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

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Roadmap

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Introduction

- Mainstream trade theory postulates the trade openness reduces poverty through ‘growth’ effect and ‘factor proportion’ effects.
- The findings of the early country case studies are consistent with these postulates.
- Recent multi-county econometric studies have found evidence in support of growth effect, and the available evidence on whether this relationship is conditioned by the degree of openness is mixed.
- I hypothesise that this is because of the limitations of the openness measure commonly used in these studies.
- Empirical analysis covers 123 countries over the last three decades.

Research question

How does trade openness affect poverty, and the growth-poverty nexus?

How does trade openness reduce poverty?

The standard trade theory postulates that openness to trade helps reduce poverty in developing countries

- directly by changing factor proportion of production (the “factor proportion” effect)
- Indirectly through economic growth (the “pull-up” effect)

1. The factor proportion effect

As postulated by Stolper and Samuelson (1941), the factor proportion effect suggests that liberalization in the poor countries

↑ specialization in labor-intensive production

↑ the demand for unskilled labor → higher unskilled wages (after surplus labor pool is depleted)

The most relevant factor is 'employment generation'

- Trade creates employment that injects income to the poor *even if* wages do not increase.

2. The pull-up effect

The basic notion is

Openness → growth, then growth → poverty

- Export earnings can relax balance of payment constraint, allowing the economy to *access* foreign-made capital goods, machinery, and essential intermediate inputs → Enable an expansion of manufacturing sector.
- Export → higher productivity/ diffuse international knowledge and foreign technology

All these factors promote growth, and growth "pulls up" people from poverty (given the existing patterns of income distribution).

The findings of a series of detailed country studies are consistent with both postulates (Little et al., 1973; Kruger, 1978; Bhagwati, 1978; Balassa, 1982, Krueger, 1983; Papapeorgiou et al., 1990, and Lal and Myint, 1996).

"The most important aspect of policy was the trade regime, with better growth performance under outward orientation"

(Lal and Myint, 1996, p. 395)

However, recent multi-country econometric studies* have found evidence in support of only the growth effect on poverty.

No evidence of direct poverty reduction effect of openness, as postulated by the standard trade theory and supported by the findings of the early country case studies.

* Edwards (1997), Roemer and Gugerty (1997), Ghura et al. (2000), Dollar and Kraay (2002, 2004), Aisbett et al. (2008), Dollar et al., (2016), Mitra (2016).

Research issue:

Do the findings of multi-country studies reflect the well-known limitations of the common-used openness indicator, the trade-to-GDP ratio?

Limitations of the trade-to-GDP ratio

- Captures things that have little to do with liberal trade policies (e.g., the country size, geography, population, capital accumulation, technological change, change in terms of trade).
  - China and USA's trade-to-GDP ratio are small (38%, 28%) even though it is big trading nations.

- Change in the trade-to-GDP ratio is found to be driven by GDP, not trade volumes (Fuji, 2019)

The trade share is susceptible to country's engagement in global production sharing (GPS)

- GPS involves small value-added additions carried out in many locations → a given consumer good can be exported many times.
- While GDP is measured in value added terms, trade is measured in gross terms.
- Lead to an inflated trade-to-GDP ratio ("super trading economies")

When manufacturing sector is integrated within GPN, the trade-to-GDP ratio can be artificially high (Krugman, 1995)

(e.g., Singapore (326%), Malaysia (131%), Luxembourg (387%), and Hong Kong (377%)

A new measure of openness

A new measure of trade openness

I construct a new index of trade openness drawing on the work of Jeffrey Williamson and his research associates (Williamson, 2000, 2002, 2008, 2014; O'Rourke and Williamson, 1999, 2000)

Basic idea: The rate of change in prices of traded goods at home and abroad should converge when a country become increasingly integrated in international markets.

- **At a given point of time**, the levels of price of a given product can of course be different across countries due to transportation costs and other fixed costs.
- **Over time,** openness to trade should manifest in convergence of changes in relative prices of traded goods.

Note that we are comparing changes in, *not the levels of*, tradable prices among countries using changes in US prices as the base.

The Price Convergence Index: Changes in the manufacturing price of a given country relative to that of the world price (the U.S.)

- Collect the data on manufacturing price index for individual country (measured by the implicit manufacturing price deflator derived from national accounts). The base year is 1970.
- Adjust price indexes of other countries for changes in the domestic currency – US$ exchange rate.
- Divide each country's exchange rate adjusted price index by the US price index. (U.S. = the largest trading nation during the period of study, relatively open)
- Calculate the absolute deviation of the adjusted price ratio from 1
- Make an inverse to make it consistent with the standard trade measure (the trade-to-GDP ratio)

Trade-to-GDP ratio
VS
Price Convergence Index

Trade-to-GDP ratio

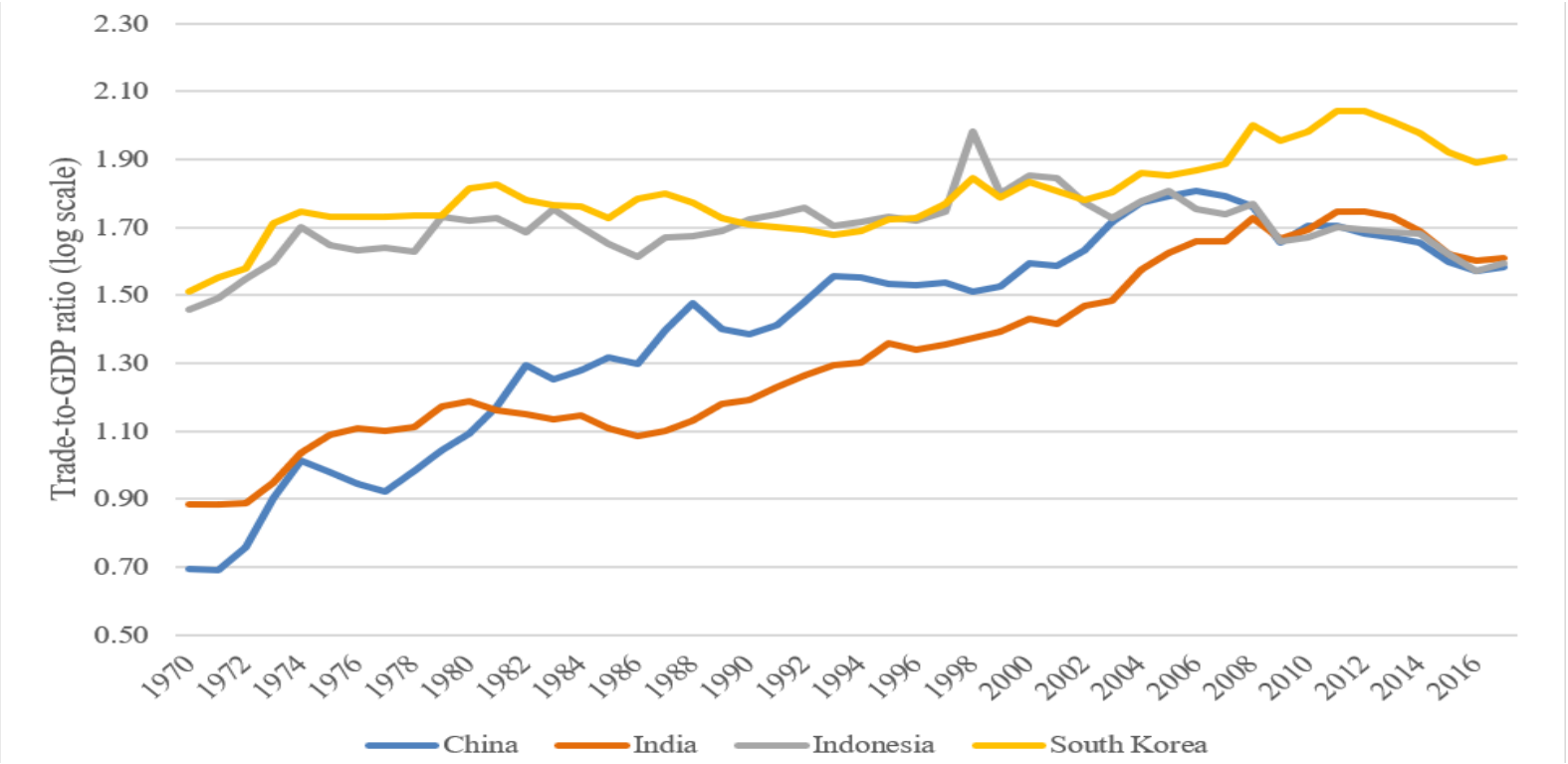

Figure 1: Trade-to-GDP ratio between 1970 and 2017 (log scale)

Price Convergence Index

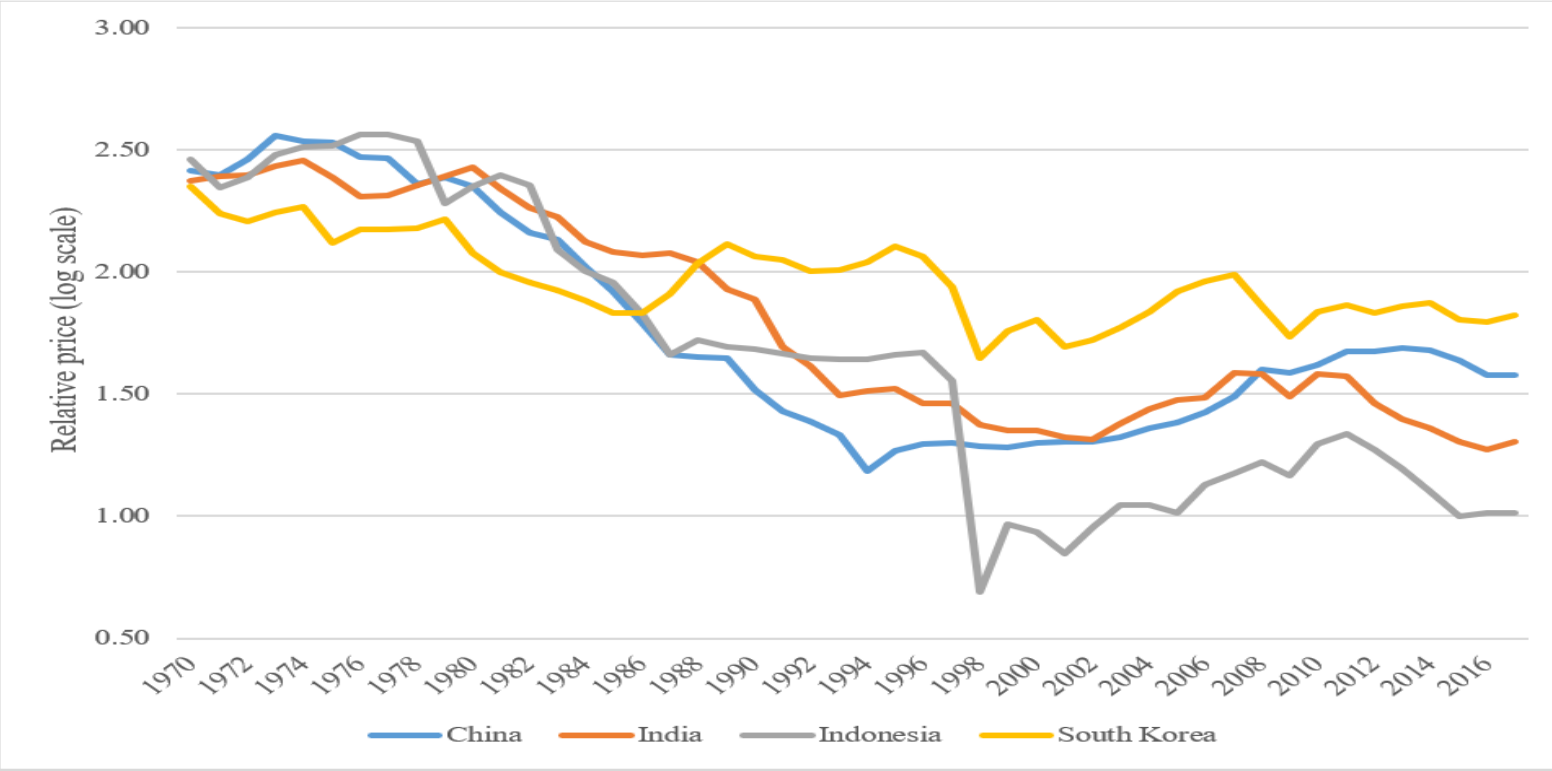

Figure 2: Price convergence index between 1970 and 2017 (log scale)

Advantage of PCI

In investigating the relationship between openness and developmental outcomes (e.g., poverty and inequality), what relevant is changes in the domestic economy driven by changes in relative prices in the home market after opening up to trade.

- In line with factor proportion effect, a greater economic integration will have an impact on the economy if the resultant changes in the domestic prices are so significant that induces a widespread reallocation of resources.

- A rise in the trade-to-GDP ratio (driven by population and income growth in trading partners) does not guarantee that there could be an impact on her domestic economy since the domestic price does not necessarily reflect such change in trade share.

Limitations of the PCI

- Impossible to assume perfect convergence of manufacturing prices even in the absence of trade restrictions because of enormous heterogeneity of manufacturing trade and other country-specific fixed factors (e.g., geographic distance and country size)

- But, allowing for these complications, we can reasonably assume that trade restrictions do play a role in the movement of relative prices of manufactured goods among countries.

Specification of the model

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

where the subscripts i refers to country and t is time (year).

- POV Poverty headcount ratio
- 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 An unobserved country effect that is constant over time
- γ An unobserved period effect that is common across countries
- v A stochastic error term, representing the omitted influences on poverty.

Introducing an interaction of the openness measure with the log-level of real GDP per capita to test whether the effect of growth on poverty is conditioned by the degree of trade openness

$$\text{Log}POV_{it} = \alpha_i + \beta_1 \text{log}GDP_{it} + \beta_2 OPEN_{it} + \beta_3 (logGDP_{it} \times OPEN_{it}) + \beta_4 INF_{it} + \beta_5 GE_{it} + \beta_6 RR_{it} + \gamma_t + v_{it} \quad (2)$$

- To test this hypothesis, the statistical significance of β_3 is examined.
- Note that the sign of β_2 itself is ambiguous (+/-) 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)

Definition of variables

Variable	Definition	Data source
Poverty Rate (POV)	Poverty headcount ratio (measured at the $1.90 poverty line, 2011 PPP)	The POVCALNET database/LIS
Trade Openness (OPEN)	There are two trade openness measures: trade-to-GDP ratio and the Price Convergence Index • PCI ranges between 0 and 100. It is an inverted 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.* • Trade-to-GDP ratio is the ratio of total exports plus imports as a percentage of total GDP.	Value added deflator used to calculate PCI are derived from Food and Agriculture Organization of the United Nations (FAO) database, exchange rate used to adjust PCI are derived from IMF, other measures are compiled from WITS and World Development Indicator (World Bank)
GDP per capita (GDP)	Gross Domestic Product (GDP) per capita (constant 2011 price). GDP per capita is in natural logarithms.	World Development Indicator (World Bank)

Variable	Definition	Data source
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. The higher the score, the higher the repressiveness of a country.	Freedom House

Note on poverty measure and quality of data are in the appendix of this presentation

Data

- Estimate the model for full sample of 123 countries, and separately for all developing countries and developing countries in Asia.

- Define ‘developing countries’ based on the UN country classification. This group includes some high-income countries which have transformed their economies during the post War era such as South Korea and Chile.

- These countries are central to the debate on the openness-poverty nexus. I use the UN classification because it is more appropriate for the purpose at hand and use the World Bank’s income-based classification for comparison.

Data organization

- Data on poverty are scanty, resulting in highly unbalanced panel dataset.
- Strictly follow work in the literature of poverty (Dollar and Kraay, 2002, 2004; Adams, 2004; Dollar et al., 2012)
- Organize data into “spells”, defined as within-country changes in variables of interest between two survey years
- Specifically, I calculate average annual log differences of incomes, poverty rate, and other explanatory variables for each spell, recognizing that different spells cover periods of different length, depending on the availability of household survey data.
- I construct a set of all possible consecutive spells by country, but imposing a minimum length of 5 years for each spell.
- Results in a set of 364 spells in 123 countries. Median spell length is 6 years.

Econometric Issue

- Given the nature of data organization, I regress annualized changes in the log of poverty rate on annualized changes in the log of real GDP per capita, trade openness indicator, and other explanatory variables.

- Basically, it is a growth regression (the first-difference estimator)

- Using consecutive survey data may cause the variance of the errors not constant across observations. Address this issue by using heteroscedasticity-consistent robust standard error.

- Using different variables to capture the role of government institution (e.g., regime repressiveness (political rights and civil liberty score), democracy index, and world governance index)

Regression Result

- Report the result separately for two measures of openness. First, the trade-to-GDP ratio. Then, the PCI.

- In each table, the results are presented separately for all countries, developing countries, and developing countries in Asia.

Results 1: Trade-to-GDP ratio

Dependent Variable: Changes in poverty rate ($1.90 per day poverty line), Openness = trade-to-GDP ratio									
	Full Sample			Developing Countries			Developing Countries in Asia		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth	-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)
Trade-to-GDP ratio		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 trade-to-GDP ratio			**-0.014 (0.112)**			**-0.029 (0.114)**			**-0.206 (0.226)**
Inflation		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		-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		-0.007 (0.042)	-0.007 (0.042)		-0.001 (0.041)	-0.001 (0.041)		-0.101 (0.120)	-0.125 (0.124)
No. of obs.	365	331	331	306	272	272	83	78	78
Adjusted R2	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 include period dummies (not reported); ***, **, * indicate significance level at 1, 5, and 10%, respectively.

Results 2: Price Convergence Index

Dependent Variable: Changes in poverty rate ($1.90 per day poverty line), openness = PCI									
	Full Sample			Developing Countries			Developing Countries in Asia		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth	-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)
Price Convergence Index		-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 Price Convergence Index			**-0.291*** (0.042)**			**-0.247*** (0.040)**			**-0.242*** (0.079)**
Inflation		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		-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		-0.008 (0.038)	-0.010 (0.039)		-0.001 (0.036)	-0.003 (0.037)		-0.071 (0.089)	-0.084 (0.100)
No. of obs.	365	325	325	306	272	272	83	78	78
Adjusted R2	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 regression include period dummies (not reported); ***, **, * indicate significance level at 1, 5, and 10%, respectively.

Robustness check

The results are consistent when using

- Sub-sample (after 2000, data quality and quantity, reliable data have become available only quite recently)
- FE estimator using levels (instead of annualized changes) of variables
- Different definition of country group based on the World Bank classification
- Different poverty line (3.30 dollar per day, national poverty line)
- 5-year averages (instead of “spell”)

Conclusion

- Examined the relationship between economic growth, poverty reduction, and trade openness using a new measure of trade openness, the Price Convergence Index.

- Using the traditional measure of openness, consistent with previous studies, no direct relationship between openness and poverty reduction.

- Using the PCI, there is a strong evidence that there is a systematic relationship between openness and the incidence of poverty.

- The poverty-reducing impact of a given rate of growth is greater for countries with more open trade regimes.

Implication

- Use of the standard measure of trade openness for examining the growth-poverty nexus fails to capture the factor proportion channel of poverty reduction, and thus understates the power of trade openness on poverty reduction.

- The results call for further attempt 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 to examine the implications openness for income inequality, employment generation, and wages.

THANK YOU

APPENDIX

Summary Statistics

	Observations	Mean	Standard Deviation	Min	Max
Poverty rate ($1.90 a day)	511	17.38	22.55	0.00	94.10
Real GDP per capita (US$)	507	12,409.71	19,070.85	213.65	110,000.00
Price Convergence Index	504	25.00	7.02	0.00	100
Trade-to-GDP ratio	504	74.21	46.42	10.39	416.39
Inflation	481	75.05	41.65	0.00	306.49
Government expenditure (% of GDP)	491	14.79	5.33	0.91	34.19
Regime Repressiveness	511	4.69	2.13	2.00	9.00

Correlation matrix

	1	2	3	4	5	6	7
Poverty Rate	1.00						
GDP	-0.7541*** (0.000)	1.00					
Price Convergence Index	-0.0269 (0.5467)	-0.0071 (0.8743)	1.00				
Trade-to-GDP ratio	-0.2033*** (0.000)	0.2437*** (0.000)	0.0386 (0.3901)	1.00			
Regime repressiveness	0.4546*** (0.000)	-0.7249*** (0.000)	0.0859 (0.0540)	-0.1669*** (0.0002)	1.00		
Inflation	0.0185 (0.6862)	0.0075 (0.8699)	-0.0235 (0.6108)	-0.0919** (0.0456)	0.0196 (0.6691)	1.00	
Government expenditure	-0.3006*** (0.000)	0.5046*** (0.000)	-0.0185 (0.6849)	0.2052*** (0.0000)	-0.4110*** (0.000)	0.0040 (0.9316)	1.00

Robust 1: Before & after year 2000

Dependent Variable: Changes in poverty rate ($1.90 per day), openness = PCI						
	Before 2000			after 2000		
	1	2	3	1	2	3
Growth	-1.388** (0.622)	-1.622*** (0.580)	-1.535*** (0.548)	-1.899*** (0.305)	-2.035*** (0.337)	-2.066*** (0.342)
Price Convergence Index		-0.007 (0.004)	0.001 (0.003)		-0.015*** (0.003)	-0.011*** (0.002)
Economic growth X Price Convergence Index			-0.342*** (0.069)			-0.675* (0.393)
Inflation		0.285 (0.259)	0.341 (0.268)		-0.015 (0.052)	-0.021 (0.052)
Government Expenditure		0.028 (0.029)	0.032 (0.029)		-0.026** (0.013)	-0.024* (0.012)
Regime Repressiveness		0.001 (0.036)	-0.005 (0.040)		-0.032 (0.056)	-0.029 (0.053)
No. of obs.	63	54	54	297	266	266
Adjusted R^2	0.059	0.13	0.151	0.12	0.148	0.156

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

Robust 2: FE estimator, using level (not change)

Dependent Variable: (log of) poverty rate ($1.90 per day), openness = PCI			
	Full Sample		
	1	2	3
Growth	-1.594*** (0.316	-1.878*** (0.396)	-1.877*** (0.395)
Price Convergence Index		-0.007** (0.004)	0.045 (0.030)
Growth x PCI			-0.606* (0.350)
Inflation		-0.041 (0.004)	0.045 (0.030)
Government Expenditure		-0.030 (0.021)	-0.029 (0.021)
Regime Repressiveness		-0.035 (0.055)	-0.038 (0.056)
No. of obs.	465	419	419
Adjusted R2	0.516	0.561	0.563

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

Robust 3: WB Classification

Dependent Variable: Changes in poverty rate ($1.90 per day poverty time), openness = PCI									
	Full Sample			All Developing Countries			Developing countries in Asia		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth	-1.852***	-1.983***	-1.996***	-1.406***	-1.351***	-1.377***	-1.643***	-1.571***	-1.674***
	(0.241)	(0.262)	(0.272)	(0.261)	(0.283)	(0.283)	(0.475)	(0.535)	(0.551)
Price Convergence Index		-0.011***	-0.006***		-0.011***	-0.006		-0.013***	-0.007**
		(0.002)	(0.001)		(0.003)	(0.004)		(0.001)	(0.003)
Growth X Price Convergence Index			-0.291***			-0.258***			-0.268***
			(0.042)			(0.039)			(0.082)
Inflation		0.081	0.079		0.175*	0.174*		0.017	-0.013
		(0.076)	(0.076)		(0.101)	(0.101)		(0.172)	(0.175)
Government Expenditure		-0.016	-0.015		-0.013	-0.011		-0.030	-0.020
		(0.012)	(0.011)		(0.012)	(0.012)		(0.037)	(0.037)
Regime Repressiveness		-0.008	-0.010		-0.009	-0.011		-0.097	-0.110
		(0.038)	(0.039)		(0.047)	(0.049)		(0.086)	(0.098)
No. of obs.	365	325	325	295	261	261	89	84	84
Adjusted R^2	0.120	0.148	0.152	0.07	0.103	0.106	0.070	0.104	0.106

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

Robust 4: 3.2$ per day poverty line

Dependent Variable: Changes in poverty rate ($3.2 per day poverty time), openness = PCI			
	Full Sample		
	1	2	3
Growth	-1.640*** (0.213)	-1.770*** (0.242)	-1.775*** (0.243)
Price Convergence Index		-0.007*** (0.002)	-0.005*** (0.002)
Growth x PCI			-0.127*** (0.046)
Inflation		0.046 (0.055)	0.045 (0.055)
Government Expenditure		-0.013 (0.008)	-0.012 (0.008)
Regime Repressiveness		-0.007 (0.023)	-0.008 (0.024)
No. of obs.	379	339	339
Adjusted R2	0.152	0.175	0.175

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

Robust 5: 5-year average regression (1.90$, FE estimator)

Dependent Variable: Changes in poverty rate ($1.90 per day poverty time), openness = Trade-to-GDP ratio			
	Full Sample		
	1	2	3
Growth	-1.874*** (0.330)	-2.003*** (0.337)	-1.963*** (0.336)
Trade-to-GDP ratio		-0.001 (0.003)	0.005 (0.011)
Growth X Trade-to-GDP ratio			-0.001 (0.002)
Inflation		-0.089 (0.096)	-0.095 (0.095)
Government Expenditure		-0.023 (0.020)	-0.024 (0.021)
Regime Repressiveness		-0.018 (0.049)	-0.017 (0.049)
No. of obs.	440	402	402
Adjusted R2	0.488	0.532	0.532

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

Robust 5: 5-year average regression (1.90$, FE estimator)

Dependent Variable: Changes in poverty rate ($1.90 per day poverty time), openness = PCI			
	Full Sample		
	1	**2**	**3**
Economic growth	-1.874*** (0.330)	-1.964*** (0.350)	-2.376*** (0.462)
PCI		-0.007 (0.070)	0.824** (0.381)
Growth X PCI			-0.100** (0.047)
Inflation		-0.053 (0.094)	-0.060 (0.091)
Government Expenditure		-0.024 (0.021)	-0.020 (0.019)
Regime Repressiveness		-0.023 (0.048)	-0.021 (0.047)
No. of obs.	440	395	395
Adjusted R2	0.488	0.547	0.544

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