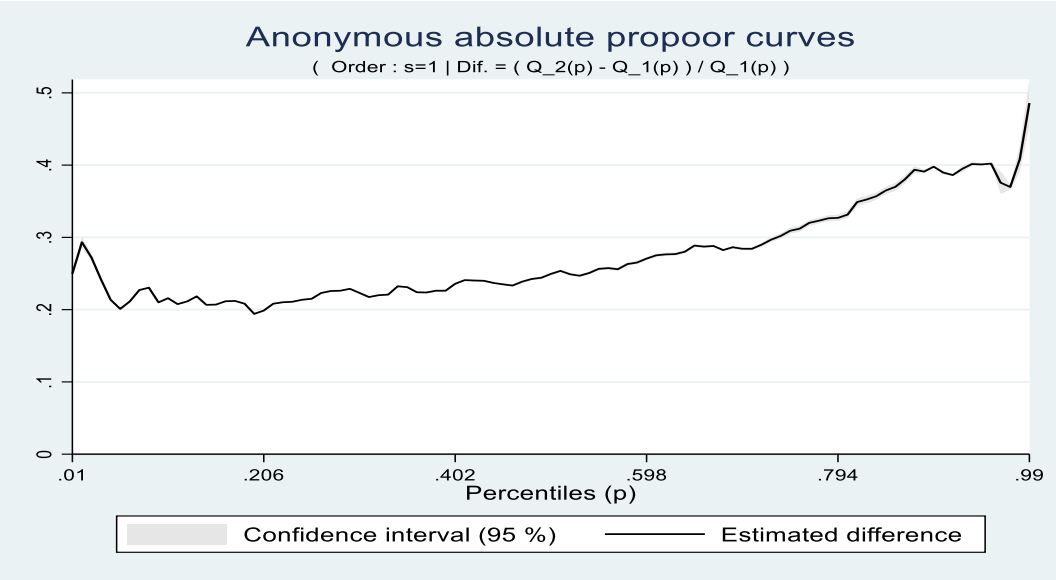
Tajikistan



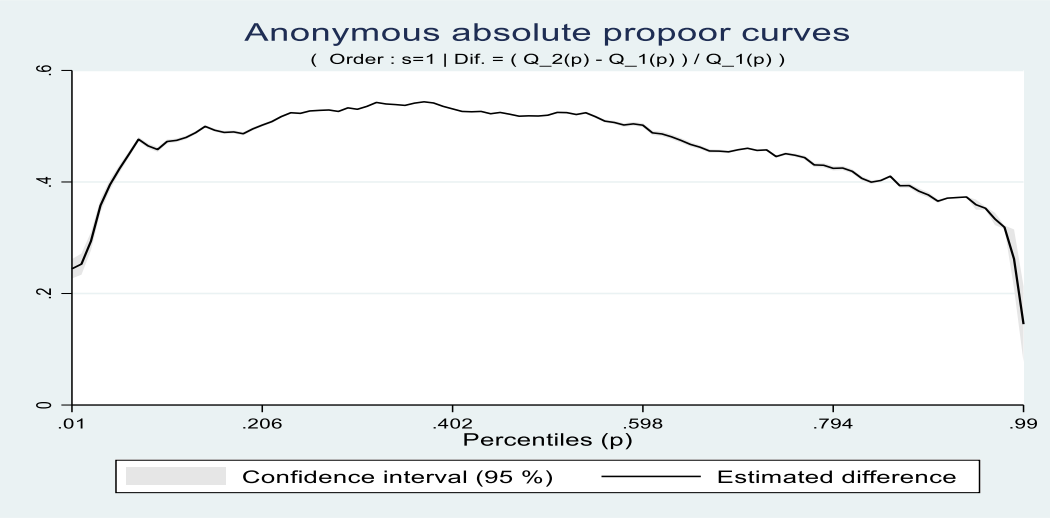
Thailand



Turkey



Vietnam



Appendix C

Pro-poor growth measures of all countries under study

```
. *Armenia
. ipropoor armenia_2010 armenia_2019, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.106721	0.000451	0.105836
Ravallion & Chen (2003) index	0.055171	0.000712	0.053775
Ravallion & Chen (2003) - g	-0.051550	0.000837	-0.053191
Kakwani & Pernia (2000) index	0.862000	0.015636	0.831350
PEGR index	0.091993	0.001650	0.088759
PEGR - g	-0.014727	0.001680	-0.018021

```
. *Bhutan
. ipropoor bhutan_2010 bhutan_2017, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.086587	0.002278	0.082121
Ravallion & Chen (2003) index	0.070969	0.000613	0.069767
Ravallion & Chen (2003) - g	-0.015618	0.002357	-0.020237
Kakwani & Pernia (2000) index	0.826923	0.028260	0.771528
PEGR index	0.071601	0.001877	0.067922
PEGR - g	-0.014986	0.002721	-0.020319

```
. *Bangladesh
. ipropoor bangladesh_2010 bangladesh_2016, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.096015	0.000829	0.094389
Ravallion & Chen (2003) index	0.050882	0.000292	0.050310
Ravallion & Chen (2003) - g	-0.045133	0.000845	-0.046789
Kakwani & Pernia (2000) index	0.529960	0.018782	0.493144
PEGR index	0.050884	0.001749	0.047456
PEGR - g	-0.045131	0.001936	-0.048925

```
. *China (Rural)
. ipropoor china_rural_2010 china_rura_2016, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.801238	0.006092	0.789296
Ravallion & Chen (2003) index	0.432513	0.003529	0.425596
Ravallion & Chen (2003) - g	-0.368725	0.007134	-0.382708
Kakwani & Pernia (2000) index	1.217404	0.010383	1.197051
PEGR index	0.975431	0.007745	0.960248
PEGR - g	0.174193	0.007713	0.159073

```
.
. *China (Urban)
. ipropoor china_urban_2010 china_urban_2016, alpha(0) pline(97.3)
   Poverty line    :        97.30
   Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.439076	0.000881	0.437349
Ravallion & Chen (2003) index	0.170095	0.003816	0.162615
Ravallion & Chen (2003) - g	-0.268981	0.003915	-0.276656
Kakwani & Pernia (2000) index	0.856823	0.016587	0.824310
PEGR index	0.376211	0.007285	0.361930
PEGR - g	-0.062865	0.007290	-0.077155

```
. *Georgia
. ipropoor georgia2010 georgia_2019, alpha(0) pline(97.3)
   Poverty line    :        97.30
   Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.310576	0.001345	0.307940
Ravallion & Chen (2003) index	0.338099	0.003357	0.331519
Ravallion & Chen (2003) - g	0.027523	0.003603	0.020460
Kakwani & Pernia (2000) index	1.396110	0.022507	1.351991
PEGR index	0.433598	0.006892	0.420089
PEGR - g	0.123022	0.006911	0.109476

```
. *India
. ipropoor india_2009 india_2011, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.173185	0.000525	0.172155
Ravallion & Chen (2003) index	0.131667	0.000293	0.131092
Ravallion & Chen (2003) - g	-0.041518	0.000615	-0.042723
Kakwani & Pernia (2000) index	0.976167	0.005705	0.964983
PEGR index	0.169058	0.000833	0.167425
PEGR - g	-0.004128	0.000995	-0.006078

```
.
. *Indonesia
. ipropoor indonesia_2010 indonesia_2019, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.556099	0.000400	0.555316
Ravallion & Chen (2003) index	0.290219	0.001754	0.286781
Ravallion & Chen (2003) - g	-0.265880	0.001925	-0.269654
Kakwani & Pernia (2000) index	0.984610	0.002246	0.980207
PEGR index	0.547541	0.001234	0.545122
PEGR - g	-0.008558	0.001250	-0.011009

```
. *Iran
. ipropoor iran_2009 iran_2018, alpha(0) pline(97.3)
   Poverty line    :        97.30
   Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	-0.024233	0.001190	-0.026566
Ravallion & Chen (2003) index	0.165605	0.004671	0.156448
Ravallion & Chen (2003) - g	0.189838	0.004819	0.180390
Kakwani & Pernia (2000) index	-4.896552	1.581161	-7.995946
PEGR index	0.118656	0.039763	0.040714
PEGR - g	0.142889	0.040156	0.064175

```
.
. *Israel
. ipropoor israel_2010 israel_2016, alpha(0) pline(97.3)
   Poverty line    :        97.30
   Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.163502	0.002311	0.158972
Ravallion & Chen (2003) index	0.119099	0.005719	0.107888
Ravallion & Chen (2003) - g	-0.044403	0.006168	-0.056493
Kakwani & Pernia (2000) index	1.000000	0.015802	0.969026
PEGR index	0.163502	0.000273	0.162968
PEGR - g	-0.000000	0.002584	-0.005064

```
. *Kazakhstan
. ipropoor kazakh_2010 kazakh_2018, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.252392	0.000273	0.251857
Ravallion & Chen (2003) index	0.162413	0.009838	0.143129
Ravallion & Chen (2003) - g	-0.089979	0.009846	-0.109279
Kakwani & Pernia (2000) index	1.247525	0.055307	1.139111
PEGR index	0.314865	0.013956	0.287509
PEGR - g	0.062473	0.013958	0.035113

```
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. *Lao
. ipropoor lao_2012 lao_2018, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.205327	0.002031	0.201345
Ravallion & Chen (2003) index	0.105284	0.000396	0.104507
Ravallion & Chen (2003) - g	-0.100043	0.002065	-0.104091
Kakwani & Pernia (2000) index	0.686305	0.014074	0.658717
PEGR index	0.140917	0.002644	0.135735
PEGR - g	-0.064410	0.003204	-0.070691

```
*Malaysia
ipropoor malaysia2011 malaysia2015, alpha(0) pline(97.3)
 Poverty line    :        97.30
 Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.267323	0.001450	0.264482
Ravallion & Chen (2003) index	0.162607	0.009544	0.143899
Ravallion & Chen (2003) - g	-0.104717	0.009658	-0.123648
Kakwani & Pernia (2000) index	1.133333	0.041313	1.052352
PEGR index	0.302967	0.010957	0.281489
PEGR - g	0.035643	0.011021	0.014040

```
*Maldives
ipropoor maldives_2009 maldives_2016, alpha(0) pline(97.3)
 Poverty line    :        97.30
 Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	1.202153	0.006985	1.188461
Ravallion & Chen (2003) index	0.339803	0.006433	0.327193
Ravallion & Chen (2003) - g	-0.862351	0.009568	-0.881106
Kakwani & Pernia (2000) index	1.087708	0.008101	1.071829
PEGR index	1.307591	0.011193	1.285651
PEGR - g	0.105438	0.009644	0.086534

```
. *Mongolia
. ipropoor mongolia_2010 mongolia_2018, alpha(0) pline(97.3)
   Poverty line    :        97.30
   Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.161773	0.000386	0.161016
Ravallion & Chen (2003) index	0.113567	0.001756	0.110125
Ravallion & Chen (2003) - g	-0.048206	0.001798	-0.051731
Kakwani & Pernia (2000) index	1.167526	0.022552	1.123318
PEGR index	0.188874	0.003634	0.181751
PEGR - g	0.027101	0.003643	0.019960

```
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. *Pakistan
. ipropoor pakistan_2010 pakistan_2016, alpha(0) pline(97.3)
   Poverty line    :        97.30
   Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.210141	0.001481	0.207238
Ravallion & Chen (2003) index	0.113452	0.000480	0.112512
Ravallion & Chen (2003) - g	-0.096689	0.001556	-0.099739
Kakwani & Pernia (2000) index	0.716078	0.011542	0.693452
PEGR index	0.150478	0.002270	0.146027
PEGR - g	-0.059664	0.002607	-0.064774

*Philipines

```
ipropoor phillipines2009 phillipines2015, alpha(0) pline(97.3)
 Poverty line    :        97.30
 Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.114941	0.000545	0.113873
Ravallion & Chen (2003) index	0.124501	0.000760	0.123011
Ravallion & Chen (2003) - g	0.009560	0.000945	0.007708
Kakwani & Pernia (2000) index	1.321489	0.027359	1.267861
PEGR index	0.151894	0.003083	0.145850
PEGR - g	0.036952	0.003115	0.030847

*Sri Lanka

```
ipropoor srilanka2010 srilanka_2016, alpha(0) pline(97.3)
 Poverty line    :        97.30
 Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.312411	0.002402	0.307702
Ravallion & Chen (2003) index	0.140990	0.001458	0.138131
Ravallion & Chen (2003) - g	-0.171421	0.002790	-0.176891
Kakwani & Pernia (2000) index	0.722901	0.013166	0.697093
PEGR index	0.225842	0.004061	0.217882
PEGR - g	-0.086569	0.004322	-0.095041

```
. *Tajikistan
. ipropoor tajikistan2009 tajikistan2015, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.171280	0.001034	0.169254
Ravallion & Chen (2003) index	0.025795	0.001202	0.023440
Ravallion & Chen (2003) - g	-0.145485	0.001570	-0.148562
Kakwani & Pernia (2000) index	0.507073	0.016598	0.474538
PEGR index	0.086852	0.002832	0.081300
PEGR - g	-0.084429	0.002944	-0.090200

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. *Thailand
. ipropoor thailand2010 thailand2019, alpha(0) pline(97.3)
  Poverty line    :        97.30
  Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.165286	0.002008	0.161349
Ravallion & Chen (2003) index	0.158600	0.007151	0.144583
Ravallion & Chen (2003) - g	-0.006686	0.007444	-0.021278
Kakwani & Pernia (2000) index	1.566929	0.085153	1.400012
PEGR index	0.258991	0.013833	0.231875
PEGR - g	0.093705	0.013906	0.066447

*Turkey

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ipropoor turkey2010 turkey2019, alpha(0) pline(97.3)
 Poverty line    :        97.30
 Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.328537	0.001850	0.324910
Ravallion & Chen (2003) index	0.159067	0.003886	0.151451
Ravallion & Chen (2003) - g	-0.169470	0.004295	-0.177889
Kakwani & Pernia (2000) index	0.921739	0.018017	0.886423
PEGR index	0.302825	0.005851	0.291355
PEGR - g	-0.025712	0.005947	-0.037370

*Vietnam

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ipropoor vietnam2010 vietnam2018, alpha(0) pline(97.3)
 Poverty line    :        97.30
 Parameter alpha :         0.00
```

Pro-poor indices	Estimate	STE	LB
Growth rate(g)	0.398542	0.003560	0.391563
Ravallion & Chen (2003) index	0.212799	0.002542	0.207817
Ravallion & Chen (2003) - g	-0.185742	0.004404	-0.194376
Kakwani & Pernia (2000) index	1.081568	0.011288	1.059440
PEGR index	0.431050	0.004145	0.422925
PEGR - g	0.032508	0.004356	0.023969