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Trade openness and the growth-poverty nexus: Reappraisal with a new openness indicator

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Trade openness and the growth-poverty nexus: Reappraisal with a new openness indicator*

Wannaphong Durongkaveroj

Abstract

Developing countries have greatly benefited from globalization, coinciding with economic growth and structural transformation. Standard trade theory postulates that trade openness contributes to poverty alleviation directly by changing factor proportions of production and indirectly through the trickle-down effect of growth. Existing multi-country studies using the trade-to-GDP ratio to measure openness often fail to find a direct effect of openness on poverty over and above the growth-poverty nexus. This paper is motivated by the concern that failure of these studies to detect the effectiveness of the factor proportion channel may be due to limitations of the commonly used measure of trade openness, the trade-to-GDP ratio. Using a newly constructed index of trade openness, which I dub ‘the price convergence index’ (PCI), I find significant direct effect of openness on poverty reduction. The results also suggest that the impact of growth on poverty is greater for countries with more open trade regimes.

Keywords: Development, Growth, Openness, Poverty, Trade

JEL Classifications: F13, F14, F15, F43, I30, O19

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1. Introduction

The last few decades have witnessed a notable increase in the share of developing countries in global trade, coinciding with rapid economic growth and structural transformation, and concomitant widespread poverty reduction, notably in the People's Republic of China (the PRC) and India. In this paper, I ask one main question: How does trade openness promote economic growth and its poverty reduction impact?

This question is increasingly relevant today as developing countries observe a less open and more conflicted international trade environment highlighted by the trade war between the United States (the US) and the PRC since 2018. Furthermore, large reductions in trade and output volumes occurred during the COVID-19 pandemic (in part due to the set of policy responses adopted). These two factors add momentum to the deglobalization trend. Since trade openness has long been praised as an engine of growth and employment generation, trade liberalisation is currently at the forefront of development policy circle.

The standard trade theory postulates that opening up to trade reduces poverty in developing countries through both an indirect effect on economic growth (the 'pull-up' effect) and by increasing the poverty impact of a given rate of growth through changes in the employment intensity of growth. The latter effect operates through changing factor proportion of production, which in a labour-abundant country means shifting resources towards labour-intensive production (the 'factor proportion' effect).

The early comparative country studies of the developmental outcome of trade policy regime shifts in developing countries from import substitution to export orientation are generally consistent with both postulates (Little, Scitovsky, and Scott, 1970; Bhagwati 1978; Krueger 1978; Balassa, 1982). Also, a comparison of more recent evidence on the poverty reduction outcome of trade policy reform episodes in some developing countries is consistent with these postulates.¹

However, recent multi-country econometric studies on the growth-poverty nexus have provided evidence that only supports the pull-up effect (Roemer and Gugerty 1997; Dollar and Kraay 2002; Aisbett, Harrison, and Zwane 2008; Dollar, Kleineberg, and Kraay 2016).² The impact of trade openness on poverty, therefore, remains the subject of considerable controversy. For

¹ The most conspicuous examples are the PRC and India. Both countries have experienced rapid growth and poverty reduction in the past few decades. However, poverty rate has fallen much faster in the PRC compared to India. There is ample evidence that the PRC is more open to foreign trade and investment compared to India (Bhagwati and Panagariya 2013, Ghosh 2010, Ravallion 2011, Joshi 2017, Panagariya 2019).

² For a survey on this literature, see, for example, Bhagwati and Srinivasan 2002, Winters et al. 2004, Winters and Martuscelli 2014, Panagariya 2019.

instance, Winters et al. (2004) and Winters and Martuscelli (2014) conclude that ‘there can be no simple general conclusion about the relationship between trade liberalisation and poverty.’

This paper is motivated by the concern that the failure of these previous studies to detect a systematic relationship between openness and poverty could have been because of the limitations of the standard measure of trade openness, the trade-to-GDP ratio. This openness indicator, however, not only captures changes in trade policy, but also other policy actions along with a variety of other factors unrelated to trade openness such as the country size, population, technological change, changing trade patterns, and income growth. I address this issue by first constructing a new index of trade openness that captures the convergence of the prices of tradable goods among countries, drawing on research by Jeffrey Williamson and others studies on relative price movement of traded goods in the context of economic globalisation. The key notion of this index, which I dub the ‘price convergence index’ (PCI), is that after allowing for transport costs, the degree of price convergence of tradable goods across countries over time is an irrefutable evidence of greater global economic integration. I undertake empirical analysis using a new multi-country panel dataset put together from various sources to examine the trade-growth-poverty nexus using the standard growth regression model. The analysis covers 123 countries from 1970 to 2017.

The results suggest that, when the new measure of trade openness is used, there is a statistically significant negative relationship between openness and poverty, after controlling for economic growth and other relevant control variables. At the same time, the coefficient of the interaction term between growth and openness is negative and statistically significant. The poverty reduction impact of a given rate of economic growth is 0.3% larger in open economies. The findings are robust to alternative measures of poverty, the inclusion of a set of relevant explanatory variables, and estimation of the model for subsamples of countries and for different periods.

2. Conceptual framework

According to the standard trade theory, trade openness can reduce poverty directly through the factor proportion effect and indirectly through the growth effect.

The Stolper and Samuelson theorem postulates that liberalisation in the poor countries promotes labour-intensive production, resulting in an increase in the demand for unskilled labour (Stolper and Samuelson 1941). Since labour is the only resource owned by the poor, the creation of employment injects income to the poor, even if wages do not initially increase under ‘surplus labour’ conditions at the early stages of economic growth (Lewis 1954). Put simply, employment creation is a sure-fire way to reduce poverty because labour is generally the only resource the poor possess. In

addition, in the process of growth and structural transformation of the economy, wages begin to increase after the pool of surplus labour is fully absorbed in the modern sector. This process, facilitated by trade openness, further augments the poverty reduction effect of economic growth.

Trade can also affect poverty through the pull-up effect of growth. The basic notion is that openness contributes to growth, and that growth reduces poverty in a number of ways (Bhagwati 1988, Findlay 1984). Export earnings can relax balance of payment constraint. This allows the economy to access imported capital goods and machinery and essential intermediate inputs, enabling an expansion of the manufacturing sector. Global market penetration enables domestic production to gain scale economies without being constrained by the size of the national economy. Moreover, openness increases the exposure of the domestic economy to international competition and diffuses international knowledge and foreign technology, resulting in higher productivity. Through these channels, growth is expected to trickle down to the poor, for a given level of income distribution (Ahluwalia, et al. 1979, Deininger and Squire 1996).

The findings of a series of in-depth comparative country studies are consistent with both postulates. A pioneering study of trade policy and industrialisation in developing countries was conducted by Little, Scitovsky, and Scott (1970). The key message of this study, which sets the stage for the subsequent ideological shift from import-substitution to export-oriented industrialisation strategy, was that redressing policy bias against exporting promotes greater efficiency in the use of resources and generates higher levels of employment and paving the way for later growth with equitable distribution of income. Other subsequent comparative studies have also come up with similar inferences (Balassa 1982, Papageorgiou et al. 1990).

However, the results from empirical studies are rather mixed. Dollar and Kraay (2002) find that the share of income of the poor significantly increases with the rise of the average income of these countries, but the interaction of the openness measures with real GDP per capita is not statistically significant. Aisbett, Harrison, and Zwane (2008) find a positive but insignificant relationship between openness and poverty reduction using instrumental variable estimation. Despite continuing controversies over methodology and the measurement of openness, several studies reach a similar conclusion that openness does not affect the income of the poor beyond the effect on average per capita income growth (Roemer and Gugerty 1997, Dollar and Kraay 2002).

Instead of focusing on income and poverty at the aggregate (countrywide) level, several recent studies have used the micro-level data to examine the openness-poverty nexus. For instance, Topalova (2010) investigates the relative effects of trade liberalisation on poverty reduction in India at district level using a difference-in-difference approach. The key result is that, in rural India,

districts that were more exposed to trade liberalisation have had slower progress in poverty reduction. Kis-Katos and Sparrow (2015) also examine the effects of trade liberalisation in Indonesia. They find that districts with a greater exposure to input tariff liberalisation experience faster poverty reduction. This poverty-reducing impact of trade liberalisation is also found in the context of Thailand's accession to WTO (Durongkaveroj and Ryu 2019).

Overall, the evidence of the direct effect of openness on poverty is mixed. At a macro level, a clear pattern emerges with a few exceptions that there is no systematic impact of trade openness on the income of the poor beyond the aggregate economic growth. At a micro level, however, there seems to be a direct impact of liberalisation on the poor. However, these studies do not paid attention to the possibility that findings of these studies might have been conditioned by the well-known limitations of the trade-to-GDP ratio commonly used as the sole measure of trade openness in these studies.

The use of the trade-to-GDP ratio as an indicator of trade openness is highly debatable. Changes in trade ratio can capture an increase in imports and/or exports driven by other factors such as the country size, geography, population, capital accumulation, technological change, and change in terms of trade, all of which have little to do with more liberal trade policies (O'Rourke and Williamson 2002, Berg and Krueger 2003, Williamson, 2014). Dollar and Kraay (2004) argue that the change rather than the level of trade-to-GDP ratio is not contaminated by geography, nor by other unobserved country characteristics. However, this reasoning is valid only if all unobservable country characteristics remain unchanged over time (Birdsall and Hamoudi 2002). For instance, change in the terms of trade can impact on trade share regardless of the openness of the trade regime. Moreover, since policy makers cannot control the level of trade driven by the ongoing process of global economic integration, trade share may have little to do with trade policy. In addition, there is strong empirical evidence that changes in trade-to-GDP ratio is significantly driven by changes in GDP *per se* (Fujii 2019).

Finally, the trade share is susceptible to a country's engagement in global production sharing (GPS), the cross-border dispersion of production processes within vertically integrated global industries (Athukorala 2014, Timmer et al. 2014, Antràs 2016). This process involves spreading of total value addition of a given product among a number of countries. This implies that the value added share of recorded exports from a given country tends to decline with the deepening of its involvement in global production networks. While GDP is measured in value added terms, trade is measured in gross terms, thus resulting in inflated trade values relative to GDP. When the manufacturing sector of a country is well integrated within global production networks, the trade-to-

GDP ratio can be artificially high even though export production involves adding small amounts of value to imported inputs (Krugman 1995).

Two other openness indicators, which are mostly used as supplementary to the standard trade-to-GDP ratio, are average applied tariff (simple average or trade weighted) and the Sachs-Warner Index (Sachs and Warner 1995). There are a number of limitations for tariff rate as an indicator of openness to trade. First, the official and effective tariff rates can be very different because imported inputs used in export production are duty-exempted in most countries (Pritchett and Sethi 1994). Second, in some cases, there are quantitative restrictions side-by-side with tariffs that naturally create an unexplained wedge between world market prices and domestic prices of the traded goods (Anderson and Neary 1992, Milner and Morrissey 1999).

The Sachs and Warners (SW) index is a binary indicator that helps distinguish between open and closed regimes. It has been designed to capture various policy measures impacting on trade openness. In constructing this index, a country's trade policy regime is treated as 'open' based on five criteria: (1) an average tariff rate below 40%; (2) non-tariff barriers covering less than 40% of trade; (3) a black-market exchange rate premium below 20% on average during the 1970s and 1980s; (4) the absence of a socialist economic system; and (5) the absence of an extractive state monopoly on major exports (Sachs and Warner 1995). This index also receives several critiques. For example, Berg and Krueger (2003) assert that this dummy variable does not capture the different degrees of restrictiveness of trade regimes, and, therefore, poses a limitation on the use of panel data analysis. In the same vein, Irwin (2019) points out that a dummy variable does not tell us about the multiple periods of being open and closed.

3. A new measure of trade openness

Mindful of the limitations of the traditional measure of trade openness, I construct a new index to measure trade openness based on changes in the relative prices of traded goods.

The idea for constructing this index comes from the work of Jeffrey Williamson and his research associates (O'Rourke and Williamson, 1999, 2002; Williamson 2000, 2002, 2014). As they point out, price convergence is a better indicator of openness compared to the trade-to-GDP ratio. It is important to note that most of these historical studies have focused on trade in primary products (e.g., sugar, spice, and coffee). However, as noted by O'Rourke and Williamson (1994, p. 899), the concept of price convergence generally applies to tradable manufactured goods, not just primary products. Rodrik (2002, p. 10) also gives credence to the case for using price convergence as a superior measure alternative to the standard trade-to-GDP ratio: 'from an economic standpoint, what

matters most is not the volume of trade as much as the degree of price convergence across national markets.’

The concept of convergence of prices of traded goods in the process of global economic integration is closely related to the law of one price (LOP), which postulates that, in the absence of transport costs and trade restrictions, each traded good is uniformly priced throughout the world by perfect commodity arbitrage (Isard 1977, p.942). Despite mixed evidence, the key inference from the empirical literature is that the ‘relative’ version of the LOP (changes in relative prices) holds even though its absolute version (absolute price difference) does not hold. As convincingly argued in these studies, if international markets are integrated, *the rate of change* in prices at home and abroad should converge. At a given point in time, prices of a given product can of course be different across countries due to differences in consumer purchasing power (which depends on the stage of economic advancement), transportation costs, and other fixed costs. However, over time, openness to trade should manifest in a convergence of *changes* in relative prices of traded goods. In other words, even though price levels are naturally different, *the rates of change in prices* are, on average, synchronised among countries (Engel and Rogers 2001, Cecchetti et al. 2002, Hufbauer et al. 2002, Goldberg and Verboven 2005). Thus, an index that captures the convergence of prices of traded goods across countries is a superior measure of openness to trade compared to the standard trade-to-GDP ratio. It captures the impact of both tariff and non-tariff restriction and behind-the-border barriers impacting on a country’s engagement in foreign trade. At the same time, unlike the trade-to-GDP ratio, this index is less susceptible to other non-trade related factors, in particular country size and GPN participation.

In the market integration literature, there has been an attempt to examine whether prices in different markets move together and price differential is driven by transfer cost (Baulch 1997, Keller and Shiue 2007;). While these studies focus on testing the co-movement of prices on which the LOP is based, the PCI measure the overall trade openness of a given country by examining changes in its national price compared to the world price. Due to methodological choices and the available data, the results from testing commodity market integration using agricultural prices are rather mixed (Federico 2012).

In this study, I construct a ‘price convergence index’ (PCI) that captures changes over times in the price of traded goods in a given country relative to that of the world price. To construct the index, manufacturing price is measured by the implicit price deflator (with 1970 as the base year) derived from national accounts of individual countries while treating the implicit price deflator for the U.S. as the proxy indicator of the world price. Individual country price indices are adjusted for

changes in the exchange rate with the U.S. dollar and then expressed as a ratio of the U.S. price index to obtain the relative manufacturing price indices. The PCI is then constructed as the absolute deviation of relative price from the base value (1970 = 100). See online appendix for how to construct this index.

I use manufacturing price index to measure traded goods price due to the relatively high degree of tradability of manufactured goods. The GDP deflator is not appropriate because it captures both tradable and non-tradable prices. Agricultural products are traded goods, but some agricultural products are quasi-nontradables (e.g., vegetables and some other food items). More importantly, agricultural prices are influenced by changes in global commodity price cycles. The U.S. manufacturing price is taken as the reference price because the U.S. is the largest trading nation in the world during the period under study with a highly open trade regime, particularly for manufactured goods.

Data for manufacturing value added deflators for all countries other than the PRC are obtained from FAO database. Data for the PRC were compiled from the data extracted from the World Bank World Development Indicator Database. Note that only data for industry (mining, construction, utilities, and manufacturing) are available for the PRC for the entire period under this study. However, comparison done for a recent period (from 2000 to 2015) for which disaggregated data are available suggests that the manufacturing deflator closely follows the patterns of the deflator for industrial production.

Figures 1 and 2 depicts the trade-to-GDP ratio and the PCI for four countries, the PRC, India, Indonesia, and the Republic of Korea, over the period 1970-2017. These four countries have experienced trade regime policy shifts during the period of study.

It is clear from Figure 1 that, regardless of policy changes, the trade-to-GDP ratio has increased successively during the past few decades. This increasing trend did not reverse even during the 1997 Asian Financial Crisis. A fall in trade share after the 2008 Global Financial Crisis was because of the slowdown in world trade, not changes in countries' trade policy. Using the traditional measure of openness, before 2000, Indonesia and the Republic of Korea were relatively open compared to the PRC and India. After that, the Republic of Korea's degree of openness has outpaced other three countries. However, there are more variations in the relative prices, and some episodes of this movement are associated with policy changes.

Despite the liberalisation reforms initiated in 1978, the PRC was considered 'close economic system' until the late 1990s (Wacziarg and Welch 2008). From around 2001, the PRC has had a relatively open trade regime after its accession to the WTO, resulting in significant reductions in

tariffs, gradual elimination of quotas and license, and a commitment to international standards in the protection of intellectual property. The PRC's trade-to-GDP ratio has increased gradually over time, with a sharp increase in trade share after the early 2000s. However, the relative price movement shown in Figure 2 indicates that the PRC's trade regime is relatively close throughout the 1980s and 1990s. This is consistent with evidence that trading rights, import license, canalisation and exclusive import rights are more liberalised only in the late 1990s (Panagariya 2019). After an accession to WTO in 2001, the PRC's price movement has begun to be more in line with that of the U.S.

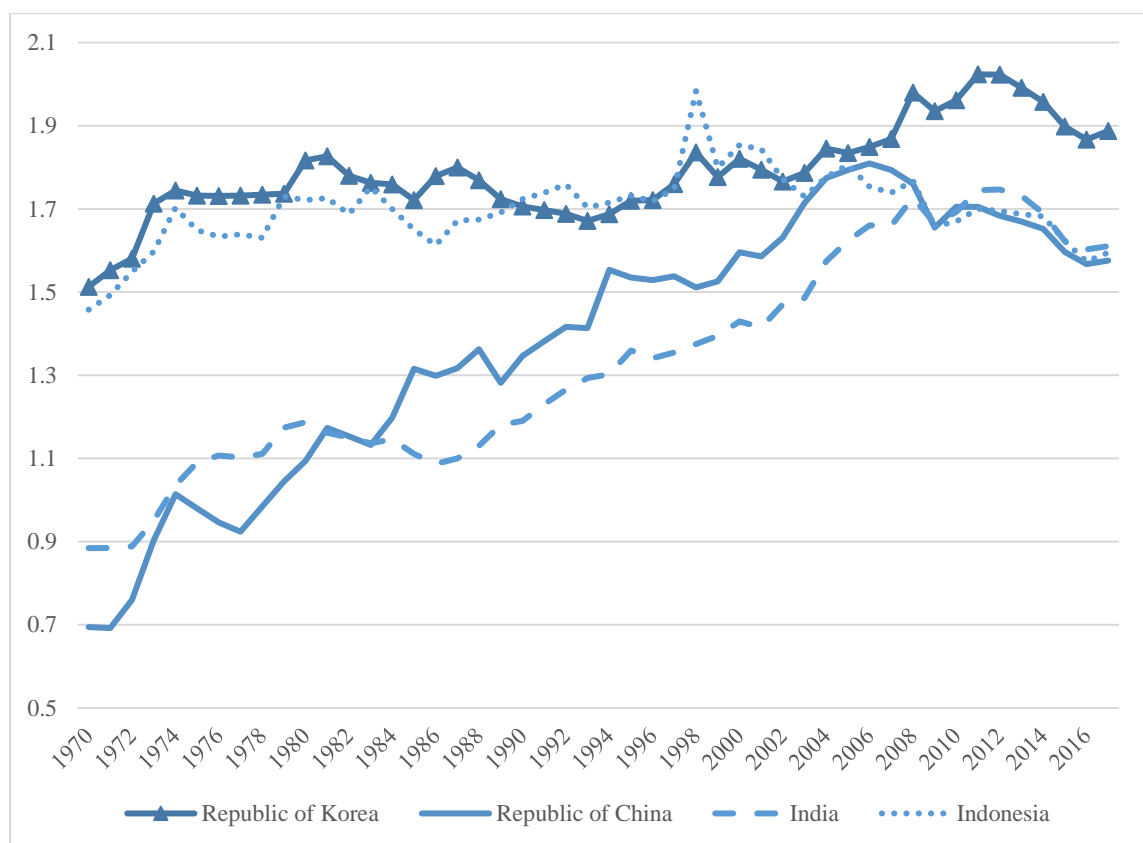


Figure 1: Trade-to-GDP ratio between 1970 and 2017 (log scale)

Source: World Bank (2020)

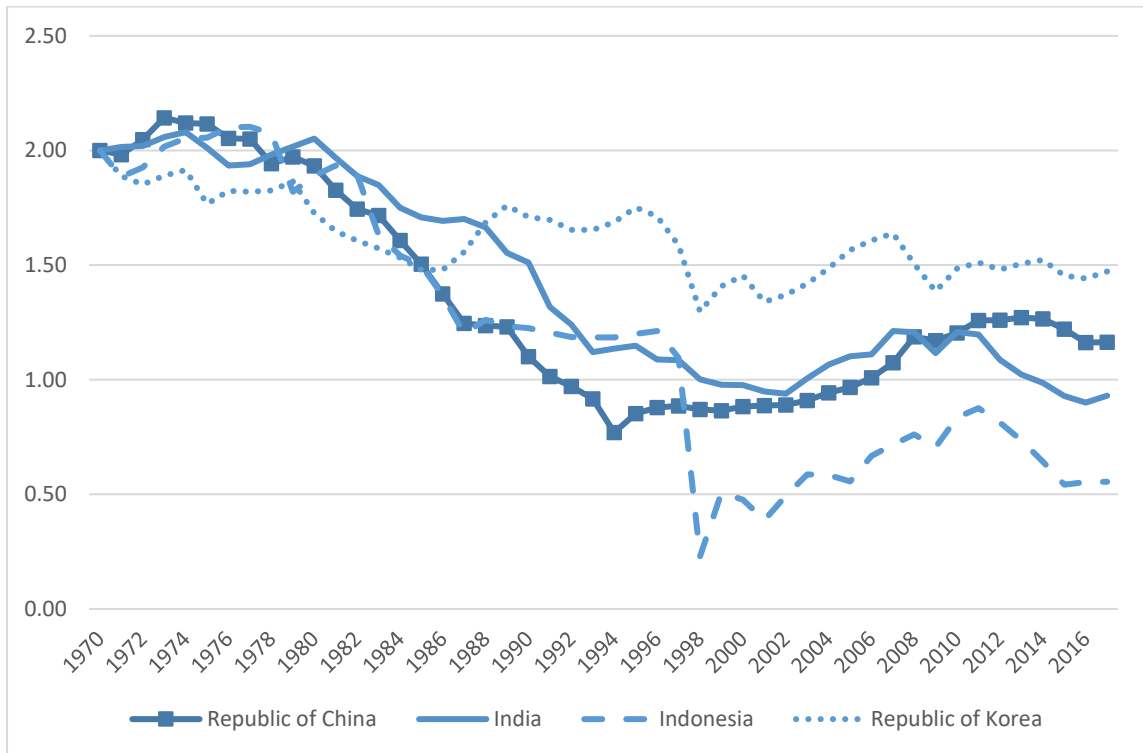


Figure 2: Price convergence index between 1970 and 2017 (log scale)

Source: Author's calculation

India seems to share a similar trend with the PRC. India gradually opened its economy to trade and investment after 1991, followed by some minor liberalisation efforts during the 1980s (Pursell 1992, Panagariya 2005). This is illustrated by a relative high degree of openness during the 1980s as shown in Figure 2. However, average manufacturing price movement in the 1990s suggests that protection in India remained high. Chad and Towar (2011) suggest that India offsets the effect of reduced tariffs through use of antidumping and safeguard protection, especially after the late 1990s. A slight increase in the relatively price movement from 2000 to 2010 indicates that India was more open during that period. However, for the last five years, such price movement has diverged from the US again. This is the period in which the Modi government launched 'Make in India' program in 2014, which was accompanied by some targeted tariff protection and government subsidies to specific industries (Athukorala 2020). Overall, India is still less open when compared with the Republic of Korea and the PRC.

Indonesia began to become relatively open from about the early 1980s with some episodes of protectionism (Fane and Condon 1992, Marks and Rahardja 2012). Yet, as shown in Figure 2, relative price movement suggests that Indonesia has experienced some policy reversals. During the 1970s and the early 1980s, Indonesia followed some forms of import substitution industrialisation

with use of tariff, export ban, and import license (Pangestu et al. 2015). From the late 1980s to the mid-1990s when Indonesia implemented deregulation and export promotion, relative price movement during this period was relatively stable. Price divergence took place again after the 1997 AFC. However, Indonesia has seen the return of protectionism in recent years, especially in the form of non-tariff barriers (Soesastro and Basri 2005, Basri and Patunru 2012, Patunru 2018). This has been clearly observed in the divergence of Indonesia's relative price movement since 2000.

As shown by both the trade-to-GDP ratio and the PCI, the Republic of Korea remained relatively open throughout the period of study. Even though the trade-to-GDP ratio has risen steadily, relative price movement indicates that there are some fluctuations in this trade regime. During 1960s, the expansion in labour-intensive exports contributed to rapid economic growth. Nonetheless, the Republic of Korea launched a targeted promotion of heavy and chemical industry (HCI) in 1973 with HCI-firms enjoying protection by high tariff. Several incentives were also provided to HCI-firms such as directed bank credit at low (on the average, negative) real interest rate and special tax treatment and trade policy concessions (Graham 2003, Adelman 2007). While the trade-to-GDP ratio during this period increased, its average manufacturing price in 1970s diverged from the world price. Relatively more liberal trade policy stance of the government of the Republic of Korea is reflected in more convergence in prices changes during the 1980s when the economy returned to a neutral regime (Panagariya 2019, p. 229). An example of liberalisation efforts can be seen in the establishment of the Tariff Reform Committee in 1983. After this, the Republic of Korea's trade policy regime has remained relatively open, albeit with some divergences in price movement during the AFC and the GFC.

Table A1 in the Appendix reports coefficient of variation of the price convergence index for all countries covered in this study. The coefficient of variation for almost all countries have declined over time. This illustrates the greater economic integration of the world economy over time. Of course, the PCI is not a perfect indicator of economic openness. Given the enormous heterogeneity of manufacturing trade and other country-specific fixed factors such as geographic distance and country size, it is impossible to assume perfect convergence of manufacturing prices even in the absence of trade restrictions. Moreover, since the PCI is constructed from the manufacturing price deflator, this index captures the average price movement over time. Of course, the ideal choice would be a comparison of price movements for a product that is homogenous across all countries, but there is no suitable product for such a comparison. However, allowing for these complications, we can reasonably assume that trade restrictions play a role in the movement of relative prices of manufactured goods among countries.

4. Methodology

4.1 The model

The objective of this section is to use the new measure of trade openness to examine how trade openness affects poverty. Following the previous studies on the trade-growth nexus (Dollar and Kraay 2004, Ravallion and Chen 1997, Santos et al. 2019), the empirical model is specified as follows:

$$\text{Log}POV_{it} = \alpha + \beta_1 \text{log}GDP_{it} + \beta_2 OPEN_{it} + \beta_3 INF_{it} + \beta_4 GE_{it} + \beta_5 RR_{it} + \mu_i + \gamma_t + v_{it} \quad (1)$$

where POV is poverty headcount ratio, the subscripts i and t refer to country and year. The explanatory variables are listed below, with the postulated sign of the regression coefficient for the explanatory variables in parenthesis.

GDP (–)	Real Gross Domestic Product per capita
$OPEN$ (–)	Trade openness
INF (+)	Inflation rate measured by consumer price index
GE (–)	Total government expenditure as a share of GDP
RR (+)	Degree of regime repressiveness
α	A constant term
μ	Country fixed effects
γ	Year fixed effects
v	An error term

In the equation [1], β_1 is commonly known as *Growth Elasticity of Poverty*. This elasticity expresses how much poverty incidence declines in response to economic growth. The sign of β_1 is expected to be negative, meaning that, *ceteris paribus*, an increase in GDP per capita should reduce the incidence of poverty. Also, the sign of β_2 is expected to be negative. This implies that an increase in the degree of openness should result in lower poverty. However, the estimated coefficient may be indifferent from zero if the effect of openness is operated through growth—that is, an indirect effect of openness on poverty. The model is first estimated with the trade-to-GDP ratio to measure openness as the benchmark and then with the price convergence index.

The rate of inflation (*INF*) is included to capture macroeconomic stability. It is important to explain inter-country differences in the poverty rate since real wages among the poor tend to be smaller in country with higher inflation. The sign of the coefficient on inflation is anticipated to be positive. Total government expenditure (*GE*) is included to control for effect of government programs. As this should directly benefit the poor, the expected sign of the coefficient should be negative. Finally, political and economic institutions are important to the overall performance of the economy because they can foster the market conditions conducive to competitive markets. The sign of the coefficient on regime repressiveness (*RR*) is likely to be positive, implying that the higher the repressiveness, the higher the poverty rate. This is because in a country, where political rights and civil liberty are low, the economic incentive and condition tends to favour only a small group of people (say, the elite and the rich few), instead of the poor. The interest of the economically disadvantaged group may not be prioritized in the decision-making process. However, it is also possible for a non-democratic regime to implement policies to alleviate poverty. The expected sign of the coefficient is, therefore, ambiguous.

In addition, I investigate whether the relationship between poverty and growth is conditioned by trade openness by introducing an interaction of the openness measure with the log-level of real GDP per capita. The estimating equation is

$$\text{LogPOV}_{it} = \alpha + \beta_1 \log \text{GDP}_{it} + \beta_2 \text{OPEN}_{it} + \beta_3 (\log \text{GDP}_{it} \times \text{OPEN}_{it}) + \beta_4 \text{INF}_{it} + \beta_5 \text{GE}_{it} + \beta_6 \text{RR}_{it} + \mu_i + \gamma_t + v_{it} \quad (2)$$

The impact of economic growth on poverty is given by the partial derivative of *P* in Equation [2] with respect to *Y*, $\beta_1 + \beta_3 \text{OPEN}_{it}$. To test this hypothesis, the statistical significance of β_3 is examined. Supposed the sign of β_3 is negative and statistically significant, it indicates that the impact of growth on poverty reduction is greater among relatively open economies. Moreover, β_2 captures the direct impact of openness on poverty while β_1 captures the indirect impact since its impact operates through growth. Total impact of openness on poverty is, therefore, $\beta_2 + \beta_3$, conditional on economic growth. Note that the sign of β_2 itself is ambiguous. This coefficient can be positive or negative depending on the nature of trade openness. Even though β_2 is positive, it does not imply that openness increases poverty. Whether its contribution is positive or not depends on the size of the coefficient of the interaction term of openness and growth. The expected signs of other explanatory variables are identical to Equation [2].

4.2 Data

The model is estimated for a sample of 123 countries, and separately for developing countries and developing countries in Asia. The data series have been compiled from various sources listed in Table A2 in the Appendix.

Developing countries are defined based on the United Nations Standard Country Classification. This group includes four countries that achieved high-income country status in the 1990s based on the World Bank's income-based country classification (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China). The experience of these countries reaching high-income status is central to the debate on the openness-poverty nexus.

One of the difficulties in studying poverty across countries over a long period of time is that data on poverty (and income distribution) are scant, resulting in a highly unbalanced and irregularly spaced panel of observations. Data on poverty before 2000 cover only few developing countries, for example, Argentina, Indonesia, and Thailand. A common way to handle with this data issue is to create 'spell' (interval) defined by the periods of time spanning two successive data, which is based on household surveys. I follow closely the methodology used in the literature on poverty (Adams 2004, Dollar and Kraay 2004, Loayza and Raddatz 2010). To create a spell for each country, I begin with the first available observation (poverty rate), and then move forward in time until the next observation on poverty exists. Since we are focusing on growth over the medium to long run, the condition to create each spell is that the length of each spell is at least 5 years. The last interval moves until the final observation on poverty incidence. This means that I drop countries that have only *one* observation on poverty (e.g., Japan, Tuvalu and Zimbabwe). Also, the adjacent annual observations are dropped.

For example, in the case of Thailand, the first change in poverty rate is between 1981 and 1988. This spell is followed by the change between 1988 and 1992. Poverty rate in 1990 is disregarded because the gap to previous observation is less than 5 years. This applies to other explanatory variables over the same period. Since the lengths of the spells differ, I then annualise the changes in poverty and other explanatory variables in order to make spells of different lengths comparable. Table A3 in the Appendix reports country coverage. Table 1 presents the summary statistics of the variables. Note that the inverse of PCI is used in the econometric analysis to make it comparable with the trade-to-GDP ratio.

Table 1: Summary statistics

Variables in the model	Observations	Mean	Standard Deviation	Min	Max
Poverty rate (<i>POV</i>)	511	17.38	22.55	0.00	94.10
Real GDP per capita (<i>GDP</i>)	507	12,409.71	19,070.85	213.65	110,000.00
Price Convergence Index (<i>PCI</i>)	504	25.00	7.02	0.00	100
Trade-to-GDP ratio (<i>TO</i>)	504	74.21	46.42	10.39	416.39
Inflation (<i>INF</i>)	481	75.05	41.65	0.00	306.49
Government expenditure (<i>GE</i>)	491	14.79	5.33	0.91	34.19
Regime Repressiveness (<i>RR</i>)	511	4.69	2.13	2.00	7.00

4.3 Estimation method

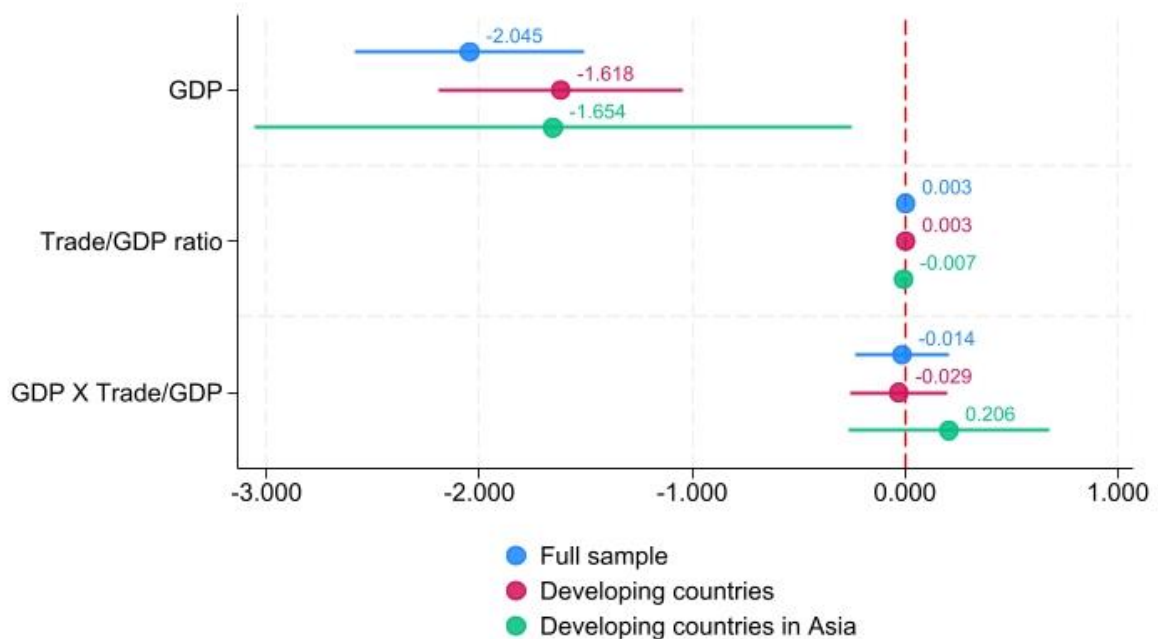
Following the previous studies (Ravallion and Chen 1997, Dollar and Kraay 2004), the model is estimated using the fixed effects (FE) estimator. This estimator takes into account time-invariant country characteristics that can influence both poverty and growth (i.e., institution, geography, and colonial history). An important concern is the possibility that the variance of the errors is not constant across observations. I address this issue by using heteroscedasticity-robust standard errors clustered at the country level, allowing for errors to be correlated across spells within countries. I cluster the standard error by country because observations of a given country (spells) are more likely to be correlated within each spell over time, not across countries.

Another potential problem relates to the omitted variable bias. One of the crucial factors that affect both poverty and growth is, of course, institutional quality. The role of government, especially in the poor countries, should not be neglected. Yet, data on institutions have only become available in recent years and are time-variant. In this study, I use several variables from different sources to capture those effects in order to minimise the omitted variable bias. In addition, hopefully, the use of a conceptually superior measure of openness should reduce the measurement error of trade openness.

5. Results

The results are presented in Tables A4 and A5 in the Appendix. Table A4 reports the results of Equation (1) and (2) with trade-to-GDP ratio as the measure of trade openness. Table A5 presents the regression results with the PCI. In each table, the results are presented for the total sample, and separately for developed and developing countries.

As shown in Figure 3 and Table A4, the coefficient on economic growth, commonly known as the growth elasticity of poverty' (GEP), is negative and statistically significant at the 1% level in all specifications. The point estimates for the GEP for the full sample range between -1.85 and -2.06. Thus, a 10% increase in growth is associated with approximately a 20% reduction in the proportion of people living in poverty (below \$1.90 per person per day). I obtain a lower GEP for the sample of developing countries, as reported in Columns 4-9. The estimates for the sample of developing countries ranges between -1.33 to -1.65.



Notes: Coefficient plot with 95% confidence intervals

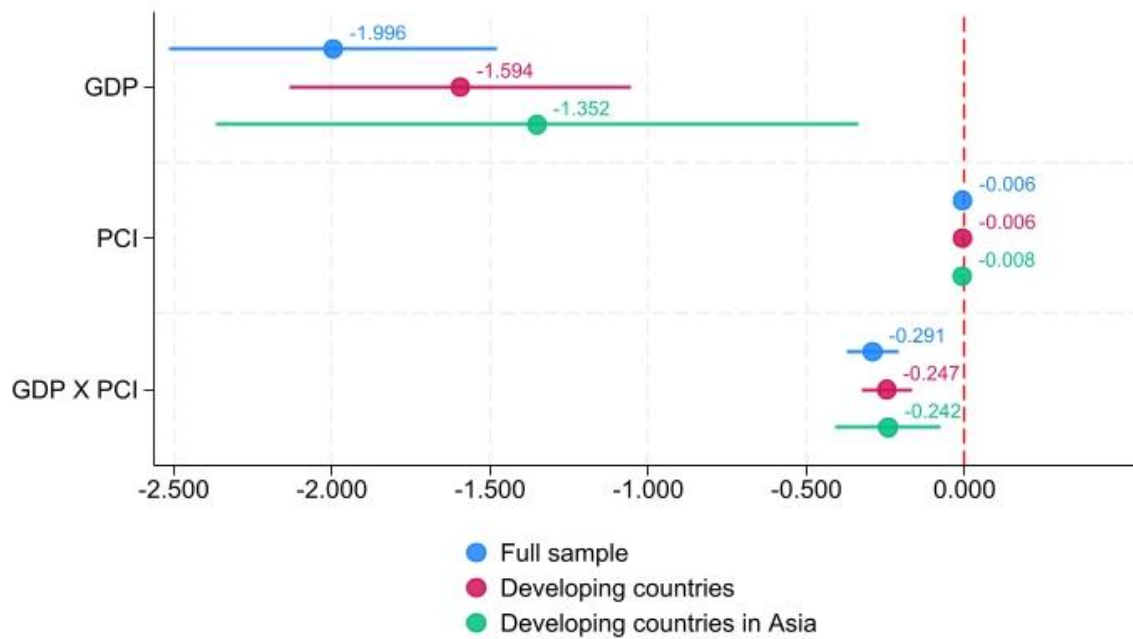
Figure 3: Regression coefficients (Trade openness is measured by the trade/GDP ratio)

The coefficient on trade-to-GDP ratio is not statistically significant even at the 10% level, indicating that there is no direct impact of trade openness on poverty. The coefficient on the interaction term between growth and trade-to-GDP ratio is also not statistically different from zero.

The results hold for all three country sub-samples. Thus, the findings are consistent with other studies that the effect of trade openness on poverty operates solely through economic growth (Roemer & Gugerty 1997, Dollar and Kraay 2002, 2004).

To comment on the results based on the PCI, the growth elasticity of poverty ranges between -1.84 and 2.00 (Table A5, Columns 1-3). This indicates that poverty rate declines by around 20% for a 10% increase in economic growth. The results withstand the inclusion of inflation, government spending, and regime repressiveness. The results also hold when high-income countries are excluded from the sample (Columns 4 to 9). There is no evidence of heteroscedasticity in terms of the Breusch-Pagan/Cook Weisberg and White's Generate tests. This suggests that that the error variances are all equal. In addition, Ramsey's RESET Test is employed to test general functional form misspecification. The results suggest the absence of this problem.

As shown in Figure 4 and Table A5, the coefficient on the interaction between growth and the PCI is negative and statistically significant. The result indicates that, for a given rate of economic growth, an increase in this openness index by 10 percentage points is associated with further reduction of poverty by 2.9%. Thus, the findings provide strong support for the theoretical postulate that the impact of economic growth on poverty is enhanced by trade openness. Also, the coefficient of the PCI is negative and statistically significant at the 1% level. This suggests that a 10-percentage-point increase in this index is associated with a decrease in poverty rate by 0.11%, *ceteris paribus*. Therefore, there is a direct impact of openness on poverty reduction, even after controlling for the growth effect.



Notes: Coefficient plot with 95% confidence intervals

Figure 4: Regression coefficients (Trade openness is measured by the PCI)

Robustness checks

To check the robustness of the results, I estimated two alternative specifications of the model. I only report of alternative estimates with the PCI as the trade openness variable. The coefficients on trade-to-GDP ratio and its interaction term with economic growth are not statistically significant in all specifications.

The relationship between poverty and economic growth can be sensitive to the poverty line used to measure the poverty rate because different poverty lines detect changes in different segments of the distribution of incomes (Ravallion 2016, Fosu 2017). To address this concern, the model is re-estimated using the poverty rate calculated based on the poverty line of \$3.20 per day and national poverty line. According to Table A6, the results are largely consistent with previous finding although the coefficient on growth is slightly smaller (Columns 1-3). The results also hold when poverty is measured using the national poverty lines of individual countries (Columns 4-6).

The model estimated for data averaged over five-year periods and using the fixed effect estimator are reported in Table A7. The results are largely consistent with previous findings. The results suggest that a 10% increase in real GDP per capita is associated with approximately a 20% decrease in poverty rate. The poverty-reducing impact of economic growth is larger for countries with more open trade regime.

6. Conclusion

Over the past few decades, several developing countries have increasingly engaged in the world economy. This phenomenon has been accompanied by rapid economic growth, structural transformation, and poverty reduction. This study has examined the relationship between economic growth, poverty reduction, and trade openness by using a new measure of trade openness, namely an index of price convergence and a multi-country panel dataset from various sources covering 123 countries over the period from 1970 to 2017.

The results based on the traditional measure of trade openness are consistent with the results of the previous studies. However, when the new measure of trade openness is used, it is found that there is a systematic relationship between openness and the incidence of poverty. In addition, the results suggest that the relationship between growth and poverty is conditioned by the degree of trade openness—that is, the poverty-reducing impact of a given rate of growth is greater for countries with more open trade regimes. This finding provides a support to the prediction of the factor proportion theory of international trade.

The new openness measure developed in this study is conceptually preferable to the traditional trade-to-GDP ratio and tracks trade policy regime shift among countries and over time in individual countries relatively better. However, it has its own limitations dictated by the nature of the availability of data. The results from this study call for further attempts to develop better indicators of trade openness in order to broaden our understanding of the poverty outcome of openness in this era of economic globalisation. Further research could also extend the analysis by focusing on case studies of individual countries to supplement the multi-country econometric studies.

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Online Appendix

Price Convergence Index

The price convergence index (PCI) is defined as changes over times in the price of traded goods in a given country relative to that of the world price.

The PCI is constructed as follow:

Step 1: Collect data on world and individual-country manufacturing price. Manufacturing price of the U.S., measured by the implicit deflator derived from the U.S. national

accounts, is used as the proxy for the world price. Manufacturing price of the countries under study are also measured by the implicit manufacturing deflator derived from national accounts (available in local currency unit). The base year for the price indices is 1970.

Step 2: Adjust individual country price indices for changes in the exchange rate with the U.S. dollar by multiplying price index by the domestic currency – US\$ exchange rate index (1970 = 100).

Step 3: Divide each country's exchange rate adjusted price index by the U.S. price index.

Step 4: Calculate the absolute deviation of relative price from the base value (1970=100).

Manufacturing prices, rather than prices of all traded goods, is used to calculate the PCI because, at the level of standard national account disaggregation, it is not possible to precisely delineate prices of other traded goods. In addition, most of the agricultural products are quasi non-tradables. Agricultural prices are also influenced by changes in global commodity price cycles. Moreover, prices of mineral products are susceptible to commodity booms and busts. Manufacturing price of the U.S. is used as a proxy for world price because the U.S. is the major trading nation in the world during the period under study with an open trade regime, particularly in manufacturing trade.

The concept of the PCI is closely related to the law of one price: the rate of change in prices of traded goods at home and abroad should converge when a country becomes increasingly integrated into the world economy, given that there is no trade friction (such as transportation cost and tariffs). It is important to note that prices of individual product may not be identical across countries even though all trade barriers are eliminated, and domestic market is freely competitive. This is because prices are determined by other factors, for instance, transportation cost, storage costs, tax, in addition to differences in product composition. These costs are country-specific and vary

enormously across countries; reduction in trade barriers alone should bring about price convergence for tradable goods but may not achieve the law of one price. Therefore, at a given point of time, the levels of price of a given product can be different across countries due to transportation costs, other fixed costs, and differences in the commodity mix. However, over time, openness to trade should manifest in convergence of changes in relative prices of traded goods (Cecchetti et al., 2002; Engel & Rogers, 2001; Hufbauer et al., 2002).

Additional tables

Table A1: Coefficient of variation (CV) of price convergence index

	ALL	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2017
Afghanistan	35.01	11.57	5.09	22.92	15.80	1.76	10.14	13.80	20.76	15.54	6.87
Albania	144.99	7.89	26.05	8.71	7.34	95.35	43.63	34.72	23.14	8.61	3.23
Algeria	106.14	18.97	12.81	18.17	29.86	78.67	11.37	13.25	13.75	6.59	10.12
Andorra	35.52	28.65	18.17	55.97	33.40	20.62	17.00	37.27	17.41	7.07	1.87
Angola	111.24	11.18	8.46	8.65	7.79	118.94	209.01	66.55	26.07	11.51	25.15
Anguilla	31.71	9.83	15.93	13.46	11.75	0.66	9.69	13.28	10.22	12.39	9.01
Antigua and Barbuda	28.10	23.30	23.94	7.63	2.38	2.91	4.46	7.18	4.02	9.37	1.60
Argentina	288.29	17.10	144.43	137.46	104.11	46.08	1.58	80.82	11.39	23.57	39.79
Aruba	43.49	11.60	17.75	13.34	2.29	8.22	5.11	7.53	5.95	2.93	1.09
Australia	38.81	33.95	14.92	18.47	18.30	8.50	16.79	38.19	13.39	12.26	9.37
Austria	119.07	30.08	17.76	38.06	34.70	5.38	148.06	33.28	13.97	7.20	0.28
Bahamas	19.96	10.57	9.52	11.50	7.75	8.62	17.53	12.32	3.64	9.27	4.63
Bahrain	40.13	33.67	22.68	29.74	10.98	10.82	13.25	14.19	17.35	3.26	6.34
Bangladesh	79.43	28.40	7.49	33.07	7.94	7.31	8.45	4.85	8.37	11.26	1.53
Barbados	31.27	19.96	3.90	9.98	6.92	6.69	9.30	10.17	17.06	2.48	0.65
Belgium	125.27	26.11	15.54	61.71	33.77	5.94	190.39	32.04	12.77	8.15	3.29
Belize	25.06	29.39	21.33	23.19	17.09	4.98	4.29	1.53	16.70	6.97	12.19
Benin	83.35	25.26	20.08	106.96	19.08	5.63	11.65	37.81	19.86	5.96	10.70
Bermuda	34.42	11.34	3.47	8.53	5.44	3.22	5.87	7.52	8.66	10.13	2.30
Bhutan	94.16	3.42	15.44	17.39	18.28	34.61	14.32	9.43	13.00	17.71	8.03
Bolivia	179.86	34.40	10.49	107.50	82.92	15.97	11.09	14.57	21.88	4.76	2.87
Botswana	78.68	10.80	8.86	21.80	20.58	16.44	30.47	38.91	20.51	22.31	6.08
Brazil	203.79	12.22	44.95	96.56	125.73	188.11	31.99	31.11	28.61	24.05	16.02

	ALL	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2017
British Virgin Islands	88.47	5.82	2.88	3.01	6.60	3.87	200.78	5.73	8.03	5.29	4.30
Brunei Darussalam	69.60	58.51	7.93	9.75	27.39	12.42	21.16	8.30	29.51	15.10	19.90
Bulgaria	164.76	11.91	41.70	8.59	5.39	193.14	152.03	37.06	19.53	9.20	4.58
Burkina Faso	44.54	20.98	15.51	48.45	30.35	40.35	14.51	38.02	15.51	10.90	1.75
Burundi	83.53	17.57	12.72	15.77	11.18	35.30	38.82	25.89	6.89	7.91	1.61
Cabo Verde	57.35	18.45	30.06	46.20	30.59	15.91	24.92	38.26	14.83	6.44	1.39
Cambodia	135.53	24.40	4.53	20.36	95.36	70.72	27.45	0.98	5.51	0.62	3.29
Cameroon	42.69	26.47	12.05	54.64	26.27	36.01	7.25	38.41	21.42	5.44	2.19
Canada	27.79	8.34	15.74	6.95	16.64	13.97	6.71	19.10	10.31	10.89	4.16
Cayman Islands	42.30	18.49	0.92	12.66	4.56	6.22	5.64	6.12	4.57	2.11	1.80
Central African Republic	67.73	27.35	15.76	61.08	31.59	41.27	34.35	34.41	29.64	6.13	7.68
Chad	38.19	19.63	13.25	35.13	18.32	39.09	15.70	36.27	16.13	22.12	11.49
Chile	363.53	75.68	70.25	55.95	9.57	5.92	11.27	15.56	6.73	9.01	2.81
China	108.92	16.52	15.84	28.50	30.02	26.81	3.07	5.82	22.13	6.05	7.79
Colombia	143.01	7.64	5.88	32.92	45.54	20.68	24.78	14.80	22.28	7.40	7.88
Comoros	43.52	25.30	16.39	73.29	27.36	34.87	9.13	39.01	27.18	9.32	2.07
Congo, Dem. Rep.	186.04	8.97	41.54	93.88	63.90	213.77	135.89	111.40	10.53	4.30	23.64
Congo, Rep.	61.95	21.59	22.06	70.18	29.63	33.71	12.60	28.87	18.61	13.31	4.32
Cook Islands	54.39	30.84	10.51	27.11	30.04	10.79	22.68	48.01	12.13	10.17	2.15
Costa Rica	150.85	9.64	2.41	115.22	22.98	20.28	15.34	10.25	8.10	5.30	4.15
Cote d'Ivoire	50.87	30.52	15.56	52.57	36.89	36.09	7.57	19.95	22.33	10.42	5.88
Cuba	26.64	25.01	8.29	26.86	11.74	29.83	27.47	3.91	9.40	2.47	2.76
Cyprus	31.62	21.24	16.11	38.30	22.59	5.83	8.48	34.42	20.46	7.54	1.07
Denmark	39.13	28.72	10.11	46.28	33.67	6.83	16.56	33.93	15.89	6.49	1.50
Djibouti	24.72	29.86	12.45	5.74	4.37	2.34	2.47	4.93	3.70	2.75	2.72
Dominica	37.41	60.18	20.99	8.34	6.69	9.44	11.33	27.05	9.57	8.21	17.07
Dominican Republic	133.00	8.40	10.47	11.54	51.43	19.83	8.83	40.44	5.20	9.11	4.92
Ecuador	127.48	18.01	10.88	46.16	90.51	37.71	51.94	10.68	9.55	8.12	1.73
Egypt, Arab Rep.	125.12	12.19	35.92	22.60	8.24	36.16	11.16	38.26	18.46	6.17	58.96
El Salvador	101.48	1.50	3.41	11.28	49.62	7.26	5.37	48.87	4.50	1.67	0.62
Equatorial Guinea	74.47	12.04	12.67	33.80	29.14	34.79	18.52	39.17	28.09	12.10	15.55
Eswatini	122.45	15.34	14.59	50.01	15.67	9.53	27.76	42.98	19.01	28.02	11.40
Fiji	44.21	43.82	15.19	33.69	19.59	7.62	29.66	27.79	16.65	6.35	3.79
Finland	80.91	27.78	7.02	36.45	31.02	33.93	91.76	27.40	13.19	6.35	0.82
France	94.56	25.19	13.90	53.00	30.19	6.92	100.69	30.13	14.91	6.97	0.64
French Polynesia	37.80	24.33	18.76	43.86	26.14	5.92	14.24	32.71	16.26	5.94	1.40
Gabon	70.19	23.47	22.49	54.43	32.49	39.78	25.07	39.47	17.30	9.68	0.61
Gambia	259.11	76.35	113.33	32.39	47.67	16.59	11.15	61.64	24.12	19.93	7.43
Germany	67.08	33.66	21.01	39.35	35.94	5.36	25.83	32.68	14.69	5.91	1.89
Ghana	188.85	18.19	43.46	69.36	74.87	26.41	34.75	10.15	22.44	33.49	10.89
Greece	141.62	12.81	8.82	52.53	12.77	16.44	19.49	67.63	21.22	6.40	2.29
Greenland	56.78	28.41	12.06	40.32	34.15	5.89	17.39	38.03	19.14	25.76	19.62
Grenada	24.72	21.35	37.64	3.88	2.37	0.72	2.27	2.94	14.09	6.43	4.79
Guatemala	70.82	6.89	4.41	1.85	80.02	2.50	9.06	17.78	10.51	6.53	5.14
Guinea	135.40	11.67	3.54	8.38	173.10	21.32	19.66	67.43	29.04	11.23	15.37
Guinea-Bissau	86.00	31.29	30.83	63.85	45.76	17.12	18.55	35.72	23.28	8.56	7.76
Guyana	152.08	11.10	35.27	28.56	73.09	100.04	12.85	33.07	17.19	6.57	3.50
Haiti	48.46	10.01	7.15	6.12	7.97	59.88	22.89	22.06	11.69	23.32	14.03
Honduras	83.97	2.27	0.75	2.23	5.94	27.45	9.65	9.60	7.55	5.88	4.39
Hong Kong	22.82	27.49	4.08	31.60	9.67	11.01	5.46	4.77	10.46	6.28	0.83
Hungary	66.54	22.17	7.70	34.66	9.56	14.86	32.04	39.50	16.65	9.16	2.94
Iceland	180.49	20.90	24.46	88.02	27.19	14.35	6.85	25.49	28.94	13.05	28.82
India	92.18	7.76	8.80	26.34	13.59	40.31	15.91	12.21	12.95	23.00	3.89
Indonesia	118.58	15.49	22.95	36.45	30.18	4.29	70.46	18.52	16.74	20.11	1.60
Iran, Islamic Rep.	108.26	20.47	3.38	7.84	23.16	84.71	10.44	78.59	10.74	39.18	7.12
Iraq	142.26	35.04	15.36	19.33	18.19	162.77	38.46	101.53	50.88	19.05	0.66
Ireland	26.41	14.91	18.31	39.21	24.55	12.09	14.75	33.46	15.39	7.30	4.63
Israel	217.98	12.76	55.08	114.88	9.22	15.36	13.81	7.98	23.53	6.27	8.14
Italy	133.19	9.62	19.08	47.28	29.70	25.27	222.95	34.72	16.33	7.75	1.73

	ALL	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2017
Jamaica	142.92	13.16	41.20	35.69	14.43	76.55	11.68	13.50	9.99	12.44	7.00
Japan	49.85	28.20	29.25	12.37	37.66	25.35	26.40	13.16	16.04	25.73	11.54
Jordan	57.33	18.92	14.80	10.63	43.39	23.02	4.54	5.35	20.35	5.19	0.81
Kenya	123.43	7.77	15.40	52.03	13.98	60.54	10.92	7.30	17.00	5.39	3.48
Kuwait	49.85	53.37	33.69	33.00	28.54	11.52	9.53	15.20	10.65	2.98	10.52
Lao PDR	252.05	46.15	45.61	66.50	96.68	10.04	76.32	10.14	29.63	7.37	3.01
Lebanon	162.09	35.37	17.87	46.92	117.32	27.36	9.27	6.36	15.06	6.69	9.57
Lesotho	104.14	29.20	17.22	34.65	19.88	15.16	23.83	33.36	16.93	19.64	17.85
Liberia	248.68	54.96	10.11	15.05	7.50	4.19	9.41	17.30	7.40	16.08	25.54
Libya	49.45	39.12	7.46	7.62	20.51	13.17	7.76	70.94	21.94	68.91	14.74
Liechtenstein	70.43	41.40	35.62	27.29	34.28	6.23	20.56	31.78	15.65	10.22	3.11
Luxembourg	131.70	32.57	19.12	50.93	29.46	10.43	190.68	31.87	25.45	12.30	1.83
Macao	51.73	26.83	14.82	30.35	11.22	14.22	1.63	2.24	13.83	15.78	3.83
Madagascar	131.66	26.17	8.56	46.88	53.98	28.16	24.19	27.72	30.53	13.39	6.45
Malawi	120.95	15.87	10.58	44.34	18.00	50.06	39.35	27.37	13.30	65.78	32.82
Malaysia	30.75	35.41	12.10	15.60	11.72	8.54	30.26	6.45	14.85	6.03	8.95
Maldives	83.38	26.44	39.29	11.43	16.28	2.34	4.95	4.49	16.46	11.72	2.81
Mali	55.08	26.94	17.75	57.91	30.77	35.67	22.80	38.12	13.94	14.12	0.99
Malta	28.21	9.62	11.89	26.14	26.38	16.14	8.09	30.11	32.55	6.22	3.06
Marshall Islands	63.10	6.08	1.47	1.67	2.31	2.50	38.37	37.90	38.83	57.93	17.93
Mauritania	67.22	32.99	8.20	19.08	11.27	23.24	37.79	15.33	19.52	7.61	7.32
Mauritius	71.32	29.19	9.95	41.66	19.27	13.78	22.54	14.21	15.80	5.92	2.00
Mexico	174.35	10.59	41.44	91.59	112.08	4.93	7.75	9.54	14.50	3.04	15.35
Micronesia	22.96	8.44	7.20	1.52	1.96	2.32	4.69	2.57	6.91	1.89	20.75
Monaco	40.17	15.06	6.62	21.61	17.56	2.78	7.09	35.34	16.84	6.90	2.60
Mongolia	120.92	11.73	8.10	13.79	14.70	117.69	81.00	20.04	23.10	17.30	17.28
Montserrat	21.95	10.28	24.03	10.12	8.48	1.66	5.22	6.24	4.70	1.54	0.47
Morocco	49.08	20.96	12.23	56.36	20.72	8.87	10.09	30.36	12.53	5.49	1.73
Mozambique	160.98	12.32	24.39	26.54	122.06	91.71	6.05	42.22	12.01	13.24	47.93
Myanmar	76.36	13.76	5.53	23.01	7.20	5.48	28.39	9.49	29.81	136.1	8.34
Namibia	93.30	14.53	12.16	38.28	19.86	12.62	27.65	44.44	17.50	27.39	9.95
Nepal	92.46	4.96	18.10	17.93	13.52	29.62	14.16	8.73	12.55	18.81	4.17
Netherlands	65.49	34.94	16.78	43.07	34.99	4.81	30.58	32.92	15.42	7.45	1.03
New Caledonia	46.44	22.46	16.07	52.63	30.81	5.44	9.90	38.53	18.29	8.37	1.16
New Zealand	39.51	27.39	11.71	32.78	28.21	11.26	22.15	43.48	14.76	12.24	6.52
Nicaragua	145.27	11.09	12.82	3.49	124.92	195.79	23.66	6.83	4.51	11.52	6.63
Niger	61.56	14.24	32.78	32.59	23.32	38.32	9.73	35.17	19.22	6.38	1.17
Nigeria	145.00	18.68	9.03	22.57	147.48	54.80	37.44	25.34	25.19	3.51	40.93
North Korea	80.09	6.23	12.30	14.99	10.28	18.68	29.11	131.88	6.91	6.00	3.38
Norway	43.85	32.00	4.97	35.83	27.17	9.54	12.31	29.61	17.06	8.82	4.21
Oman	40.15	112.1	24.35	5.99	7.11	4.31	16.75	6.28	20.41	7.03	5.67
Pakistan	133.64	68.38	2.80	31.24	12.95	15.33	22.17	12.29	12.08	9.90	4.11
Palau	79.74	8.56	2.57	8.06	20.71	11.13	33.61	29.95	3.97	2.56	0.73
Palestine	218.40	18.54	58.46	118.73	11.19	19.88	14.32	7.84	16.52	4.11	7.12
Panama	29.72	7.13	10.06	4.32	11.91	3.32	2.78	3.85	21.33	9.03	1.28
Papua New Guinea	62.07	40.70	18.05	25.35	18.17	3.18	43.78	21.82	18.71	20.10	10.43
Paraguay	124.10	19.86	4.57	25.83	48.68	12.83	23.79	38.52	39.11	11.02	7.25
Peru	212.97	13.36	76.87	81.14	79.20	125.43	18.68	9.39	12.69	7.11	4.81
Philippines	71.85	8.84	2.30	36.86	7.32	8.42	30.71	10.21	21.76	4.70	11.23
Poland	205.40	14.39	55.81	31.37	71.65	68.19	28.15	17.98	23.54	8.58	3.54
Portugal	130.82	22.32	39.64	57.85	20.32	13.87	217.02	32.72	16.47	8.42	3.02
Puerto Rico	41.43	2.29	4.67	1.91	3.38	4.12	6.74	9.39	10.59	1.62	1.66
Qatar	95.47	39.43	15.76	14.96	19.88	13.98	12.29	50.64	29.43	10.64	6.46
Romania	169.64	56.10	7.16	24.05	10.45	164.57	79.08	14.98	31.45	12.06	1.81
Rwanda	74.46	22.39	15.92	13.81	15.05	45.32	7.43	28.05	17.86	8.60	9.57
Saint Kitts and Nevis	47.17	10.50	33.91	6.99	19.47	2.32	4.15	9.62	15.09	2.88	1.30
Saint Lucia	21.49	16.20	11.76	8.18	4.80	2.03	4.02	7.01	11.16	18.47	2.67
Saint Vincent and the Grenadines	36.63	15.19	17.80	11.84	3.93	4.13	1.81	12.63	10.66	8.64	3.35
Samoa	62.63	28.95	23.78	36.42	14.14	25.19	7.30	26.57	24.83	7.67	1.52
San Marino	133.94	8.90	17.61	43.99	31.65	23.39	222.94	36.00	16.30	7.17	1.86
Sao Tome and Principe	143.90	20.17	47.39	14.95	51.13	96.56	91.36	6.27	19.45	7.39	9.01
Saudi Arabia	35.36	71.91	13.17	15.90	13.45	4.91	3.28	9.25	6.48	1.14	1.17

	ALL	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-2017
Senegal	50.08	23.66	16.62	57.95	28.79	33.45	18.04	35.74	21.91	8.81	3.32
Seychelles	36.19	16.93	23.68	11.73	16.85	19.60	15.61	9.36	34.50	13.63	2.14
Sierra Leone	158.99	5.34	17.31	42.55	101.91	50.53	33.03	15.24	9.91	3.88	24.21
Singapore	43.49	35.74	8.43	3.87	12.53	15.71	18.56	10.15	6.79	3.19	4.41
Solomon Islands	71.74	27.15	13.50	24.96	37.70	21.55	14.15	31.47	22.37	20.09	2.80
Somalia	212.01	15.75	91.81	31.51	75.54	58.31	11.58	54.78	42.11	35.95	3.99
South Africa	91.32	16.03	14.38	33.19	19.79	11.81	31.65	43.91	17.00	29.77	12.31
South Korea	41.53	13.46	7.82	17.67	29.97	5.84	41.27	13.64	21.30	4.10	3.58
Spain	133.43	25.79	17.72	56.33	30.97	22.69	215.38	36.44	17.91	7.41	2.22
Sri Lanka	141.43	7.35	57.04	24.08	12.57	11.41	12.33	5.96	8.11	7.19	7.52
Suriname	105.09	12.63	3.35	6.92	27.66	57.09	27.51	32.94	18.79	12.01	49.16
Sweden	42.42	22.16	8.26	52.02	27.99	27.87	19.34	25.93	12.81	6.36	1.39
Switzerland	60.93	39.94	33.98	26.45	34.62	6.07	22.75	31.40	17.02	8.82	5.27
Syria	90.10	11.15	16.65	40.54	83.20	23.43	11.67	37.54	28.36	114.0	65.05
Tanzania	141.69	8.03	13.44	30.74	118.67	54.88	9.29	16.69	9.76	10.65	9.08
Thailand	24.96	12.65	2.31	11.80	8.65	2.54	36.65	11.58	19.34	5.87	4.28
Togo	63.17	12.04	16.50	64.80	34.38	36.87	16.97	29.04	14.73	15.85	2.14
Tonga	37.74	45.90	7.00	24.22	36.59	41.80	17.93	17.28	11.76	7.52	3.14
Trinidad and Tobago	51.29	11.03	16.03	16.41	39.17	19.95	14.29	13.50	17.37	12.85	6.48
Tunisia	53.43	25.84	7.53	51.37	9.08	9.53	17.82	20.06	16.45	13.59	16.51
Turkey	186.89	16.88	20.67	74.22	39.78	82.64	91.40	49.06	15.63	19.43	19.27
Turks and Caicos Islands	22.78	3.61	9.51	4.99	1.55	0.79	4.48	10.87	8.80	9.81	1.56
Tuvalu	42.65	29.09	16.16	21.36	27.01	14.29	13.08	48.07	15.34	12.06	5.42
Uganda	179.91	14.69	5.78	159.01	105.07	68.41	25.29	8.75	19.67	5.59	3.68
United Arab Emirates	29.85	85.37	3.65	6.21	2.91	7.86	2.98	4.94	6.69	2.12	1.90
United Kingdom	23.82	7.05	19.82	40.23	26.97	14.15	7.35	21.34	15.63	6.32	16.37
United States of America	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uruguay	296.06	63.57	48.32	78.31	57.65	43.39	25.63	57.51	22.95	5.57	7.19
Vanuatu	48.13	28.04	13.12	46.09	6.76	6.07	9.84	28.72	22.46	6.26	1.93
Venezuela	135.11	24.90	5.32	25.86	68.80	44.01	57.98	51.30	30.03	52.25	45.91
Viet Nam	192.09	2.28	3.63	73.43	172.75	17.68	9.13	2.13	6.78	3.66	1.59
Zambia	165.31	93.17	6.58	41.53	65.48	115.39	41.62	11.41	26.03	17.56	14.05
Zimbabwe	96.17	25.22	12.06	33.86	7.99	63.74	67.52	85.99	223.60	2.61	9.02

Table A2: Variable definitions and data sources

Variable	Definition	Data source
Poverty Rate (P)	Poverty headcount ratio (measured at the \$1.90 poverty line, 2011 PPP)	World Development Indicator (World Bank)
Trade Openness (OPEN)	<p>There are two measures of trade openness: trade-to-GDP ratio (TO) and the price convergence index (PCI)</p> <p>An index of price convergence ranges between 0 and 100. It is an inverse of absolute deviation of the manufacturing price deflator of a given country to the world price (the U.S. price). The higher the price convergence index, the higher the degree of openness.</p> <p>Trade-to-GDP ratio is the ratio of total exports plus imports as a percentage of total GDP.</p>	<p>Value added deflators used to calculate PIC are derived from Food and Agriculture Organization of the United Nations (FAO) database, exchange rate used to adjust PIC are derived from IMF, other measures are compiled from WITS and World Development Indicator (World Bank).</p>

GDP per capita (GDP)	Gross Domestic Product (GDP) per capita (constant 2011 price). GDP per capita is in natural logarithm.	World Development Indicator (World Bank)
Government expenditure (GE)	Government consumption as a proxy for public welfare. It is measured as total government consumption to GDP (%)	World Development Indicator (World Bank)
Inflation (INF)	Inflation rate measured by consumer price index	World Development Indicator (World Bank)
Regime repressiveness (RR)	An average of scores of political rights and civil liberties. It ranges from 1 (less repressive) to 7 (most repressive).	Freedom House

Table A3: Country coverage

Country	Spell	Initial poverty rate	Final poverty rate	Poverty Growth	Country group	Regions
Albania	1996-2012	1.10	1.10	0.00	UMI	Europe
Algeria	1988-2011	6.40	0.50	-5.90	UMI	Africa
Angola	2000-2008	32.30	30.10	-2.20	LMI	Africa
Argentina	1980-2017	0.40	0.50	0.10	UMI	Latin America and the Caribbean
Australia	1981-2014	1.00	0.70	-0.30	HI	Oceania
Austria	2003-2015	0.20	0.70	0.50	HI	Europe
Bangladesh	1983-2016	29.90	14.80	-15.10	LMI	Asia
Belgium	2003-2015	0.20	0.00	-0.20	HI	Europe
Belize	1993-1999	10.10	13.90	3.80	UMI	Latin America and the Caribbean
Benin	2003-2015	48.80	49.50	0.70	LC	Africa
Bhutan	2003-2017	17.60	1.50	-16.10	LMI	Asia
Bolivia	1990-2017	7.10	5.80	-1.30	LMI	Latin America and the Caribbean
Botswana	1985-2015	42.60	16.10	-26.50	UMI	Africa
Brazil	1981-2017	21.40	4.80	-16.60	UMI	Latin America and the Caribbean
Bulgaria	1992-2014	0.00	1.50	1.50	UMI	Europe
Burkina Faso	1994-2014	83.10	43.70	-39.40	LC	Africa
Burundi	1992-2013	81.10	71.80	-9.30	LC	Africa
Cabo Verde	2001-2007	16.20	8.10	-8.10	LMI	Africa

Country	Spell	Initial poverty rate	Final poverty rate	Poverty Growth	Country group	Regions
Cameroon	1996-2014	48.10	23.80	-24.30	LMI	Africa
Canada	1981-2013	0.50	0.50	0.00	HI	North America
Central African Republic	1992-2008	84.30	66.30	-18.00	LC	Africa
Chad	2003-2011	62.90	38.40	-24.50	LC	Africa
Chile	1987-2017	11.70	0.70	-11.00	HI	Latin America and the Caribbean
China	1990-2015	66.2	0.7	-65.5	UMI	Asia
Colombia	1992-2017	8.90	3.90	-5.00	UMI	Latin America and the Caribbean
Comoros	2004-2013	13.50	17.90	4.40	LMI	Africa
Congo (Democratic Republic of)	2004-2012	94.10	76.60	-17.50	LC	Africa
Congo (Republic of)	2005-2011	53.40	37.00	-16.40	LMI	Africa
Costa Rica	1981-2017	24.70	1.00	-23.70	UMI	Latin America and the Caribbean
Cote d'Ivoire	1985-2015	6.80	28.20	21.40	LMI	Africa
Cyprus	2004-2015	0.00	0.00	0.00	HI	Asia
Denmark	2003-2015	0.20	0.20	0.00	HI	Europe
Djibouti	2002-2017	20.60	17.10	-3.50	LMI	Africa
Dominican Republic	1986-2016	5.20	1.60	-3.60	UMI	Latin America and the Caribbean
Ecuador	1987-2017	17.60	3.20	-14.40	UMI	Latin America and the Caribbean
Egypt	1990-2015	7.40	1.30	-6.10	LMI	Africa
El Salvador	1989-2017	18.00	1.90	-16.10	LMI	Latin America and the Caribbean
Eswatini	1994-2009	81.70	42.00	-39.70	LMI	Africa
Fiji	2002-2013	4.90	1.40	-3.50	UMI	Oceania
Finland	2003-2015	0.00	0.00	0.00	HI	Europe
France	2003-2015	0.00	0.00	0.00	HI	Europe
Gabon	2005-2017	8.00	3.40	-4.60	UMI	Africa
Gambia	1998-2015	70.50	10.10	-60.40	LC	Africa
Germany	1991-2015	0.00	0.00	0.00	HI	Europe
Ghana	1987-2016	42.60	13.30	-29.30	LMI	Africa
Greece	2003-2015	0.50	1.50	1.00	HI	Europe
Guatemala	1986-2014	48.60	8.70	-39.90	UMI	Latin America and the Caribbean
Guinea	1991-2012	91.60	35.30	-56.30	LC	Africa
Guinea-Bissau	1991-2010	43.00	67.10	24.10	LC	Africa
Guyana	1992-1998	33.90	14.00	-19.90	UMI	Latin America and the Caribbean
Honduras	1989-2017	42.20	17.20	-25.00	LMI	Latin America and the Caribbean
Hungary	1987-2015	0.10	0.50	0.40	HI	Europe
Iceland	2003-2014	0.00	0.00	0.00	HI	Europe

Country	Spell	Initial poverty rate	Final poverty rate	Poverty Growth	Country group	Regions
India	1997-2011	61.60	21.20	-40.40	LMI	Asia
Indonesia	1984-2017	71.40	5.70	-65.70	LMI	Asia
Iran	1986-2016	6.80	0.30	-6.50	UMI	Asia
Iraq	2006-2012	2.10	2.50	0.40	UMI	Asia
Ireland	2003-2015	0.20	0.20	0.00	HI	Europe
Israel	1979-2016	0.00	0.20	0.20	HI	Asia
Italy	2003-2015	0.70	2.00	1.30	HI	Europe
Jamaica	1988-2004	6.20	1.70	-4.50	UMI	Latin America and the Caribbean
Jordan	1986-2010	0.00	0.10	0.10	UMI	Asia
Kenya	1992-2015	31.40	36.80	5.40	LMI	Africa
Lao PDR	1992-2012	32.20	22.70	-9.50	LMI	Asia
Lesotho	1986-2010	49.40	59.70	10.30	LMI	Africa
Liberia	2007-2016	68.60	40.90	-27.70	LC	Africa
Luxembourg	2003-2015	0.00	0.20	0.20	HI	Europe
Madagascar	1980-2012	46.10	77.60	31.50	LC	Africa
Malawi	1997-2016	63.30	70.30	7.00	LC	Africa
Malaysia	1984-2015	2.90	0.00	-2.90	UMI	Asia
Maldives	2002-2009	10.00	7.30	-2.70	UMI	Asia
Mali	1994-2009	85.10	49.70	-35.40	LC	Africa
Malta	2006-2015	0.50	0.00	-0.50	HI	Europe
Mauritania	1987-2014	40.00	6.00	-34.00	LMI	Africa
Mauritius	2006-2012	0.40	0.50	0.10	UMI	Africa
Mexico	1989-2016	7.10	2.20	-4.90	UMI	Latin America and the Caribbean
Micronesia	2005-2013	8.10	15.40	7.30	LMI	Oceania
Mongolia	1995-2016	12.70	0.60	-12.10	LMI	Asia
Morocco	1984-2013	11.10	1.00	-10.10	LMI	Africa
Mozambique	1996-2014	82.90	62.40	-20.50	LC	Africa
Namibia	2003-2015	31.50	13.40	-18.10	UMI	Africa
Nepal	1995-2010	61.90	15.00	-46.90	LC	Asia
Netherlands	2004-2015	0.20	0.00	-0.20	HI	Europe
Nicaragua	1993-2014	36.30	3.20	-33.10	LMI	Latin America and the Caribbean
Niger	1992-2014	78.20	44.50	-33.70	LC	Africa
Nigeria	1985-2009	53.30	53.50	0.20	LMI	Africa
Norway	2003-2015	0.20	0.20	0.00	HI	Europe
Pakistan	1987-2015	62.20	3.90	-58.30	LMI	Asia
Panama	1979-2017	8.10	2.50	-5.60	HI	Latin America and the Caribbean
Papua New Guinea	1996-2009	53.20	38.00	-15.20	LMI	Oceania
Paraguay	1990-2017	1.20	1.20	0.00	UMI	Latin America and the Caribbean

Country	Spell	Initial poverty rate	Final poverty rate	Poverty Growth	Country group	Regions
Peru	1997-2017	17.90	3.40	-14.50	UMI	Latin America and the Caribbean
Philippines	2000-2015	13.90	6.10	-7.80	LMI	Asia
Poland	1985-2015	0.20	0.50	0.30	HI	Europe
Portugal	2003-2015	1.00	0.50	-0.50	HI	Europe
Romania	1989-2015	0.30	5.70	5.40	UMI	Europe
Rwanda	1984-2016	63.00	55.50	-7.50	LC	Africa
Samoa	2002-2013	2.00	1.10	-0.90	UMI	Oceania
Sao Tome and Principe	2000-2010	29.80	32.30	2.50	LMI	Africa
Senegal	1991-2011	67.90	38.00	-29.90	LMI	Africa
Sierra Leone	1989-2011	66.70	52.20	-14.50	LC	Africa
Solomon Islands	2005-2013	45.60	25.10	-20.50	LMI	Oceania
South Africa	1993-2014	31.70	18.90	-12.80	UMI	Africa
South Korea	2006-2012	0.20	0.20	0.00	HI	Asia
Spain	2003-2015	0.70	1.00	0.30	HI	Europe
Sri Lanka	1985-2016	13.30	0.80	-12.50	UMI	Asia
St. Lucia	1995-2016	35.80	4.70	-31.10	UMI	Latin America and the Caribbean
Sweden	2003-2015	0.20	0.50	0.30	HI	Europe
Switzerland	2006-2015	0.00	0.00	0.00	HI	Europe
Tanzania	1991-2011	72.10	49.10	-23.00	LC	Africa
Thailand	1981-2017	19.60	0.00	-19.60	UMI	Asia
Togo	2006-2015	55.60	49.20	-6.40	LC	Africa
Tonga	2001-2015	2.80	1.00	-1.80	UMI	Oceania
Trinidad and Tobago	1988-1992	0.70	3.40	2.70	HI	Latin America and the Caribbean
Tunisia	1985-2015	15.00	0.30	-14.70	LMI	Africa
Turkey	1987-2016	2.40	0.20	-2.20	UMI	Asia
Uganda	1989-2016	57.70	41.70	-16.00	LC	Africa
United Kingdom	2004-2015	0.50	0.20	-0.30	HI	Europe
United States	1979-2016	0.50	1.20	0.70	HI	North America
Uruguay	1981-2017	0.00	0.10	0.10	HI	Latin America and the Caribbean
Venezuela	1981-2006	5.80	10.20	4.40	UMI	Latin America and the Caribbean
Vietnam	1992-2016	52.90	2.00	-50.90	LMI	Asia
Zambia	1991-2015	54.10	57.50	3.40	LMI	Africa

Table A4: Trade openness and poverty reduction, with the trade-to-GDP ratio as the measure of trade openness

Dependent Variable: Changes in poverty rate (\$1.90 per day poverty line)									
	Full Sample			Developing Countries			Developing Countries in Asia		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth (<i>GDP</i>)	- 1.852* ** (0.241)	- 2.055* ** (0.270)	- 2.045* ** (0.272)	1.564* ** (0.247)	- 1.635* ** (0.281)	- 1.618* ** (0.288)	- 1.375* ** (0.409)	- 1.327 ** (0.494)	- 1.654 ** (0.669)
Openness measured by the trade-to-GDP ratio (<i>TO</i>)		0.003 (0.002)	0.003 (0.003)		0.003 (0.002)	0.003 (0.003)		- 0.001 (0.004)	- 0.007 (0.007)
Growth X the trade-to-GDP ratio (<i>GDP</i> × <i>TO</i>)			-0.014 (0.112)			-0.029 (0.114)			- 0.206 (0.226)
Inflation (<i>INF</i>)		0.077 (0.074)	0.076 (0.074)		0.151 (0.092)	0.149 (0.092)		0.084 (0.185)	0.076 (0.194)
Government Expenditure (<i>GE</i>)		-0.016 (0.012)	-0.016 (0.012)		-0.014 (0.012)	-0.015 (0.012)		- 0.016 (0.037)	- 0.014 (0.036)
Regime Repressiveness (<i>RR</i>)		-0.007 (0.042)	-0.007 (0.042)		-0.001 (0.041)	-0.001 (0.041)		- 0.101 (0.120)	- 0.125 (0.124)
Constant	-0.007 (0.006)	-0.012 (0.009)	-0.012 (0.009)	- 0.018* ** (0.006)	- 0.031* ** (0.010)	- 0.031* ** (0.010)	- 0.042* * (0.016)	- 0.053 * (0.029)	-0.043 (0.034)
No. of obs.	365	331	331	306	272	272	83	78	78
Adjusted R-squared	0.12	0.135	0.132	0.099	0.118	0.114	0.047	0.017	0.015

Notes: Standard errors (in parenthesis) are clustered at country level; all regression includes period dummies (not reported); ***, **, * indicate significance level at 1, 5, and 10%, respectively.

Table A5: Trade openness and poverty reduction, with the price convergence index as the measure of trade openness

Dependent Variable: Changes in poverty rate (\$1.90 per day poverty line)									
	Full Sample			Developing Countries			Developing Countries in Asia		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth (<i>GDP</i>)	- 1.852* ** (0.241)	- 1.983* ** (0.262)	- 1.996* ** (0.260)	- 1.564* ** (0.247)	- 1.565* ** (0.269)	- 1.594* ** (0.270)	- 1.375* ** (0.409)	- 1.249* * (0.459)	- 1.352* * (0.484)
Openness measured by PCI (<i>PCI</i>)		- 0.011* ** (0.002)	- 0.006* ** (0.001)		- 0.011* ** (0.003)	- 0.006* (0.003)		- 0.013* ** (0.002)	- 0.008* * (0.004)
Growth X PCI (<i>GDP</i> × <i>PCI</i>)			- 0.291* ** (0.042)			- 0.247* ** (0.040)			- 0.242* ** (0.079)
Inflation (<i>INF</i>)		0.081 (0.076)	0.079 (0.076)		0.148 (0.095)	0.147 (0.094)		0.085 (0.178)	0.054 (0.186)
Government Expenditure (<i>GE</i>)		-0.016 (0.012)	-0.015 (0.011)		-0.016 (0.012)	-0.014 (0.012)		-0.023 (0.038)	-0.015 (0.039)
Regime Repressiveness (<i>RR</i>)		-0.008 (0.038)	-0.010 (0.039)		-0.001 (0.036)	-0.003 (0.037)		-0.071 (0.089)	-0.084 (0.100)
Constant	-0.007 (0.006)	-0.013 (0.009)	-0.013 (0.009)	- 0.018* ** (0.006)	- 0.031* ** (0.011)	- 0.031* ** (0.011)	- 0.042* * (0.016)	- 0.056* (0.028)	-0.050 (0.029)
No. of obs.	365	325	325	306	272	272	83	78	78
Adjusted R-squared	0.12	0.148	0.152	0.099	0.131	0.133	0.047	0.075	0.074

Notes: Standard errors (in parenthesis) are clustered at country level; all regressions include period dummies (not reported); ***, **, * indicate significance level at 1, 5, and 10%, respectively.

Table A6: Trade openness and poverty reduction, with the price convergence index as the measure of trade openness (different poverty line)

	\$3.20 per day			National Poverty Line		
	(1)	(2)	(3)	(4)	(5)	(6)
Growth (<i>GDP</i>)	- 1.640*** (0.213)	-1.770*** (0.242)	-1.775*** (0.243)	-0.978*** (0.222)	-1.139*** (0.231)	-1.086*** (0.232)
Openness measured by PCI (<i>PCI</i>)		-0.007*** (0.002)	-0.005*** (0.002)		-0.001 (0.003)	0.031*** (0.009)
Growth x PCI (<i>GDP</i> × <i>PCI</i>)			-0.127*** (0.046)			-1.307*** (0.371)
Inflation (<i>INF</i>)		0.046 (0.055)	0.045 (0.055)		0.204 (0.153)	0.219 (0.154)
Government Expenditure (<i>GE</i>)		-0.013 (0.008)	-0.012 (0.008)		-0.002 (0.007)	-0.001 (0.007)
Regime Repressiveness (<i>RR</i>)		-0.007 (0.023)	-0.008 (0.024)		0.014 (0.021)	0.018 (0.019)
Constant	0.002 (0.005)	-0.001 (0.007)	-0.001 (0.007)	-0.010 (0.006)	-0.016 (0.010)	-0.019* (0.011)
No. of obs.	379	339	339	126	119	119
Adjusted R-squared	0.152	0.175	0.175	0.125	0.152	0.155

Notes: Standard errors (in parenthesis) are clustered at country level; all regressions include period dummies (not reported); ***, **, * indicate significance level at 1, 5, and 10%, respectively.

Table A7: Trade openness and poverty reduction, with the price convergence index as the measure of trade openness (regression based on 5-year averaged data)

Dependent Variable: Changes in poverty rate (\$1.90 per day poverty time)			
	(1)	(2)	(3)
Growth (<i>GDP</i>)	-1.874*** (0.330)	-1.964*** (0.350)	-2.376*** (0.462)
Openness measured by PCI (<i>PCI</i>)		-0.007 (0.070)	0.824** (0.381)
Growth X PCI (<i>GDP</i> × <i>PCI</i>)			-0.100** (0.047)
Inflation (<i>INF</i>)		-0.053 (0.094)	-0.060 (0.091)
Government Expenditure (<i>GE</i>)		-0.024 (0.021)	-0.020 (0.019)
Regime Repressiveness (<i>RR</i>)		-0.023 (0.048)	-0.021 (0.047)
Constant	16.276*** (2.502)	17.738*** (2.824)	20.872*** (3.725)
No. of obs.	440	395	395
Adjusted R-squared	0.488	0.547	0.544

Notes: Data on poverty and other explanatory variables are averaged over five-year periods; standard errors (in parenthesis) are clustered at country level; all regressions including period dummies (not reported); ***, **, * indicate significance level at 1, 5, and 10%, respectively.