Equality of Opportunities and Fiscal Incidence in Côte d'Ivoire

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Abstract

This study analyzes opportunities for children in Côte d'Ivoire, where opportunities refer to access to basic services and goods that improve the likelihood of a child maximizing his or her human potential. The principle that guides this analysis is one of equality of opportunity, which is that a child's circumstances at birth should not determine his or her access to opportunities. The analysis computes the Human Opportunity Index, which measures the extent to which access to basic services is universal and evenly distributed among children of different circumstances.

Opportunities are limited in Côte d'Ivoire, despite some improvements in access to electricity and timely access to primary education. Otherwise, trends on access remain stagnant. Scale effects (variations across the board) are behind these trends, with little improvement observed from equalizing interventions. Circumstances

such as region and household head characteristics affect a child's access to opportunities, while household incomes and a child's gender and ethnicity play a relatively small role in access differentials. Public spending on education opportunities is shown to be regressive and pro-rich, especially when analyzed across the distribution of circumstances rather than across income level.

The groups of children that are particularly behind in terms of educational opportunities are those whose household heads lack primary education and reside in rural areas. Closing the enrollment gap of these children should be a priority for targeted educational interventions. However, improving opportunities may require more than a single type of intervention: opportunities with low coverage may need to be scaled up, while those with large inequalities of access may require equalizing interventions.

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1. Introduction

Access to basic services and goods in Côte d'Ivoire is limited for children and the overall population. This report presents the findings of an effort to measure and analyze the equality of opportunities for children in Côte d'Ivoire, where “opportunities” are defined in terms of access to basic goods and services in education and critical infrastructure facilities, such as clean water and sanitation. The use of the equality of opportunities framework involves looking beyond measures of *average* access to basic goods and services. Rather, the measure that underpins the analysis, the Human Opportunity Index (HOI), also takes into account the extent to which *existing* opportunities in the country are equitably distributed across children of different characteristics, such as gender, economic status, location, and family or parental attributes, which are all circumstances established at birth.

There are a number of compelling reasons why an in-depth country report for Côte d'Ivoire on the equality of opportunities is of interest to the Bank, country policy makers, and other stakeholders in Côte d'Ivoire's development process. The most important among these reasons is that human development remains a challenge, because the country is still recovering from a series of civil conflicts and political instability. (See Box 1.) The numbers from recent household surveys report that almost half of the children from age 6 to 15 years of age do not attend school. Moreover, around one-third of Ivoirian youth younger than age 16 lack access to basic goods, such as sanitation facilities and electric light in the home. Evidence presented in this report also shows that access is unevenly distributed across groups. Because access to basic goods and services represent the minimum level of opportunities a child would need to maximize his or her human and productive potential in life, the low and unequally distributed access severely jeopardizes opportunities for these children.

The following section of this report introduces the underlying concept, properties, and empirical methods for estimating the Human Opportunity Index. Section 3 presents the data and analytical choices made. Section 4 presents the main results related to opportunities, and section 5 presents the results from a fiscal policy analysis to better understand the financial implications of improving of opportunities (in particular, access to education), using an equality of opportunity-based approach.

Box 1. The Link between Welfare and Instability

Côte d'Ivoire experienced prosperity in the two decades that followed its independence in 1960. Unfortunately, the country failed to reform its political and economic institutions, and as a result it has faced a massive deterioration in living standards since the early 1980s. The graph below from the World Bank (2010) Poverty Assessment for Côte d'Ivoire shows the close link between the increases in the poverty rate and the several shocks that affected the Ivoirians. Both externally driven price shocks and internal political changes are correlated with lower welfare. This report on equality of opportunities looks beyond average welfare changes and examines group-specific impacts and the extent to which a series of circumstances are associated with such impacts

Source: World Bank 2010.

2. The Human Opportunity Index: Concepts and Measurement

2.1 Concept

A large body of social science literature has been concerned with equality of opportunity for some time. Amartya Sen has been deeply influential in arguing for an equitable distribution of “capabilities”—a person’s ability and effort to convert resources into outcomes he or she has reason to enjoy. John Roemer’s 1998 *Equality of Opportunity* was the first to formalize an equality of opportunity principle and

remains the most relevant piece of academic literature underpinning the proposed work for Côte d'Ivoire (and other countries in Africa).¹ "Opportunity" in this context, and in the context used throughout this report, is understood as the set of basic services or goods that make it possible for an individual to lead a life with dignity and freedom of choice. "Circumstances at birth" are attributes of individuals for which society believes people should not be held accountable for and which affect a person's ability to achieve access to advantages (opportunities). Roemer argues that policy should work to equalize opportunities *independent* of circumstances and that outcomes should depend only on effort.

The World Bank's (2006) *World Development Report: Equity and Development* argues that the **inequality of opportunity, both within and among nations, results in wasted human potential and weakens prospects for overall prosperity**. Conducting an analysis of equality of opportunity, however, requires a measure or a set of measures that provides a practical way to track a country's progress toward equalizing opportunities for all its citizens. To be useful to analysts and policy makers alike, such a measure must combine a few attractive properties—intuitive appeal, simplicity, practicality (especially in relatively data scarce environments), and sound microeconomic foundations—to ensure that it has an interpretation that is consistent with its objective.

Much of the empirical work in developing countries until recent times has focused mainly on measuring (and comparing) average rates of access to goods or services in health and education for the population and different subgroups within. What has been lacking is an intuitive and unified framework to address a range of questions across different types of opportunities, such as:

- How far away is a country from universalizing each type of opportunity?
- How unequal is the distribution of available opportunities across different subgroups of the population?
- How important are an individual's circumstances at birth in determining access to opportunities?
- What circumstances affect access and, in that sense, contribute the most to the inequality in access?
- What would it take, in terms of resources, to reduce inequality in opportunities, when providing universal access is clearly not possible in the near term?

There has been significant progress in recent years in addressing questions, such as those stated above, in a simple and intuitive framework, as demonstrated by Barros and others (2009) in *Measuring Inequality of Opportunities in Latin America and the Caribbean* (LAC). This report develops a Human Opportunity Index (HOI) by examining children's access to a set of basic goods and services that significantly improves their likelihood of being able to reach their human potential. The report computes HOI for and

analyzes five indicators: access to clean water, sanitation, and electricity; completing sixth grade on time; and attending school from age 10 to 14. The analysis focuses on children because, unlike adults, children cannot be expected to make the efforts needed to access these goods and services, therefore, these five indicators can be considered as proxies for opportunities available to a child. Barros and others (2009), and the updated Barros and others (2010) edition, *Do Our Children Have a Chance?*, analyze these five indicators for 19 LAC countries using the HOI, exploring both changes over time within countries and comparing changes among countries.

The HOI measures how far a society is from universal provision of basic services and goods, such as sanitation, clean water, education, and the extent to which those goods and services are unevenly distributed.² A key feature of HOI is that it not only takes into account the overall coverage rates of these services, but also how *equally* the coverage is distributed. Coverage is determined by measuring the extent to which those *without* coverage are concentrated in groups with particular circumstances (for example, economic status, gender, parental education, and ethnicity), which are conditions established at birth. More specifically, *HOI is an inequality-sensitive coverage rate* that incorporates (i) the average coverage of a good or service, which society accepts should be universal (which implies that the *individual* is not held responsible for lack of access), and (ii) whether it is allocated according to an equality of opportunity principle.

2.2 Unpacking the HOI

The HOI is defined as the difference between two components: the overall coverage rate of the opportunity (C), and a “penalty” for the share of access to opportunities that is allocated in violation of the equality of opportunity principle (P). $HOI = C - P$, which implies that the maximum value HOI for a particular opportunity is the average access (or coverage) rate for that service. It also implies that an HOI of 1 would be possible only when access is *universal* ($C = 1$ and $P = 0$).

Figure 1 shows a simple graphical interpretation of HOI. It graphs the probability of a child of a particular circumstance (for example, percentile of per capita income or wealth) completing sixth grade on time, with circumstance (on the horizontal axis) improving from left to right. The horizontal line is the average coverage rate for the entire population of children.

Figure 1. A Simple Graphical Interpretation of HOI

Source: Adapted from Molinas et al. (2010) and Barros et al. (2010).

The curved line shows access rates for different levels of circumstance. There is no equality of opportunity in this case because the probability of access to the opportunity positively correlates with circumstance, which is shown by the fact that the curved line does not coincide with the horizontal line. Opportunities allocated in the red area (“Penalty”) above the average coverage violate the equality of opportunity principle: they show dependence of the access to education on income or wealth. There is an intuitive interpretation of the red area: it is the share of the total number of opportunities that are “misallocated” across groups of different circumstances, that is, opportunities that are allocated to children with better circumstances so that they have higher than average access to the opportunity.³ The HOI corresponds to the blue area in the graph (“HOI”), which is the area below the curved line discounted by the red area above the average coverage rate. A second interpretation of the HOI invokes an index (D , D -index), equivalent to (P/C) , which is known as the “inequality of opportunity” or “dissimilarity” index. The D -index corresponds to the share of opportunities out of the total amount of opportunities available in society that would have to be reallocated across groups—for an unchanged rate of overall coverage—to achieve equality of opportunity: $HOI = C - P = C * (1 - D)$.

Box 2 outlines a simple hypothetical example of how HOI is measured for two countries with identical populations of children and average coverage rates of primary school enrollment. The example demonstrates how HOI is sensitive to inequality in coverage and how it would change in response to an increase in overall coverage or reallocation favoring the more disadvantaged group.

Box 2. A Simple and Intuitive Example of HOI

Consider two countries, A and B, each with a total population of 100 children. Each country has two groups of children, I and II, which consist of the top 50 percent and bottom 50 percent by per capita income, respectively. The coverage rate of school enrollment (or the average enrollment rate) for both countries is 0.6, that is, 60 children attend school in each country. The table below shows the number of children going to school in each group for each country.

Given the total coverage rate, the principle of equality of opportunity will hold true for each country if each of the two groups in each country has the same rate of coverage, that is, if each group has 30 children going to school. But in reality, group II has 20 enrollments in country A and 25 in country B. This suggests that firstly, opportunities are unequally distributed, and secondly, that inequality of opportunities is higher in country A. The D-index is the share of total enrollments that is “misallocated,” namely $10/60$ and $5/60$ for A and B, respectively. Therefore, $HOI_A = C_0 (1 - D) = 0.6 * (1 - 10/60) = 0.50$; $HOI_B = C_0 (1 - D) = 0.6 * (1 - 5/60) = 0.55$.

Thus, even though both countries have equal coverage rates for enrollment, the higher inequality of opportunity in country A leads to the D-index being higher for A than for B, and HOI being higher for B than for A. It is also easy to see that HOI will increase in a country if: (i) the number of enrollments in each group increases equally (in proportionate or absolute terms); (ii) the enrollment for any group increases without decreasing the coverage rates of the other group; and (iii) the enrollment for group II increases, keeping the total number of children enrolled unchanged (implying enrollment in group I reduces by an equivalent amount). These three features relate to the “scale,” “Pareto improvement,” and “redistribution” properties of HOI, respectively—properties that are intuitively appealing.

Groups by circumstance, income	Number of children ages 6 to 10 years enrolled in school	
	Country A (100 children)	Country B (100 children)
Group I (top 50% by income)	40	35
Group II (bottom 50% by income)	20	25
Total	60	60

Source: Authors

The HOI is an inequality-sensitive coverage rate in the sense that it improves when inequality decreases with a fixed number of opportunities in a society, or when the number of opportunities increases and inequality stays constant. In more formal terms, the properties of the HOI guarantee that the improvement in the index is sensitive to (i) the overall coverage—when the coverage for all groups increases by factor k , the HOI increases by the same factor; (ii) Pareto improvements—when the coverage for one group increases without decreasing the coverage rates of other groups, the HOI increases; and (iii) redistribution of opportunities—when the coverage rate of a vulnerable group increases for a constant overall coverage rate, there is a decrease in inequality and an increase in the HOI.

To compute HOI for a particular opportunity for the children of a country, household survey data are essential. To allow computation of HOI for education and health opportunities, the survey must have a minimum set of information, at the individual (child) or household level, as appropriate. Examples of these would be whether the child is attending school, grade level and last grade completed, and health

indicators such as weight and height of child and whether the child has been immunized. Computing HOI for access to basic infrastructure, such as safe drinking water, electricity and sanitation, would require household-level information for these indicators. With regard to circumstances, the minimum information needed to make the analysis meaningful would be gender, age, and location (urban/rural and/or regional) of the child; demographic characteristics of the household (size and composition); characteristics of parents (gender, age, and education); and some measure of household income, consumption, or wealth.

In practical terms, computing HOI for a particular opportunity when the number of circumstances is relatively large (more than three) requires an econometric exercise, which involves obtaining a *prediction* of the D-index from observed access to opportunities and circumstances among children. In simple terms, the exercise consists of running a logistic regression model on the full sample of children for whom the HOI measure will be constructed to estimate the relationship between access to a particular opportunity and circumstances of the child. The estimated coefficients of the regression are used to obtain, for each child, his or her predicted *probability* of access to the opportunity, which is then in turn used to estimate the D-index, the coverage rate, and eventually the HOI (see box 3 for more technical details on the econometric exercise).

Box 3. Computing the Human Opportunity Index from Household Survey Data

To construct the HOI, the conditional probabilities of access to opportunities for each child based on his or her circumstances must be obtained. To do so, one can estimate a logistic model, linear in the parameters β , where event I corresponds to accessing the opportunity (for example, access to clean water), and x the set of circumstances (for example, gender of the child, education, gender of the head of the household, and the like). One can fit the logistic regression using survey data:

$$\ln \left(\frac{P[I=1|X=(x_1, \dots, x_m)]}{1 - P[I=1|X=(x_1, \dots, x_m)]} \right) = \sum_{k=1}^m x_k \beta_k$$

where x_k denotes the row vector of variables representing the k dimension of circumstances, hence, $x = (x_1, \dots, x_m)$ and $\beta' = (\beta_1, \dots, \beta_m)$ a corresponding column vector of parameters. From the estimation of this logistic regression, one obtains estimates of the parameters $\{\beta_k\}$ to be denoted by $\{\hat{\beta}_{k,n}\}$ where n denotes the sample size.

Given the estimated coefficients, one can obtain for each individual in the sample his or her predicted probability of access to the opportunity in consideration:

$$\hat{p}_{i,n} = \frac{\text{Exp}(x_i \hat{\beta}_n)}{1 + \text{Exp}(x_i \hat{\beta}_n)}.$$

Finally, compute the overall coverage rate, C ; the D-Index; the penalty, P ; and the HOI using the predicted probability $\hat{p}$ and sampling weights, w :

$$C = \sum_{i=1}^n w_i \hat{p}_{i,n} \quad D = \frac{1}{2C} \sum_{i=1}^n w_i |\hat{p}_{i,n} - C|$$

$$P = C * D; \text{ and } HOI = C - P.$$

Source: Adapted from Molinas et al (2010); Barros, Vega, and Saavedra (2010).

Change in HOI over time can be used to assess progress in gaining access to opportunities in a society, taking into account both the universality of access and the inequality of access among different circumstance groups. To help understand the factors that contribute to a change in HOI, a decomposability property of HOI is useful. A change in HOI can be decomposed into (i) a *composition* effect, which refers to changes in the distribution of circumstances (for example, if the distribution of income improves, chances of accessing opportunities are likely to increase); (ii) a *scale* effect, which refers to the proportional change in the coverage rate of all groups (for example, if there is policy directed toward increasing coverage of an opportunity across all groups); and (iii) an *equalization* effect, which refers to the change in the coverage of vulnerable groups (groups with coverage below the national average), with the average coverage rate held unchanged—in other words, a move toward greater or less inequality for the same average level of coverage.

Interpretations of the three decomposed components are quite intuitive. A positive composition effect shows whether a child's underlying circumstances at birth are improving over time as a result of demographic changes, economic growth, or social progress. A positive scale effect shows whether opportunities are improving for all groups in the society, perhaps as a result of public policy or social progress (for example, increased awareness among all households). The equalization effect in essence indicates the trend in equity in a society, showing whether available opportunities are distributed more equitably among its members, so that a child's circumstances at birth begins to decrease in influence regarding access to basic goods and services.

There are a number of limitations associated with the analysis of equality of opportunities (Abrás and Cuesta 2011). First and foremost, the HOI circumvents the challenge of controlling differences of effort among individuals and groups by selecting children, not adults, for the analysis, because children cannot be made responsible for differences in effort, if any. A second limitation is a degree of arbitrariness involved in the selection of some key concepts. The distinction between circumstance and opportunity is not always clear. For example, being exposed to or the victim of conflict may be considered as both a circumstance (in the same way as urban or rural residence) as well as a lack of

opportunity for children (when considering the potential effects on the physical and emotional development of the child). Furthermore, what is considered ethically acceptable or desirable conveniently depends on a society's judgment. Another limitation is to the empirical application of measurements. The HOI is also sensitive to the set of circumstances selected as well as the set of opportunities considered. Quality issues are rarely included in the analysis because it is an open-ended conceptual issue (whether an opportunity is simply access to a service or, rather, access to a *quality* service) and because datasets typically lack the information to systematically include quality considerations. Finally, from a policy point of view, HOI does not address the causes or motivations behind the distributive features of a policy or set of policies that cause the inequality of opportunities.

3. Choice of Opportunities and Circumstances for Côte d'Ivoire

As with previous work on opportunities using HOI, the focus is on opportunities for children for two main reasons. First, intuitively there can be little disagreement about the set of circumstances that are beyond a child's control, and the issue of "effort" in achieving access to the opportunities can be considered irrelevant in the case of children. Second, and perhaps more important, "opportunities" for children, which are defined as access to basic goods and services early in life, are generally accepted as necessary for an individual to progress to a productive adulthood and fulfill his or her potential as a member of society.

In selecting the final set of indicators among the list of basic opportunities (as discussed in the previous section) that can be analyzed as "opportunities" for Côte d'Ivoire, two issues are of paramount importance:

- (i) **The indicators must be available from available data sources.** Fortunately, a series of household surveys for Côte d'Ivoire have been administered since 1985. The surveys are nationally representative and fairly comparable over time. In addition to the long time period covered, analysts can take advantage of the information on household income and spending, which are usually not available in other surveys used for the HOI study of African countries.
- (ii) **The indicators chosen must be relevant for Côte d'Ivoire and provide useful information.** In terms of relevance, the broad categories of basic opportunities identified in earlier work (education and access to basic services) correlate to capabilities that are almost universally accepted as necessary for a productive life. However, in defining the precise indicators within each broad category, country-specific factors need to be taken into account. In particular, it is

important to note that an HOI index is useful, in terms of adding value to what is already known, if the “coverage” or incidence of a particular opportunity is reasonable in a country. If, for example, only a small share of the population has access to a given opportunity, the HOI analysis will not provide much light as almost everyone remains equally excluded from the basic service.

Table 1 lists the set of opportunities and circumstances constructed with the data. The opportunities cover two aspects of well-being: education and habitation. The circumstances are related to inherent characteristics of the child and his or her household.⁴ The relevant opportunities are for both socioeconomic mobility (through education) and health and well-being (water, sanitation, and electric light). Education opportunities are related to attending school and starting and completing primary school on time. Infrastructure opportunities include, in addition to the standard indicators of access to water and sanitation, access to electric light. Electric light allows for reading and studying in late hours, is usually a healthier and more reliable source than fuel, and indicates access to electricity for other general purposes, such as access to information (by radio and television).

The list of circumstances considered includes those that are specific to every child (gender) or the household (such as number of children, household income, and location). The education level and gender of the head of the household are included as circumstances; studies from a number of countries have suggested that education and gender of parents can affect a child’s access to opportunities.⁵

Table 1. Opportunities and Circumstances for Children

Opportunities	Circumstances
<i>Education</i>	<ul style="list-style-type: none"> • Gender of the child • Number of children and presence of elderly in the household • Location: urban/rural and region • Years of education, age, and gender of head of household
<ul style="list-style-type: none"> • Attending school (6–12 yrs) • Attending school (13–15 yrs) • Started primary school on time (6–7 yrs) • Finished sixth grade (13–15 yrs) 	<ul style="list-style-type: none"> • Household total income (in quintiles) • Ethnicity of the head and conflict-related dummies (only in 2008)
<i>Infrastructure/habitation</i>	
<ul style="list-style-type: none"> • Water (0–15 years) • Sanitation (0–15 years) • Electric light (0–15 years) 	
<i>Source:</i> Authors’ compilation.	

It is important to note that **the list of circumstances does not include all the circumstances that may be relevant in determining a child's access to opportunities**. This is because the selection of circumstances, which defines the groups between which the equality of opportunities is examined, is necessarily limited by the information that is available from surveys. To consider just one example: conventional wisdom suggests that access to opportunities for a child may be influenced to some extent by the child's ethnic group or tribe at birth. However, because ethnic and tribal affiliation is not included in the household surveys, this characteristic cannot be incorporated as a circumstance in the analysis. Information on the region where the child is located, wherever available, has been used as an extremely rough proxy to compensate for the absence of information on ethnicity. Similarly, the selection of opportunities is also limited to available information. For example, even when a timely record of vaccinations is critical for the health of children, this information is not provided by respondents in the household surveys.

Given that the list of circumstances cannot be completely comprehensive, the HOI that is computed using just the available circumstances would serve as a theoretical "upper bound."⁶ This means that adding the important circumstances currently missing would very likely *add* to the penalty for inequality and drive HOI downward. In simple terms, the "true" HOI, if one could obtain that, would not show a picture that is "better" than what the HOI, based on limited information, would suggest.

Table 2 presents the coverage rate of opportunities for children of the relevant age groups for which the HOI is computed, and the incidence of circumstances in the population in each year for which a household survey is available. There is wide variation across opportunities as measured in terms of average coverage rates. Access to clean water for children under 15 years is widespread, but declining, during this decade; access to electric light is, in contrast, more limited, but it has increased steadily since 1985. Access to sanitation is somewhere in the middle, with a coverage rate between that of electricity and that of water, but hardly any increase in the last two decades. More worrisome, educational opportunities are more limited across Ivorian children, with relatively unchanged attendance to school; despite the increasing timely primary enrollment, there has been a substantive decline in the percentage of teenagers finishing sixth grade. These changes have taken place in a context of changing circumstances: increasing female household heads, declining presence of children in the household, and declining urbanization, as indicated in table 3.

To compute HOI for each individual's opportunity, the method outlined in section 2 (and box 3) is followed. Access to a particular opportunity (a dummy variable is assigned the value 1 if the child has the

opportunity and 0 otherwise) is regressed—using a logistic regression method—on the set of circumstances of the child, for the full sample of children of the relevant age group. The estimated coefficients of the regression are used to obtain the predicted probability of access to the opportunity for each child. These data are then used to estimate the D-index for the particular opportunity, the coverage rate, and the HOI.

Table 2. Infrastructure/Habitation and Education Opportunities

	Survey years			
	1985 (%)	1998 (%)	2002 (%)	2008 (%)
<i>Infrastructure/habitation</i>				
Children 0–15 years with access to electric light	37	45	50	52
Children 0–15 years with access to sanitation	58	61	61	62
Children 0–15 years with access to clean water	88	87	92	85
<i>Education</i>				
Attending school (6–12 years)	54	56	56	55
Attending school (13–15 years)	47	52	47	47
Started primary school on time (6–7 years)	—	39	39	46
Finish sixth grade (13–15 years)	55	31	31	29

Source: Authors' compilation.

Table 3. Average Incidence of Circumstances in the Population

	Survey years			
	1985	1998	2002	2008
Circumstances for children under 16 years				
Urban location (%)	40	42	39	35
Gender of the child (male) (%)	51	51	51	52
Gender of the head of household (male) (%)	94	89	86	84
Age of the head of household (years)	47.68	45.35	46.19	45.08
Education of the head of household (school years completed)	2.84	3.59	4.21	3.83
Number of children	5.97	5.13	4.70	4.27
Mean per capita household income (francs)	73,942.22	272,832.25	287,390.70	413,257.06
Region (number of regions represented in the survey)	10	10	10	10

Source: Authors' compilation.

4. Opportunities for Children: Results from HOI Analysis

This section presents the results of the HOI for the infrastructure and education opportunities, including the extent to which HOI differs from coverage rates (that is, the extent to which access rates are unequally distributed); how the index changes over time; and what factors contribute to these changes (the decomposition of changes in the HOI).

The vertical bars in figures 2 and 3 represent the HOI for each habitation/infrastructure and education opportunity, respectively; the dots represent the coverage (or average access) rate; and the small vertical line at the top of each bar represents the confidence interval of HOI. The graphs clearly show how the HOI differs from the coverage rate, and whether that difference is statistically significant (whether the coverage rate is within the confidence interval of the HOI).

4.1 Infrastructure/Habitation Opportunities

Figure 2 shows that the HOI is significantly different from the coverage rate for all habitation opportunities. Comparing across opportunities over the last 20 years, there has been a small improvement in electricity and sanitation, but hardly any progress on clean water. The difference between HOI and coverage is the greatest for access to sanitation, indicating that inequality between children of different circumstances is high for that access. Overall, if one focuses on the recent decade of civil conflict (1998–2008), changes in habitation opportunities have not been substantive and opportunities remain fairly constant.

Figure 2. Opportunities for Infrastructure/Habitation

4.2 Education Opportunities

Figure 3. Education Opportunities of Child

Figure 3 presents HOI and coverage for educational opportunities. The HOI is significantly different from coverage rates across all opportunities in all years (that is, the difference between HOI and access rates is statistically significant across all categories and years). Interestingly, both coverage and HOI are much higher for the opportunities related to attendance than for starting primary school on time (ages 6 to 7) or completion of primary school by age 13 to 15. This is combined with the fact that attendance in school is higher for 6- to 12-year-olds than for 13- to 15-year-olds. The results are similar for 1985, although the 1985 results present a better picture of primary school completion.

4.3 Change in HOI over Time and Decompositions

The results for the decomposition of the changes in HOI over time are shown below. Figure 4 reports the contributions of each effect (composition, scale, and equalization) on the changes of each habitation and education HOI between 1998 and 2008.

There is not a single, simple pattern behind the dynamics of HOI in Côte d'Ivoire. While most opportunities improved between 1998 and 2008, two worsened (access to clean water and finishing sixth grade). Among the improving opportunities, the scale effect (that is, a broad-based improvement affecting children of all circumstances) is the dominating factor for (improved) educational opportunities and access to electricity. It is also the dominating factor explaining the deterioration of sixth grade completion. Composition effects are the main driver behind the decline in clean water opportunities, but they are also behind the improvement in sanitation opportunities. In other words, most improvements in opportunities have come from scale effects, even in a period marred by conflict; but for those opportunities that deteriorated over time, there is no clear dominating factor. Equalization effects have typically played a positive role in improving opportunities across Ivoirians, although to a limited extent except, perhaps, for electricity.

Figure 4. HOI Decomposition (between 2008 and 1998)

Source: Authors;

Note: HOI change attributed to composition, scale, and equalization effects.

4.4 Circumstances Important for Access to Basic Goods and Services

To address the question of which circumstances are most important for access to basic goods and services, this section focuses on three simple empirical exercises: (i) the decomposition of the inequality of opportunity by circumstance; (ii) the characterization of the most vulnerable and least vulnerable groups in terms of opportunities; and (iii) a preliminary exploration into the possible links between opportunities and conflict-related circumstances.

4.4.1 Opportunities with High Inequality of Opportunity

Figure 5 shows the scatter plot of coverage versus the inequality of opportunity index (or D-index) and a linear trend representing their relationship for all education and habitation opportunities. The main message that emerges from this exercise is that the D-index tends to be higher when coverage is lower. This correlation can be explained by simple intuition: as coverage increases, the size of the groups who are excluded from the opportunity (also referred to as “vulnerable” groups) becomes smaller, so that the proportion of total available opportunities that is “misallocated” (unequally distributed between circumstance groups) also tends to fall. The green and black lines in the graph correspond to the “regression” line between the two variables for 1998 and 2008. The green line always lies on top of the black line, suggesting that in 2008, for the same level of coverage of opportunities, the inequality is lower than that in 1998.

Figure 5. Relationship between D-Index and Coverage Rate: Which Opportunities Show Higher Than Expected Inequality of Opportunities?

Source: Authors' calculation using household surveys for 2008 and 2009.

4.4.2 Most and Least Vulnerable Groups in Terms of Opportunities

This section presents a profile for vulnerable and non-vulnerable groups in Côte d'Ivoire. The profile consists of a comprehensive map of access to opportunities across circumstances for two groups: the least and the most vulnerable groups. As a result, the profile is computed for two sets of children, one pertaining to the first (lowest) and the fifth (top) quintiles of the distribution of estimated probabilities of access to education and habitation opportunities. The former constitutes the most vulnerable group, while the latter represents the least vulnerable group.

Table 4 highlights two interesting results. First, the least vulnerable group appears to be concentrated in urban households with higher income and heads of households who have completed more years of education. This result reinforces the belief that a favorable socioeconomic background early in life has a positive impact on the future progress of children. Second, the gender dimension appears to be important mostly for educational opportunities: children belonging to female heads of households are slightly more likely to be found in the upper quintile of education opportunities than children in male heads of households. Yet, most of the least and the most vulnerable children both belong to male heads of households.

Male children are more likely to both attend school and start and finish primary education on time. This characteristic of the data might come from several different results, including the belief that female heads place greater value on child education than male heads do, and the investment in education for girls is perceived as having lower returns and higher opportunity costs for the household. On the other hand, whether they belong to the least or the most vulnerable quintile does not appear to affect children in households headed by females and female children in terms of good habitation conditions. For these opportunities, location, years of education of the head of household, and average household incomes among the most and least vulnerable have the largest gaps associated with both groups.

Table 4. The Most and Least Vulnerable Groups in Côte d'Ivoire in 2008

	Urban area (%)	Child is male (%)	Male household head (%)	Years of education of household head	Number of children	Age of child	Household income	Age of household head
Access to electricity								
Most vulnerable 20%	0	55	85	0.42	4.34	6.49	971,330.30	42.69
Least vulnerable 20%	100 ^c	49 ^c	84 ^b	10.06 ^c	3.58 ^c	7.51 ^c	3,926,481.00 ^c	44.54 ^c
Access to sanitation								
Most vulnerable 20%	0	56	87	1.01	3.73	6.53	721,631.80	43.49
Least vulnerable 20%	100 ^c	47 ^c	79 ^c	9.05 ^c	3.82 ^c	7.50 ^c	4,240,425.00 ^c	45.02 ^c
Access to clean water								
Most vulnerable 20%	68	53	85	1.27	3.42	6.45	1,467,846.00	40.57
Least vulnerable 20%	16 ^c	54	90 ^c	5.23 ^c	5.22 ^c	7.42 ^c	2,320,163.00 ^c	49.30 ^c
School attendance (6–11 years)								
Most vulnerable 20%	8	34	91	0.22	4.94	8.68	971,407.70	45.04
Least vulnerable 20%	76 ^c	64 ^c	84 ^c	11.21 ^c	3.87 ^c	9.04 ^c	3,146,262.00 ^c	44.34 ^c
School attendance (12–15 years)								
Most vulnerable 20%	19	43	86	0.48	4.54	14.09	1,147,449.00	48.67
Least vulnerable 20%	64 ^c	79 ^c	86	11.12 ^c	3.95 ^c	13.99 ^b	4,454,583.00 ^c	46.85 ^c
Begin primary school on time								
Most vulnerable 20%	1	39	92	0.14	5.00	6.49	902,141.50	43.49
Least vulnerable 20%	81 ^c	56 ^c	87 ^c	10.92 ^c	3.76 ^c	6.52	3,090,659.00 ^c	43.24
Finish primary school at age 13–15 years								
Most vulnerable 20%	5	31	94	0.34	5.28	14.06	1,105,417.00	49.76
Least vulnerable 20%	93 ^c	65 ^c	76 ^c	11.00 ^c	3.42 ^c	14.04	5,968,637.00 ^c	46.61 ^c

Source: Authors' estimates

Note: ^a10%, ^b5%, and ^c1% refer to the t-test difference in mean between the least vulnerable 20 percent and the most vulnerable 20 percent. Results for each opportunity are reported in the second row.

4.4.3 Comparing HOI of Subgroups: The Use of Geometric HOI

The data presented in table 4 show that there are substantial differences among children in different circumstance groups in terms of opportunities. To further illustrate this point, HOI is calculated for school attendance of 13- to 15-year-olds using an alternate method, the geometric mean (see box 4). The use of this measure ensures that the HOI is subgroup consistent (the HOI for the full group is the geometric

mean of HOIs of subgroups)—a property that is needed to ensure a meaningful comparison of HOI for different subgroups.

Box 4. The Geometric HOI

The standard HOI is only weakly sensitive to inequality. When inequality changes, the HOI would never change in the opposite direction, but it may also remain unchanged even when the inequality has clearly increased. One solution is to build the geometric HOI as the average of a strictly concave function. The geometric HOI is the geometric mean of circumstance-specific coverage rates. In this case, any proportional increases in all circumstance-specific coverage rates would increase the index.

In principle, if opportunities improved for each and every section of the society, then they should also improve when measured for the whole society. Take for instance the HOI for a country, when the geometric HOI is adopted, the country's overall opportunity index is given by the geometric mean of the regional specific indices, that is,

$$HOI = \prod_r (HOI_r)^{\alpha_r}$$

where the HOI_r is the population weighted geometric mean of the circumstance group-specific coverage rates in region r , and α_r is the fraction of the population in region r . As a consequence, the country index would always increase when all regional indices increase. The geometric HOI has the property of subgroup consistency.

Source: Authors

Figure 6. Geometric HOI for School Attendance for Children Ages 6 to 15 Years for Different Circumstance Groups

Source: Household survey, 2008; authors' illustration.

Two subgroups are chosen for comparison: urban male children and rural female children, age 6 to 15 years, who are likely to have significantly different attendance rates. As expected, HOI and coverage rate are higher for urban boys than rural girls (figure 6). The difference between the groups is sharp because another important circumstance is considered: the education level of the head of household. Rural girls in a household with a head who did not complete six years of education have a much lower HOI and coverage rate than do urban boys in a household with a head who had six years of education. The fact that HOI is significantly lower than coverage for rural girls with uneducated household heads suggests that even *within* this vulnerable group, there is some inequality of opportunities due to differences in circumstances, namely circumstances other than gender, rural/urban, and education of household head.

The 2008 household survey also provides information on the intrahousehold allocation of decision making. Though it is usually the case that the head of the household makes all major important decisions regarding spending and education, the data allow for the option that other persons in the household (either the spouse, small groups, or another person affected) could participate in the decision. Because financial choices are bound to affect opportunities of poor households as they allocate scarce resources, the sample is separated into two groups: (i) household head reports making all important financial decisions and (ii) someone other than the head participates in financial decision making. Interestingly, a cooperative

process inside the household is positively correlated with school attendance of children age 6 to 15 years. This result highlights the fact that household income does not explain all instances of inequality.

4.4.4 The Impact of Conflict on Opportunities

Given the extended civil conflict in Côte d'Ivoire, this analysis considers available information on how conflict has affected households and uses it as a circumstance to evaluate how the war may have contributed to the inequality of opportunity in recent years. The variables used to measure conflict are related to whether the household reports violence related to conflict, need of displacement, major loss or difficulty due to the civil crises, and the reported ethnic group. The Shapley decomposition of inequality of opportunity in table 5 (also box 5) analyzes a series of circumstances in different groups and calculates their share in explaining total inequality. Interestingly, urban/rural location appears to be the main circumstance affecting opportunities, especially in habitation differences (with around 50–60 percent of such differentials being explained by location). Ethnicity is responsible for almost one-fourth of the inequality in school attendance. Reported household income does not appear to be a relevant circumstance, explaining about a 10 percent of opportunities differentials. Violence-related variables are not a major contributor, with less than 5 percent of the observed differentials. This may be explained by the fact that less than 10 percent of children under age 15 belong to households reporting an event of displacement or conflict-related violence.

Table 5. Shapley Decomposition of Circumstances for Opportunities

(Including “ethnicity and conflict variables” as proxies for impact of civil conflict)

Inequality decomposition	Electricity (%)	Sanitation (%)	Clean water (%)	Attendance (6–11 years) (%)	Attendance (12–15 years) (%)	Start primary school on time (%)	Finish sixth grade (%)
Urban rural/region	63	58	47	26	24	30	31
Gender of the child	1	1	0	7	16	2	10
Gender, age, and education of the head	18	18	25	30	22	33	27
Children and presence of elderly	3	1	14	3	2	3	6
Household income quintile	11	12	7	9	7	11	10
Violence, displacement, and loss during crises	0	0	1	2	3	2	1
Ethnicity	5	10	9	24	26	19	15
Total	100	100	100	100	100	100	100

Source: Household survey 2008; authors’ calculation.*Note:* Conflict-related questions were available only for the 2008 survey.**Box 5. Shapley Decomposition: Identifying How Each Circumstance “Contributes” to Inequality**

Following Barros et al. (2009), the inequality of opportunities can be measured by the penalty (P) or by the dissimilarity index (D). The value of these two measures, where P is just a scalar transformation of D , is dependent on the set of circumstances considered. Moreover, these measures have the important property that adding more circumstances always increases the values of P and D . If there are two sets of circumstances A and B , and set A and B do not overlap, then $HOI(A, B) \leq HOI(A)$, and alternatively $D(A, B) \geq D(A)$. The impact of adding a circumstance A is given by:

$$D_A = \sum_{S \subseteq N \setminus \{A\}} \frac{|S|! (n - |S| - 1)!}{n!} [D(S \cup \{A\}) - D(S)]$$

Where N is the set of all circumstances, which includes n circumstances in total; S is a subset of N that does not contain the particular circumstance A . $D(S)$ is the dissimilarity index estimated with the set of circumstances S . $D(S \cup \{A\})$ is the dissimilarity index calculated with set of circumstances S and the circumstance A .

One can define the contribution of circumstance A to the dissimilarity index as:

$$M_A = \frac{D_A}{D(N)}$$

$$\text{where } \sum_{i \in N} M_i = 1$$

Source: Adapted from World Bank African Report on the HOI (forthcoming)

4.5 Comparison with Other African Countries

Figure 7 shows the HOI and coverage for school attendance of Côte d'Ivoire and several African countries for comparable years (Roemer 1998).⁷ For habitation opportunities, a meaningful comparison across African countries was not possible. With respect to completion of sixth grade, **Côte d'Ivoire lies among the best performers in the region, despite their low incidence.** With a similar access rate for starting first grade on time (around 32 percent), Côte d'Ivoire lies at the center of the distribution of countries analyzed. For most countries, however, appropriate age at the start of first grade performs better than for completion rates—suggesting that dropout rates play a substantive role in halting the education of teenagers. However, in Côte d'Ivoire, access to both opportunities appears to be at very similar levels. What Côte d'Ivoire shares with other African countries is the significant gap between HOI and coverage.

Figure 7. HOI and Coverage for Entry and Completion of Primary School at Appropriate Age in Selected African Countries

a. Finish sixth grade

b. Start primary school on time

Source: Demographic Health Survey used for African countries, except Côte d'Ivoire, which uses household survey data. All country surveys are from 1998.

5. Benefit Incidence Analysis in Côte d'Ivoire

This section **relates the fiscal policy angle to the new measurement developments of equality of opportunities**. The authors conducted an exercise, expanding one of the most traditional and commonly used distributive analysis methods for fiscal policies, benefit incidence analysis (BIA), to relate it to the concept of equality of opportunities. The authors derived the **Opportunity Benefit Impact Analysis, or Op-BIA**, to present an incidence analysis of public educational spending along the distribution of opportunities and compare it with the traditional BIA based on income distribution. The Op-BIA has two main advantages over the traditional BIA. First, it allows one to analyze directly the allocation of public resources to education against a concept of vulnerability *directly related* to education, not an indirect concept of per capita household income or consumption as performed by BIA. In other words, it allows a sharper picture of distribution of resources and opportunities directly associated to such resources (in this case, education resources). Second, it provides insights on how multiple factors (all those considered

relevant circumstances) affect the distribution of educational resources. This is not to say that the analysis determines *causality* between circumstances and educational benefits (in the same way that a traditional BIA does not establish causality between household incomes and education spending), but it certainly complements the insights provided by the traditional BIA based on household per capita income.⁸

The average household spending per child in education (that is, the unitary private contribution to education) is CFAF 42,770 (US\$217.75). The average government gross unitary benefit to children enrolled in primary school is 14 percent of GDP per capita, or CFAF 65,574 (US\$137.76). However, these averages conceal significant differences across types of households (classified by either their incomes or opportunities realized). Figure 8 compares the traditional and the Op-BIA. The left side of figure 8 shows that the net unitary benefit (public transfer less private contributions) is positive only for the first two poorest quintiles of the distribution (in terms of their incomes). For the rest of quintiles, the net unitary benefit is either zero or negative, indicating that private contributions exceed the average transfer per student. This progressive feature is not the result of a pro-poor distribution of the benefit (that is, poorest household receiving a higher share of benefits), which is rather uniform across benefiting households regardless of their income level. This is confirmed in figure 9 (see also the Appendix 1), which shows that children in the first quintile of income receive a share of total benefits in primary education below what they would have received if proportional to their population share. The remaining quintiles receive slightly more than their share in the total population.

The right side in figure 8 shows an even more regressive distribution of education benefits alongside the distribution of educational opportunities. Those whose circumstances make them least likely to enjoy this opportunity receive on average a low transfer and are enrolled in school only after paying a very high private contribution. The average private contribution per beneficiary (of public schools) decreases while the gross unitary benefit increases as opportunities improve for the population. In other words, as children have circumstances that make them likely to go to school, the unitary benefit they receive increases. **As a result, the distribution of educational benefits is neither pro-poor nor progressive in terms of both incomes and opportunities.** See Appendix 2 for a similar comparison across specific circumstance groups.

Finally, table 6 presents an intuitive indication of which circumstance most affects the probability of benefiting from school. Among the eight groups determined by gender of child, location of household, and education of household head and children whose heads of household are educated, all present above

the average probability. Location and gender do not appear to determine consistently placing above or below the average probabilities.

Table 6. Distribution of Educational Opportunities in Côte d'Ivoire		
Type	Description	Estimated probability of access (%)
1	Rural, female child, head with no primary	39.24
2	Rural, male child, head with no primary	52.28
3	Urban, female child, head with no primary	57.22
4	Urban, male child, head with no primary	68.01
5	Rural, female child, head with primary	68.65
6	Rural, male child, head with primary	77.23
7	Urban, female child, head with primary	75.20
8	Urban, male child, head with primary	85.03

Source: Authors' estimates from 2008 household survey.

Figure 8. Traditional and Op-BIA

Source: Authors' estimates

Notes: Quintiles of income: Q1: CFAF 119,879,000—CFAF 360,300; Q2: CFAF 360,775—CFAF 755,365; Q3: CFAF 756,000—CFAF 1,285,850; Q4: CFAF 1,286,000—CFAF 2,520,000; Q5: CFAF 2,520,002—CFAF 733,710,000.

Quintiles of probability: Q1: 0–38%; Q2: 38–56%; Q3: 56–71%; Q4: 71–83%; Q5: 83–100%.

Note: The average transfer is approximated using the 2007 educational budget divided by an estimate of the total population 6 to 15 years of age and in public school and the ratio of unitary benefit per pupil as a fraction of GDP per capita. Household spending is the ratio of the total household reported education spending over the number of children in the household age 6 to 15 years attending school.

Figure 9. Who Captures Government Transfers?

Source: Authors' estimates

Note: The share of total transfer is approximated using the share of the estimated benefit used in figure 8 given to each income quintile of the population.

6. Final Remarks

Access to opportunities in the form of basic goods and services is limited in Côte d'Ivoire. These opportunities, including access to education and good habitation, can improve the likelihood that a child will maximize his or her human potential and pursue a productive life as a citizen. The guiding principle is one of equality of opportunity: that a child's circumstances at birth (for example, gender, location, and parental, social, and economic status) should not determine a child's access to opportunities.

Two empirical exercises were conducted: (i) construction and analysis of an inequality-sensitive coverage rate of opportunities and (ii) a benefit incidence analysis of access to education using an equality of opportunity framework. The first exercise identified that opportunities not only have low coverage rates, but they are unevenly distributed among different groups in society. Variables such as region and location and household head characteristics differ along the probability distribution of access to opportunities. The

country did not make major progress in providing opportunities for all, and most progress came in the form of a scalar increase in coverage rates instead of an equalization of chances among different groups. Interestingly, income does not appear as a major determinant of access to opportunities; results for the effect of ethnicity, location, and household allocation of decision making suggest other dimensions of unequal circumstance groups. In such a context, public spending on education is found—unsurprisingly—to be neither pro-poor nor progressive. Children with disadvantageous circumstances and a lower probability of attending school receive a lower share of total transfers than children in nonvulnerable groups of the population.

This evidence can help shape the ongoing policy debate in Côte d’Ivoire in several directions. In addition to the policy dialogue on the need for management and decentralization reforms and increasing public resources, the equality of opportunities in Côte d’Ivoire underscores the need to think carefully on *how* to spend current resources more effectively. One-size-fits-all interventions will not be equally effective in improving access to opportunities that, in some cases, are very far from universal provision, while in others, there are very unequal distributions. While not exclusive in theory, budgetary constraints in practice may call for a policy decision regarding interventions that expand coverage or reduce access inequalities. HOI can be a tool to provide empirical evidence on where to use each type of intervention. Also, it identifies which groups are lagging behind in terms of opportunities and, therefore, which policies need be targeted (whether through conditional cash transfers, increasing supply, specific programs at schools, communication campaigns, or other types of interventions).

Appendix 1

Table A.1. Habitation and Education Opportunities

Habitation (0–15 years)	
Electric light	Electricity as main source of lighting
Sanitation	Household has at least a latrine or flush toilet
Clean water	Water source is at least a well or better
Education	
Attending school (6–12 years)	Report attending school
Attending school (13–15 years)	Report attending school
Started primary on time (6–7 years)	Entered first grade at age 6 or 7 years
Finished sixth grade (13–15 years)	Report six years of completed education

Source: Authors' compilation.

Table A.2. Household Survey Data for 1985, 1998, 2002, and 2008 (%)

Opportunity	Coverage	D-index	HOI	Std-HOI
1985				
Electric light	38.42	40.00	23.05	0.75
Sanitation	59.81	24.61	45.09	1.07
Clean water	88.20	7.22	81.82	0.92
School attendance (6–12 years)	54.25	12.66	47.38	1.15
School attendance (13–15 years)	46.80	13.81	40.34	1.87
Start primary school on time	56.08	13.14	48.71	0.92
1998				
Electric light	49.96	30.23	34.85	0.36
Sanitation	58.35	23.33	44.73	0.42
Clean water	91.71	4.28	87.78	0.37
School attendance (6–12 years)	55.85	15.91	46.97	0.71
School attendance (13–15 years)	52.27	16.90	43.43	1.20
Start primary school on time	32.12	22.66	24.84	1.10
Finish sixth grade on time	32.75	26.04	24.22	1.01

2002				
Electric light	51.57	26.81	37.74	0.35
Sanitation	61.20	20.18	48.85	0.39
Clean water	85.14	3.92	81.80	0.32
School attendance (6–12 years)	60.90	13.88	52.45	0.55
School attendance (13–15 years)	55.28	14.73	47.14	0.91
Start primary school on time	46.18	19.17	37.33	0.94
Finish sixth grade on time	29.22	26.72	21.41	0.76
2008				
Electric light	60.90	13.88	52.45	0.55
Sanitation	55.28	14.73	47.14	0.91
Clean water	46.18	19.17	37.33	0.94
School attendance (6–12 years)	60.90	13.88	52.45	0.55
School attendance (13–15 years)	55.28	14.73	47.14	0.91
Start primary school on time	46.18	19.17	37.33	0.94
Finish sixth grade on time	29.22	26.72	21.41	0.76
<i>Source: Authors' compilation.</i>				

Appendix 2: Who captures the government transfers?

Note: We approximate the share of total transfer using the share of the estimated benefit used in Figure 8 given to each income quintile of the population.

Table A.3: Distribution of Transfers by Type

<i>Type</i>	<i>Share in the Population of Children 6-15 (%)</i>	<i>Share in Total Benefit (%)</i>
Rural, female child, head with no primary	18.09%	12.97%
Rural, male child, head with no primary	21.77%	19.39%
Urban, female child, head with no primary	11.72%	9.98%
Urban, male child, head with no primary	11.88%	12.06%
Rural, female child, head with primary	6.90%	8.85%
Rural, male child, head with primary	7.77%	10.78%
Urban, female child, head with primary	11.22%	11.91%
Urban, male child, head with primary	10.64%	14.06%

Source: Authors' estimates from 2008 household survey.

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Endnotes

¹ For a discussion on different definitions of equal opportunities, see Abras and Cuesta (2011).

² This discussion draws from three sources: Barros et al. (2009), Barros et al. (2010)

³ This also implies that the red area is the share of total opportunities that would have to be reallocated to children with lower than average opportunities to achieve equality of opportunities for a given level of coverage.

⁴ See Appendix 1 for a detailed definition of variables according to the survey questions.

⁵ While education and gender of household head need not necessarily be the same as that of the parents of a child living in the household, there is a large overlap between household heads and parents. Using the information of household heads results in ease of analysis, given the way the data are reported in the surveys.

⁶ While this theoretical property may not always hold when the HOI is estimated from a logistic regression as it is done in most cases, it would be rare to find cases where adding a circumstance would actually increase HOI.

⁷ Note that in 1998, educational opportunities were similar to those found in later years, except for starting first grade on time. For that opportunity, rates in 1998 were the worst recorded among the years for which information is available (see figure 3).

⁸ Figures used in this exercise come from the *Côte d'Ivoire Public Expenditure Management and Financial Accountability Review* (World Bank 2008); numbers for unitary transfers in primary education are from UNESCO (United Nations Educational, Scientific, and Cultural Organization); and population numbers are from the 2008 household survey. Unitary transfers for secondary, tertiary, and technical education were approximated with values of CFAF 20,490; CFAF 416,804; and CFAF 399,144, respectively. Transfers were attributed only to children who reported attending public schools. In previous work in Liberia (see Abras and Cuesta [2011]), the BIA analysis was complemented by simulations of benefit redistribution policies. For Côte d'Ivoire, the net benefit variable is not statistically different from zero in the HOI probit regressions; hence simulation exercises were not performed.