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Poverty and inequality in Asia

1965–2014

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Abstract: This paper aims to depict the post-Second World War poverty and inequality trends in Asia, its sub-regions, and individual economies. Efforts are made to explain these trends and explore the interrelationship between growth, poverty, and inequality in Asia. Analytical results confirm significant reductions in poverty across the board due to fast growth, although the benign effect of growth on poverty was offset by worsening distribution in many economies. Looking ahead, Asia is expected to eradicate poverty but likely to continue facing high inequality, particularly as major technology breakthroughs such as artificial intelligence and the internet of things replace more and more labour.

Keywords: inequality, poverty, poverty–growth–inequality triangle, Asia
JEL classification: O1, O53, R1, R58

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1 Introduction

Poverty reduction featured most prominently among the Millennium Development Goals (MDGs) as well as in the post-2015 development agenda of the Sustainable Development Goals (SDGs). And containing inequality was added to the latter. Against this background, the primary objective of this paper is to construct and discuss poverty and inequality profiles in Asia[1] for the past 50 years or so. While data on inequality are available from the World Income Inequality Database (WIID) of the United Nations University's World Institute for Development Economics Research (UNU-WIDER), consistent poverty estimates do not exist for the early years. Thus, household consumption data from the Penn World Table (PWT version 9) have been combined with the inequality observations of WIID to generate poverty profiles for Asia, its sub-regions, and individual economies.[2] The poverty lines are set at US$1.90 and US$3.20 per person per day, adjusted by the 2011 purchasing power parity exchange rates. They correspond to the extreme and moderate poverty lines of the World Bank, respectively.

Our analytical results demonstrate that, contrary to Myrdal (1968) who was rather pessimistic about the future of Asia, Asia has achieved remarkable growth and miracle poverty reduction since the mid-1960s. Beginning with Japan's taking off after the Second World War, followed by the emergence of the four dragons of Korea, Taiwan, Hong Kong, and Singapore in the 1960s and 1970s, Asia's re-rise received a huge boost when China embarked on its reform and opening up journey in late 1978, reinforced later by the fast growth of the Indian and other Asian economies. Consequently, Asia's share in global gross domestic product (GDP) has been rising rapidly (see Nayyar 2013). The share is expected to rise further (ADB 2011), and could reach more than 76 per cent by 2040 according to Fogel (2007).

The fast growth has helped lift billions of Asians out of poverty. According to the estimates presented in Section 2.3, Asia's poverty rate under the US$3.20 poverty line dropped from 73.57 per cent in 1965 to 9.69 per cent in 2014. The corresponding decrease under the US$1.90 poverty line is from 48.52 per cent in 1965 to 2.58 per cent in 2014. In fact, the MDG on poverty reduction would not have been achieved if Asia were excluded (ADB 2014).

On the other hand, however, the fast growth has been accompanied by rising inequality.[3] For Asia as a whole, the Gini index, an indicator of inequality, increased from 38.43 per cent in 1965 to 42.80 per cent in 2006 before declining in recent years. The recent decline may be attributable to the financial crisis that began in 2007/2008 (see more discussions later in the paper). In particular, inequality worsened significantly in the most populous countries of Asia: China, India, Indonesia, Bangladesh, and Sri Lanka (see Section 2.2).

The rising inequality has far-reaching implications. It can offset the benign effect of growth on poverty (Ravallion and Chen 2004). Furthermore, in highly unequal societies, the elite may hijack the power of the state, adversely affecting the provision of public goods and services that tend to

[1] Unless otherwise specified, Asia or region in this paper refers to the following economies: China, Hong Kong, Japan, Mongolia, South Korea, and Taiwan from East Asia; Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam from Southeast Asia; and Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, and Sri Lanka from South Asia.

[2] Accessed 1 July 2018.

[3] This paper only considers inequality of income, which is generally more equally distributed than wealth but more unequally distributed than consumption due to smoothing.

benefit the poor more (Bourguignon and Dessus 2009). Most fundamentally, inequality is expected to undermine future growth through various transmission channels (Wan at al. 2006). In particular, it may raise the likelihood of financial crises and stimulate current account deficits (Rajan 2010; Acemoglu 2011).

Clearly, the interwoven relationship between growth, poverty, and inequality, coined the growth–poverty–inequality triangle by Bourguignon (2004), is an important and complex subject worth careful examination. While much has been published on Asia's phenomenal growth, Asia's poverty profile is largely absent if one extends the time horizon back to the 1970s or 1960s. Further, existing studies on income inequality are mostly centred on within-country inequality. Even the flagship publication of ADB (2012) and ESCAP (2018) did not take into consideration income gaps between economies. This is regrettable as Asia's welfare depends not only on growth and inequality within individual economies but also on disparities between economies (Sen 1973). In short, to gain a good understanding of the development process in Asia requires a comprehensive and coherent analysis of the growth, inequality, and poverty issues for Asia, its sub-regions, and individual economies.

Consequently, a methodology has been developed to combine the Gini observations from WIID with between-economy disparities in per capita consumption to produce the Asia-wide inequality profile. Another methodology has been developed to estimate poverty using the Gini estimates from WIID and per capita household final consumption from PWT. In addition to the provision of poverty and inequality profiles, this paper addresses three related issues: what were the impacts of growth and inequality on poverty reduction in Asia? What are the drivers of absolute poverty? And what is the relationship between growth and inequality?

It is important to point out that poverty will be estimated using per capita consumption data from the latest PWT. This is recommended by Feenstra et al. (2015) and Anand and Segal (2015) and is also more consistent with the World Bank that uses consumption not income data from household surveys to estimate poverty. However, the level of consumption reported in PWT is usually higher than that from household survey. Also, Asia on average is more developed than Africa. Thus, we focus on results based on the US$3.20 poverty line unless specified otherwise. Our use of the PWT data is supported by Pinkovskiy and Sala-i-Martin (2016).

The rest of the paper is organized as follows. Section 2 presents profiles of growth, inequality, and poverty for Asia, its sub-regions, and individual economies. Section 3 focuses on sources of poverty reduction while Section 4 is devoted to the study of inequality, with a special emphasis on the costs and drivers of inequality. Finally, Section 5 provides a summary and policy recommendations.

2 The growth, inequality, and poverty profiles

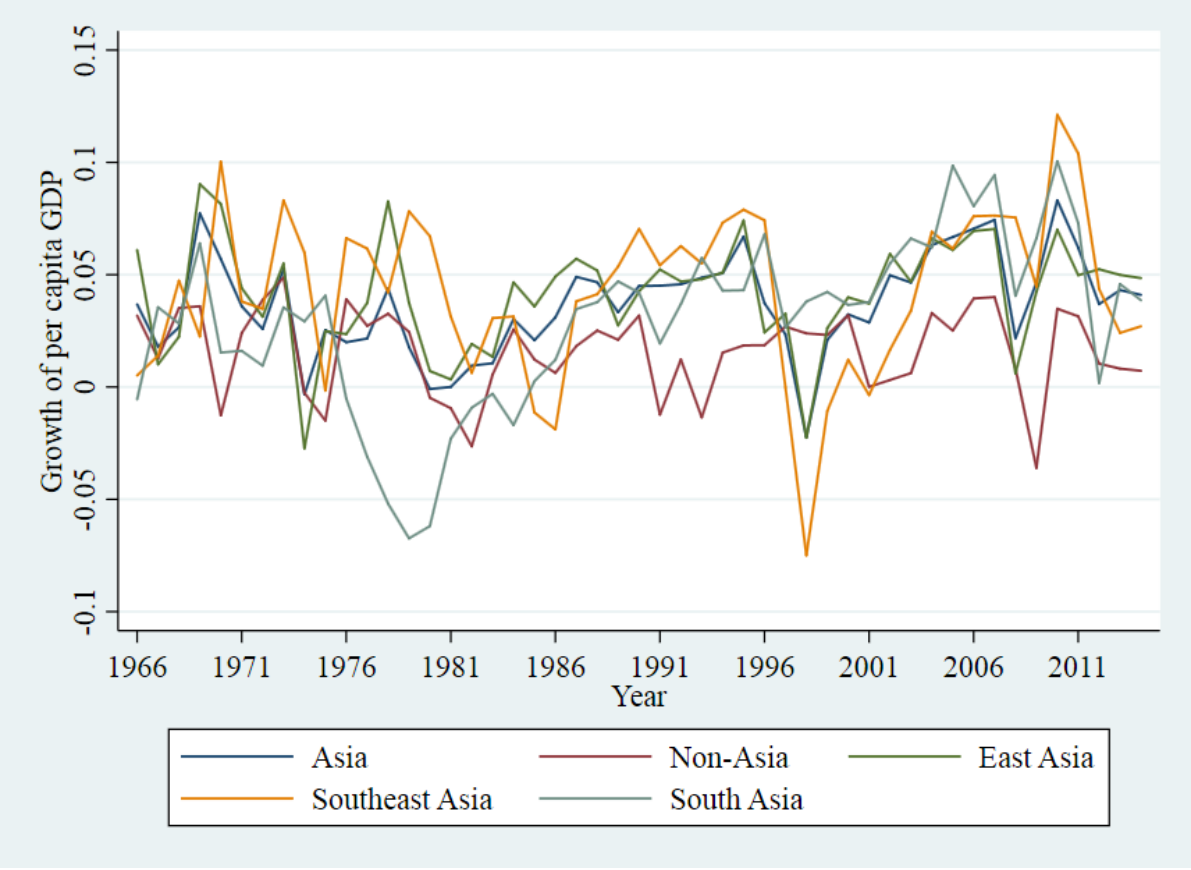
According to Sen (1973), the overall well-being of a region such as Asia depends on two variables: regional average income/consumption and regional distribution of income/consumption. The latter can be represented by an indicator of inequality such as the Gini or Theil index. Further, the two variables completely determine the level of poverty for a given poverty line. The aim of this section is to depict the development process of Asia for the period 1965–2014 by constructing and presenting these three interrelated profiles.

2.1 Growth profile

The importance of growth requires no justification at all. As pointed out by Myrdal (1968), growth is likely to improve almost all other conditions, even attitudes and institutions. In the context of this paper, growth leads to lower poverty and welfare gains holding income distribution or inequality constant.

To demonstrate the role of Asia's economic growth in a global picture, Figure 1 shows the growth trends of Asia, its sub-regions, and non-Asia countries, where non-Asia countries include both developing and developed countries. As expected, Asia's growth has been phenomenal since the mid- or late 1960s. It outpaced non-Asia countries except during the second energy crisis of the late 1970s and the Asian financial crisis in the late 1990s. This is particularly true in the late 1960s when the four dragons took off and becomes even more significant when China began its expansion in the late 1970s, with contributions from India and other Asian economies. However, different sub-regions performed quite differently. East Asia has been the star performer, and, for most years, Southeast Asia performed well too.

Figure 1: Growth of per capita GDP: Asia and sub-regions

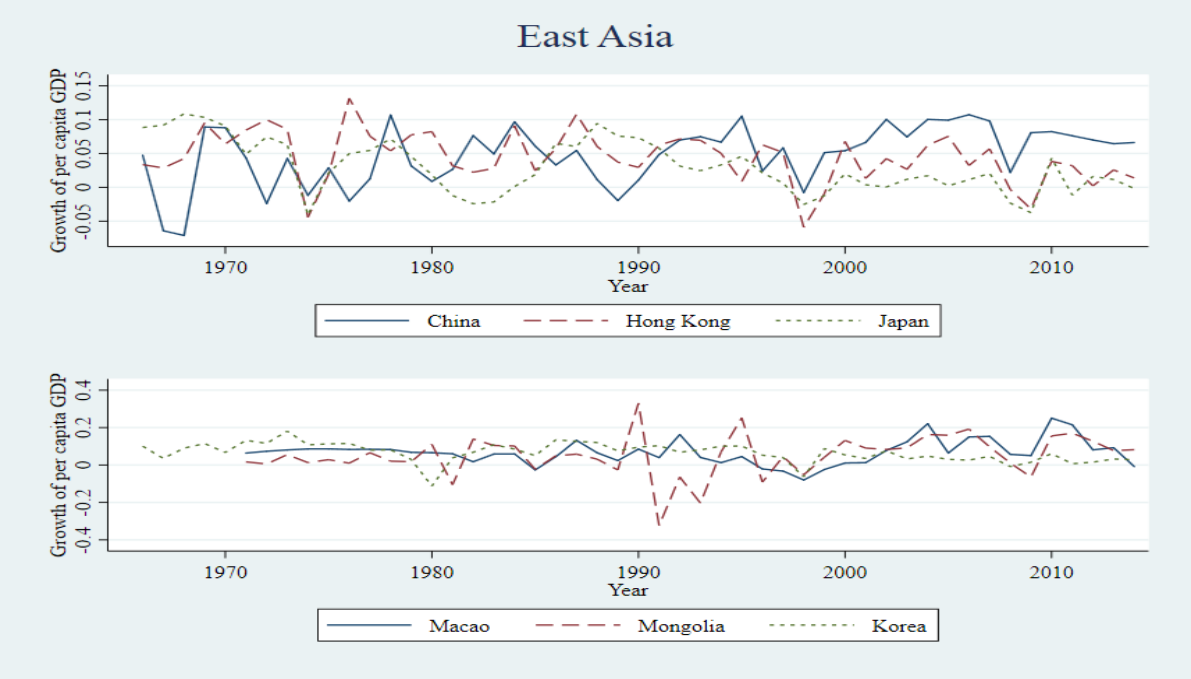


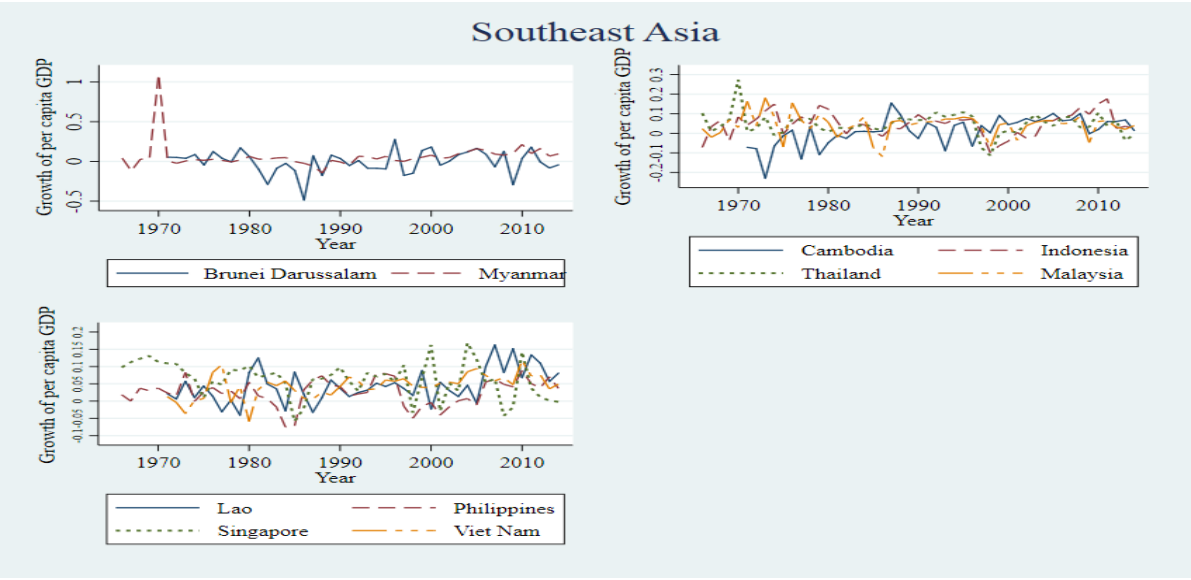
Note: Asia contains countries from East Asia, Southeast Asia, and South Asia; Non-Asia includes all countries except for countries from East Asia, Southeast Asia, and South Asia.

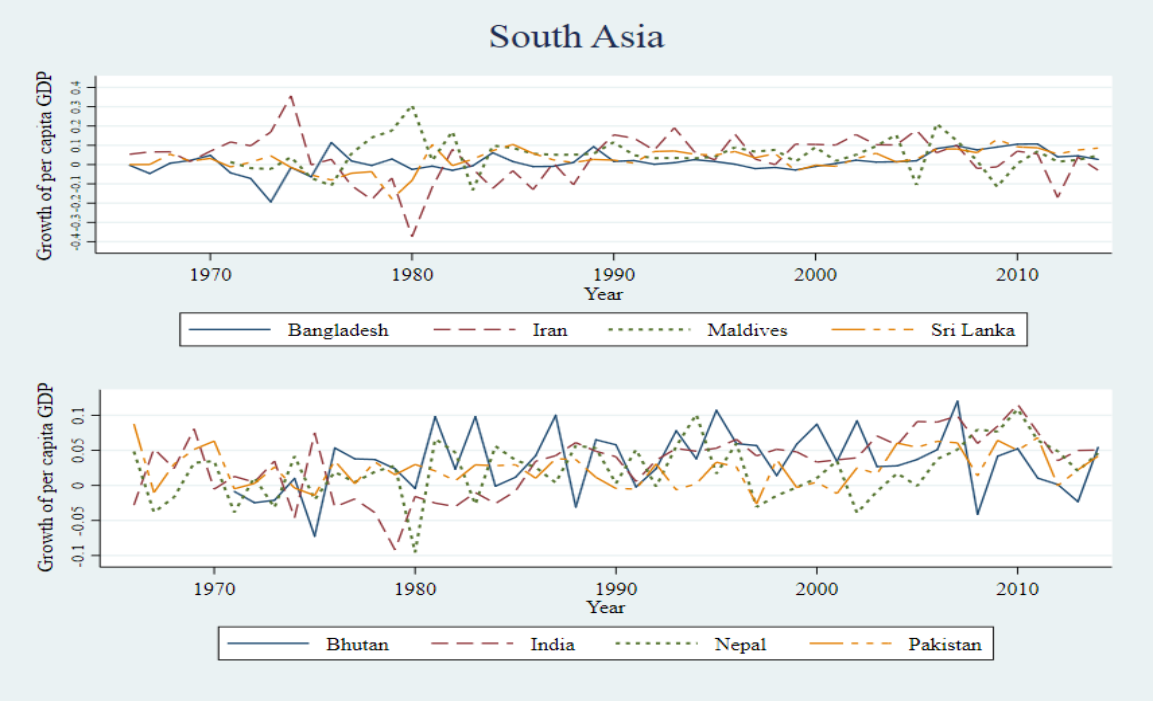
Source: Authors' compilation based on PWT data.

The heterogeneity in growth performance is even more visible when examining the growth trend of individual economies (Figure 2). Economies in East Asia not only grew fast but also are relatively stable. The growth fluctuations are more synchronized within Southeast Asia than economies in other sub-regions. Whether this is related to the formation of the Association of Southeast Asian Nations is an interesting topic for future research.

Figure 2: Growth of per capita GDP, individual economies grouped by sub-regions







Source: Authors' compilation based on PWT data.

2.2 Inequality profile

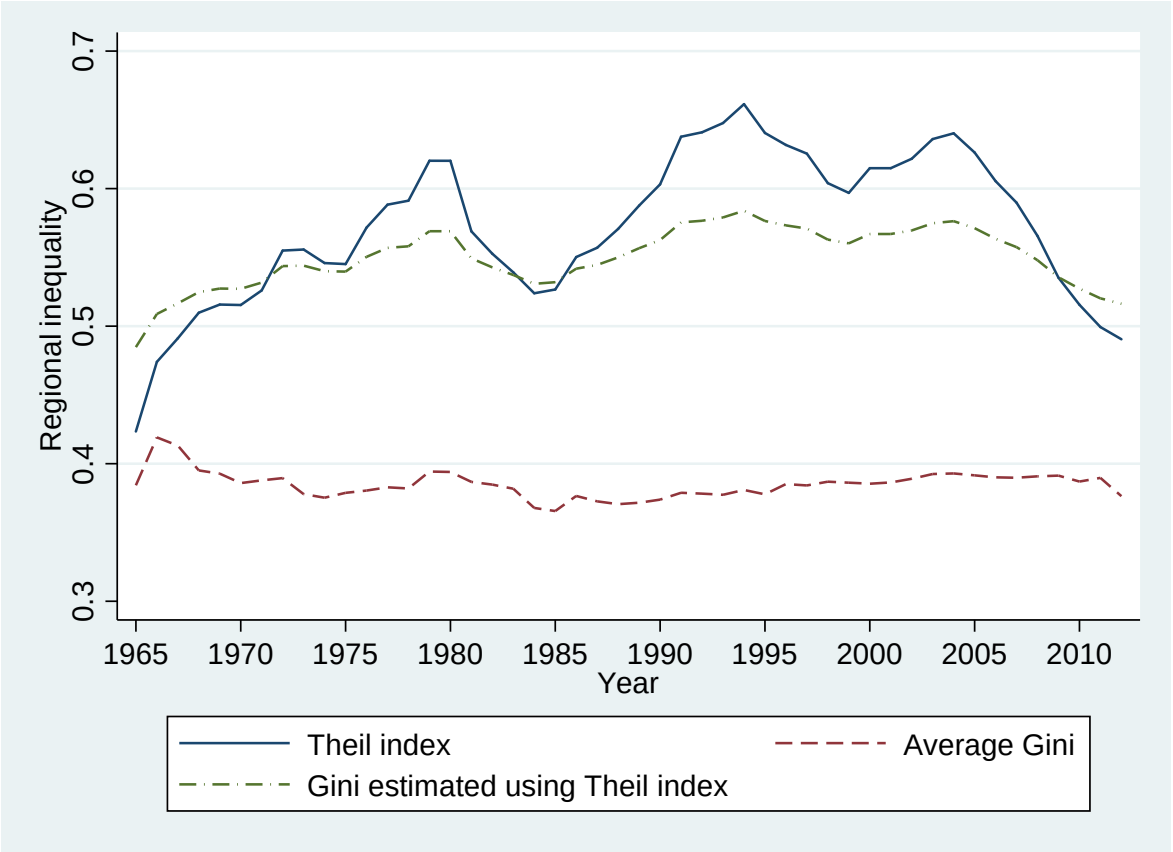
The fast growth in Asia does not necessarily lead to welfare improvement unless the poor gain equally or more than the rich. Societal welfare could even decrease if the growth benefits the rich at the cost of the poor (Sen 1973). In other words, the more the poor benefit, which implies declining inequality, the larger the welfare gains for the society. Unfortunately, growth is often accompanied by rising inequality, as pointed out by Kuznets (1955) and Lewis (1955) and as happened in Asia.

To assess whether Asia's growth was accompanied by worsening distribution, it is necessary to construct an Asia-wide inequality profile, ideally based on household or individual data. In the absence of such data, a methodology is developed in this paper (see Appendix A) to convert the Gini estimates of WIID into Theil estimates (Theil 1967).[4] Adding up these Theil estimates weighted by population shares gives rise to the so-called within-economy inequality. Using per capita GDP of individual economies, a Theil estimate representing the so-called between-economy inequality can be obtained. The sum of these two components is the overall inequality (Theil index) for Asia, which can be converted back into the Gini coefficient.

Figure 3 depicts Asia's inequality profile which exhibits an inverted U pattern. The curve at the bottom shows the simple unweighted average of Gini estimates of individual economies. The gap between this curve and the regional Gini reflects two impacts: gaps between economies and the importance of population weights. It is clear that the conventional wisdom of using the unweighted Gini is misleading. More realistic estimates of the regional inequality (the top two curves in Figure 3) paint a much more serious picture. Apart from severe underestimation, the unweighted Gini even produces different inequality trends.

[4] Theil index is another popular indicator of inequality.

Figure 3: Regional inequality in Asia



Source: Authors' compilation based on PWT data.

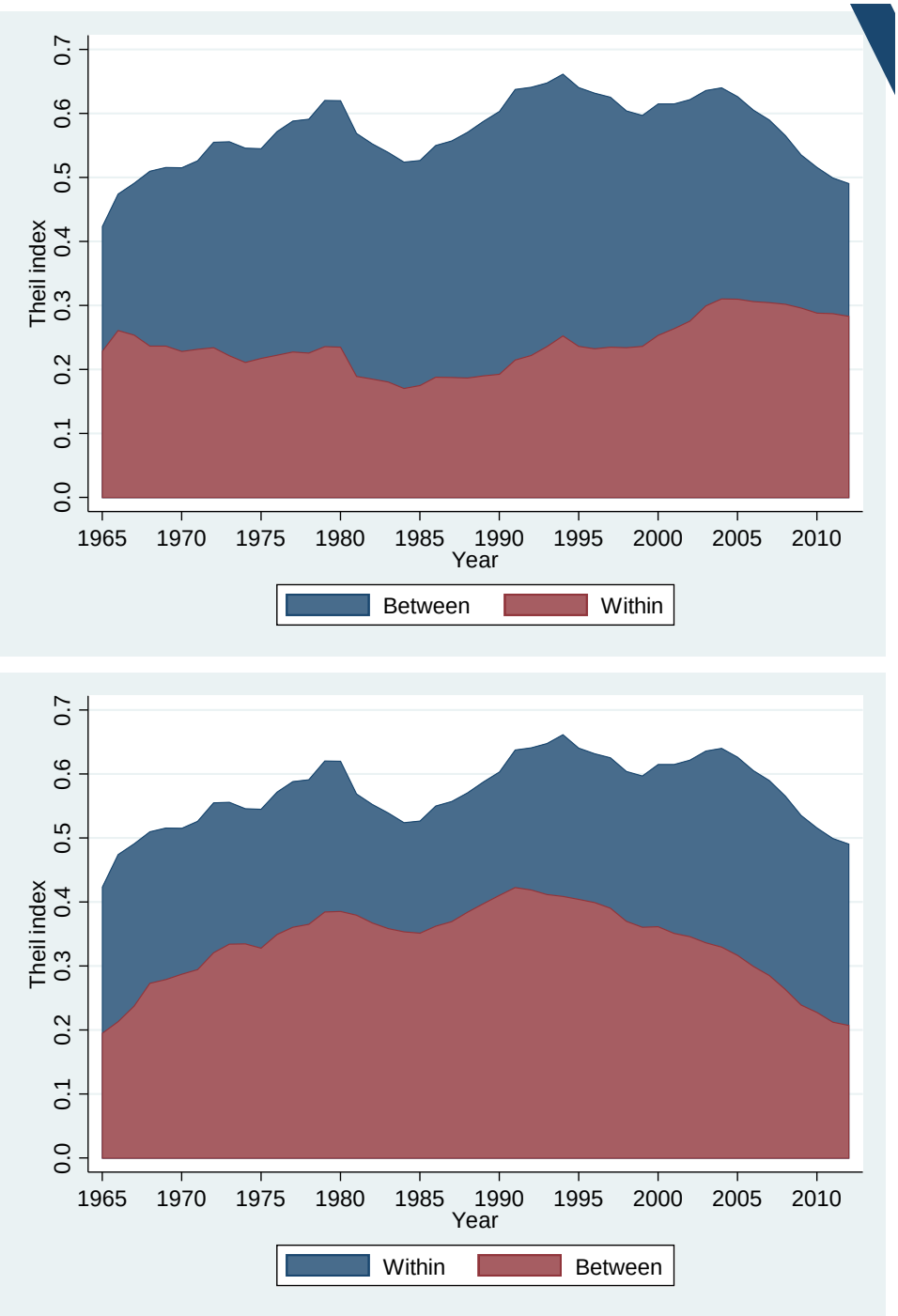
An interesting finding from Figure 3 is the decreases in inequality during crises, initially noted by Wan (2001). Inequality in Asia grew successively from 1965 until the first oil crisis of 1973. The decline in inequality during this crisis was small and short-lived. Afterwards, regional inequality resumed its climbing trend until the onset of the second oil crisis that began in 1979. This time, the inequality decline lasted several years until the mid-1980s. The decrease in inequality during the 1997 Asian financial crisis was also short-lived. Most importantly, the prolonged and lingering global crisis of 2007/2008 is associated with successive declines of Asia's inequality.

As Lopez-Acevedo and Salinas (2000) demonstrated, the rich usually suffer from severe capital losses during crises, seriously affecting their income. Also, crises cause more income damage to workers of non-tradable sectors such as financial services and to individuals in the top income decile. These can be confirmed by the drop in the income share accruing to top income earners. According to the World Inequality Database, from 2008 to 2009, the share of pre-tax income of the top 1 per cent earners dropped from 12.7 to 11.2 per cent in France, 29.3 to 27.4 per cent in Brazil, 11.4 to 9.7 per cent in Taiwan, 11.3 to 10.4 per cent in Japan, and 15.2 to 13.7 per cent in Singapore. Similarly, from 2008 to 2009 the income share of the top 10 per cent earners dropped from 37.3 to 35.6 per cent in France, 56.2 to 55.0 per cent in Brazil, 36.9 to 33.7 per cent in Taiwan, 43 to 41.3 per cent in Japan, and 43.6 to 39.6 per cent in Singapore. Of course, social protections kick in during crises, helping moderate after-tax income inequality.

Figure 4 shows the within- and between-economy components of Asia's inequality. The latter dominated the total inequality and yet it has been neglected by the public, the policy, and even research communities. Further, the trend of Asia's inequality is almost completely driven by the between-component. For example, the early ascent of the total inequality was accompanied by the

increasing between-component. And the post-1990s decline was accompanied by the decreasing between-component despite the rising within-component.

Figure 4: Regional inequality in Asia: Theil index decomposition



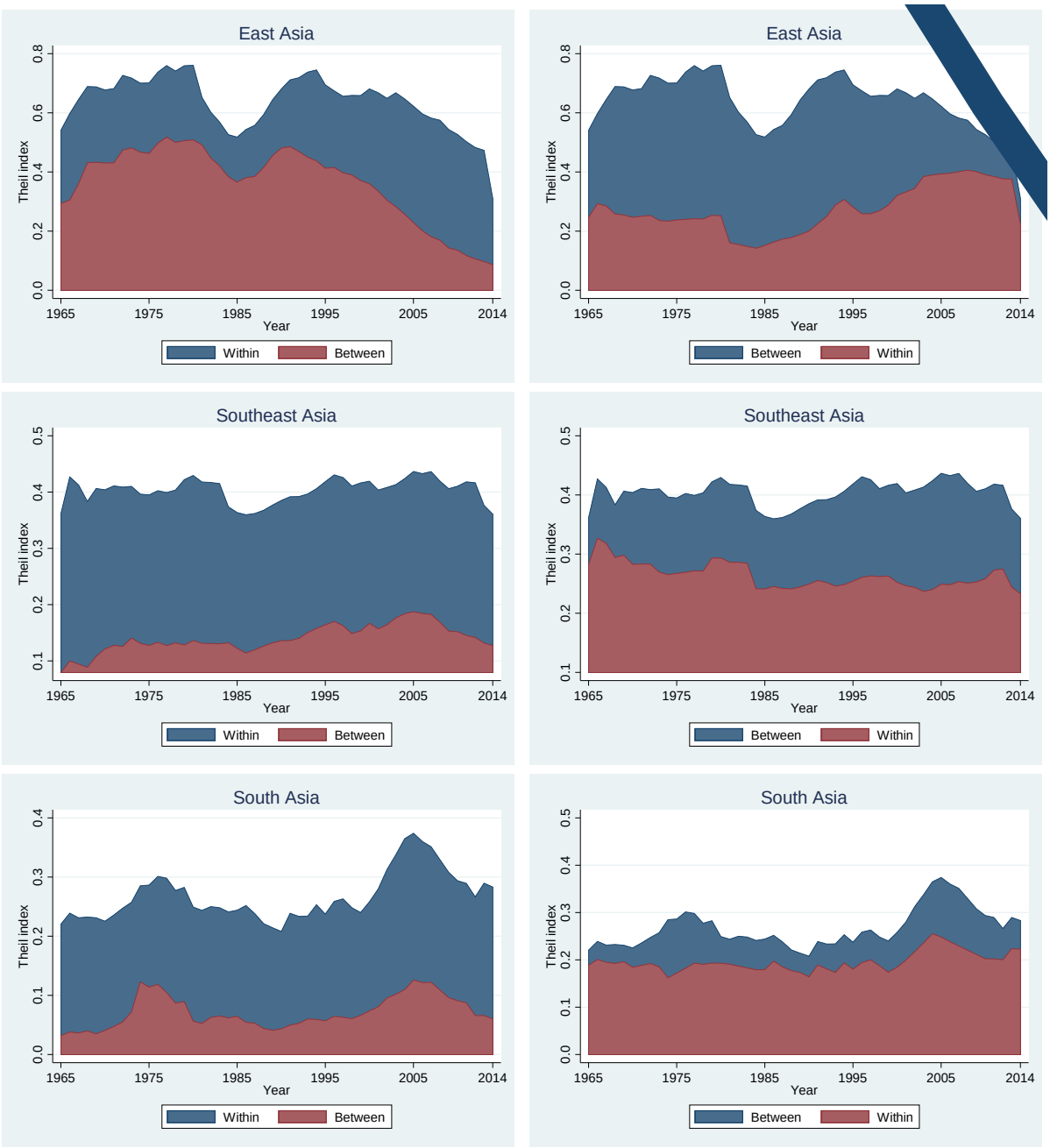
Note: Total inequality is the sum of within-country inequality (Theil index (within)) and between-country inequality (Theil index (between)).

Source: Authors' compilation based on PWT and WIID data.

The sub-regional profiles differ from the regional counterpart and from each other (see Figure 5). Several findings are discernible. First, very much like the regional picture, sub-regions experienced inequality rises and significant declines, with a peak around the height of the second oil crisis. They also experienced an upward trend starting from the mid-1980s. Unlike the inverted U pattern of

the regional profile, East Asia and South Asia exhibit an M pattern. Moreover, the overall inequality is lower in South Asia while East Asia is most unequal. Second, for East Asia, the main contributor of inequality is the between-component while in South and Southeast Asia, the within-component dominates and economies in these two sub-regions are relatively more homogeneous in terms of development level. In fact, the between-component in South and Southeast Asia is relatively stable. Third, East Asia is unique in the sense that the latest declining trend occurred much earlier than in other sub-regions. This is related to the dominance of the between-component in East Asia and is driven by the catching up of China with its two neighbours of Japan and Korea, particularly after 1988 when Japan began to experience the lost decades.

Figure 5: Sub-regional inequality: Theil index decomposition



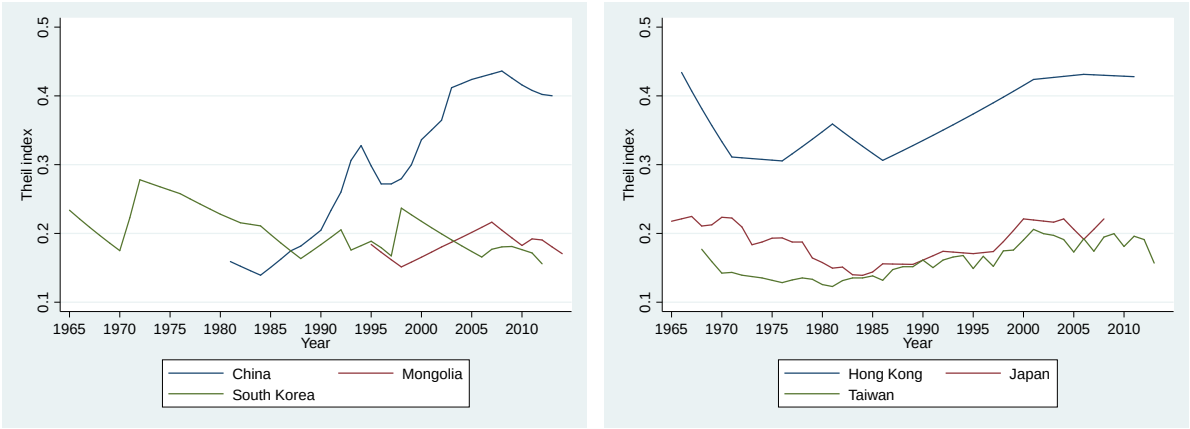
Note: Total inequality is the sum of within-country inequality (Theil index (within)) and between-country inequality (Theil index (between)).

Source: Authors' compilation based on PWT and WIID data.

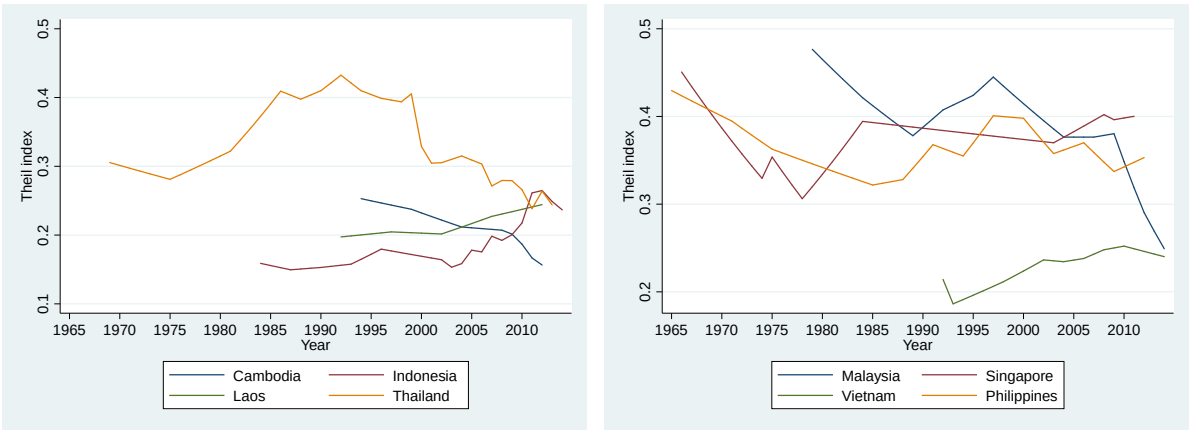
As expected, the inequality profiles at the economy level are more diverse, as shown in Figure 6. It is interesting to observe that economies within each sub-region share similar inequality trends while trends differ across sub-regions, making one wonder if cultural factors may play a role in driving inequality. In addition to cultural factors that are difficult to quantify, level of development, technical change, unemployment, urbanization, globalization, and ageing are potential drivers of inequality (see Section 4 for more details). Note that economies in Southeast Asia experienced more erratic changes in inequality while East Asia (excluding China) and South Asia witnessed more stable distributions with one or two outliers.

Figure 6: Inequality of individual economies: Theil index

(a) East Asia



(b) Southeast Asia



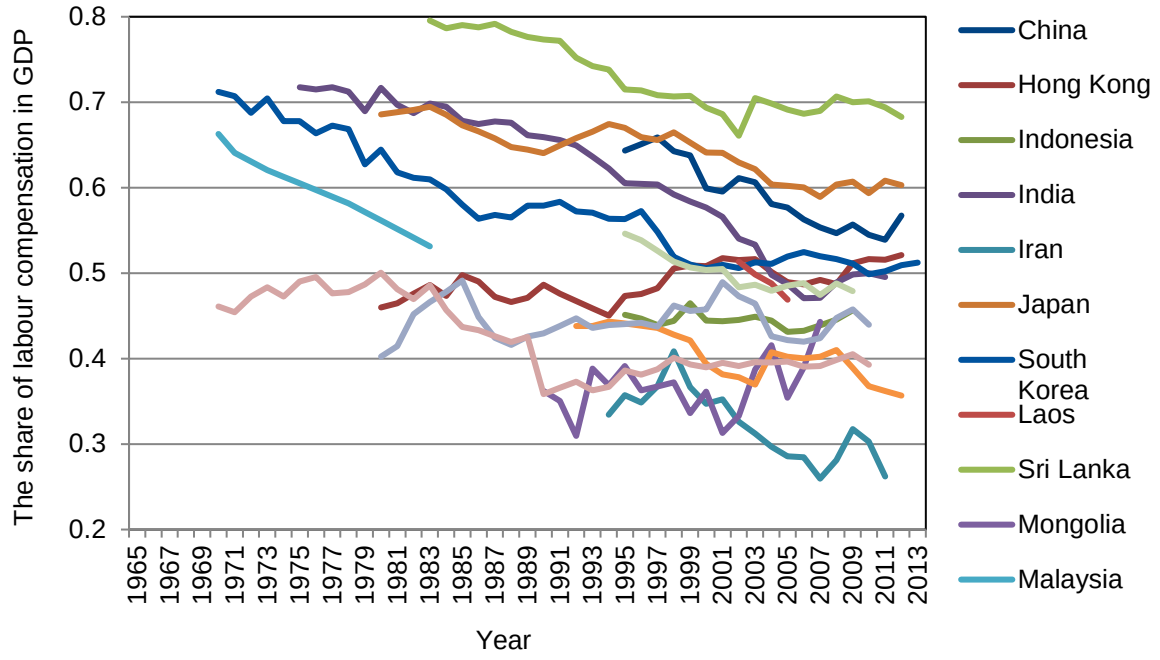
(c) South Asia

Source: Authors' compilation based on WIID data.

Among the most populous economies, inequality in China was low in the pre-reform period and even declined in the early period of reform but rose quite substantially since the mid-1980s until recently. While growth in China was accompanied by rising inequality, this is not the case for Japan that experienced fairly equal distribution until the early 1980s. Inequality in Japan did grow since then but the level remained low. Inequality in India fluctuated more and stayed at relatively high levels until recently. The trend of inequality in Bangladesh is similar to that in China, while inequality in Indonesia also grew. These countries represent more than 90 per cent of Asia's population. It is worth noting the spatial dimension of inequality in large countries such as China, India, and Indonesia where the rural–urban divide contributes significantly to national inequality (see Shorrocks and Wan 2005). In China, this contribution amounted to more than 50 per cent of total inequality (see Wan 2007; Wang et al. 2014).

Another indicator of income distribution is the labour share in national income. Analytically, a decline in the labour share implies rising inequality as labour income is usually more equally distributed than capital income (Luo et al. 2018; Piketty 2014; Jacobson and Occhino 2012). As shown in Figure 7, Asian economies except Hong Kong, Mongolia, and Singapore experienced decreases in the labour share, with the largest decline observed in India (from 71.75 per cent in 1975 to 49.54 per cent in 2011). Figure 7 helps confirm the generally worsening distributional trend in Asia.

Figure 7: The share of labour compensation in GDP



Source: Authors' compilation based on PWT data.

2.3 Poverty profile

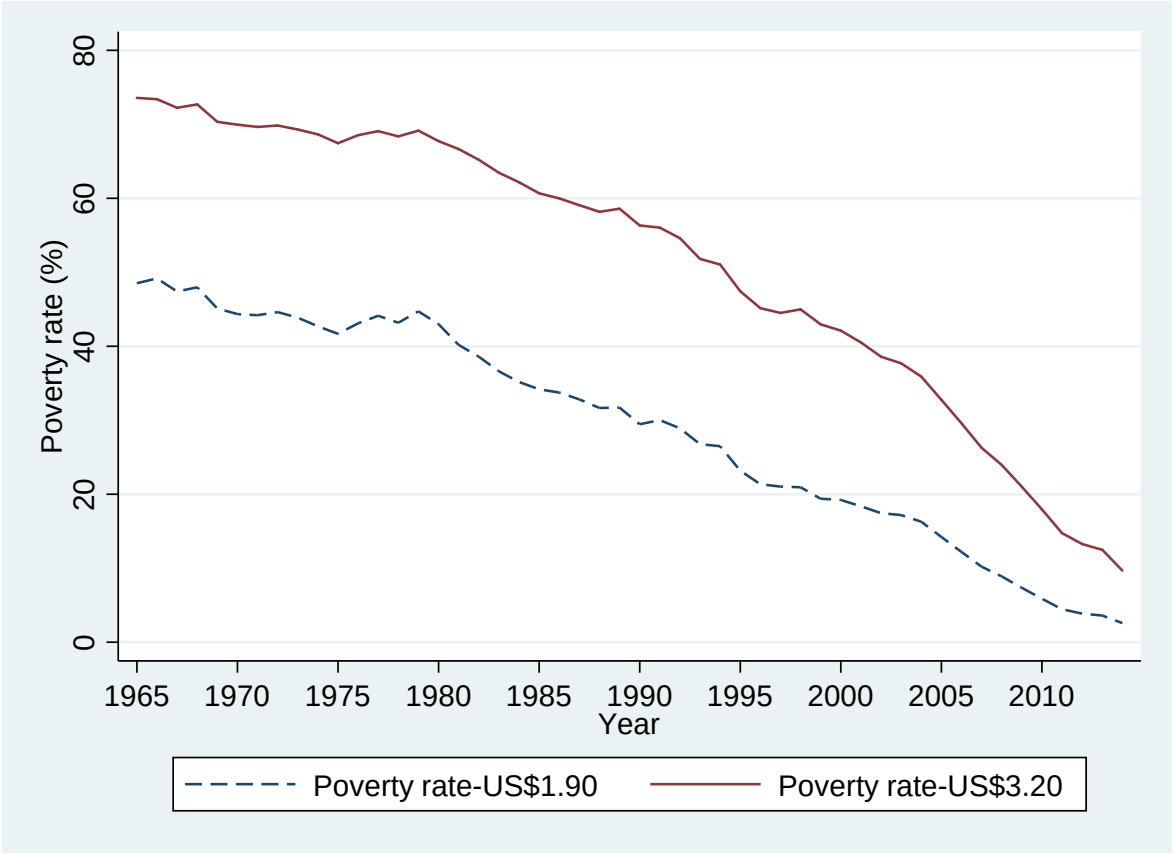
While the impact of growth on inequality is subject to debate, its impact on poverty is always benign provided that the distribution does not deteriorate. Since inequality has risen in many parts of Asia (see Section 2.2), the poverty profile cannot be determined a priori despite the general growth trends in Asia.

A formidable challenge in constructing the poverty profile lies in the lack of household or individual data. However, under a reasonable assumption, poverty can be estimated using the Gini estimates of WIID and the per capita household final consumption data from PWT (see Appendix

B). Ideally, the Gini estimates should be based on consumption rather than income data. However, if consumption is proportional to income, income and consumption inequalities would be identical. In reality, due to consumption smoothing, its inequality is generally smaller than income inequality. Nevertheless, consumption is highly correlated with income, justifying to a certain extent the mixed use of income Gini estimates from WIID. Note that interpolation and extrapolation were necessary to fill in some of the missing Gini estimates.

Figure 8 presents the poverty head count ratios or poverty rate for Asia and its sub-regions under the US$1.90 and US$3.20 poverty lines. It is striking to see that in 1965 73.57 per cent of Asians lived under the US$3.20 poverty line and half of Asians lived with less than US$1.90 per day. After 50 years of development, Asia has eliminated extreme poverty using the 3 per cent threshold of the World Bank, although Asia is still some way from ending moderate poverty. In 2014, there are still 421.48 million moderately poor in Asia.[5]

Figure 8: Asia's poverty



Source: Authors' compilation based on PWT and WIID data.

Not surprisingly, the poverty profile differs considerably across sub-regions (see Figure 9) although they all share a similar declining trend. In terms of poverty rate, in 1965 Southeast Asia was the poorest. By 2014, however, South Asia, which had not managed to end extreme poverty under the 3 per cent threshold of the World Bank, became the poorest.

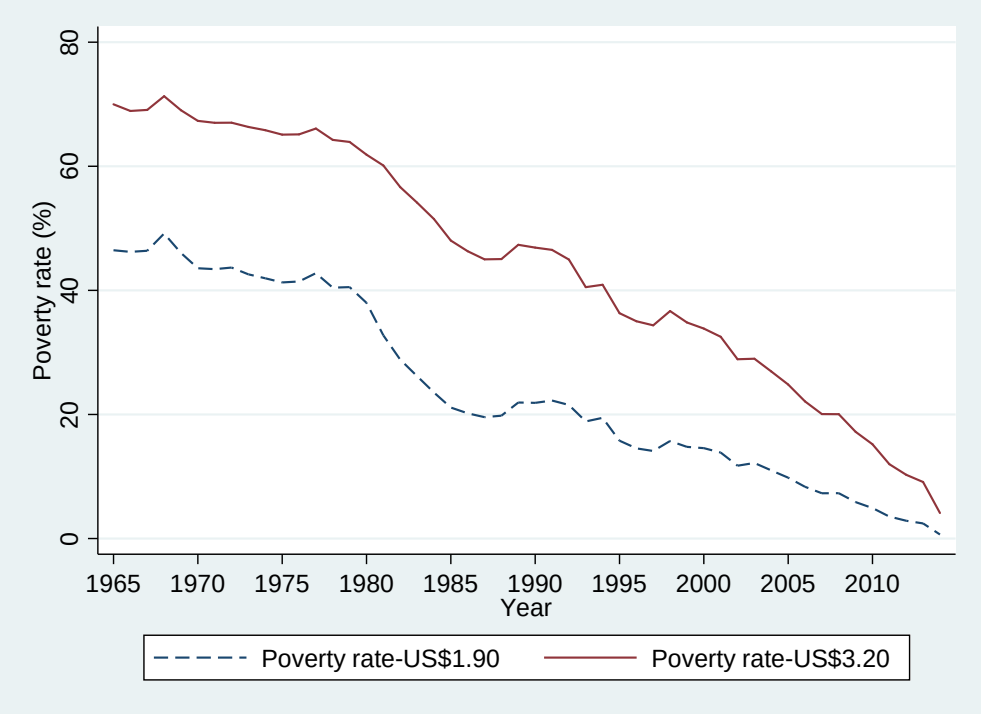
The general declining trends in Figure 9 imply the dominating growth impact of poverty reduction. However, the trend became flatter for East Asia since the mid-1980s and for Southeast Asia since

[5] Asia's total population is 4349.6 million, according to United Nations (2015).

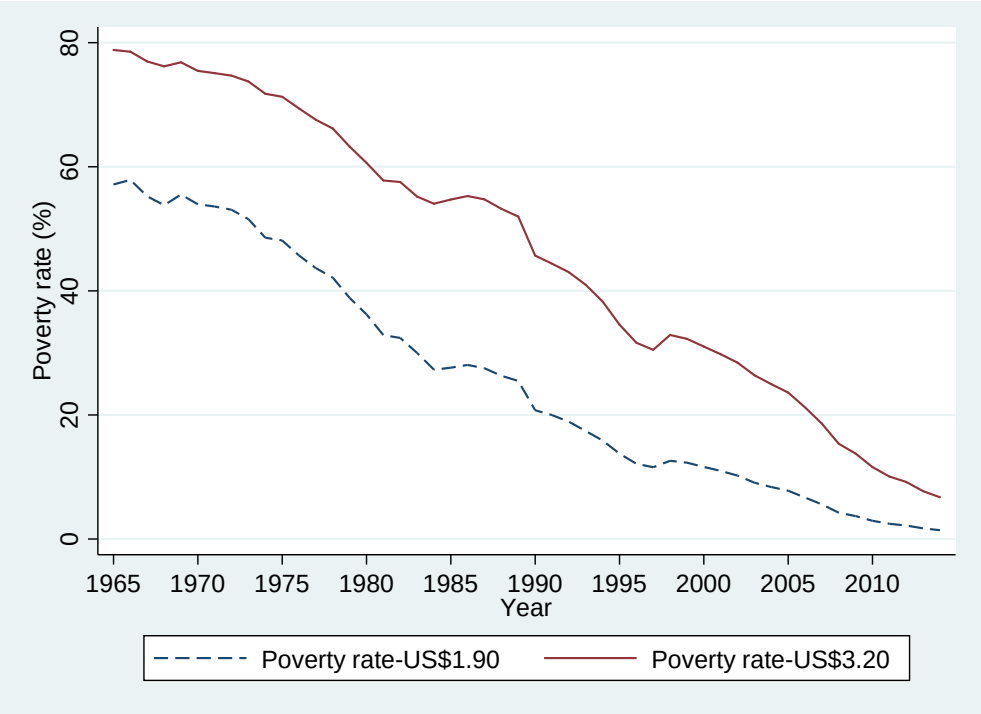
the early 1980s. The former may be related to the fast-rising inequality in China and the latter may be explained by growth moderation combined with increases in inequality in Southeast Asia.

Figure 9: Poverty rate in Asia

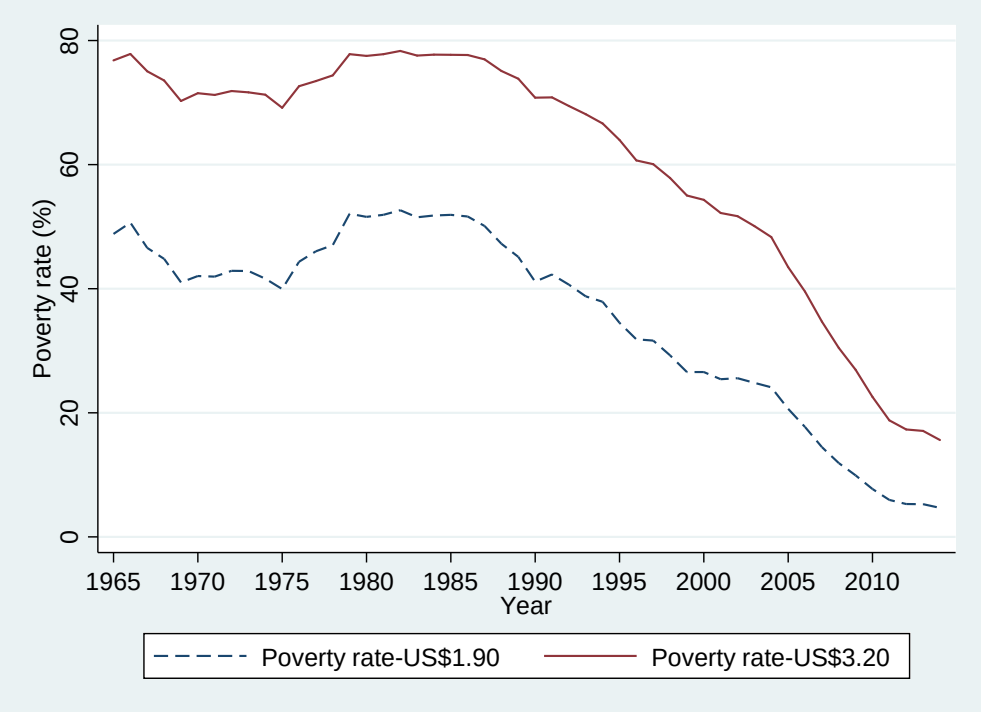
(a) East Asia



(b) Southeast Asia



(c) South Asia



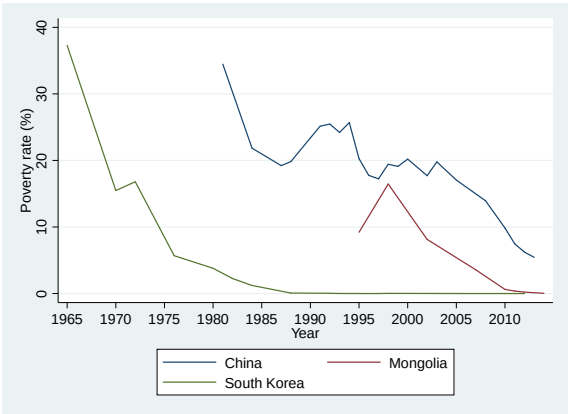
Source: Authors' compilation based on PWT and WIID data.

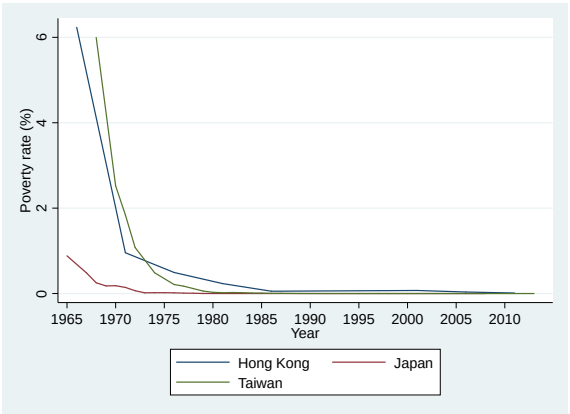
It is useful to note some episodes of poverty increases. For example, South Asia became poorer from the mid-1970s to the early 1980s. This is due to the independence of Bangladesh in 1971 and socio-economic instabilities afterwards. Also, Sri Lanka experienced poverty increases from the early 1970s to the mid-1980s due to a series of wars (see Figures 10a and 10b).

Figures 10a and 10b present poverty profiles for individual economies under the US$1.90 and US$3.20 poverty lines. It is striking to see the heterogeneity in both the level and fluctuations in the poverty rates across economies. Apart from Japan, all other economies suffered from abject poverty back in 1965. Under the 3 per cent threshold, Taiwan and Hong Kong eliminated extreme poverty in late 1960s, Singapore mid-1970s, followed by South Korea in early 1980s, Malaysia late 1990s, and Thailand and Indonesia in the new millennium. By contrasting the poverty profiles with the corresponding growth profiles presented earlier, the correlation appears to be quite high, implying that poverty reduction is largely driven by growth. Changes in inequality only played a supplementary role, as discussed further in Section 3.

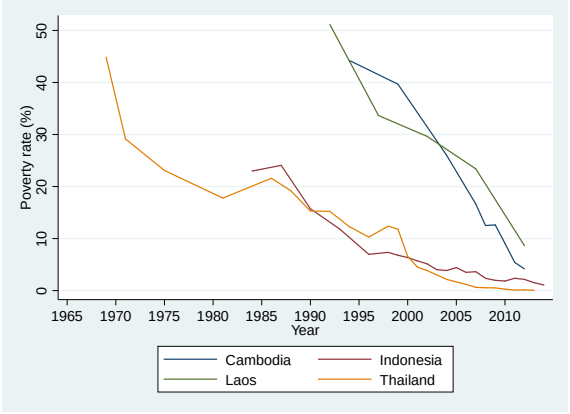
Figure 10: Poverty rate of individual economies, grouped by sub-regions: (a) US$1.90; (b) US$3.20

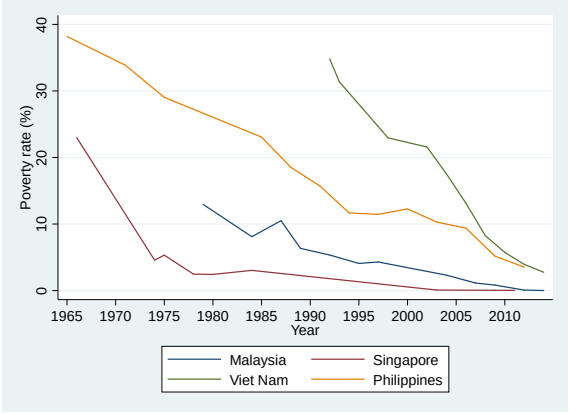
(a-i) East Asia



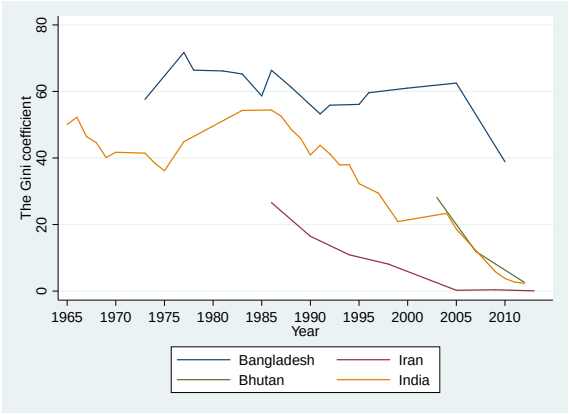


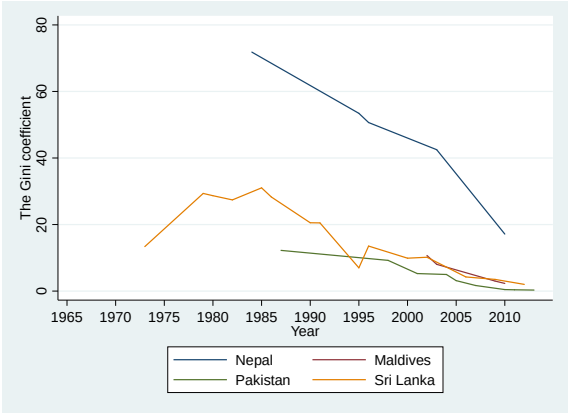
(a-ii) Southeast Asia



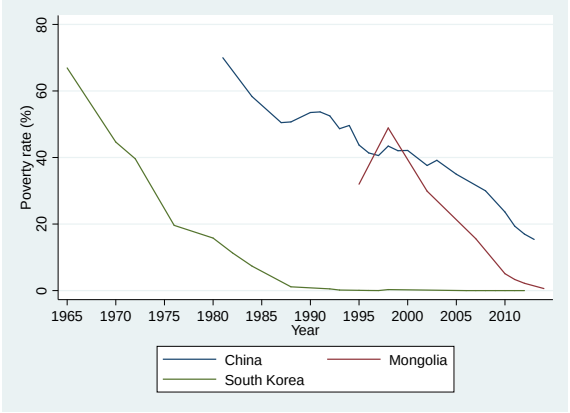


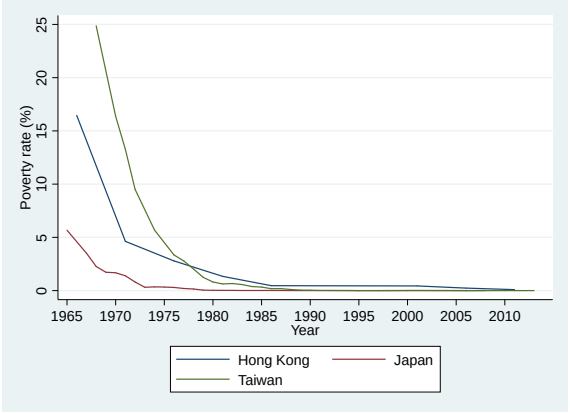
(a-iii) South Asia



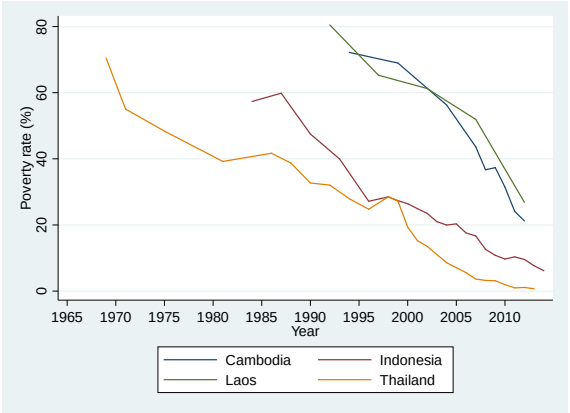


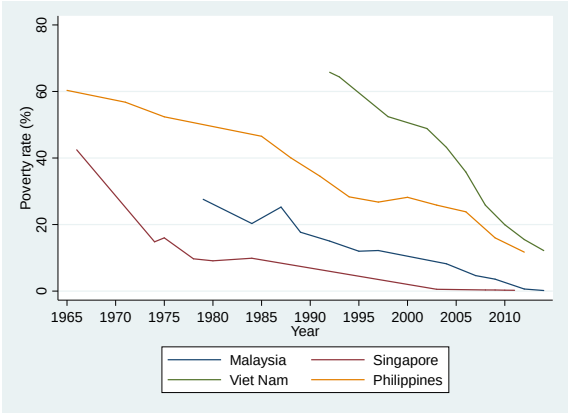
(b-i) East Asia





(b-ii) Southeast Asia





(b-iii) South Asia

Source: Authors' compilation based on PWT and WIID data.

3 Sources of poverty reduction

Having provided the poverty, growth, and inequality profiles, this section explores the poverty–growth–inequality triangle, focusing on sources of poverty reduction. As mentioned earlier, both the MDG and SDG frameworks set poverty reduction as the most important development goals. From the public policy perspective, the bottom segment of the distribution ladder should receive the most attention as welfare gains are maximized when the same growth benefit goes to the poorest. According to Rawls (1971), social welfare is determined solely by the living standard of the poorest.

To disentangle the growth–poverty–inequality triangle, one approach is to decompose a poverty change into the growth and inequality components or effects. The methodology to be used here is based on Zhang and Wan (2006) who modified the decomposition framework of Datt and Ravallion (1992). Let ΔP denote a change in poverty P between period 0 and period T:

$$\Delta P = P(Y_T; I_T) - P(Y_0; I_0) \quad (1)$$

where Y denotes average consumption and I denotes distribution or inequality. By definition, the growth component of ΔP is the change in poverty due to a change in Y holding I constant. The inequality or redistribution component is the change in poverty due to a change in the distribution I while holding Y constant. Let $P(Y_i, I_j)$ be the poverty estimate from a hypothetical distribution, $i = 0$ or T, $j = 0$ or T and $i \neq j$. The growth component can be defined as:

$$Growth\ component\ = P(Y_T, I_0) - P(Y_0; I_0) \quad (2)$$

or, alternatively as

$$Growth\ component\ = P(Y_T; I_T) - P(\ Y_0, I_T) \quad (2a)$$

Similarly, the inequality component can be defined as:

$$Inequality\ component\ =\ P(Y_0, I_T) - P(Y_0; I_0) \quad (3)$$

or

$$Inequality\ component\ =\ P(Y_T, I_T) - P(Y_T; I_0) \quad (3a)$$

Different combinations of the alternative growth and inequality components produce four distinct decompositions of ΔP. If Equations (2) and (3) are used, period 0 is considered as the reference point. By contrast, choosing equations (2a) and (3a) implies the use of period T as the reference point. The results from the two decompositions need not agree, and both are inexact in the sense that the two components do not add up to ΔP. If the combination of Equations (2a) and (3) or (2) and (3a) is used, the decomposition will be exact since

$$P(Y_T; I_T) - P(Y_0; I_0) = [Growth\ component] + [Inequality\ component]$$

$$= [P(Y_T; I_T) - P(Y_0, I_T)] + [P(Y_0, I_T) - P(Y_0; I_0) \quad (4)$$

$$= [P(Y_T, I_0) - P(Y_0; I_0)] + [P(Y_T; I_T) - P(Y_T, I_0)] \quad (5)$$

However, the inequality and growth components are measured against different reference points in Equations (4) and (5), which may produce different results. A solution to the reference point problem is to take the average of Equations (4) and (5) to arrive at

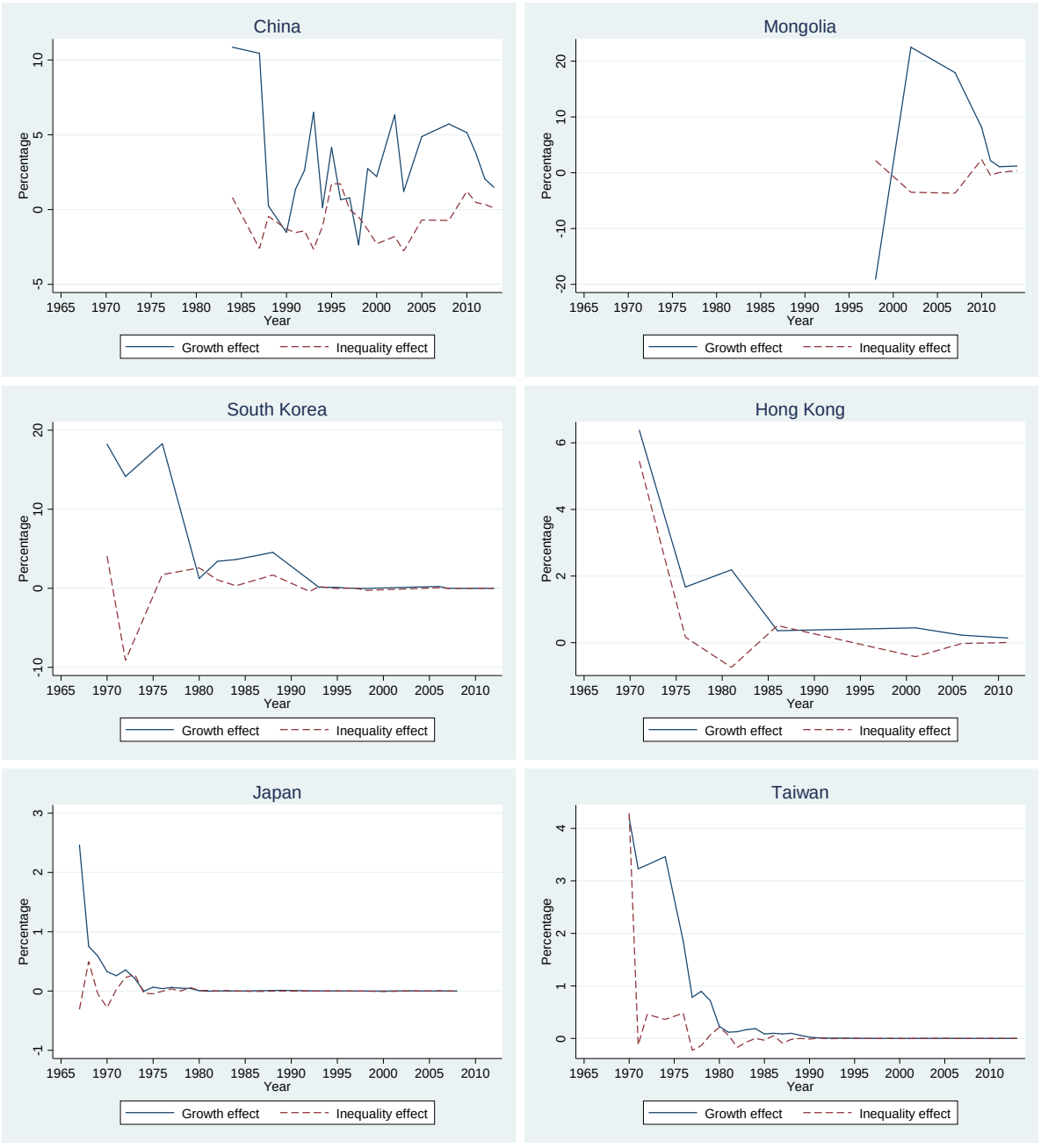
$$\Delta P = 0.5\{[P(Y_T; I_T) - P(Y_0, I_T)] + [P(Y_T, I_0) - P(Y_0; I_0)]\} + 0.5\{[P(Y_0, I_T) - P(Y_0; I_0)] + [P(Y_T; I_T) - P(Y_T, I_0)]\} = \{Growth\ component\} + \{Inequality\ component\} \quad (6)$$

As it turns out, the decomposition in Equation (6) is not an arithmetic gimmick and can be justified using the cooperative game theory (Shorrocks 1999). Apart from notational difference, Equation (6) is identical to what Shorrocks (1999) derived using the Shapley value. Note that the decomposition of Zhang and Wan (2006) does not have the annoying residual term and is not path-dependent, as in Datt and Ravallion (1992).

The decomposition results for Asia under the US$3.20 poverty line are shown in Figure 11, with a positive effect reflecting poverty reduction. Note that the estimated inequality effect is positively correlated with poverty reduction—a rise in inequality implies poverty rise and vice versa. On the contrary, the estimated growth effect is negatively correlated with poverty reduction—growth implies poverty reduction and vice versa. For Asia, the inequality effect is mostly poverty-increasing, echoing the general trend of rising inequality. Meanwhile, the growth effects are negative in most years. Comparing the two effects, the benign growth effect clearly dominates. Therefore, it can be concluded that the impressive achievement in poverty reduction in Asia is largely accounted for by growth. The inequality effect has been detrimental, but it is small in absolute values.

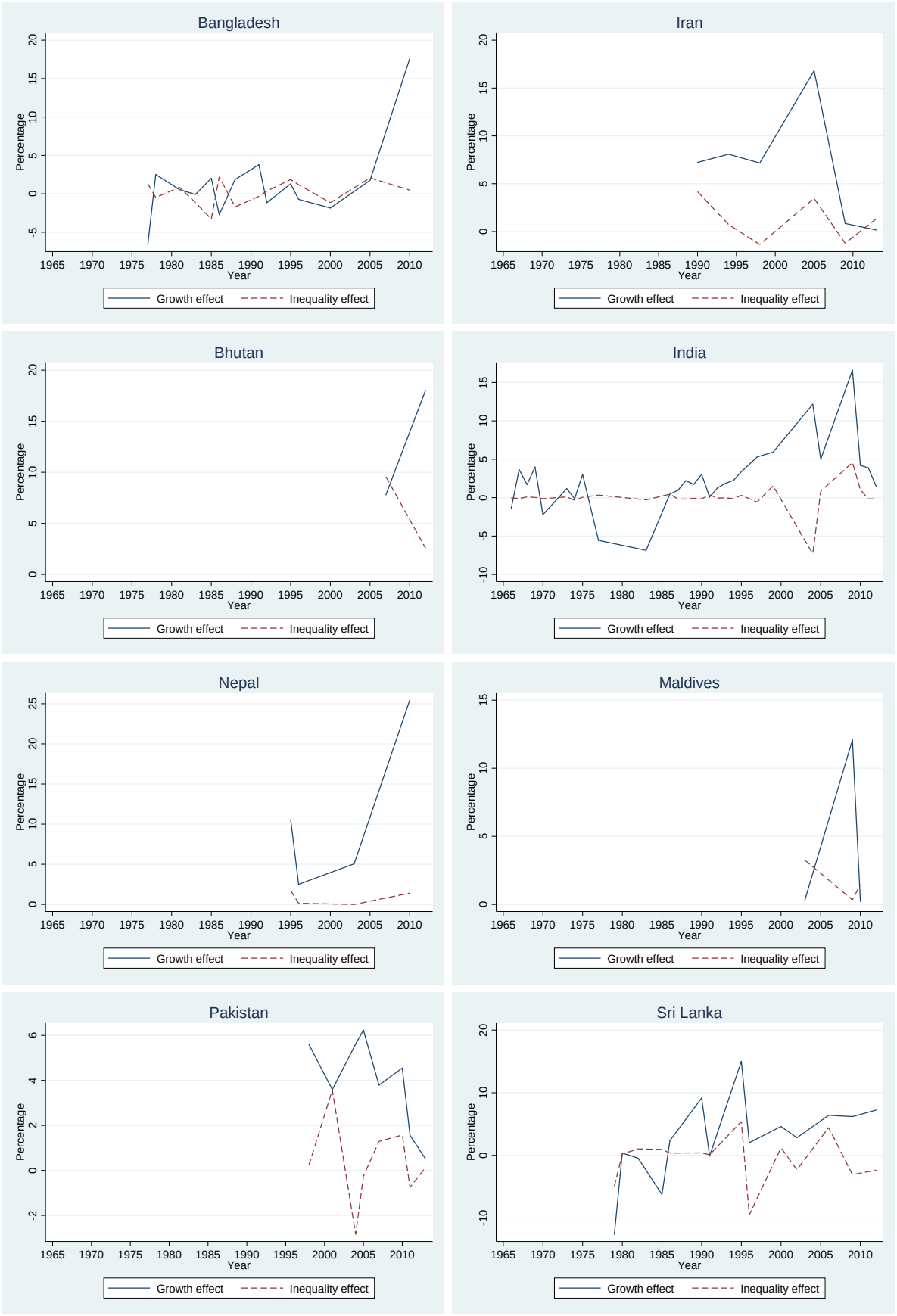
Figure 11: Poverty decomposition (US$3.20)

(a) East Asia



(b) Southeast Asia

(c) South Asia



Source: Authors' compilation based on PWT and WIID data.

As far as East Asia is concerned, the growth effect for South Korea, Hong Kong, Japan, and Taiwan was large in the early years and began converging to zero since around the early 1990s. In China and Mongolia, the growth effect was also positive although the contributions appeared relatively small. This is not surprising as China is well-known for high savings rate or low consumption rate despite its miracle growth in the last four decades. Inequality improved in Hong Kong and Taiwan in the early 1970s, reinforcing the benign growth impact of growth. In South Korea, the inequality effect also helped reduce poverty in most years, corresponding to the declines in its inequality (see Figure 6).

Turning to Southeast Asia, on average the growth effect was larger than that for East Asia although it declined over time. Singapore witnessed the largest growth effect in the mid-1970s, reducing the poverty rate by more than 20 per cent. In Laos and the Philippines, the growth effect was significant in recent years. Inequality effect in Southeast Asia was similar to that in East Asia, being close to zero.

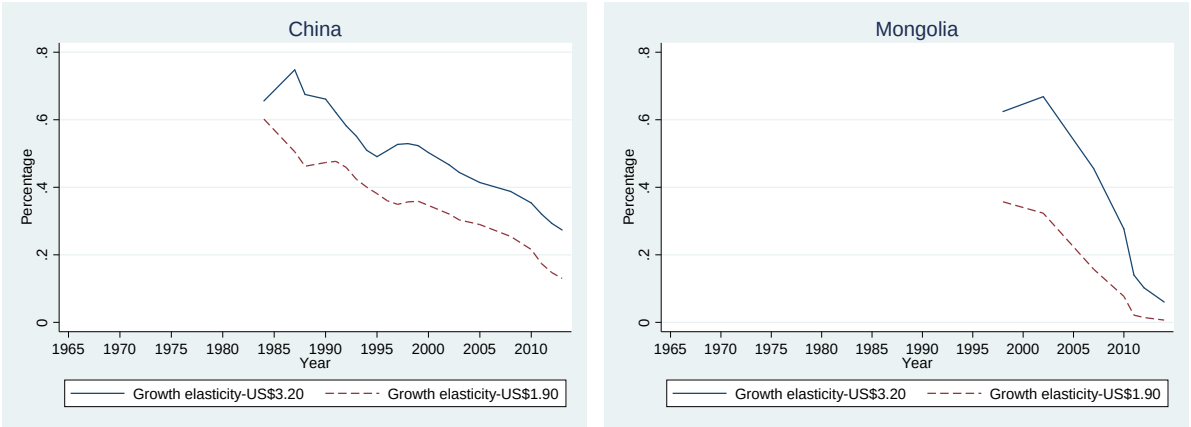
As far as South Asia is concerned, the pattern of growth effect was opposite to that for most of the other Asian economies where the growth effect decreased over time. For example, in Bangladesh, India, and Nepal, the growth effect increased over time.

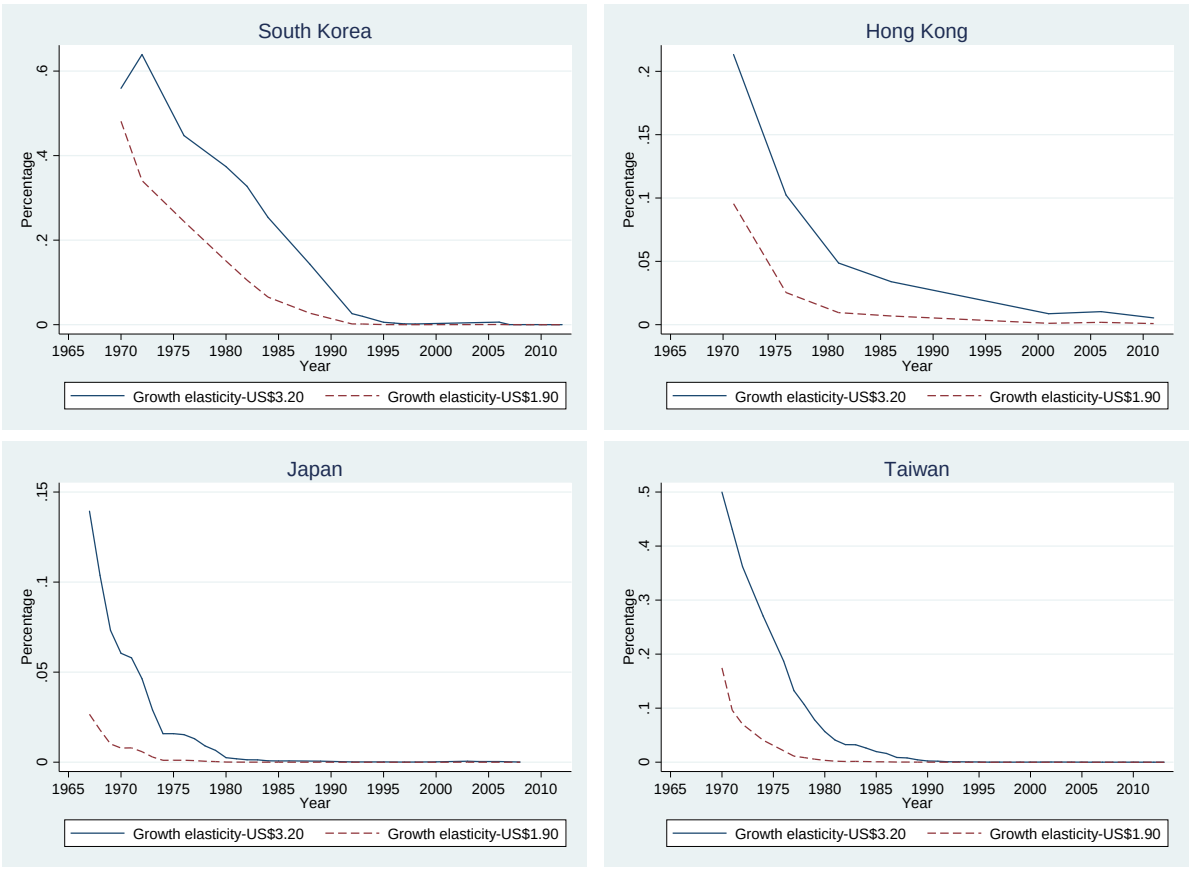
Except in East Asia, redistribution effects are close to and fluctuate just above zero, and the growth effects are mostly positive and dominate the total changes in poverty. The growth effect in different sub-regions became small over time in Southeast Asia but expanded in South Asia. Such a difference is attributable to three factors: differences in the growth rate of per capita consumption, the growth impact on poverty, and the base-period level of poverty.

Since the magnitude of the growth effect depends on the growth rate and its impact on poverty, it is useful to divide the growth effect by the growth rate to obtain the growth elasticity of poverty reduction. These elasticities are plotted in Figure 12. The results demonstrate the diminishing impact of growth on poverty reduction over time: a same 1 percentage point of growth (in consumption per capita) leads to less and less poverty reduction over time—a typical phenomenon of 'ripping the low-hanging fruits first'. This is why the growth impact is related to the base-period level of poverty.

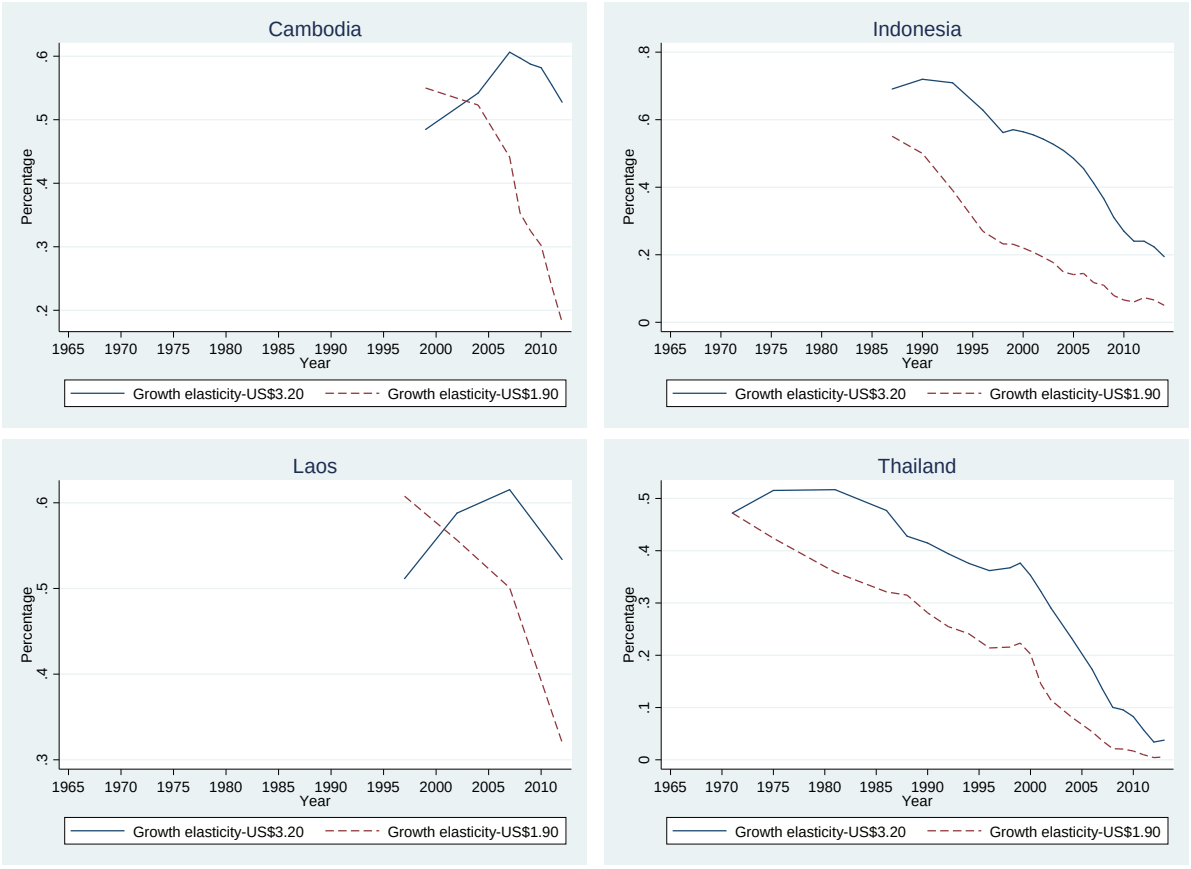
Figure 12: Growth elasticity of poverty (US$3.20 and US$1.90)

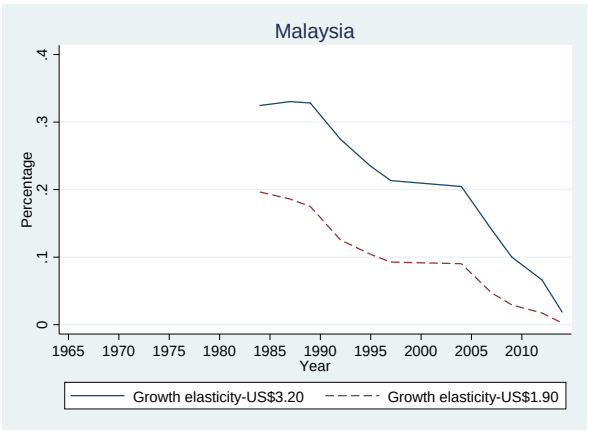
(a) East Asia

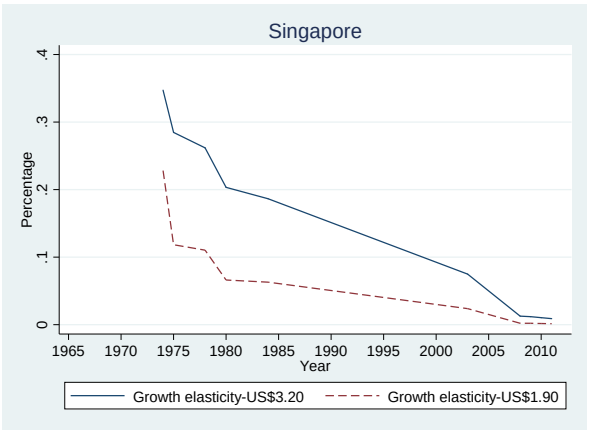


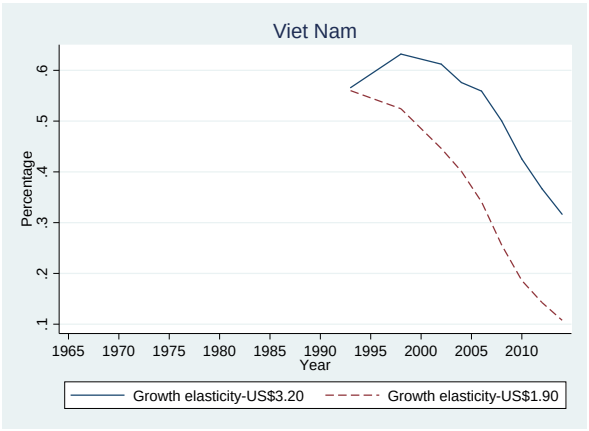


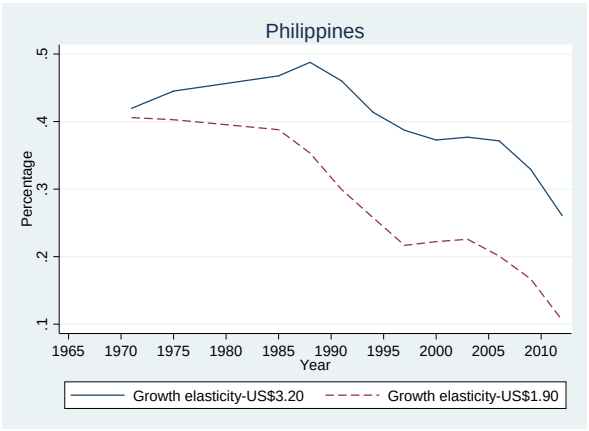
(b) Southeast Asia



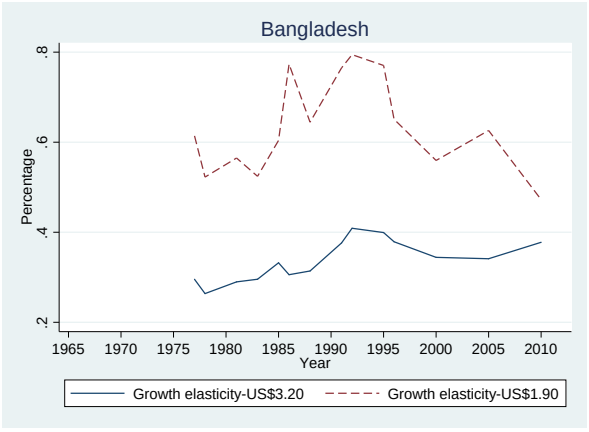

Malaysia
Percentage
0
.1
.2
.3
.4
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90

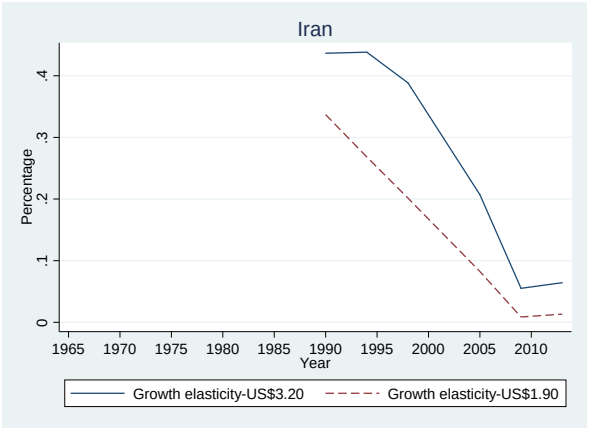

Singapore
Percentage
0
.1
.2
.3
.4
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90

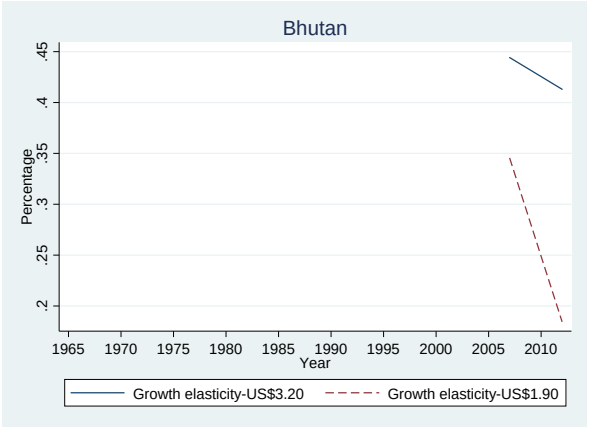

Viet Nam
Percentage
.1
.2
.3
.4
.5
.6
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90

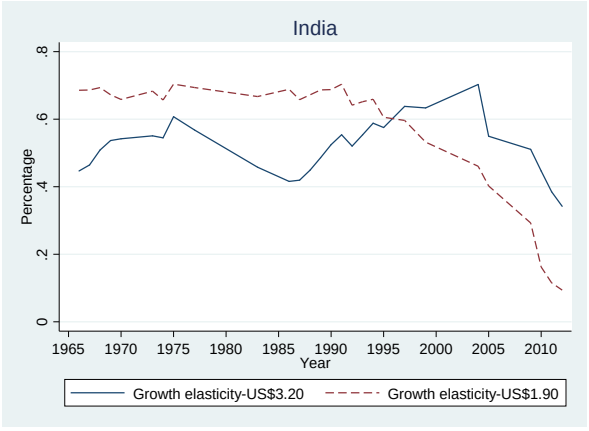

Philippines
Percentage
.1
.2
.3
.4
.5
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90

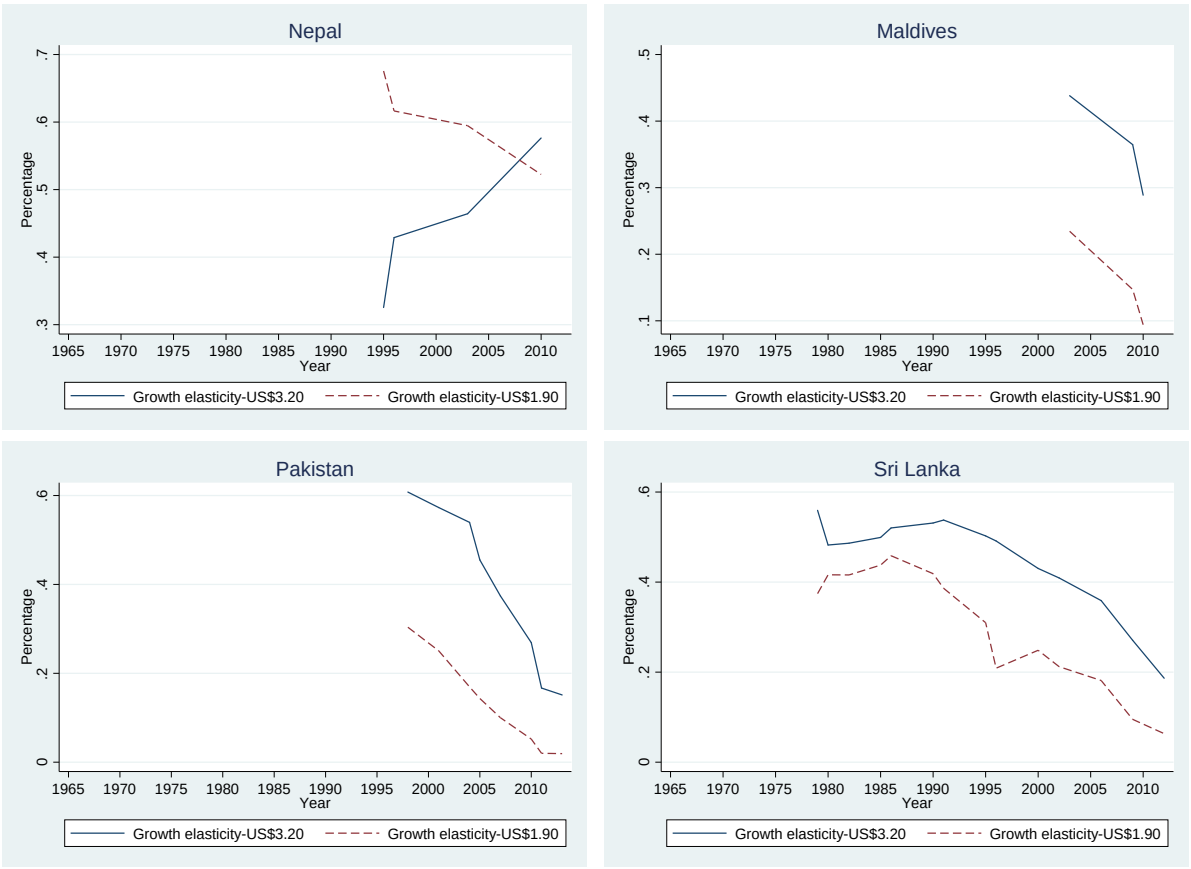
(c) South Asia


Bangladesh
Percentage
.2
.4
.6
.8
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90


Iran
Percentage
0
.1
.2
.3
.4
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90


Bhutan
Percentage
.2
.25
.3
.35
.4
.45
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90


India
Percentage
0
.2
.4
.6
.8
1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year
Growth elasticity-US$3.20
Growth elasticity-US$1.90



Source: Authors' compilation based on PWT and WIID data.

To further explore fundamental drivers of poverty, Table 1 reports regression results using poverty rate under the US$3.20 poverty line as the dependent variable. The result shows a U-shaped relationship between GDP per capita (in logarithm) and poverty. Since GDP per capita (in logarithm) ranged from 6.92 to 11.82 in our data, the estimated marginal effect of economic growth is always below zero, confirming that growth is good for the poor in Asia. Technological progress and trade exposure also helped poverty reduction. Also, as expected, ageing is positively related to poverty.

In addition, the unemployment rate is positively correlated with poverty although the coefficient is insignificant. As noted by Gustafsson and Johansson (1999), a weak or non-existent relationship could be attributable to income losses from unemployment which are masked by unemployment benefits or by increased labour market activity of other family members. Nevertheless, the poor largely live on returns to labour rather than capital. Thus, growth with employment creation reduces poverty far more than jobless growth.

Table 1: Drivers of poverty

	m1	m2	m3	m4	m5	m6	m7
	Poverty 3.2	Poverty 3.2	Poverty 3.2	Poverty 3.2	Poverty 3.2	Poverty 3.2	Poverty 3.2
Ln(*GDP per capita*)	−181.843***	−210.418***	−196.928***	−191.153***	−203.496***	−203.439***	−167.331***
	(17.410)	(20.738)	(25.908)	(29.170)	(30.769)	(31.021)	(31.189)
Ln(*GDP per capita*)^2	10.226***	12.402***	11.630***	11.548***	12.325***	12.021***	10.020***
	(1.018)	(1.230)	(1.652)	(1.703)	(1.814)	(1.815)	(1.772)
Total factor productivity (*TFP*)		−18.952*	−36.242**	−45.298**	−45.832**	−29.720	−34.982**
		(10.367)	(17.564)	(19.845)	(19.643)	(18.086)	(15.680)
Unemployment rate			0.171	0.282	0.329	0.482	0.372
			(0.368)	(0.348)	(0.338)	(0.332)	(0.317)
Urbanization				−0.250	−0.264	−0.199	−0.286
				(0.227)	(0.215)	(0.202)	(0.195)
Trade					−0.042*	−0.037	−0.051*
					(0.024)	(0.026)	(0.028)
Foreign direct investment (FDI)						−0.231**	−0.152
						(0.116)	(0.104)
Population share aged >65 years							1.919***
							(0.479)
Constant	806.222***	894.919***	851.367***	827.691***	878.279***	885.841***	721.546***
	(76.371)	(89.933)	(103.382)	(116.985)	(124.432)	(125.674)	(129.299)
Country dummy	Y	Y	Y	Y	Y	Y	Y
Year dummy	Y	Y	Y	Y	Y	Y	Y
N	190	145	125	125	125	125	125
Adjusted R^2	0.963	0.953	0.943	0.944	0.945	0.947	0.953

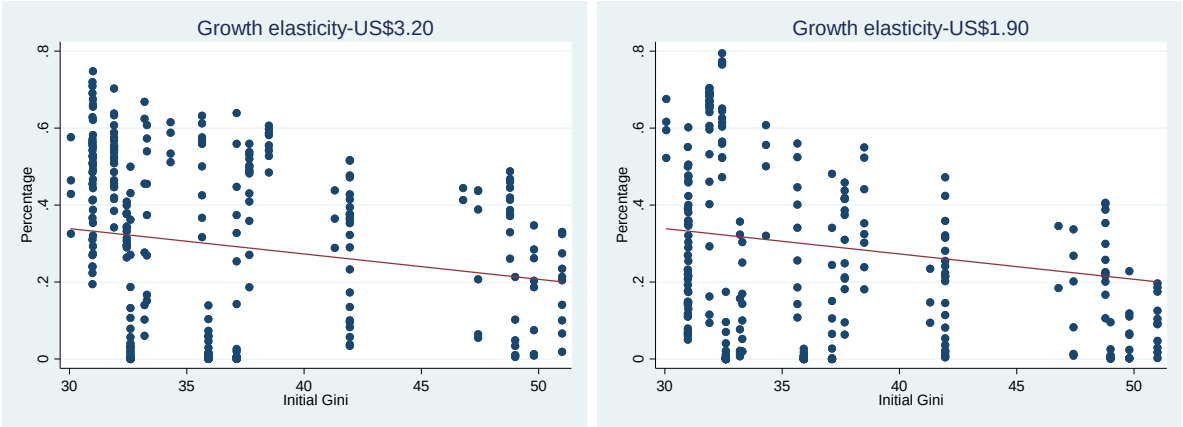
Notes: Robust standard errors in parentheses. *P<0.1, **P<0.05, ***P<0.01.

Source: Authors' compilation based on PWT, World Development Indicators (WDI), and WIID data.

Needless to say, policy matters too. To demonstrate the relevance of policy measures, we take China and India as case studies. In 1986, China set up the Poverty Alleviation Office under the State Council, taking the overall responsibility for poverty alleviation. Early efforts targeted areas inhabited by minorities, remote and border regions, and revolutionary bases. In 2001, the government issued a document entitled 'Outline of Poverty Alleviation and Development for the Rural Area (2001–2010)' and in 2012 it issued the document 'The Twelfth Five-Year Plan for Poverty Alleviation and Development for Whole Villages'. In India, the government proposed strategies, such as 'The National Social Assistance Programme' in 1995, 'Indira Awaas Yojana' in 1996, and the 'Public Distribution System' introduced in 1944 was replaced by the 'Targeted Public Distribution System' in 1997. More recently, India launched the 'Mahatma Gandhi National Rural Employment Guarantee Scheme' in 2005. These policies helped generate jobs for the poor or directly transferred income or consumption to the poor.

The dominating role of growth in poverty reduction shown shall be interpreted with caution as the decomposition overlooks the dynamic nature of the growth–poverty–inequality triangle. Changes in inequality may affect future growth, indirectly influencing poverty in subsequent years. In particular, it is possible that the higher the initial inequality, the smaller the effect of the same growth on poverty. This is because high inequality implies larger social and economic risks, such as crime, peer pressure, and political instability. Consequently, part of economic growth may be spared to lower these risks, for instance via social programmes and police expenditure. To explore this dynamic role of inequality, Figure 13 plots the initial Gini coefficient against estimates of growth elasticity, demonstrating that, regardless of the poverty line, higher initial inequality is associated with lower growth impact on poverty.

Figure 13: Initial inequality and growth elasticity of poverty (US$3.20 and US$1.90)



Source: Authors' compilation based on PWT and WIID data.

4 Drivers and costs of inequality

Inequality not only erodes the growth impact (see Figure 13), it may directly lower growth itself. In this section, we first model drivers of inequality and then gauge the costs of inequality in terms of lost GDP and poverty that could have been reduced if inequality did not rise.

4.1 Drivers of inequality

To examine the driving forces of inequality, we run a number of pooled time series cross-section regression analyses. The equations are specified as follows, where *Asia* denotes a dummy variable:

$$Inequality = \text{f}(GDP, GDP^2, TFP, Unemployment, Urbanization, Trade, FDI, Ageing, GDP \times Asia, GDP^2 \times Asia, TFP \times Asia, Unemployment \times Asia, Urbanization \times Asia, Trade \times Asia, FDI \times Asia, Ageing \times Asia) \quad (7)$$

Besides GDP, Equation (7) includes a number of socio-economic variables. Technological progress tends to favour capital over labour and skilled labour over unskilled labour—the so-called capital or skill bias. Meanwhile, as an economy becomes more technology and capital intensive, those with capital and skills are paid more. The simultaneous increases in the quantities and prices of capital and skill naturally raise the capital share in the national pie at the cost of the labour share. This leads to worsening distribution because capital income is more unequal than labour income (Piketty 2014) and because the capitalists and the skilled tend to be in the upper segment of the income ladder. To control technical change, we use total factor productivity (TFP) from PWT.

The linkage between globalization and income distributions have been analysed extensively (Mahler 2004). From the Stolper–Samuelson theorem, exposure to international markets raises demand for skilled labour, causing larger wage gaps (Burgoon 2001). Two measures are included to account for the effect of globalization, namely trade openness (share of import + export over GDP) and net foreign direct investment (FDI) flows as a percentage of GDP.

Also, an increase in the elderly dependency ratio implies less employment and less taxes (Lam 1997; Gustafsson and Johansson 1999). Meanwhile, the elderly are usually located at the lower part of the income ladder. Thus, ageing could lead to rise in income inequality (Lindert 1978; Repetto 1978; Razin et al. 2002). Therefore, we control for the percentage of population aged 65 years.

Finally, the unemployment rate is added to assess the impact of jobs on inequality. Given the urban–rural gap and different levels of inequality in rural and urban areas, urbanization rate is included. Data for 217 countries and the period 1965–2014 are used. Except the Gini coefficient sourced from WIID and TFP from PWT, other variables are from World Development Indicators (WDI).

Table 2 presents the estimation results. For Asia, a significant inverted U-shape is found between GDP per capita and the Gini coefficient, confirming the Kuznets hypothesis, although this is not the case when global sample is used. More significantly, unemployment rate and population ageing are found to be associated with higher inequality, forcefully demonstrating the importance of jobs in containing inequality.

Table 2: Drivers of inequality

	m1	m2	m3	m4	m5	m6	m7
	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID
Ln(*GDP per capita*)	−45.418**	−34.511**	−74.941***	−73.633***	−72.331***	−76.151***	−81.083***
	(12.155)	(13.225)	(10.710)	(10.133)	(12.220)	(12.306)	(11.557)
Ln(*GDP per capita*)^2	2.539**	2.097**	4.321***	4.268***	4.188***	4.404***	4.558***
	(0.710)	(0.688)	(0.641)	(0.614)	(0.701)	(0.721)	(0.669)
TFP		−6.910	−7.594	−8.691*	−8.573	−8.865	−7.325
		(4.346)	(3.836)	(4.128)	(4.270)	(4.433)	(4.550)
Unemployment rate			0.188**	0.199**	0.194**	0.200*	0.178*
			(0.072)	(0.068)	(0.069)	(0.079)	(0.086)
Urbanization				−0.103	−0.097	−0.074	−0.061
				(0.100)	(0.121)	(0.110)	(0.107)
Trade					0.004	0.010	0.007
					(0.012)	(0.015)	(0.015)
FDI						−0.002	−0.002
						(0.002)	(0.002)
Population share aged >65 years							0.573***
							(0.133)
Asia×Ln(*GDP per capita*)	74.637***	74.770***	119.925***	115.175***	113.592***	116.420***	122.236***
	(13.534)	(15.722)	(7.524)	(6.633)	(9.711)	(9.948)	(9.717)
Asia×Ln(*GDP per capita*)^2	−3.998***	−4.273***	−6.752***	−6.401***	−6.294***	−6.397***	−6.601***
	(0.754)	(0.846)	(0.435)	(0.423)	(0.559)	(0.578)	(0.557)
Asia×*TFP*		14.014***	20.927***	20.063***	19.813***	17.233**	16.250**
		(3.169)	(3.341)	(3.613)	(3.750)	(4.874)	(4.728)
Asia×*Unemployment rate*			−0.097	−0.029	−0.020	−0.058	−0.054
			(0.109)	(0.071)	(0.083)	(0.114)	(0.124)
Asia×*Urbanization*				−0.014**	−0.018	−0.025	−0.024
				(0.004)	(0.012)	(0.014)	(0.015)
Asia×*Trade*					−0.016	−0.040	−0.047
					(0.088)	(0.076)	(0.070)
Asia×*FDI*						0.062	0.071
						(0.041)	(0.041)
Asia×*Population share aged >65 years*							−0.425**
							(0.130)
Constant	187.117***	132.742*	287.351***	289.373***	284.322***	295.917***	316.460**
	(45.555)	(57.864)	(42.268)	(33.577)	(42.595)	(42.919)	(40.262)
Country dummy	Y	Y	Y	Y	Y	Y	Y
Year dummy	Y	Y	Y	Y	Y	Y	Y
N	1344	1106	987	982	982	960	960
Adjusted R^2	0.841	0.867	0.898	0.901	0.901	0.900	0.900

Notes: Robust standard errors in parentheses. *P<0.1, **P<0.05, ***P<0.01.

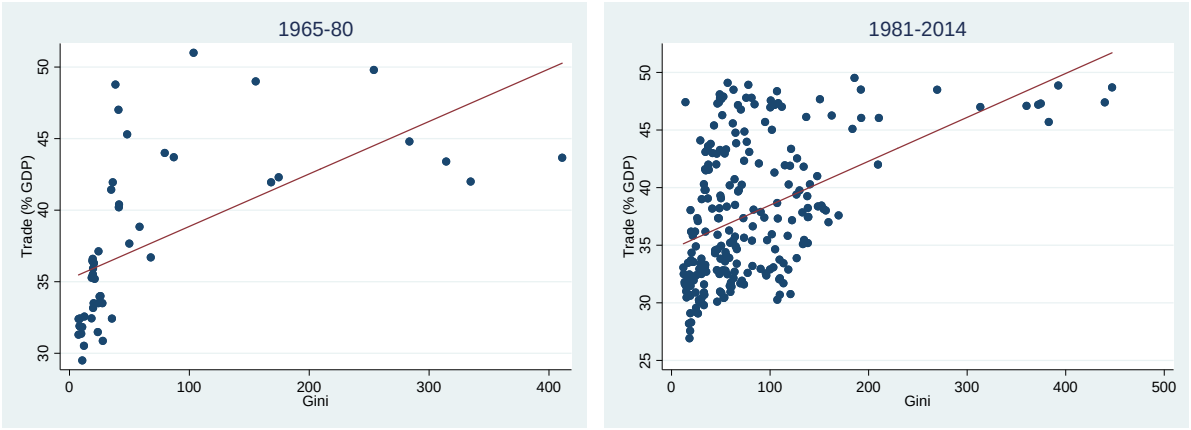
Source: Authors' compilation based on PWT, WDI, and WIID data.

However, the globalization variables are insignificant, possibly because their impacts changed around 1980 when the current wave of globalization began but limited data points for the pre-1980 period does not permit separate modelling for the two periods. However, we can simply plot

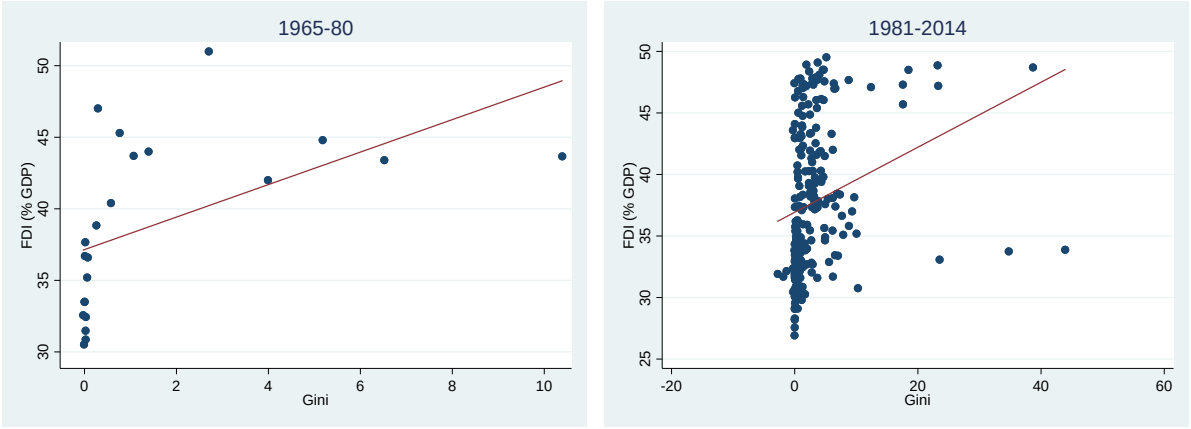
inequality-globalization variables for the two periods (see Figure 14). It is clear that both trade and FDI are positively correlated with inequality in Asian countries in both periods.

Figure 14: Globalization and inequality

(a) Trade



(b) FDI



Source: Authors' compilation based on WDI and WIID data.

What about the effect of land reform? Land reform broadly means regulation of ownership, operation, leasing, sales, and inheritance of land (Ghatak and Roy 2007). Several countries are known to have undertaken land reform in Asia: China, India, Japan, the Philippines, Sri Lanka, South Korea, Taiwan, and Viet Nam (see Appendix Table C1). To estimate the effect of land reform on inequality, a dummy variable (*land reform* = 1) interacted with the reciprocal of time trend (to ensure that the impacts of land reform possibly decline over time) is added to Equation (7). Here, the country fixed effect must be removed, otherwise the effect of land reform is not estimable. Table 3 presents the result, showing an inverted U-shaped relationship between land reform and inequality. Figure 15 plots this relationship, demonstrating that the inequality-reducing effect of land reform diminishes over time and converges to 0, much as expected.

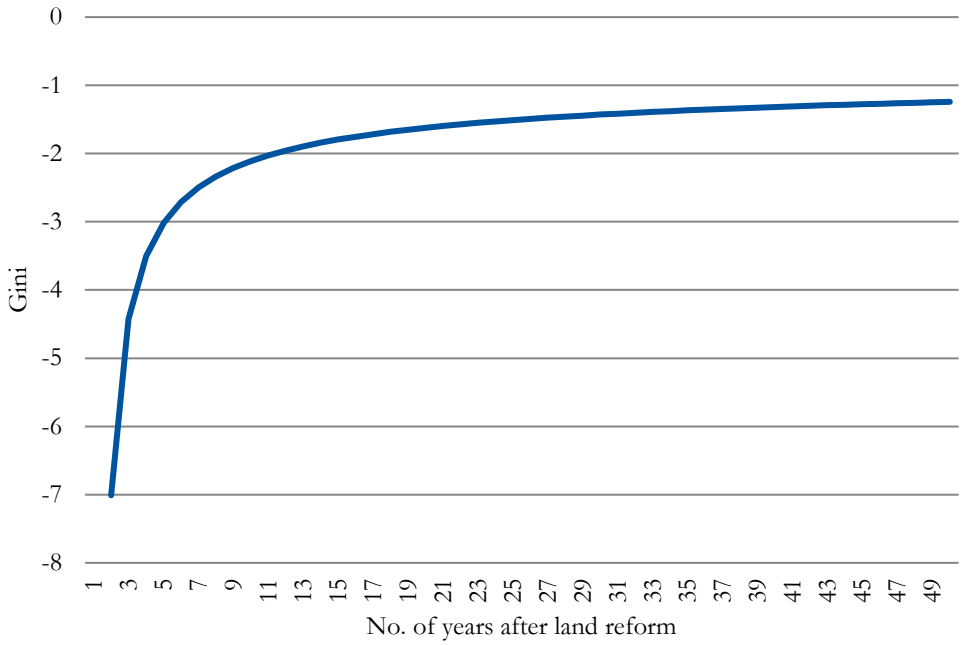
Table 3: The effect of land reform on inequality

	m1	m2	m3	m4	m5	m6	m7
	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID	Gini_WIID
Ln(*GDP per capita*)	22.089***	20.392***	14.253**	8.771	10.682*	10.099*	10.595*
	(3.118)	(3.688)	(6.310)	(6.324)	(6.012)	(5.957)	(5.674)
Ln(*GDP per capita*)^2	–1.401***	–1.391***	–1.118***	–0.916***	–1.015***	–0.999***	–0.748**
	(0.171)	(0.199)	(0.330)	(0.330)	(0.314)	(0.311)	(0.296)
Land reform	–7.751***	–6.900***	–5.857**	–2.852	–2.860	–1.699	–4.859[a]
	(2.237)	(2.549)	(2.726)	(2.857)	(3.007)	(3.089)	(3.316)
TFP		71.807***	98.843***	105.414***	103.337***	107.535***	30.239*
		(15.497)	(20.329)	(20.668)	(20.875)	(21.195)	(16.887)
TFP^2		–32.512***	–43.367***	–47.141***	–46.030***	–47.800***	–9.412
		(8.923)	(11.418)	(11.662)	(11.745)	(11.934)	(9.167)
Unemployment rate			–0.084	–0.094	–0.122*	–0.129*	–0.014
			(0.067)	(0.070)	(0.068)	(0.069)	(0.061)
Urbanization				0.122***	0.125***	0.152***	0.111***
				(0.021)	(0.022)	(0.022)	(0.020)
Trade					–0.001	0.008	–0.004
					(0.007)	(0.007)	(0.006)
FDI						–0.040***	–0.027***
						(0.007)	(0.006)
Population share aged 65+ years							–1.020***
							(0.072)
Constant	–46.976***	–71.220***	–50.808*	–27.213	–35.412	–36.137	–16.879
	(14.351)	(17.717)	(28.840)	(28.627)	(27.322)	(27.065)	(26.442)
Country dummy	N	N	N	N	N	N	N
Year dummy	Y	Y	Y	Y	Y	Y	Y
N	1344	1106	987	987	982	960	960
Adjusted R^2	0.204	0.296	0.346	0.370	0.370	0.376	0.517

Notes: Robust standard errors in parentheses. [a]*P*<0.15, **P*<0.1, ***P*<0.05, ****P*<0.01.

Source: Authors' compilation based on PWT, WDI, and WIID data.

Figure 15: The effect of land reform on inequality

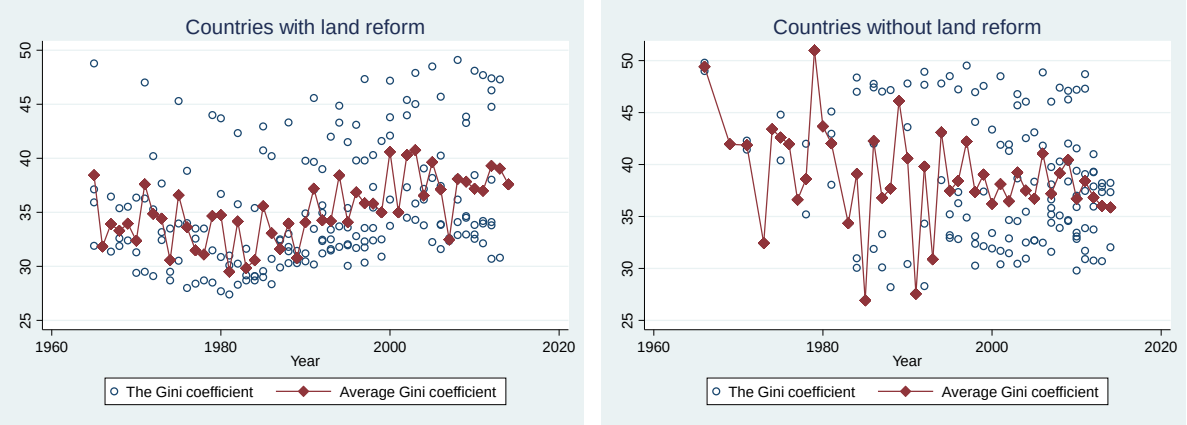


Notes: Estimation results from Table 3. *x* axis denotes the number of years after land reform; *y* axis denotes the effect of land reform on the Gini coefficient.

Source: Authors' compilation based on PWT, WDI, and WIID data.

To supplement the modelling result, Figure 16 contrasts the Gini estimates for countries with and without land reforms. It shows that, on average, countries with land reform have lower inequality, mostly below 40 per cent, while for the non-land-reform group the Gini coefficients are mostly above 40 per cent. In addition, countries with high initial inequality tend to face higher levels of inequality over time, as regression results in Table 4 show.

Figure 16: Inequality in countries with and without land reform



Source: Authors' compilation based on WIID data.

Table 4: The effect of initial inequality on overall inequality

	m1	m2
	Gini_WIID	Gini_WIID
Initial Gini coefficient	0.667*** (0.035)	0.668*** (0.039)
Constant	12.204*** (1.401)	12.751*** (1.835)
Country dummy	N	N
Year dummy	N	Y
N	327	327
Adjusted R^2	0.482	0.470

Notes: Robust standard errors in parentheses. *P<0.1, **P<0.05, ***P<0.01.

Source: Authors' compilation based on WIID data.

4.2 Costs of inequality

Inequality can be detrimental to growth (Wan et al. 2006). First, a higher inequality implies more individuals facing credit constraints under an imperfect capital market. Consequently, they cannot carry out productive investments (Galor and Zeira 1993; Fishman and Simhon 2002). Second, worsening distribution generates a rise in the fertility rate among, and less investment in human capital of, the poor (De La Croix and Doepke 2004). Third, increasing inequality may lead to weaker domestic demand, constraining the economy. This is particularly relevant to Asia which saves more and consumes less. Fourth, growing disparity increases the pressure for redistribution, deterring investment incentives (Alesina and Rodrik 1994; Persson and Tabellini 1994). Fifth, enlarged gaps mean a more unstable socio-political environment for economic activities (Benhabib and Rustichini 1996). Finally, rising inequality adversely affects crimes and health (Wan et al. 2018; Yao and Wan 2018). Empirically, Dabla-Norris et al. (2015) find that a 1 percentage point rise in the income share of the top 20 per cent lowers GDP growth by 0.08 percentage points in the following five years. On the contrary, a 1 percentage point increase in the income share of the bottom 20 per cent is correlated with a 0.38 percentage point rise in economic growth.

To quantify the effect of inequality on economic growth, the following model can be estimated:

$$GDP\ per\ capita = \mathrm{f}(Gini, Capital\ stock, Human\ capital, TFP, Sector\ ratio, Trade, Gini \times Asia, Capital\ stock \times Asia, Human\ capital \times Asia, TFP \times Asia, Sector\ ratio \times Asia, Trade \times Asia) \quad (8)$$

where sector ratio is defined as the share of value added of the manufacturing industry to value added of the primary industry (see Bourguignon and Morrisson 1998). Other variables are self-explanatory.

Results in Table 5 confirms the adverse effect of inequality on GDP per capita. This relationship is rather robust and stable. More specifically, every 1 percentage point increase in the Gini coefficient leads to a decline of GDP per capita, on average, by US$209. Other estimation results are largely consistent with a priori expectations.

Table 5: The effect of inequality on growth

	m1	m2	m3	m4	m5	m6
	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita
Gini coefficient	108.434*	25.289	38.611	43.223	43.695	29.962
	(45.961)	(41.634)	(33.510)	(23.206)	(25.741)	(22.742)
Capital stock per capita		9.4e+04***	9.3e+04***	1.0e+05***	5.3e+04***	5.0e+04***
		(1.2e+04)	(1.3e+04)	(9261.137)	(1.1e+04)	(6765.451)
Human capital index			−1.6e+03	263.301	176.738	−1.3e+03
			(4081.721)	(3717.562)	(3897.517)	(3569.102)
TFP				1.2e+04***	1.1e+04***	1.2e+04***
				(2608.077)	(2628.943)	(1865.266)
Ratio of manufacturing industry to primary industry					394.522***	346.926***
					(32.538)	(34.701)
Trade						43.786***
						(6.678)
Asia×Gini coefficient	−211.995**	−137.154**	−160.447***	−231.866***	−223.370***	−209.261***
	(60.709)	(48.045)	(33.972)	(47.420)	(47.829)	(41.207)
Asia×Capital stock per capita		2.8e+04***	5.3e+04**	4.6e+04**	6.5e+04***	6.9e+04***
		(3100.348)	(1.8e+04)	(1.8e+04)	(1.2e+04)	(1.1e+04)
Asia×Human capital index			−3.2e+03	−2.9e+03	−788.000	229.355
			(3517.043)	(2373.827)	(2605.179)	(1470.570)
Asia×TFP				−3.8e+03	−3.8e+03	−4.2e+03**
				(2046.457)	(2412.322)	(1337.840)
Asia×Ratio of manufacturing industry to primary industry					−367.360***	−317.682***
					(37.677)	(39.385)
Asia×Trade						−37.259**
						(9.935)
Constant	2.0e+04***	1.5e+04***	2.1e+04	4199.864	4345.825	5266.407
	(1554.350)	(2053.074)	(1.1e+04)	(9355.659)	(1.1e+04)	(1.0e+04)
Country dummy	Y	Y	Y	Y	Y	Y
Year dummy	Y	Y	Y	Y	Y	Y
N	1343	1309	1224	1105	1027	1018
Adjusted. R^2	0.979	0.985	0.986	0.988	0.991	0.992

Notes: Robust standard errors in parentheses. *P<0.1, **P<0.05, ***P<0.01.

Source: Authors' compilation based on PWT, WDI, and WIID data.

As discussed earlier, rising inequality means higher poverty for a given economic pie because transfers from the poor to the rich push more people into poverty. This can be defined as the

poverty cost of inequality. This cost can be easily simulated by holding GDP at the level in the base or current year and letting inequality change from the base year level to the latest level. Table 6 presents the results, in total, 248.4 million (under US$3.20 poverty line) and 145.09 million (under the US$1.90 poverty line) people who could have but were not lifted out of poverty due to rising inequality. The cost largely came from China (212.57 million and 114.18 million), followed by India, Indonesia, and Bangladesh.

Table 6: The impact of inequality on poverty (in millions)

Economy	Period t_0–t_1	Poverty-reducing impact (US$3.20)	Poverty-increasing impact (US$3.20)	Population in poverty brought by inequality	Poverty-reducing impact (US$1.90)	Poverty-increasing impact (US$1.90)	Population in poverty brought by inequality	Gini t_0	Gini t_1	Gini t_1–Gini t_0
Bangladesh	1973–2010	0.00	3.97	3.97	0.00	16.57	16.57	32.44	41.56	9.12
Bhutan	2003–12	0.10	0.00	–0.10	0.06	0.00	–0.06	46.78	35.95	–10.83
China	1981–2013	0.00	212.57	212.57	0.00	114.18	114.18	31	47.3	16.3
Hong Kong	1966–2011	0.00	0.00	0.00	0.00	0.00	0.00	49	48.7	–0.3
Indonesia	1984–2014	0.00	12.80	12.80	0.00	4.73	4.73	30.98	37.34	6.36
India	1965–2012	0.00	32.22	32.22	0.00	15.94	15.94	31.9	34.1	2.2
Iran	1986–2009	4.33	0.00	–4.33	2.06	0.00	–2.06	47.42	37.35	–10.07
Japan	1985–2008	0.00	0.02	0.02	0.00	0.00	0.00	35.92	36.18	0.26
Cambodia	1994–2012	1.47	0.00	–1.47	1.13	0.00	–1.13	38.5	30.76	–7.74
South Korea	1965–2012	0.58	0.00	–0.58	0.58	0.00	–0.58	37.13	30.7	–6.43
Laos	1992–2012	0.00	0.29	0.29	0.00	0.23	0.23	34.31	37.89	3.58
Sri Lanka	1973–2012	0.00	1.35	1.35	0.00	0.55	0.55	37.67	46.29	8.62
Maldives	2002–10	0.02	0.00	–0.02	0.01	0.00	-0.01	41.31	37	–4.31
Mongolia	1995–2014	0.01	0.00	–0.01	0.00	0.00	0.00	33.2	32.04	–1.16
Malaysia	1979–2014	1.39	0.00	–1.39	0.59	0.00	–0.59	51	38.23	–12.77
Nepal	1984–2010	0.00	0.58	0.58	0.00	0.99	0.99	30.06	32.84	2.78
Pakistan	1987–2013	3.96	0.00	–3.96	1.10	0.00	–1.10	33.3	30.7	–2.6
Philippines	1965–2012	4.39	0.00	–4.39	2.89	0.00	–2.89	48.78	44.77	–4.01
Singapore	1966–2011	0.04	0.00	–0.04	0.02	0.00	–0.02	49.8	47.3	–2.5
Thailand	1969–2013	1.12	0.00	–1.12	0.68	0.00	–0.68	41.95	37.85	–4.1
Taiwan	1968–2013	0.06	0.00	–0.06	0.02	0.00	–0.02	32.6	30.8	–1.8
Viet Nam	1992–2014	0.00	2.06	2.06	0.00	1.06	1.06	35.65	37.59	1.94
Total	—	17.47	265.86	248.40	9.17	154.26	145.09	—	—	—

Source: Authors' compilation based on WIID and WDI data.

5 Summary and conclusions

Asia has experienced rapid growth in the post-Second World War period, where East Asia has been the star performer. Asia's fast growth has contributed to significant poverty reductions in the region. According to our estimates, Asia's poverty rate under the US$3.20 poverty line dropped from 73.57 per cent in 1965 to 9.69 per cent in 2014. The corresponding decrease under the US$1.90 poverty line is from 48.52 per cent in 1965 to 2.58 per cent in 2014, implying eradication of abject poverty at the aggregate regional level under the 3 per cent threshold of the World Bank. At the sub-regional level, in 1965 Southeast Asia was the poorest. By 2014, however, South Asia, which is the only sub-region that had not managed to end extreme poverty, became the poorest. Under the 3 per cent criterion, Taiwan and Hong Kong eliminated extreme poverty in the late 1960s, Singapore in the mid-1970s, followed by South Korea in the early 1980s, Malaysia in the late 1990s, and Thailand and Indonesia in the new millennium. However, Asia is still some way away from ending moderate poverty. In 2014, there are still 421.48 million moderately poor (with a poverty rate of 9.69 per cent) in Asia.

On the other hand, however, the fast growth has been accompanied by inequality changes. For Asia as a whole, the Gini index increased from 38.43 per cent in 1965 to 42.80 per cent in 2006 before declining in recent years. At the sub-regional level, South Asia is most equal while East Asia is most unequal. Like the regional picture, the sub-regional inequality all exhibited an inverted U pattern. Further, Asia's inequality is mainly driven by the between-economy disparities. Inequality profiles of individual economies share common trends with their sub-regional counterparts, notwithstanding significant heterogeneity of inequality trends across economies and sub-regions. In particular, inequality worsened significantly in the most populous countries of Asia, including China, India, Indonesia, and Bangladesh.

Drivers of inequality include level of development, technical change, unemployment, urbanization, globalization, and ageing. In particular, unemployment and ageing are found to be positively associated with higher inequality, forcefully demonstrating the importance of employment in containing inequality. Regarding poverty drivers, it is not surprising to find that growth led to poverty reduction but this benign impact is found to have diminished as economies grow. That is, a same 1 percentage point of growth led to less and less poverty reduction over time—a typical phenomenon of 'ripping the low-hanging fruits first'. Other poverty-reducing factors include technological progress and trade exposure. Ageing and unemployment are also found to be positively correlated with poverty, once again demonstrating the importance of employment in fighting poverty.

Despite its recent declines, rises in inequality had cost Asia dearly. Modelling results in our paper indicate that every 1 percentage point increase in the Gini coefficient led to a decline of GDP per capita by US$209 on average. The cost of inequality also includes offsetting the benign effect of growth on poverty: a higher initial inequality is associated with smaller impacts on poverty of subsequent growths. In total, 248.4 million (under the US$3.20 poverty line) and 145.09 million (under the US$1.90 poverty line) Asians could have been lifted out of poverty but were not due to rising inequality in the region. This cost largely came from China (212.57 million and 114.18 million), followed by India, Indonesia, and Bangladesh.

Looking ahead, regardless of the ongoing de-globalization tide and possible clashes between the old and new global powers, growth of India is expected to accelerate and growth of China may re-accelerate (Lin et al. 2016), both providing major impetus for continuous development in Asia and beyond. The expected growth is likely to lead to future declines in inequality, based on our confirming the applicability of the Kuznets curve in Asia. Both the continued growth and predicted

improvement in income distribution will lead to further poverty reduction in the region (see Appendix B for more details), holding other things constant. According to our baseline projection, the moderate poverty rate could decline to 9.4 per cent in 2015, below 3 per cent in 2028, and 0.6 per cent in 2040. Appendix B also provides alternative inequality and poverty projections, depending on different growth scenarios that are assumed.

Nevertheless, Asia should not be complaisant with the growth prospect and the declining trend in inequality. As the benign growth impact diminishes, the adverse impact of inequality on poverty will gain more importance. Moreover, inequality could undermine growth and the cost of inequality in terms of lost growth and poverty reduction is quite substantial in Asia.

Apart from confirming the inequality-reducing role of land reform and inequality-rising role of globalization, this paper concludes that technical change is one of the most important drivers of inequality. Consequently, Asia should remain on high alert as artificial intelligence, big data, and information and communications technology (ICT) continue to advance, displacing manual labour and benefiting the skilled and the capitalists. How to generate jobs and reverse or at least halt the declining labour share in national income is a formidable challenge facing policy makers in Asia and beyond (Piketty 2014). On the other hand, these technology progresses may be used to help fight poverty and lower inequality. For example, 'accurate poverty reduction' recently invented and adopted in China relies on big data and ICT for poverty targeting and monitoring among others, which can be more effective than traditional modality of policy interventions.

Another finding worth reiteration is the role of employment in lowering inequality and poverty. This appeals for more public resources on education and training, upgrading the skills and enhancing the human capital of the disadvantaged. Closely related to this is the challenge of ageing which directly reduces labour supply and worsens poverty. Postponing the retirement age and strategic retraining of older workers ought to be added urgently to the policy agenda of relevant governments.

In short, it can be said that inequality plays a pivotal role in disentangling the growth–inequality–poverty triangle. While market may be most efficient in discovering prices for resource and output allocations, these allocations need not be optimal for maximizing social welfare. Thus, governments must step in when it comes to solving the distributional issue. However, the conventional wisdom of relying on fiscal tools has been proven to be insufficient. Measures or interventions at the stage of primary distribution must be considered. From this perspective, ground-breaking theories and practice (such as the basic income guarantee) are needed to raise the returns to labour relative to capital and raise the returns to the less skilled relative to the highly skilled.

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Appendix A: Estimation of regional inequality

Conceptually, inequality for a region such as Asia consists of two components: intra-country inequality (the within-component) and inter-country inequality (the between-component). Using Theil index as the indicator of inequality, the regional inequality is simply the sum of these two components. The within-component is estimated as the weighted sum of Theil estimates of individual economies. The between-component is the Theil estimate computed using economy averages. This is not possible when the Gini index is used.

WIID and other databases on inequality provide Gini estimates, not Theil estimates. However, under the reasonable assumption of log-normal distribution for poverty and inequality analyses (see Shorrocks and Wan 2009; Chotikapanich et al. 1997; Milanovic 2002; Lakner and Milanovic 2013; Lopez and Servén 2006; Pinkovskiy and Sala-i-Martin 2009; Liberati 2015), there is a one-to-one correspondence between these two inequality indicators:

$$Theil\ index = \frac{1}{2}\sigma^2 = \left[\Phi^{-1}\left(\frac{Gini+1}{2}\right)\right]^2 \quad \text{(A1)}$$

Thus, to construct the regional inequality profile, we use data on average household consumption from PWT 9 to compute the between-economy Theil estimates. Meanwhile, Equation (A1) can be used to convert Gini estimates from WIID to within-country Theil estimates. Adding the two components gives rise to the regional Theil index, which can converted into the Gini index using Equation (A1).

Appendix B: Poverty estimation

For many countries, poverty data in early years are not available. However, under the log-normal assumption, it is possible to obtain poverty head count ratio with a given Gini estimate, a poverty line, and average consumption.

Assume that income Y is log-normally distributed with mean μ_Y and variance $V(Y)$, then LnY is normally distributed with mean μ and variance σ^2, where

$$\mu = \ln \mu_Y - \frac{1}{2}\sigma^2 \tag{B1}$$

$$V(Y) = \text{Exp}(2\mu + \sigma^2)(\text{Exp}(\sigma^2) - 1) \tag{B2}$$

Let Φ denote the standard normal distribution function, we have

$$Gini = 2\Phi\left(\frac{\sigma}{\sqrt{2}}\right) - 1 \tag{B3}$$

From (B3), we can find

$$\sigma = \sqrt{2}\,\Phi^{-1}\left(\frac{Gini+1}{2}\right) \tag{B4}$$

For a given income observation y, the Lorenz coordinates ($P(y)$, $L(y)$) are given by

$$P(y) = \Phi\left(\frac{\ln y - \mu}{\sigma}\right) \tag{B5}$$

$$L(y) = \Phi\left(\frac{\ln y - \mu}{\sigma} - \sigma\right) \tag{B6}$$

Under the poverty line of z, the poverty head count ratio is simply

$$Pov(z) = \Phi\left(\frac{\ln z - \mu}{\sigma}\right) = \Phi\left(\frac{\ln\left(\frac{z}{\mu_Y}\right)}{\sigma} + 0.5\sigma\right) \tag{B7}$$

Thus, to estimate the poverty cost of rising inequality, say from $Gini_0$ to $Gini_1$, one can use Equation (B4) to obtain different σ estimates and Equation (B7) to obtain Pov; the difference is the poverty cost of an inequality change.

It is possible to project the growth rate that is needed to eliminate poverty, holding inequality constant or project the Gini that is needed to eliminate poverty, holding the mean expenditure constant:

$$\Phi\left(\frac{\ln z - \mu}{\sigma}\right) = \Phi\left(\frac{\ln\left(\frac{z}{\mu_Y}\right)}{\sigma} + 0.5\sigma\right) < 0.03 \tag{B8}$$

$$\Phi^{-1}(0.03)\sigma - 0.5\sigma > \ln z - \ln\left(\frac{z}{\mu_Y}\right) uy$$

Note, however, inc*reases in inequality (Gini or Theil) do not necessarily lead to rising poverty. To show this, let* M=(ln(z/μ_Y))/σ+0.5σ and one can obtain:

$$\frac{\partial M}{\partial \sigma} = 0.5 - \ln\left(\frac{z}{\mu_Y}\right) / \sigma^2$$

Thus, when $z=\mu_Y \text{Exp}(0.5\sigma^2)$, a small change in inequality has no effect on poverty. A rise in inequality leads to an increase in poverty if $z<\mu_Y \text{Exp}(0.5\sigma^2)$. It leads to a poverty decrease if $z>\mu_Y \text{Exp}(0.5\sigma^2)$. In other words, this unexpected feature happens when the poverty line is larger than a multiple of the mean expenditure or when inequality is small and the poverty line is high relative to the mean expenditure.

Holding Gini or σ constant (at the base year value or current year value), the growth effect *G* of a poverty change is:

$$G = Pov(Base\ year\ \mu_Y) - Pov(Current\ year\ \mu_Y)$$

In the case of missing data on average income or household final consumption, μ_Y can be estimated:

$$\mu_Y = f(GDP\ per\ capita, Control\ variables)$$

Appendix C: Land reform in Asia

Table C1: Land reform in eight Asian economies

China	In October 1947, China began land reform campaigns in North China. In the mid-1950s, a second land reform was undertaken to form the infamous communes, leading to the disastrous Great Leap Forward. In the late 1970s, a third land reform was carried out by allotting land back to individual families, signalling the beginning of China's opening up and reform era.
India	In 1949, state governments in India began the latest land reform by abolishing intermediaries, imposing a ceiling on land ownership, and promoting land consolidation.
Japan	The 1873 land reform privatized land ownership, replacing the previous land taxation system. Between 1947 and 1949, the government purchased around 38% of Japan's cultivated land which was sold to farmers at very low prices.
Sri Lanka	In 1972, the government enacted the Land Reform Law, placing a ceiling of 20 hectares for private land ownership. Any excess was distributed to landless peasants. Consequently, about 228,000 hectares of land was taken over by the Land Reform Commission between 1972 and 1974. And in 1975, more than 169,000 hectares of plantations were brought under state control.
South Korea	Land reform was undertaken from 1945 to 1950, confiscating land owned by the Japanese colonial government, Japanese companies, and individual Japanese for redistribution to farmers.
Taiwan	In the 1950s, the Sino-American Joint Commission on Rural Reconstruction was responsible for land reform and community development.
The Philippines	Land reform in the early 1960s was implemented in Central Luzon covering rice fields only. The Marcos government instituted land reform to support rice and corn production, transforming the Philippines from a rice importer to a rice exporter. In the mid-1980s, the Aquino Administration carried out land reform, covering all agricultural lands. The reform was a failure as it did not achieve the goal of land redistribution but led to rice shortages. The reform expired in December 2008.
Viet Nam	From 1953 to 1956, land was redistributed to more than 2 million poor and landless peasants. In 1970, South Viet Nam launched the Land to the Tiller programme, limiting individuals to 15 hectares of land. Owners of expropriated tracts were compensated.

Source: Authors' compilation based on Ding (2003), Ho (2005), Flores (1970), and The LawPhil Project (1963).