Inequality of Human Opportunities in Developing Asia

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This paper analyzes the equity of opportunity in basic education and infrastructure services in seven developing countries, Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. The analysis applies a method developed by the World Bank called the Human Opportunity Index, which measures the total contribution of individual socioeconomic and demographic circumstances to inequality of opportunity in accessing basic services. The new and major contribution of the paper, however, is the development of a methodology that quantifies the relative contribution of each circumstance variable to the inequality of opportunity. This contribution is crucial in identifying which underlying inequalities matter most—which can have important policy implications, for instance, in terms of developing better-targeted interventions. Results of the empirical analysis indicate that more needs to be done to improve the distribution of economic benefits. Opportunities to access basic education and infrastructure services in the seven countries vary widely in terms of availability and distribution. The study also finds that inequality of opportunity is driven mainly by per capita household expenditure. This suggests that household poverty plays a crucial role in determining equitable access to basic services.

Keywords: inequality, education, health, basic infrastructure, human opportunity, poverty, access to water and sanitation, access to electricity, urbanization, agglomeration, developing Asia

JEL codes: I14, I24, I25, I38, O15, O57

I. Introduction

Inequality remains a persistent challenge in many economies today. In Asia and the Pacific, inequality has risen over the last decade despite growth rates that have lowered poverty incidence (ADB 2007a). In the 16 countries that make up developing Asia, the Gini coefficient increased from 46.8 in 1993 to 52.4 in 2003 (ADB 2007a).

Inequality is usually measured in terms of income or consumption, but the concept is now being extended to cover many other standard of living dimensions such as inequality of outcomes in health, education, and basic infrastructure, among

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others. In a recent study, Zhang and Kanbur (2005) and Tandon and Zhuang (2007) have demonstrated that disparities in health outcomes in the People’s Republic of China (PRC) have gotten worse.

Although any society’s ultimate objective is to eliminate or reduce inequality of outcomes, the 2006 World Development Report has argued that it is not appropriate to focus on this alone when assessing the fairness of a social system. Inequality of opportunity, not of outcome, should inform the design of public policy. According to this view, public policies need not necessarily eliminate or reduce all outcome inequalities but may instead focus on reducing inequalities that arise from unequal opportunity. Thus, a just society is one that provides equal opportunity to all.

Governments usually provide people opportunities in education, health, nutrition, security, and basic infrastructure. However, not all citizens can equally avail of these opportunities. For instance, many school-age children in developing countries are unable to attend school due to family circumstances. Similarly, many of those children have no access to clean water, electricity, and sanitary toilets. Measuring the inequality of opportunity in such basic services is therefore essential prior to designing policies aimed at providing universal provision of these basic opportunities.

To measure the inequality of opportunity contributed by individual socioeconomic and demographic circumstances, the World Bank (2006) has developed the Human Opportunity Index (HOI). Inequality of opportunity due to differences in circumstances is considered unjust and should be of concern to society. When a child is unable to get proper education because her family belongs to a low social group, for instance, it is deemed as gross injustice. In its study on Latin America, the World Bank considered six circumstance variables: (i) urban or rural area, (ii) gender, (iii) number of siblings, (iv) parents’ education, (v) per capita income, and (vi) presence of parents. The number of circumstance variables included was determined by the availability of data in 19 Latin American countries.

This paper seeks to measure for the first time the inequality of opportunity in seven developing countries: Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. The HOI is measured for a set of opportunities related to education and basic infrastructure—school attendance among children aged 6–11 years for primary school and 12–17 years for secondary, as well as access to safe water, electricity, and sanitation.

The HOI measures the total contribution of individual socioeconomic and demographic circumstances to inequality of opportunity in accessing basic services.

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1Selection of the seven countries was based purely on the availability of data. Although these countries are not representative of developing countries in Asia, they are at different stages of economic development and thus provide a nice contrast. This is the first study that has applied the World Bank’s method to Asian countries. The household surveys used in this study include: the Household Income and Expenditure Survey 2000 for Bangladesh; the Bhutan Living Standard Survey 2007; SUSENAS 2009 for Indonesia; the Household Integrated Economic Survey 2007–2008 for Pakistan; the Annual Poverty Indicator Survey 2002 for the Philippines; the Household Income and Expenditure Survey 2009–2010 for Sri Lanka; and the Household Living Standards Survey 2008 for Viet Nam.
The new and major contribution of this paper, however, is the development of a methodology that quantifies the relative contribution of each circumstance variable to the inequality of opportunity. This contribution is crucial in identifying underlying inequalities that matter most, which can have important policy implications for instance in terms of developing better-targeted interventions. Results of the empirical analysis indicate that more needs to be done to improve the distribution of economic benefits. Opportunities to access basic education and infrastructure services in the seven countries vary widely in terms of availability and distribution. The study also finds that inequality of opportunity is driven mainly by per capita household expenditure. This suggests that household poverty plays a crucial role in determining equitable access to basic services.

This paper is outlined as follows. Section II briefly outlines the HOI methodology. Section III discusses the method of quantifying the relative contribution of each of circumstance variable to inequality of opportunity. Section IV provides a cross-country comparison of inequalities in opportunity in the seven developing countries considered in this study. Section V summarizes the major findings emerging from the study and presents the corresponding policy implications.

II. Human Opportunity Index

Let us define a variable $z_i$ which takes a value of 1 if the $i$th individual has access to an opportunity (such as education) and takes a value of 0 if the $i$th individual lacks access to the opportunity. It can be easily seen that $E(z_i) = \pi_i = P(z_i)$, where $\pi_i$ is the probability that the $i$th individual has access to a given opportunity. A distinction is made between circumstance and effort variables (Roemer 1998). Circumstance variables are exogenous variables in the sense that an individual has no control over them. Effort variables, meanwhile, reflect an individual’s efforts and capacity to innovate and take risk. Inequality caused by differences in effort is deemed acceptable, while inequality caused by circumstances is considered unjust and unacceptable, and should thus be reduced.

The HOI measures the contribution of inequality of opportunities given the circumstance variables. Therefore, we estimate $\pi_i$ by means of a logit model using a set of $k$ circumstance variables $x_{i1}, x_{i2}, \ldots, x_{ik}$. Accordingly, we have a logit model:

$$\pi_i = \frac{e^{\sum_{j=1}^{k} \beta_j x_{ij}}}{1 + e^{\sum_{j=1}^{k} \beta_j x_{ij}}}$$

(1)

This model can be estimated using the maximum likelihood method. $\hat{\pi}_i$, the maximum likelihood estimate of $\pi_i$, gives the estimate of the probability of access to a given opportunity that is explained by the circumstance variables. Any measure of inequality of $\hat{\pi}_i$ will be the inequality of opportunity that is explained by the
circumstance variables. The World Bank (2006) uses the relative mean deviation defined as

\[ D = \frac{1}{2\pi} \sum_{i=1}^{n} w_i |\hat{\pi}_i - \bar{\pi}| \]  

(2)

where \( n \) is the number of sample households, \( w_i \) is the population weight attached to the \( i \)th sample household, and \( \bar{\pi} \) is the proportion of the population with access to a given opportunity.\(^2\) Note also that \( \bar{\pi} \) may be called level or coverage.\(^3\) \( D \) measures the degree of inequality of opportunity that is explained by the individual’s circumstances. As such, \((1 - D)\) may be interpreted as equity of opportunity. \( D \) takes values between 0 and 1. \( D = 0 \) implies that every individual in a society enjoys the same opportunities, while \( D = 1 \) implies that only one person in the society enjoys all opportunities.

The HOI is then defined as

\[ HOI = \pi (1 - D) \]  

(3)

which is a composite index of two factors: (i) the level or coverage, and (ii) equity of opportunity.\(^4\) Since \( 0 \leq D \leq 1 \), HOI will always be less than or equal to \( \pi \), which means that there will always be loss of average opportunities available to the society because opportunities are not equally enjoyed by all members of the society. HOI can be interpreted as an inequality-adjusted coverage rate. The policymakers’ objective will be to maximize HOI, which can be achieved by enhancing total opportunity (coverage), increasing equity of opportunity (more equitably distributing opportunity), or increasing both coverage and equity.

### III. Contribution of Individual Circumstance Variables

The relative mean deviation defined in equation (2) measures the total contribution of all circumstance variables to inequality of opportunity. Although it is useful to determine the total impact of all circumstance variables on inequality of opportunity, determining the impact of each circumstance variable would be more useful to policymakers. These individual contributions will identify the circumstance variables having the most impact on inequality of opportunity. In this section, we present a method of calculating the relative contributions of individual circumstance variables to the inequality of opportunity.

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\(^2\) \( D \) is also referred to in the literature as the dissimilarity index, which is widely used in sociology.

\(^3\) Note that \( \bar{\pi} \) is the mean of \( \hat{\pi}_i \) across all individuals.

\(^4\) This methodology was developed by Paes de Barros et al. (2008).
A variable $y_i = \frac{\pi_i}{(1-\pi_i)}$ is the ratio of the odds of $z_i = 1$ against $z_i = 0$. Thus, the larger is $y_i$, the greater are the odds that the $i$th person will have access to an opportunity. A special feature of the odds ratio is that, in utilizing equation (1), it can be written in natural logarithmic form as

$$\ln(y_i) = \sum_{j=1}^{k} \beta_j x_{ij}$$

(4)

The maximum likelihood estimate of $y_i$ is then given by

$$\ln(\hat{y}_i) = \sum_{j=1}^{k} \hat{\beta}_j x_{ij}$$

(5)

where $\hat{\beta}_j$ is the maximum likelihood estimate of $\beta_j$ derived from the logit model in equation (1), and $\hat{y}_i$ is the estimate of the $i$th person’s odds ratio that is explained by the circumstance variables.

Since $y_i$ is a monotonically increasing function of $\pi_i$, there is one-to-one relationship between them. This implies that inequality of $\pi_i$ will be equivalent to inequality of $y_i$. This in turn suggests that inequality of $\hat{y}_i$ will be equivalent to inequality of $\hat{\pi}_i$ which, as shown above, is also equal to the inequality of opportunity explained by the circumstance variables. We can thus measure the inequality of opportunity explained by the circumstance variables by measuring the inequality of $\hat{y}_i$.

We may measure inequality of opportunity by any of the inequality measures that have been proposed in the literature. As discussed above, the World Bank (2006) used the relative mean deviation to measure inequality of opportunity. In this study, we use the log variance measure of inequality, which has an attractive feature of decomposability.

Following Fields (2003), we take the variance of both sides of equation (5) to obtain

$$\sigma^2(\ln(\hat{y}_i)) = \sum_{j=1}^{k} \hat{\beta}_j \text{cov}(x_{ij}, \ln(\hat{y}_i))$$

(6)

which decomposes the inequality in opportunity (measured by the log variance) in terms of the contributions made by each of the individual circumstance variables.\(^5\)

Dividing both sides of equation (6) by $\sigma^2(\ln(\hat{y}_i))$ gives the percentage contribution of individual circumstance variables as

$$100\% = \sum_{j=1}^{k} S_j$$

(7)

\(^5\)Equation (6) follows a straightforward application of calculating the variance of a sum of random variables.
where
\[
S_j = \frac{100 \times \hat{\beta}_j \text{cov}(x_{ij}, \ln(\hat{y}_i))}{\sigma^2(\ln(\hat{y}_i))}
\]

(8)
is the percentage contribution of the \(j\)th circumstance variable to the total inequality of opportunity. The larger is \(S_j\), the greater is the contribution of the variation in the \(j\)th circumstance variable to total inequality of opportunity. The idea is similar to analysis of variance that is widely used in statistics to measure contributions of various factors to the total variance. Further, it should be noted that \(S_j\) measures the net contribution of the \(j\)th circumstance variable after accounting for all interactions between circumstance variables. \(S_j\) will generally be positive because \(\hat{\beta}_j\) and \(\text{cov}(x_{ij}, \ln(\hat{y}_i))\) are expected to be of the same sign. However, due to interactions among circumstance variables we may obtain a negative value of \(S_j\), which is largely expected to be statistically insignificant. In that case, the contribution of the \(j\)th circumstance variable may be deemed as neutral to total inequality.

The decomposition presented in equation (7) is based on the log variance as a measure of inequality. This may appear to be a restricted result but is in fact not. Using the famous Shorrocks (1982) theorem, we can easily show that this result holds for a wide variety of inequality measures including the Gini index, the Atkinson index, the generalized entropy family, and the coefficient of variation.

IV. Empirical Analysis

In this section, the methodologies outlined in the previous sections are applied to seven developing countries in Asia: Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam. The section provides analysis of the inequality of opportunity related to basic education and infrastructure.

There are five outcome variables used in our analysis: (i) primary school attendance among children aged 6–11 years, (ii) secondary school attendance among children aged 12–17 years, (iii) access to safe water, (iv) access to electricity, and (v) access to sanitation.\(^6\) Similarly, we used a set of circumstance variables required to estimate the D-Index and the HOI. This comprised (i) gender, (ii) location of household (urban or rural area), (iii) education of household head, (iv) per capita household expenditure, (v) age of household head, (vi) gender of household head, and (vii) household size. Circumstances, as used here, consist of personal or family

\(^6\)School attendance for children aged 6–11 years and 12–17 years was not restricted to primary levels and secondary education levels, respectively (i.e., some in the 6–11 year age group may be in secondary levels). This definition was followed uniformly across all countries. Similarly, same definitions were adopted for access to safe water, access to electricity, and access to sanitation across all seven countries studied.
Table 1. Inequality of Opportunity in Primary Education, 6–11 Years

| Country    | Survey Year | Average Opportunity | D-Index | Human Opportunity Index |
|------------|-------------|----------------------|---------|-------------------------|
| Indonesia  | 2009        | 94.29                | 0.92    | 93.42                   |
| Philippines| 2002        | 93.92                | 1.80    | 92.22                   |
| Viet Nam   | 2008        | 96.31                | 1.29    | 95.07                   |
| Bangladesh | 2000        | 75.59                | 3.53    | 72.92                   |
| Bhutan     | 2007        | 83.05                | 4.98    | 78.91                   |
| Sri Lanka  | 2009–2010   | 99.39                | 0.12    | 99.27                   |
| Pakistan   | 2007–2008   | 74.59                | 8.71    | 68.09                   |

Source: Author’s calculations based on household surveys.

socioeconomic and demographic characteristics over which an individual has no direct control. These seven circumstance variables are available in household datasets for the seven countries selected for the study.7

A. Inequality of Opportunity in Basic Education

The distribution of opportunity for children to access basic primary education is highly variable across countries in Asia. As indicated by the high value of HOI in Table 1, the playing field is level for primary-school-age children in Sri Lanka, where 99.27% of primary education services are available and equitably allocated. In contrast, only 68.09% of the basic services in Pakistan are available and distributed inequitably among children. Countries in Southeast Asia, such as Indonesia, the Philippines, and Viet Nam are moving towards universal access of basic primary education. For each of these countries, the estimated HOI is higher than 90%, suggesting that more than 90% of primary education services required for universal coverage are available and distributed equitably. Three countries are at the bottom of the ranking, with HOIs lower than 80%. These are Bangladesh, Bhutan, and Pakistan (Figure 1).

Compared to their younger cohorts, children in the secondary-school-age group (12–17 years old) in developing Asia are more likely to have lower levels of equitably allocated education services. The HOI for primary school attendance is far higher than the corresponding figure for secondary school attendance across the seven countries. As shown in Table 2 and Figure 2, the HOI for secondary education services ranges from a high of 84.49 for Sri Lanka to a low of 47.64 for Pakistan.

These findings suggest that countries in the region face greater challenges in equitably ensuring that all children aged 12–17 attend school than ensuring that all children of primary school age attend school. This result could be expected because

7For Bangladesh and the Philippines, relatively old datasets were used—2000 and 2002, respectively—possibly resulting in “unfair” comparisons for the two countries. That is, they may perform worse than they actually do as compared to countries with more recent data.
the opportunity costs of sending children to school are higher at the secondary than at the primary level. This also implies that financial incentives such as conditional cash transfer programs could be more effective in targeting older children if the main objective is to improve school enrollment.
Table 3. Inequality of Opportunity in Access to Safe Water

| Country   | Survey Year | Average Opportunity | D-Index | Human Opportunity Index |
|-----------|-------------|---------------------|---------|-------------------------|
| Indonesia | 2009        | 26.80               | 21.34   | 21.08                   |
| Philippines | 2002 | 61.54               | 12.05   | 54.12                   |
| Viet Nam  | 2008        | 26.38               | 42.66   | 15.12                   |
| Bangladesh | 2000 | 6.66                 | 76.34   | 1.58                    |
| Bhutan    | 2007        | 89.94               | 3.38    | 86.91                   |
| Sri Lanka | 2009–2010   | 40.54               | 16.34   | 33.92                   |
| Pakistan  | 2007–2008   | 34.15               | 24.07   | 25.93                   |

Source: Author's calculations based on household surveys.

Table 4. Inequality of Opportunity in Access to Electricity

| Country   | Survey Year | Average Opportunity | D-Index | Human Opportunity Index |
|-----------|-------------|---------------------|---------|-------------------------|
| Indonesia | 2009        | 89.51               | 3.21    | 86.63                   |
| Philippines | 2002 | 78.45               | 12.53   | 68.62                   |
| Viet Nam  | 2008        | 97.19               | 1.45    | 95.78                   |
| Bangladesh | 2000 | 32.55               | 38.30   | 20.08                   |
| Bhutan    | 2007        | 70.05               | 13.28   | 60.75                   |
| Sri Lanka | 2009–2010   | 93.83               | 2.05    | 91.90                   |
| Pakistan  | 2007–2008   | 90.24               | 4.66    | 86.03                   |

Source: Author's calculations based on household surveys.

B. Inequality of Opportunity in Basic Infrastructure

Basic infrastructure services make significant contributions to well-being. Basic services such as safe water and sanitation (e.g., flushing toilets) have a direct impact on health status and overall well-being. Access to services such as electricity helps households increase their productivity for income generation. A number of studies reveal that a household’s access to basic infrastructure services is highly and significantly correlated with a lower probability of being poor.

Compared to basic education services, results for the HOIs suggest that Asia faces a greater challenge in providing basic infrastructure services. As presented in Tables 3–5, the HOIs for access to basic infrastructure services such as safe water, electricity, and sanitation show lower values for all countries and higher dispersion across countries than those for access to basic education services, highlighting the uneven rates of progress in expanding opportunities for basic infrastructure services in the region.

As seen in Table 3, Bhutan takes the lead in the provision of access to safe water, with an HOI equal to 86.91. In contrast, Bangladesh and Viet Nam have HOIs lower than 20 for this service. In the area of electricity provision, Viet Nam and Sri Lanka lead with HOIs higher than 90, in contrast to an HOI of about 20 for Bangladesh (Table 4). In sanitation, three of the seven countries examined in this study have an HOI higher than 50, while Bangladesh and Bhutan have HOIs lower than 20 (Table 5). These findings suggest that less than one out of five people in...
Table 5. **Inequality of Opportunity in Access to Sanitation**

| Country    | Survey Year | Average Opportunity | D-Index | Human Opportunity Index |
|------------|-------------|----------------------|---------|-------------------------|
| Indonesia  | 2009        | 55.18                | 10.61   | 49.33                   |
| Philippines| 2002        | 85.64                | 6.38    | 80.17                   |
| Viet Nam   | 2008        | 40.24                | 30.96   | 77.40                   |
| Bangladesh | 2000        | 20.33                | 34.20   | 13.38                   |
| Bhutan     | 2007        | 26.47                | 43.51   | 14.95                   |
| Sri Lanka  | 2009–2010   | 94.19                | 2.22    | 92.10                   |
| Pakistan   | 2007–2008   | 66.01                | 17.72   | 54.31                   |

Source: Author’s calculations based on household surveys.

Bangladesh have equal opportunity to live in households with access to safe water, electricity, and sanitation.

C. **Do Circumstance Variables Matter for Inequality of Opportunity?**

This section quantifies the relative contribution of each of the seven circumstance variables to inequality of educational opportunity for both primary and secondary levels, as well as inequality of opportunity to access basic infrastructure such as safe water, electricity, and sanitation. As pointed out, different circumstance variables may interact with each other. As such, the percentage contributions calculated in this section are the net contributions after taking into account all interactions among circumstance variables.

For primary education, the most important circumstance variable that influences whether or not a child has fair access to education opportunities is per capita household expenditure. Its contribution to inequality of opportunity for primary education ranges from 60.6% in Pakistan to more than 95% in countries such as Bangladesh and the Philippines (Table 6). This suggests that overall standards of living of households play a major role in influencing the ability of a child to improve his or her situation over time and achieve intergenerational mobility through education.

With regard to equal opportunity for primary education, variables such as education of household head, urban or rural location (where a child lives), and household size are also important circumstance conditions in Asia. In Pakistan, the household head’s level of formal education accounts for more than 20% of the inequality of educational opportunity for children of primary school age (6–11 years). This suggests a direct association between the household head’s education and his perception of education. A recent study by Lodhi, Tsegai, and Gerber (2011) found that parents with less education in Pakistan are more likely to view education as a trivial factor to future income. Parents with these perceptions are significantly more likely to send their children to madrassahs\(^8\) or let them find paid work.

\(^8\)Madrassah refers to any type of religious school or college for the study of the Islamic religion, though this may not be the only subject studied.
### Table 6. Percent Contribution of Circumstance Variables to Inequality of Opportunity for Primary Education, 6–11 Years

| Country     | Survey Year | Gender | Area of Residence (urban/rural) | Per Capita Household Expenditure | Age of Household Head | Gender of Household Head | Education Level of Household Head | Household Size |
|-------------|-------------|--------|---------------------------------|----------------------------------|-----------------------|--------------------------|-----------------------------------|----------------|
| Indonesia   | 2009        | 0.9*   | 12.4*                           | 74.6*                            | 4.5*                  | -0.0                     | 3.4*                              | 4.0*           |
| Philippines | 2002        | 0.8*   | 1.3                             | 95.2*                            | 0.6*                  | 0.2                      | 0.3*                             | 1.7*           |
| Viet Nam    | 2008        | 0.1    | 10.5                            | 72.8*                            | 0.0                   | -0.4                     | 6.3*                             | 10.7*          |
| Bangladesh  | 2000        | 2.8*   | -2.7*                           | 97.1*                            | -0.0                  | 0.7                      | 2.1*                             | -0.0           |
| Bhutan      | 2007        | 0.2    | 16.1*                           | 77.6*                            | -1.1                  | 0.9*                     | 6.8*                             | -0.5           |
| Sri Lanka   | 2009–2010   | 0.4    | 5.1*                            | 76.4                             | 3.8                   | 2.1                      | 0.0                              | 12.1*          |
| Pakistan    | 2007–2008   | 5.8*   | 10.5*                           | 60.6*                            | -0.0                  | 2.4*                     | 20.5*                            | 0.2            |

* = estimated coefficient found to be statistically significant at the 5% level in the logit regression model of the probability of school attendance among the primary-school-age children, 6–11 years.

Source: Author's calculations based on household surveys.
Similarly, location circumstance (i.e., urban–rural residence) substantially contributes to inequality of opportunity for primary education in countries like Bhutan (16.1%) and Indonesia (12.4%). In addition, a significant proportion of children aged 6–11 years old in Sri Lanka and Viet Nam are often deprived of basic opportunities to help them gain access to education due to large household size, which accounts for 12.1% and 10.7%, respectively, of inequality of opportunity for primary education. Controlling for other factors such as household expenditure and parents’ education, households with more members tend to invest less in education of school-age children (Dang and Rogers 2008).

Results in Table 6 suggest that circumstance variables such as age and gender of household head have little influence on whether or not a child of primary school age has fair access to education opportunities.

In terms of school attendance for children aged 12–17, the inequality of educational opportunity is also driven mainly by their per capita household expenditure. Table 7 shows that per capita household expenditure yields a higher level of contribution to inequality of opportunity for secondary education compared with the other six circumstance variables in the seven selected countries. The contribution of household expenditure to inequality of opportunity for secondary education ranges from 61% in Pakistan at the minimum to 96% in Sri Lanka at the maximum. Apart from per capita household expenditure, the gender of the child, urban–rural residence, and education of household head make a sizable contribution to the inequality of educational opportunity for children of secondary school age.

In Bangladesh, a child’s gender accounts for 20.8% of the inequality of opportunity for secondary education and about 10% in Pakistan. These findings call for strategic government policies that could redistribute available education services toward female children to help achieve equality of opportunity in secondary education. In Bangladesh, a major hindrance to girls’ attendance in secondary school is early marriage and fertility, prompting the government to introduce the highly successful Girls’ Stipend Program aimed at encouraging girls to continue their schooling (Raynor and Wesson 2006).

However, despite recent increases in enrollment, girls still face inequity in achieving education outcomes especially in secondary school (Hossain and Zeitlyn 2010). A similar story of gender bias can also be found in Pakistan. For children of secondary school age, households exhibit a pro-male bias both in the decision to enroll children and amount to spend on education conditional on enrollment, while for the primary-school-age group the bias is only in the decision to enroll (Aslam and Kingdon 2008).

The results in Table 7 also show that the rural–urban divide in terms of residence affects whether or not the child has access to opportunities for secondary education. The contribution of this location circumstance is particularly prominent for the Bhutan case where urban–rural residence accounts for 42.4% of the total inequality of opportunity. In Bhutan, urban–rural residence is the next most important
| Country   | Survey Year | Gender | Area of Residence (urban/rural) | Per Capita Household Expenditure | Age of Household Head | Gender of Household Head | Education Level of Household Head | Household Size |
|-----------|-------------|--------|---------------------------------|----------------------------------|-----------------------|--------------------------|-----------------------------------|----------------|
| Indonesia | 2009        | 0.2*   | 11.6*                           | 69.1*                            | 0.4*                  | 1.5*                     | 17.2*                             | 0.1            |
| Philippines | 2002      | 6.4*   | 2.4*                            | 90.7*                            | 0.3*                  | −0.5*                    | 0.0                               | 0.6            |
| Viet Nam  | 2008        | 4.0*   | 6.6*                            | 65.7*                            | 1.2                   | −0.4                     | 11.0*                             | 12.0*          |
| Bangladesh | 2000       | 20.8*  | −2.6*                           | 76.9*                            | −0.4                  | 2.5*                     | 0.5                               | 2.5*           |
| Bhutan    | 2007        | 3.4*   | 42.4*                           | 54.7*                            | 4.1*                  | 1.4*                     | −4.5*                             | −1.6           |
| Sri Lanka | 2009–2010   | 1.3*   | 0.8*                            | 96.0*                            | 0.6                   | 0.7                      | 0.0                               | 0.6            |
| Pakistan  | 2007–2008   | 9.5*   | 5.2*                            | 61.0*                            | 0.2                   | 1.2*                     | 24.0*                             | −1.1*          |

* = estimated coefficient found to be statistically significant at the 5% level in the logit regression model of the probability of school attendance among the secondary-school-age children, 12–17 years.

Source: Author's calculations based on household surveys.
circumstance variable after per capita household expenditure (54.7%). Children living in rural areas in Bhutan have limited access to schools due to their remote and mountainous location. According to the Ministry of Education of Bhutan (2004), a continuing problem is the tendency for children to drop out of schools if these are distant, and the unwillingness of teachers to be assigned to remote areas. A study conducted by the World Bank (2006) found that teachers are a critical constraint to improving quality of education in Bhutan. In particular, it is more difficult to recruit and motivate teachers for deployment to rural and remote areas.

Furthermore, the results also reveal that the education level of the household head has a significant influence on whether or not a child of secondary school age has fair access to education opportunities. More importantly, the relative contribution of parental education to inequality of opportunity among children is far higher for secondary education than for its primary level counterpart: its contribution jumps to 17.2% for secondary school from 3.4% for primary school in Indonesia, and to 11% for secondary school from 6.3% for primary school in Viet Nam.

As indicated by Table 7, other circumstance variables such as the age and gender of the household head and household size seem to have relatively negligible or statistically insignificant effects on the inequality of opportunity for secondary education.

For access to safe water, electricity, and sanitation, the inequality of opportunity is driven mainly by per capita household expenditure and where an individual lives (urban or rural residence). As can be seen from Tables 8–10, location circumstance dominates in six out of seven countries in the case of safe water access, while per capita household expenditure is the most important circumstance in five countries in the case of access to electricity and sanitation.

In the case of water and sanitation, access is generally higher in urban areas than rural areas (WHO and UNICEF 2010). This phenomenon can also be observed
in Tables 8 and 9. In rural areas, the main challenge deals with the relatively higher cost of building water and sanitation infrastructure as well as the presence of rural poverty. Given this, rural areas often lack an enabling environment that encourages public or private investment in water services leading to low provision of these services (WHO and UNICEF 2010). This is a particular problem in South Asia where there is low overall public or private investment in such infrastructure particularly in Bangladesh, India, and Pakistan (WaterAid 2011). Moreover, even if investments are made in these countries, poor maintenance in rural areas still persists due to poor planning and lack of support. Even in Sri Lanka, which is on track to meet its Millennium Development Goal commitments on water and sanitation, rural areas are relatively underserved because the National Water Supply and Drainage
Board has concentrated its efforts on providing services to densely populated areas (ADB 2007b).

On top of financial constraints to providing water and sanitation services to rural areas, the perceptions and behavior of people in rural areas relating to water use and sanitation also pose challenges. Many rural households do not see the need to invest in tap water or sanitary toilets in their households since there are free options available. This leads to low demand and further decreases the financial viability of such projects. Such behavior has been observed in Indonesia where low consumer demand and community acceptance for water and sanitation services in rural areas are deemed important constraints to investment (AusAID 2009, Yuerlita and Saptomo 2008). Similarly, lack of community participation in water and sanitation projects and poor hygienic behaviors in rural areas, which contribute to low demand, are seen as constraints to improving health and sanitation outcomes in Bhutan (Collett 2010). In Viet Nam, this problem is exacerbated by the decentralized structure of delivering water and sanitation services. Households and communes in Viet Nam are expected to pay for the construction, use, and maintenance of these structures. However, in rural areas, there is less interest among households to invest in such costly infrastructure (Sijbesma, Truong, and Devine 2010).

In the Philippines, household poverty is a more important constraint to accessing water and sanitation services than residing in a rural area. As seen in our results in Tables 8 and 9, per capita household expenditure is the main contributor to inequality of opportunity to access water and sanitation services in the Philippines. Although the rural population in general still has less access to safe water or sanitation services than urban dwellers, poor people in rural and urban areas suffer the most deprivation and thus tend to bear higher burdens of disease or economic costs arising from unsafe water and inadequate sanitation. Thus, investments in water and sanitation in the country should be focused on rural areas and urban slums.

As shown in Table 10, the inequality of opportunity for access to electricity is largely dependent on two circumstance variables: location (i.e., whether living in urban or rural areas) and economic status (as measured by per capita household expenditure). The first circumstance is straightforward to explain—there are high costs associated with building an electricity grid in rural areas (World Bank 2010). As such, people living in rural areas are expected to be less likely to have access to electricity than their urban counterparts. However, this is not the entire story, as there are other constraints to achieving universal electrification in rural areas. In the case of Viet Nam, early attempts at rural electrification were hampered by inefficient coordination and a lack of regulatory framework (World Bank 2010). The high cost of building a rural grid and lack of central coordination also hampered electrification in Sri Lanka. In response to this, the government adopted a decentralized approach by encouraging off-grid electrification such as the use of solar panels (Independent Evaluation Group 2008).
Particular problems for rural electrification in Bhutan and Indonesia are their terrain, remoteness, and scattered settlements. Indonesia’s many islands are so sparsely populated that electrifying them is not financially viable (World Bank 2005). In fact, it is unlikely that the Indonesian State Electricity Company will achieve its electrification targets outside the islands of Java and Bali. In Bhutan, a major challenge is the ruggedness and remoteness of the mountainous terrain, compounded by the fact that the rural population is scattered in small settlements (Kumar 2011). Similarly, community remoteness is an important factor that explains a lack of access to electricity in Pakistan (Mirza and Kemp 2011). Thus, even rich households in rural areas can be considered living in energy poverty.

On the other hand, in Bangladesh and the Philippines, it is household-level constraints—i.e., poverty—that is a major constraint to electrifying rural areas (World Bank 2010). Poor rural households are unlikely to be able to pay for connection fees or electricity consumption, which in turn makes it less financially viable to invest in rural electrification. However, the recent success of Bangladesh shows the importance of central planning to map out subsidies and investments in rural electrification as well as the need to provide rural households with financial assistance through cooperatives (Barnes 2007). As for the Philippines, household poverty is a particularly binding constraint to access to electricity because of high costs as confirmed by studies showing that the country has among the highest electricity rates in Asia due to inefficiencies in energy production and transmission (Department of Energy 2008, Woodhouse 2005).

V. Conclusions

Inequality has become a major item on the development agenda in recent years. After decades of rapid economic growth around the world, economic gains have been threatened by the global financial crisis of 2008 and the ongoing eurozone crisis. While economic theory has always maintained that growth is a necessary but not sufficient condition for improving standards of living, the recent economic crises have reinforced this view even in developed countries. Concepts such as equity, fairness, and justice in the distribution of economic benefits are no longer in the realm of philosophers and theorists. Rather, they are now in the forefront of policy design and economic reform in both developed and developing countries.

This study is concerned with analyzing the equity of distribution of opportunity for basic services in education and infrastructure. The analysis was carried out using a methodology introduced by the World Bank called the Human Opportunity Index (HOI), which is the product of average opportunity and equity of opportunity. The HOI examines both the coverage and distribution of opportunity in an outcome variable such as school attendance, access to safe water, access to electricity, or access to sanitation. The methodology was applied empirically using available...
household data from Bangladesh, Bhutan, Indonesia, Pakistan, the Philippines, Sri Lanka, and Viet Nam.

The HOI measures the total contribution of all circumstance variables to inequality of opportunity. From the perspective of policymakers, determining the impact of individual circumstance variables would be more useful since these individual contributions will help to identify circumstance variables that have the most impact on inequality of opportunity. This study presents a method of quantifying the relative contributions of individual circumstance variables to the inequality of opportunity. The new methodology introduced in this study would be helpful in analyzing binding constraints to providing equitable opportunities across countries.

Among the circumstance variables examined, household expenditure and the location of residence in rural or urban areas were found to be crucial in influencing access to education and basic infrastructure. Household poverty—as manifested in the contribution of per capita household expenditure in the inequality of opportunity—plays an extremely significant role in determining equitable access. Household poverty defines the ability of households to pay for and access these services. This study showed a significant correlation between household resources and the demand for education and infrastructure services.

Thus, policymakers may opt to explore policies that address the demand side of the provision of education and infrastructure. Targeted subsidies or loans may be used to provide incentives to households to increase their demand for education and infrastructure. For education, cash transfers have been widely used to encourage school attendance (e.g., the Philippine government's conditional cash transfer program that provides stipends to poor households whose children meet the required school attendance rate, among others).

Apart from household poverty, the location of residence in urban or rural areas also plays a crucial role in shaping access to infrastructure services. Serving as economic hubs, urban areas often have access to basic infrastructure services since adequate basic infrastructure is a fundamental requirement for encouraging private investments. Basic infrastructure also helps to ensure the proximity of various economic agents such as firms and workers. With reduced transport and transactions costs given the presence of basic infrastructure, firms opt to locate near each other in urban areas, giving rise to the economies of agglomeration which allow for reduced production costs through specialization and division of labor. Thus, there are greater incentives for urban communities to invest in basic infrastructure to take advantage of the benefits of urbanization and agglomeration.

In contrast, there is lower demand for basic infrastructure services in rural areas. These services such as water and sanitation are often provided through free and communal means. As such, there is little willingness to pay for these services among rural settlers, discouraging private investments in the provision of water, electricity, or sanitation services. Given the varying access to basic infrastructure between urban and rural communities, policies may be implemented to compensate
for the lack of demand and incentive to provide basic infrastructure services in rural areas. For instance, subsidies may be provided to rural communities to support the provision of safe water or reliable electricity supply.

Opportunities to access basic education services in the seven countries vary widely. At the primary and secondary levels, Sri Lanka is a stellar example in equitably providing opportunities to access education, with school attendance among children aged 6–11 years reaching nearly 100% and an HOI of more than 99. The country also has the highest attendance rate among secondary-school-age children (86.38%) and an HOI of about 85. Sri Lanka’s educational achievements are remarkable considering that it does not have the highest per capita gross domestic product (GDP) among the seven countries, with the Philippines’ per capita GDP higher in 2007.

In contrast, Sri Lanka’s neighbors, Bangladesh, Bhutan, and Pakistan, have yet to reach 90% attendance rates among primary-school-age children, while attendance rates for children of secondary school age are still below 60% in Bangladesh and Pakistan. HOIs in these South Asian countries are also among the lowest, indicating that they need to both improve overall access to basic education services and ensure that education opportunities among children are equally distributed, even to the poorest segments of the population.

In Southeast Asia, access to and distribution of opportunities for basic education services have been impressive in Indonesia and Viet Nam in recent years, pointing to the effectiveness of their governments’ efforts to provide basic education for all.

Meanwhile, there is also wide variation in the availability and distribution of opportunities to access basic infrastructure services such as safe water, electricity, and sanitation. Bhutan has the highest level of access to safe water (89.94%), Viet Nam has the highest level of electrification (97.19%), and Sri Lanka has the highest percentage of population living in homes with sanitation (94.19%). Our findings highlight the uneven rates of progress in expanding opportunities to access quality infrastructure services in the region as compared with education opportunities.

Unfortunately, for all basic infrastructure, Bangladesh shows the lowest levels of overall opportunities available and the distribution across population. Less than one-third of the population has household access to electricity, about one-fifth has access to sanitation, and only a little more than one-twentieth has access to safe water. For all these facilities, only the richest 20% of the population has access rates of 50% or higher. These findings suggest that these basic infrastructure services are nearly luxuries to most Bangladeshis.

Clearly, a lot needs to be done to improve the distribution of economic benefits in developing countries in Asia. While Bangladesh may be a particularly urgent case, all countries considered in this analysis need to bolster their efforts to improve access to basic education and infrastructure services, especially among the poor and marginalized groups. Sri Lanka’s achievements in equitably providing
basic education opportunities demonstrate the importance and possible effectiveness of public policy in achieving equity of opportunity, particularly in education.

An important factor to consider in improving the delivery of basic services could be decentralization. Many countries have decentralized the delivery of services in education, water, electricity, and sanitation mainly to improve transparency, accountability, and responsiveness in the provision of these services. However, decentralization could also exacerbate existing inequalities across various local government units. Moreover, these local government units will have their own solvency and liquidity issues, which could affect their access to financial services. This could cause highly inequitable distribution of services across districts, with affluent areas having much better services than poorer areas. As such, national governments will have to balance the costs and benefits of decentralizing the responsibility of delivering these services. More rigorous research would be required to determine the best method to deliver public services more effectively and efficiently.

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