

Effects of Education & Globalization on Income Inequality in Asia

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Introduction

Income distribution and its economic and social effects has long been a topic of interest for many scholars. There have been many studies analyzing the relationship between income distribution and economic progress. Some have further extended their analysis to the linkage of income inequality and political violence. Simon Kuznets, the 1971 Nobel laureate in economics, hypothesized in the 1950s that income inequality tends to initially increase, peak, and then fall as economies develop. The economic development process involves structural changes which, along with dualism, cause this progression. Urbanization and population growth associated with the early stages of economic development initially exacerbate income inequality, but subsequent political factors and economic policies decelerate income growth of the upper income group while simultaneously promoting the situation of the lower income group.

This widely-recognized inverted-U curve hypothesis of Kuznets has a long history as a contentious subject in economics. The academic world witnessed a surge of research on the Kuznets hypothesis in the 1970s, principally comparative empirical studies with cross-country data. When updated data on distribution of income became available later in the 1990s and 2000s, there was a revival of cross-country empirical studies on the Kuznets hypothesis again. Most of the cross-country empirical research found evidence that supports the Kuznets hypothesis while a few studies disputed this hypothesis. The Kuznets hypothesis of an inverted U-curve relationship between the level of per capita income and income inequality is still an unresolved issue despite the growing number of empirical studies on this topic.

The recent rise of national income inequality has prompted inquiry into the causes of the resurgence of income inequality. For example, the Gini coefficient of income inequality for the OECD average in 2011 had increased more than 10% from the mid-1980s. More recent studies have proposed the “great U-turn” hypothesis, implying that the trend again reverses further down the timeline of development for countries with very high income. Recent globalization and concurrent outsourcing and wage compression may have fostered a reversal of the inclining trend of balanced income distribution.

Although this study is an extension of abundant cross-country analyses previously performed on the Kuznets hypothesis, some particulars distinguish my research from past research. First, instead

of focusing on the inverted-U hypothesis itself, the importance of education variables as significant explanatory variables for income inequality is emphasized. Second, the effect of globalization on income inequality is considered. Beginning in the 1980s, many countries have carried out financial and trade liberalization policies and the level of globalization has been generally increasing with few exceptions. Globalization affects income inequality both directly and indirectly by affecting education levels. Finally, the present study analyzes how globalization and education affect income inequality with a focus on the Asian and the Pacific regions. This research tries to more accurately define the connection between education and income inequality in the framework of an ever more globalized and integrated world economy, using expanded and recently updated data. This article is based on my original research paper, *Education, Globalization and Income Inequality in Asia*, published as a working paper of the Asian Development Bank Institute in May 2017.

Income Inequality in Asia

The World Income Inequality Database (WIID) provides the most comprehensive set of income inequality statistics available for developed, developing, and transition countries. The WIID3.3, released in 2015, covers 175 countries for the period of 1950-2012 for most countries. However, the data set, being a collection of data from various sources, has missing years for many countries as well as many different observations for the same year. For example, in the case of China, seven different Gini coefficients are reported in 2010 while no observations are reported for 1954-1963, 1965, 1969, 1971 and 1976.

Table 1 shows the trend of the Gini coefficient as well as the bottom 20% share and the top 20% income share in Asian countries between the mid-1990s and around 2010. Out of the 29 countries with available data in the mid-1990s, 14 showed high income inequality with their Gini coefficients greater than 40, the commonly known threshold for high inequality, while 10 out of the 32 countries around 2010 showed high income inequality. A decrease in the number of countries with high income inequality might give a spurious indication of improvement in income distribution, which would be misleading.

Most Asian countries, 16 out of 29, actually experienced worsening income distribution as can be seen from the last column of *Table 1*. In particular, the Gini coefficient of China jumped by 12.6

TABLE 1

Trends in income inequality in Asia

Country	Code	Mid-1990s				Around 2010				Δ Gini
		Year	Gini	Bottom 20%	Top 20%	Year	Gini	Bottom 20%	Top 20%	
Afghanistan	AF					2008	27.4	9.4	37.48	
Armenia	AM	1996	48.2	4.56	55.3	2010	36.2	5.00	45.00	-12
Azerbaijan	AZ	1996	45.8	7.98	40.98	2008	33.7	7.99	42.08	-12.1
Bangladesh	BD	1996	38.7	5.79	47.9	2010	45.8	5.22	51.79	7.1
Bhutan	BT					2012	36	7.10	43.70	
Cambodia	KH	1997	44.7	5.96	54.16	2010	36	2.80	60.47	-8.7
China	CN	1993	35.5	7.35	43.23	2010	48.1	6.44	39.24	12.6
Fiji	FJ	1991	46	5.1	50.1	2009	42.8	6.20	49.59	-3.2
Georgia	GE	1998	50.3	3.44	54.5	2010	43	5.38	46.90	-7.3
Hong Kong	HK	1996	52	3.7	56.3	2011	48.9	4.40	54.20	-3.1
India	IN	1992	32	8.8	41.1	2010	36.8	8.12	42.46	4.8
Indonesia	ID	1996	36.1	7.78	44.9	2010	38	7.15	45.47	1.9
Japan	JP	1993	24.9	10.58	35.65	2009	31.1	7.54	40.89	6.2
Kazakhstan	KZ	1996	39.4	6.68	42.33	2009	27.8	9.12	38.41	-11.6
Kyrgyzstan	KG	1996	48.5	3.08	54.1	2009	36.2	6.82	43.38	-12.3
Laos	LA	1997	34.9	8.02	43.28	2008	36.7	7.64	44.84	1.8
Malaysia	MY	1995	48.5	4.21	55.26	2009	46.2	4.54	51.45	-2.3
Maldives	MV	1998	46.2	6.51	44.24	2010	37	7.00	43.00	-9.2
Mongolia	MN	1995	33.2	7.37	40.76	2008	36.5	7.10	44.04	3.3
Myanmar	MM					2010	30.3	11.98	31.97	
Nepal	NP	1996	38.8	7.59	46.97	2010	32.8	8.27	41.46	-6
Pakistan	PK	1996	31.2	9.45	41.09	2011	30.6	9.40	40.10	-0.6
Philippines	PH	1997	42.7	6.01	48.91	2009	44.8	5.10	51.90	2.1
Singapore	SG	1997	44.4	3.6	48.2	2010	47.2	5.08	43.99	2.8
South Korea	KR	1996	32.8	5.99	38.8	2009	34.5	6.52	38.40	1.7
Sri Lanka	LK	1996	46.6	5.03	53.88	2007	40.3	6.94	47.79	-6.3
Taiwan	TW	1996	31.7	7.23	38.39	2010	34.2	6.49	40.19	2.5
Tajikistan	TJ	1999	30.4	7.67	41.58	2009	30.8	8.29	39.37	0.4
Thailand	TH	1996	42.9	5.7	50.1	2009	40.8	6.10	48.70	-2.1
Turkmenistan	TM	1993	35.8	6.7	42.76	1999	35.8	6.70	42.76	0
Uzbekistan	UZ	1993	33.3	7.28	40.74	2003	36.7	7.14	44.19	3.4
Vietnam	VN	1998	35.4	7.38	45.46	2008	35.6	7.42	43.41	0.2

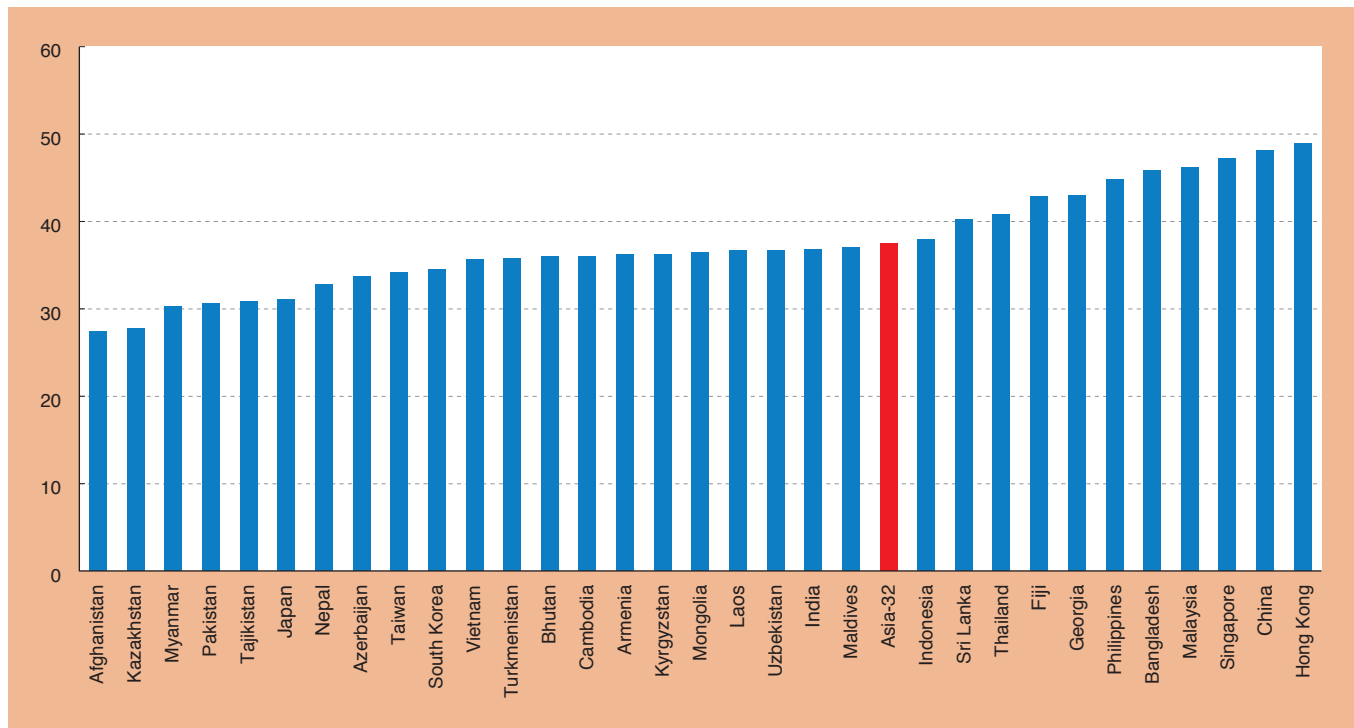
Source: WIID (World Income Inequality Database) 3.3

points from 35.5 in 1993 to 48.1 in 2010, while Japan's Gini coefficient jumped by 6.2 points from 24.9 in 1993 to 31.1 in 2009. The countries that displayed an improvement in their Gini coefficients are mainly from Central Asia. They include Armenia, Azerbaijan, Georgia, Kazakhstan, and Kyrgyzstan. When they experienced drastic changes in their social and economic structures in the process of transition from a command economy to a market economy in the 1980s and 1990s, their Gini coefficient initially surged. As their economies have stabilized and more income opportunities have become available, their Gini coefficients have also steadily declined. For example, Armenia's Gini coefficient fluctuated

from 26.9 in 1986 to 48.2 in 1996 to 36.2 in 2010. Other transition economies such as Georgia, Kazakhstan, and Kyrgyzstan show a similar pattern. Cambodia also experienced a similar trend with its regime changes in 1975 and 1997. The trend of Gini coefficients in Kyrgyzstan with a total of 47 Gini coefficient estimates between 1981 and 2009 clearly shows the presence of an inverted-U Kuznets curve.

Most Asian countries, except for some Central Asian ones, Cambodia, and a few small countries experienced rising income inequality. The key driving factors are technological progress, globalization, and market-oriented reform. These factors helped the rapid growth of developing Asian countries in the last two decades.

CHART 1

Gini coefficients in Asia, 2010

Source: WIID (World Income Inequality Database) 3.3

However, they also had negative consequences in income distribution in the region. Technological progress combined with capital-intensive technology tends to favor skilled labor over unskilled labor, increasing skill premiums and causing income inequality. Globalization could favor particular regions (for example, coastline over inland in China) or particular industries (those with comparative advantage), thus causing more income inequality. On the other hand, the Stolper and Samuelson theorem and “growth with equity” experiences in South Korea, Taiwan, China, and Singapore suggest improvement in income distribution. Therefore, whether globalization has a positive or negative effect on income distribution in the Asia and Pacific areas will be empirically tested in this study.

Compared with OECD countries, Asia’s income inequality is higher by 5.46 points on average. The average Gini coefficient of Asia’s 32 countries around 2010 was 37.46 as shown in [Chart 1](#), while the average Gini coefficient of 34 OECD countries in 2011 was 32.0. While changes in the Gini coefficients in the OECD countries over time tend to be mild, many Asian countries experienced drastic surges or drops in their Gini coefficients between the 1990s and 2010.

Education Attainment & Education Inequality in Asia

In 2012, professors Robert Barro of Harvard University and Jong-

Wha Lee of Korea University compiled a new data set of educational attainment for 146 countries from 1950 to 2010, by updating their existing panel data set of 1993 and 2001. This new data set includes 31 Asian and Pacific (hereafter Asian) countries. In 1950, the Asian population aged 15 and over had an average 2.59 years of schooling, increasing steadily to 5.24 years in 1980 and 8.29 years in 2010. Compared to the world population aged 15 and over, Asian countries started at a lower level than the world average of 3.2 years in 1950, but reached a higher level than the world average of 7.8 years in 2010. Steady growth in average years of schooling over time in all three levels of education — primary, secondary and tertiary — is observed in Asia.

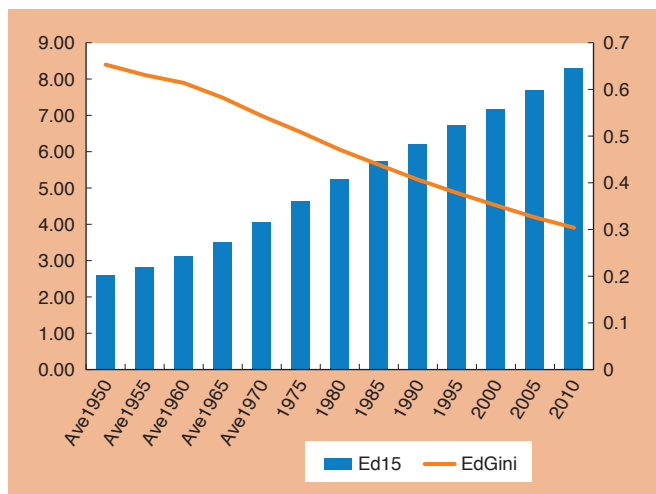
Educational inequality can be obtained by the following education Gini formula with the mutually exclusive and collectively inclusive seven categories of the Barro-Lee data set. The seven categories are non-schooling, partial primary education, complete primary education, partial secondary education, complete secondary education, partial higher education, and complete higher education.

$$EDGini = 1/\mu \sum \sum p_i |y_i - y_j| p_j$$

where EDGini represents the education Gini index derived from the dispersion of educational attainment, μ is the mean years of education for the relevant population, p_i and p_j represent the proportions of population with specified levels of education, y_i and y_j are the years of education at different educational attainment levels, and $n = 7$ where it indicates the number of levels/categories in

CHART 2

Average years of schooling & education Gini: Asia



Source: New data set of educational attainment in the world 1950-2010 by Barro-Lee

education attainment data. The cross-country pattern of the distribution of education in [Chart 2](#) shows that education Gini coefficients decline continuously as the average years of schooling increase over time.

This inverse relationship between educational attainment and educational inequality is confirmed not only over time ([Chart 2](#)) but

also across-country in 2010 ([Chart 3](#)). The only outlier from this pattern is Cambodia.

Model & Variables

There are several ways to structure models to formulate the Kuznets inverted-U hypothesis. A characteristic model that numerous authors have utilized may be presented as follows.

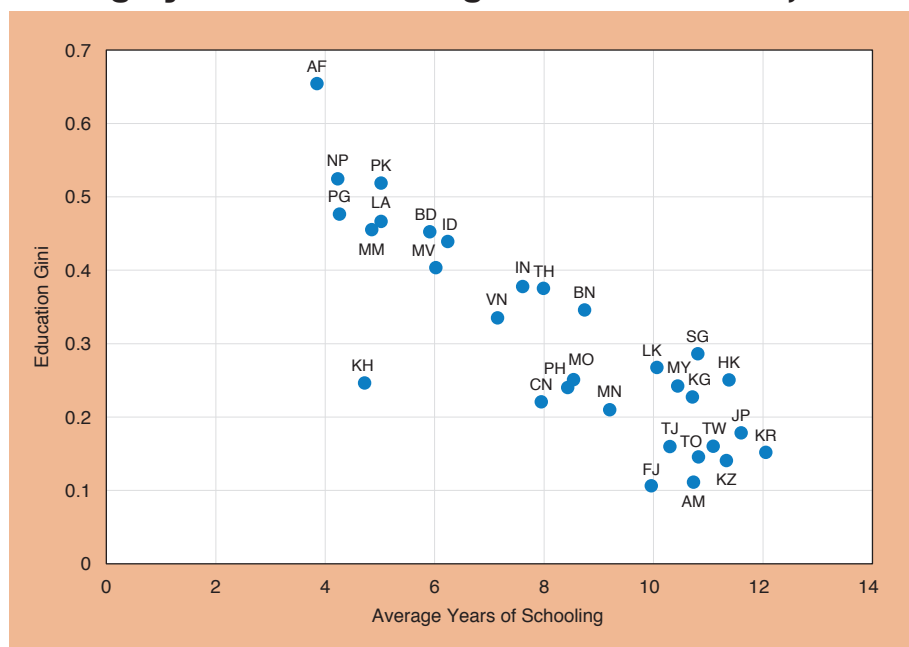
$$\text{Gini} = a_0 + a_1 \ln Y + a_2 (\ln Y)^2 + u \quad (1)$$

where Gini is the Gini index, an indication of income inequality, $\ln Y$ is shorthand for the logarithm of income (per capita GDP), which generally represents the level of economic development, and u is the residual. We expect a positive sign for a_1 , while a negative sign is predicted for a_2 .

Several other independent variables that have been incorporated into cross-sectional studies are usually included along with the income variables to better analyze income inequality. For this purpose, we use a stepwise regression method, in which a variable from a set of explanatory variables is considered in each step for addition in the model. We consider two educational variables, one globalization variable and two freedom measures (economic and political). The two educational variables are the average years of schooling (ED) and the dispersion of schooling (EDGini). A country's globalization level and its degree of freedom, either political or economic, may influence distribution of income, especially in the progressively integrated and globalized world. Relevant significant control variables are added to the final regression equation as shown

CHART 3

Average years of schooling & education Gini, 2010



Source: New data set of educational attainment in the world 1950-2010 by Barro-Lee
See [TABLE 1](#) for country abbreviation codes.

below.

$$\text{Gini} = b_0 + b_1 \ln Y + b_2 (\ln Y)^2 + b_3 \text{ED} + b_4 \text{EDGini} + b_5 \text{FREEDOM} + b_6 \text{GLOBAL} + u \quad (2)$$

where FREEDOM represents either a country's degree of economic freedom or degree of political freedom, and GLOBAL indicates the degree of globalization of a country.

There are various measures of income inequality and the well-known and widely used measure of income inequality is the Gini coefficient. Additionally, the income shares of the top 20% of the population (TOP20), and the income share of the bottom 40% of the population (BOTTOM40) are utilized as alternative measures of the income inequality variable. As proxy variable for the income level (or economic development), the logarithm of per capita GDP is used and the data are from the World Bank's World Development Indicators (WDI). One education variable, the average years of schooling (ED), is acquired from the new data set of educational attainment in the world 1950-2010 of Barro-Lee and the second education variable, the dispersion of schooling (EDGini), is calculated by myself according to the formula given in section 3, using the Barro-Lee data.

Two different measures of freedom are used to estimate the variable FREEDOM. First, the economic freedom of a country is determined by the degree of freedom of businesses and individuals from government restrictions on their economic activities. How well legal and institutional systems are structured to preserve economic freedom is also considered. Since 1995, the index of economic freedom has been annually published by the Heritage Foundation. Its publication, the *Index of Economic Freedom*, rates countries in the world based on 50 independent variables that are organized into 10 broad categories of economic freedom.

Second, political freedom is a fundamental factor of democracy. A country's political freedom is rated by estimating the degree to which people are unrestricted in the areas of political rights and civil rights. Beginning in 1978, the index of political freedom has been annually published by Freedom House, a New York-based nonprofit organization that monitors political rights and civil liberties around the world. Its publication, *Freedom in the World*, lists country rankings by the level of political freedom derived from their data on such rights and liberties.

Among the various indices to indicate the level of globalization of individual nations, the KOF globalization index is utilized as a proxy variable for globalization. This index is available for 208 countries for the period 1970–2016 and most suitable for our research because it covers many countries for a long period of time. The KOF globalization index is based on economic, political and cultural integration of a country to the world and the degree of personal contact across national borders. The metrics for economic integration include convergence of domestic and international prices, movements of goods and services, and outward and inward foreign direct investment (FDI) as well as portfolio capital flows. On the other hand, the metrics for the degree of personal contact across

national borders include international travel, memberships in international organizations, cross-border remittances, Internet users and servers, and international phone calls.

Empirical Results

Despite the improvements of WIID data over time, some observations of the Gini index are missing in the data set. In some instances, there exist discrepancies in estimates for the same country in the same year. A possible method to analyze such data with many missing observations is to do an unbalanced panel data analysis. Therefore, an unbalanced panel data analysis, with 1990, 2000, and 2010 data, is done in this study. The sample size is inevitably reduced due to many missing observations of the Gini index. To eliminate the possibility of reverse causality, we used lagged independent variables. Whereas 1990, 2000, and 2010 data points are used for independent variables, the dependent variables, Gini, TOP20 and BOTTOM40, are from data of a few years later (at least two to three years) than 1990, 2000, and 2010 respectively.

The Kuznets hypothesis is supported from the estimation of equation (1). We observe an inverse U-shaped curve relationship for Gini and TOP20, while BOTTOM40 exhibits a U-shaped curve relationship. We obtained the predicted signs for all coefficients, and most of them are significant statistically at the 5% level, regardless of whether Gini, TOP20 or BOTTOM40 are used as the dependent variable. However, with inclusion of the two education variables, ED and EDGini, a quietly different result is obtained. First, inclusion of the additional variables raised the adjusted R² statistic, thus contributing to improvement in the explanatory power of the model. Second, both education variables have significant effects on income inequality while the magnitude and significance of the income variables declined as indicated by smaller and less significant coefficients of both $\ln Y$ and $(\ln Y)^2$. A negative and significant coefficient of ED on Gini and TOP20 indicates that a higher level of schooling reduces overall income inequality (lower Gini index and less TOP 20% income share) while a positive and significant coefficient of ED on BOTTOM40 indicates that a higher level of schooling improves the income share of the poor (more BOTTOM 40% income share). On the other hand, a positive effect of EDGini on GINI and TOP20 and a negative effect of EDGini on BOTTOM40 indicate that the larger the dispersion of schooling, the more unequal the distribution of income.

Table 2 shows the regression results of estimating equation (2), which includes all independent variables including two control variables in addition to two income variables and two education variables. These two control variables signify a country's degree of freedom and degree of globalization. With a moderate improvement in the adjusted R² statistic, the explanatory power of the model is increased. The significance of the two education variables remains unchanged while the two income variables become less significant, though they exhibit predicted signs.

TABLE 2

Regression of income inequality on income, education & globalization

	Gini	TOP 20%	BOTTOM 40%
Constant	10.56 (12.84)	3.28 (5.26)	16.34 (10.74)
1n Y	13.21 (7.68)	12.63* (7.14)	-4.26 (2.94)
(1n Y) ²	-1.55 (1.17)	-1.13 (0.72)	0.73 (0.58)
ED	-1.72* (0.96)	-2.17** (0.66)	0.98** (0.44)
EDGini	5.94** (2.37)	6.94** (1.13)	-4.76** (1.91)
ln ECONOMIC FREEDOM INDEX	1.73 (2.05)	2.184 (2.12)	-1.31* (0.71)
POLITICAL FREEDOM RATING	-0.15 (0.29)	0.28 (0.63)	-0.09 (0.11)
ln GLOBALIZATION INDEX	2.95** (1.13)	3.01** (0.97)	-1.01* (0.54)
N	69	69	69
Adj. R ²	.445	.489	.394

The first entry for each predictor is the coefficient estimate, and the second in parentheses is the standard error of the coefficient estimate.

* indicates significance at the 10% level and

** at the 5% level.

Source: Kang H. Park, *Education, Globalization and Income Inequality in Asia*, Asian Development Bank Institute working paper series #732, May 2017.

Economic freedom, though not significant, is positively related to income inequality while no meaningful association between political freedom and income inequality is found. This study also confirms that some variations in income inequality can be explained by globalization, sustaining the great U-turn hypothesis. So, the longitudinal tendency toward rising income inequality may be partially explained by globalization trends. Globalization may influence income inequality through technical changes favoring highly educated and skilled workers, with a bias against unskilled workers, causing wider wage differentials.

Conclusion & Implications

Education has been a crucial factor in economic and social policies because of its potential to promote economic and social progress for the individual as well as the country as a whole. Historically, education as human capital investment and its effect on economic growth have been major subjects of concern for scholars as well as policy makers. Lately, the importance of establishing the relationship between education and income and between education and income distribution has gained prominence.

In this article, I have offered evidence on how the education level and education inequality influence income inequality in the Asian and Pacific areas, based on the panel data of 1990, 2000, and 2010. Results from the panel data analysis indicate that a higher level of schooling of the population has reduced income inequality, while a greater dispersion of schooling among the population has increased income inequality. The presence of the inverted-U curve is supported when only the income variables are included in the model as

independent variables. However, the effect of the income variables becomes weaker and statistically less significant when two additional educational variables, specifically the average years of schooling and the dispersion of schooling, are incorporated into the model. This analysis demonstrates that an increasing degree of globalization results in increasing inequality in income distribution. However, freedom, either political or economic, has only limited impacts on distribution of income.

This study offers policy implications on how to improve income distribution. The chief finding of this study is that education plays a significant role in reducing income inequality. If a government plans to improve distribution of income, it is suggested that government policy makers focus on education policies that promote educational expansion while affording individuals with equal and greater access to educational opportunities. I also identified in an earlier study that educational expansion with less dispersion of schooling is a major factor contributing to economic growth. Government policy makers need to monitor the dispersion of educational attainment because education expansion under certain circumstances may produce an increase in education inequality.

At the same time, as changes in educational attainment and dispersion of schooling can take a long time, this indirect and long-term education policy needs to be supplemented by more direct and short-term government policies focusing on a progressive income tax structure and transfer payments to the poor. Some argue that redistributive policies have a tendency to have a negative impact on economic growth. However, equitable distribution may not necessarily be detrimental to economic growth as Japan, Taiwan, and South Korea represent a few cases of achieving both equity and economic growth with their emphasis on education in their economic development process. Equity and growth can be achieved by an optimal mix of long-term education policies and short-term redistributive government policies.

This study also confirms the important role played by globalization in determining income inequality. The difficulty in establishing relationships comes from the complexity of globalization measurements. The globalization index is comprised of numerous elements such as movements of goods and services, inward and outward FDI as well as portfolio capital flows, convergence of domestic and international prices, and international travel. To discover which elements play important roles in determining income inequality, further research on the different components of globalization would be required. **JS**

Kang H. Park is a professor of economics at Missouri State University in the United States. He was a US Fulbright scholar in China in 2009-2010 and is currently recommended for a US Fulbright award in South Korea for 2018-2019.