Can Better Quality Motivate Interest in Schooling in Developing Countries:

A Case Study of Jamaica

Godfrey A. Gibbison[a]
Assistant Professor of Economics
Department of Finance and Economics
Georgia Southern University

Abstract

This paper investigates inequality of access to high quality primary education in a developing country context. This issue is of interest because it is hypothesized that poor quality can demotivate parents who have other uses for the time of their children. It is found that while access to quality differ by economic status, regional differences are also very important. Furthermore, students are much more likely to attend school regularly the better the quality of the school. The concavity of the relationship between school quality and school attendance suggests that there is potential for significant gains by focusing on improving the schools at the bottom of the distribution.

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[a] Please send correspondence to P.O. Box 8151, Statesboro, GA 30460. Email: ggibbiso@gasou.edu

Introduction and Motivation

The question of access to primary education in developing countries is an issue of quality as well as quantity. It is very important that educational opportunities are available in the communities where people reside and that sufficient school places are available so that every child can be accommodated. However, as Behrman and Birdsall (1983) suggest, it is possible to over extend on the side of quantity provision without taking adequate account of quality issues. In this paper two aspects of access to primary education are explored in a developing country context. First, using a measure of educational quality based on the output of the school (Hanushek, 1996) the question of who has access to high quality primary education is explored. Second, the paper looks at the matter of parental perception of the quality of their children's school. An important issue here is whether perception about quality affects the parents' attitude towards education, measured by the propensity of the parents to send children to school on a regular basis.

School quality has been a subject of extensive research in the human capital literature with perhaps two main themes. The first is aimed at discovering what school inputs;[1] used as proxies for school quality, affect student performance and educational attainment (Behrman et. al, 1996; Michaelowa, 2001; Glewwe et. al, 1995 among others). The second seeks to determine whether various measures of school quality are correlated with success later in life. The latter would include job attainment and wages (Card and Krueger, 1996; Bratsberg and Terrell, 2002). There has also been an obsession with school quality in another literature that pertains mostly to the United States. That is the literature on the importance of school quality in determining where households choose to locate and the consequent premium people are willing to pay to locate near a good school (Black, 1999; Brasington, 1999).

Surprisingly, many measurable inputs have been found to have insignificant effect on student performance in advanced countries (Hanushek, 1996). Hanushek and Harbison (1992),

using a sample of 96 studies from developing countries, show that none of the six common input measures had consistent positive and significant effect on student achievement. Behrman et. al. (1996) raise questions about the usefulness of these studies, criticizing them on the grounds of methodological weakness. They in turn, in a case study of rural Pakistan, show that teacher quality and increased student exposure to teachers improved student achievement, though improved physical infrastructure and equipment did not. Michaelowa (2001) found teacher education and training and the availability of books to positively affect student achievement. Glewwe et. al. uses the same eclectic approach as Berhman and found that while few inputs had any impact on student achievement in Jamaica, intensity of testing, teacher training and use of textbooks in instruction matter.

The other mostly US literature that has focused on school quality is the literature on location choice of households. It is a well established result that school quality has an important influence on where households locate and there are various estimates of the premium parents are willing to pay for a house in the right school district.[2] Furthermore, it is almost taken for granted in the housing literature that proficiency test scores are the standard by which the performance of a school is judged (Brasington, 1999).

The subtext of the paper can now be stated as follows: What influence, if any, does school quality have on the educational choices that parents make toward their children in developing countries? While the majority of parents in less developed countries are unlikely to migrate to a good school district,[3] might it not be that quality of available schools affects their interest in regular participation in educational activities. Regular participation in educational activities is supposedly intended to raise the human capital of children over time. The economic context of most households in less developed countries is such that allowing children to use their

[1] There are six popular school inputs that are often used as proxies for school quality: student/teacher ratio, teacher education, teacher experience, expenditure per pupil, teacher salary and facilities.
[2] See, for example, Sandra E. Black, "Do Better School Matter? Parental Valuation of Elementary Education," The Quarterly Journal of Economics, May 1999.

time for the acquisition of education is a considerable sacrifice. Not only are direct costs important, it is often the case that using a child's time for schooling have direct consequences for the household's production of income and other household services. The implication is that unless parents are convinced of the value of schooling there should be little motivation to educate children.[4,5]

One possible objection is that parents in developed countries tend to be more educated than parents in less developed countries so parents in less developed countries are less able to assess school quality. Though parents in less developed countries are less educated there is no reason to believe they cannot perform the requisite calculus or are less informed. First, there is community information, or what might be termed common knowledge. In other words there is usually a good deal of local knowledge of the school's history in producing learned students. A school that has served two or three generations will already have a reputation either as a good school or a bad school and that opinion is part of the parents' information set. Furthermore, each community is likely to have some reasonably well educated citizens who enjoy broad respect. The opinions and actions of these persons often inform the behavior of others.[6] Furthermore, some countries have terminal exams for primary school students and the ability of the school to produce students who succeed in these exams is likely to be widely known.

This latter point leads to an important issue about how one measures school quality. If one is interested in discussing the aspects of school quality that is likely to affect the decisions of parents it seems a more fruitful effort to measure school quality by looking at the output of the school rather than inputs. First, whereas the output of the school is easily observed, understood

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[3] Migration is often linked to the search for better economic opportunity. Migrants more often than leave their children behind in the care of other family members.

[4] It should be clear that there are many structural influences upon the schooling decision. While the availability of schools of good quality is expected to be important, job market opportunity might also have a significant influence. It is not clear how migration opportunities work to mitigate the influence of local economic conditions.

[5] While Bedi and Marshall (1999) did not find evidence that school quality (measured by various inputs) affect school attendance in rural Honduras Mora (1997) found evidence that the high school drop out rate of various racial groups in the US is affected by school quality (also using various inputs).

[6] As in cases where a teacher in a particular school educated their children in a different school at higher cost.

and often form part of the communal knowledge base, it seems less likely that parents can evaluate the importance of a complicated set of inputs, even in developed countries. Also, as Hanushek likes to point out, two schools with identical inputs often have very different output because of differences in the level of efficiency of schools.

The Context of Primary Education in Jamaica

Jamaica's 330,000 children age 6 to 12 years old are provided primary education through a network of approximately 950 schools. Ninety-five percent of primary school students attend schools that are publicly funded and managed.[7] A primary level education is available from three types of schools. What is called a "primary school" in Jamaica is a school that includes only grades one through six. "Allage Schools" have grades one to nine, as do Junior High schools. In both the Allage and Junior High school a primary level education is available in grades one to six. With a wide network of primary schools over a small land area[8] and the fact that much of Jamaica is not habitable means that the population is so concentrated that most children are within close proximity to a school.[9] In fact, based on the 1990 Jamaica Survey of Living Conditions (JSLC) the average child lives not more than 2.3 miles to the nearest primary school and many children can get to school by walking. Nearly 70 percent of the poorest children (quintile 1) attend the school that is closest to home and travel an average distance of 1.6 miles. Richer students tend to travel longer distances to get to schools. Only 41 percent of quintile 5 children attend the school closest to home and they travel an average distance of 3.3 miles. Therefore at this point in Jamaica primary education is generally accessible with relative ease for Jamaican children.

[7] Actually private primary schools have been facing problems in more recent times. With rising operational costs and parents' inability to ay the fees as a results of the economic crisis in the last 10 years some private schools have handed over management to the Ministry of Education.
[8] Jamaica covers an area of 4,411 square miles.
[9] More than ½ of Jamaica's population live in a town or a city.

Access to quality in primary education is perhaps a lot more problematic. In this section the matter of access to quality in primary education will be assessed in detail. In the section that follows a multivariate approach to the question of what determines access to quality primary education is undertaken. Finally, an attempt is made to refine the relationship, if any, between school quality and school attendance. It is not clear that school quality should vary by economic status or by location, though one suspects that to be the case. Since there are fees for primary schools in Jamaica, if all schools were the same quality all children, whatever their socio-economic background should have equal access. If however there is differential access to quality economic status should be an important divider because poor children will not be able to access good schools if they are not available in their community. Transportation cost, for example, might make access to school prohibitive. If good schools are concentrated in urban areas, a matter to be discussed below, economic factors should be less significant to access in urban areas because transportation systems, though not necessarily good, are more extensive and less expensive than in rural areas.

Throughout the analysis school quality is measured by the average performance of the school in English, Mathematics and Science or a composite measure ("Quality") based on the average performance of the school in English, Mathematics and Science in the Grade Six Achievement Test (GSAT). English is of particular interest because the ability to read and write is a skill that parents and the community can readily assess, unlike computational skills. The GSAT was introduced in 1999 to replace the Common Entrance Exam. It is an important test because it is the terminal exam for primary school students and the result of the test determines where students are placed in the secondary system. The test scores for each school in the three subjects were averaged over the three years (1999-2001). Also, in order to provide an overall measure of quality the scores were further combined in a composite score by simply averaging the scores in English, Mathematics and Science. The 2001 JSLC allows the children whose households were visit in the household survey to be traced to the primary school they attend.

Household level data can therefore be linked to the quality of the primary school that children attend.

Table 1 provides average scores by per capita consumption quintile and overall average scores across all schools. The quality of schools children attend is higher in households in higher consumption quintiles. Though quintiles 1 and 2 show no difference in the quality of school children attend, differences begin to appear in quintiles 3 and 4. The difference in average score between schools attended by students in quintiles 1 and 2 and schools attended by students in quintiles 3 and 4 is roughly ½ standard deviation based on the population distribution. The mean scores of schools attended by students in quintile 5 are one standard deviation higher than the means score of school attended by quintile 1 students. Although across the board the highest mean scores are in English and the lowest scores are in Mathematics, the size of the difference between quintiles 1 and 5 does not depend on subject area. In all subjects the richest students attend better schools and the distance between the rich and poor is the same in all subject areas.

Recall that quintile 5 students were the least likely to be registered at a local school (school closest to home), while the vast majority of students in the lower population quintiles attend the closest school. Clearly then quintile 5 households have the flexibility, due to the availability of greater resources, to seek after school of better quality when local schools are judged to be inadequate. However, the fact that some poor households do not use the closest school available suggests that the search for quality in education is an important part of all households' decision making process, not just the rich ones. It also suggests that even poor households, where the taste for quality is strong enough, will make the sacrifice to access schools where quality is perceived to be higher (Alderman et. al. 2001).

Regional differences in access to quality schools are also important. Table 2 shows the distribution of test scores by region. Students who reside in the Kingston Metropolitan Area (KMA) have a clear advantage over students who reside in towns and rural areas. In English and Mathematics, schools in the KMA on average have GSAT scores that are 9 points above rural

schools. That amounts to nearly one standard deviation. In science the difference between schools in the KMA and schools in rural areas was slightly less, while the overall measure of quality, the composite score is one standard deviation higher in the KMA. The difference between other urban schools (other towns) and rural schools is not as pronounced. Town school and rural schools are actually closer in quality than town schools and KMA schools. Notice as well that the standard deviation among schools attended by KMA students is almost twice as high as rural schools, suggesting that while there is high variability in school quality in the urban areas, the schools in the rural areas are uniformly poor.

I will now turn to a discussion of the interaction between area of residence and economic resources in affecting access to schools of good quality (Table 3). Comparing the urban poor and the rural poor (defined as the bottom 20 percent households based on per capita consumption, that is, quintile 1) shows that students from urban and rural poor households attend school of nearly identical quality with average scores almost identical in all subject areas. The equality of mean school quality among urban and rural poor rejects the hypothesis above that urban poor have better access to quality because urban areas in Jamaica tend to be smaller geographical areas with better (and cheaper) transportation systems than rural areas. This latter point is very important because it says that the poor is at an educational disadvantage regardless of where they live. The greater availability of quality primary schools in urban areas does not translate into greater opportunities for educational success of the urban poor.

The gap between the urban rich (quintile 5) and the urban poor is astonishing. The difference in average score between schools attended by rich children and those attended by poor children varies from 13 points in Science to 16 points in English, or in any case more than one population standard deviation.[10] In percentage terms quintile 5 students attend schools with scores that are 30 percent higher than quintile 1 students in English and Mathematics. Although the rural rich appear to attend better schools than the rural poor the difference is nowhere as

pronounced. The advantage of the rural rich over the poor is less than 10 percent in all subject areas. But by far the most dramatic revelation of the data is the difference in the quality of schools attended by the urban rich and the rural rich. In all subject areas urban rich children are in schools that outperform the schools of the rural rich by at least one standard deviation. The largest gap is in Mathematics where schools attended by the urban rich are 23 percent better than school attended by the rural rich. The smallest gap is in science, but even there the advantage of school attended by the urban rich is 17 percent.

The gap between the rural and urban rich is surprising but provides some important insights into the issue of access to quality in primary education in Jamaica. It suggests that whereas in urban areas it is a matter of rich versus poor (a resource problem), in rural areas the resource problem is not the crucial factor.[11] Furthermore, it suggests that the other major area of divide is urban versus rural. For while school attended by the urban poor score at nearly the average for all rural schools, school attended by the urban rich far outperform those of the rural rich. This could mean high quality rural schools are a scarce commodity in rural areas and, more importantly, the marginal cost of moving one's child to a school of better quality is very high, high enough in fact to deter even households with sufficient resources to potentially overcome them.

Averages are notorious for being affected by extreme values or a couple of extreme cases (outliers) so the data were arranged and analysed in a manner that bypasses averages to check whether the results outlined above still hold. In each subject area the average score of the schools in the sample are arranged in ascending order and grouped into four categories such that roughly a quarter of the schools fall into each group (quartiles). Group 1 has schools in the worst performing quartile, while group 4 has the best performing schools. The results above not only

[10] In English the difference is approximately 1.5 standard deviations.
[11] Recall the very small gap between the schools that the rural poor and the rural rich attend.

hold after this new grouping, it has revealed additional information.[12] Looking among the group 1 schools, two-thirds of those schools are attended by quintile 1 students. Only 5 percent of group one schools have quintile 5 students. Looked at from the point of view of the household, where as 55 percent of quintile 5 students attend a school within group 4, only 14 percent of quintile 1 students attend a school within group 4 (Table 4). So, overall economic circumstance is an important determinant of the quality school children can attend at the primary level. The same overall pattern described for English is observed for Math and Science, sometimes to greater extreme.

Also of importance is the distribution of good schools by region. Again the distribution will be described for English. According to Table 5 Group 1 schools are concentrated among people in the rural areas with 81.5 percent of such schools to be found in rural areas. On the other hand 54 percent of group 4 schools are in the KMA. Only one-third of the top schools have students from the rural areas. There is another way to look at this, which is revealing of the differential access to good schools. Sixty-two percent of children in the KMA attend a school that fall within group 4 (the top 25 percent of schools), but only 16 percent of students from rural areas attend a school that falls into group 4. Except for small changes in the percentages the patterns are quite similar for Math and Science. To reiterate, it appears that most low quality schools are in rural areas (at least 80 percent in English, over 86 percent in science), the top school are concentrated in the KMA, at the very best only 20 percent of rural students attend the top ranked schools in any given subject, whereas about 60 percent of children from the KMA attend a top ranked school.

One possible explanation for the observed differences in the quality of school attended by children in rural and urban areas could be that people in urban areas are in general more educated than people in rural areas and are therefore better able to identify good schools. Higher levels of education among urban dwellers could also imply higher exogenous taste for education. This

[12] Only the results for English are discussed here.

would mean that the differences observed in school quality simply reflect the superior education status of urban households and not differences in access to good schools. It will be shown in section 4 that differences in education status of households cannot explain the difference in school quality between urban and rural schools.

Can Parents Correctly Rank School?

For each child in school a parent or responsible adult was asked to provide their subjective rating of the quality of the school the child attends.[13] A rating was provided for 63 percent of the schools attended by children in the sample. This provides the requisite data to determine how closely the household rating of the school correlate with the ranking based on test scores. It is an albeit crude test of the hypothesis that parents/guardians in developing countries can and do evaluate the quality of available schools.

Before examining the data it might be useful to say what bias, if any, might arise because only 63 percent of the parents provided a rating for the schools. In particular, a serious bias could arise if only parents of children in good (bad) schools provided a rating of the schools. That does not appear to be the case. Table 6 lists the average characteristics of households that provided a rating and those that did not. Average quality of schools for which a rating was provided is 51.3, while the score for schools without rating it 50 points. For all subject areas the largest difference in average score is 1.5 points or about one-sixth of a standard deviation. There does not appear to be any significant difference in the education status of the households either. The average years of schooling of the adults in the households that provide a rating is 9.24 years, while households that did not provide a rating the average years of schooling is 9.18 years.[14] There are some differences with respect to economic status and location. Households that provided a rating were

[13] The actual question was, "In your opinion how good is the school that …[NAME]…attends?" The possible responses were very good, good, neither good nor bad, bad and very bad.

more likely to be in quintile 4 than those that did not give a rating (24 percent versus 14 percent), while those that did not give a rating were more likely to be in quintile 1 (32.5 percent versus 26 percent). Regarding location, households that rated the schools were more likely to be in the KMA than those that did not (34 percent versus 16 percent), while those that did not rate schools were more likely to live in towns than those that gave a rating (24 percent versus 10 percent).

Bearing in mind the patterns noted above, the discussion turns now to a look at the consistency between the rating of the parents/guardians and the raking based on test scores. First, none of the parents rated schools as very bad. Otherwise, the rating of the parents and those based on the GSAT scores are fairly consistent (Table 7).[15] Seventy-nine percent of the schools that the household rated "very good" were either in groups 3 or 4 (upper fifty percent). The majority (58 percent) of the schools rated good were in the upper fifty percent, while those ranked neither good nor bad were divided 55 percent to 45 percent. Notably, 25 percent of those schools rated "neither good not bad" fall into group 1 (bottom 25 percent) while only 16 percent of those rated "good" fall into group 1. So the ranking of parents are more or less consistent with the ranking based on test scores, indicating that parents are able to assess the quality of available schools.

Education Quality and the Impact on School Attendance

Data and Variables

The bivariate analysis of section 2 suggests that in urban areas access to quality primary education differ significantly by economic status while in rural areas economic status appears not as important. However, it was also shown that the rural/urban gap is even more pronounced than the rich/poor gap. In this section, these relationships are refined by taking into account other

[14] See Section 4 for an explanation of the household education variable.
[15] The discussion here is based on the test scores in English Language.

important influences on access to quality in primary education. Another issue of particular importance is whether school quality affect the efforts that parents put into their children's education, measures by the frequency with which children are sent to school.[16] Some evidence on this issue is provided here.

Table 8 lists the variables used in the regression analysis, their means and standard deviation. The economic status of the household is captured using the per capita consumption quintiles into which the household falls, rather than a continuous variable such as annual consumption expenditure. The main reason for this is to be able to compare the effects of discrete movements from quintile 1 to higher quintiles with the effect of a discrete change in location, say, rural to urban. Two other variables have direct economic significance, the industry in which the principal earner is employed, and the principal earner's occupation. In particular those heads in elementary occupations (agricultural laborers, maids, street vendors) are distinguished from other occupations. Households in which the principal earner is employed in agriculture are singled out from employment is all other industries. Both variables are expected to have a negative impact on school quality since they are correlated with having less resource, and to lower school attendance because in these more labor intensive areas of employment it is expected that the opportunity cost of a child's time is higher. In this sample 21 percent of the principal earners are employed in agriculture while 17 percent of principal earners fall into of the occupations classified as elementary occupations.

The education variable used in this analysis is the average education of all household members who are 15 years or older and who are not currently enrolled in school. The exact derivation of the variable is explained in an appendix. The result of the derivation is an continuous variable that gives the weighted average of the number of years of school completed

[16] The exact question from the JSLC reads, "During the 4 week period (start date - end date) how many days was …[NAME]… sent to school?"

by out-of-school adult members of the household. This variable can also be used to assign the household to an education level (see appendix).

The main justification for using all the available information on education in the household, rather than the education of any one household member (such as the head), is that it gives a better indication of the household environment and taste for education. Given the extended family situation that is likely to be present in most developing countries it is reasonable to expect that household members other than the biological parents of a child have an influence on important decisions concerning the child. Furthermore, using the education level of the head might not be sufficient to account for all these influences because in many households in developing countries the head is often less educated than younger adult members of the household because of improvements in access to education over time. Based on the data the average household adult member has completed 9.2 years of schooling, which places the majority of households in the "some secondary" education level. Thirty-one percent of housheols are at the secondary level. The remaining thirteen percent of households are divided between tertiary (6 percent) and primary (7 percent).

The models also include a number of demographic characteristics of the household. Assuming older household heads are able to make better decisions, it is expected that older heads seek better educational opportunities for children.[17] The average head is 47 years old. Fifty-four percent of the households are headed by females. Other demographic characteristics of interest are the child and elderly dependency ratios. The dependency ratio is computed as the number of children (adults) under fifteen years of age (over 65 years of age) divided by the number of working-age adults (15 - 65 years old) not currently enrolled in school. Since it represents greater stress on the households resources and greater opportunity cost of time because of greater need for home production the child dependency ratio is expected to be negatively correlated with

[17] The truth of this statement is to be seen. While older heads are supposedly wiser, younger heads are often more educated.

school quality and school attendance. The impact of the adult dependency ratio is harder to predict. In fact, Knight (2002) calls into question the use of the term dependency as applied to older adults, at least in the Jamaican context. She finds that in the year 2000 the proportion of elderly in the household raises household welfare, perhaps because they are a source of steady income through pensions, remittances and other such means.

The child characteristics used include age, sex, foster status and current grade. A child is defined as fostered if neither biological parent is a household member. This might be important as it may affect interest is providing for that child's educational development. About 19 percent of the children in this sample are foster children. The child's current grade is also used as a regressor on the grounds that while children are often promoted automatically in Jamaica with no reference to performance[18] a parent might seek better educational opportunities (better schools) for children as they progress though school and reveal their ability and motivation. Also, as children get closer to the placement exam for secondary school (the GSAT) parents might rearrange their schooling portfolio, so to speak, by moving "brighter" children to better schools to maximize their score on the GSAT.

Results: Access to Education Quality

The first column of Table 9 presents parameter estimates for the effects of the variables on the quality of primary school children attend. This model does not include a measure of the household education status. In line with expectations, economic status is very important in determining access to a good primary education. Children in quintile 2 have no advantage over their quintile 1 counterparts. Children in quintiles 3 and 4 have a modest and statistically significant advantage, while children in quintile 5 have a large advantage. The other economic

[18] In 2001 the Ministry of Education changed this policy. A new policy was implemented whereby children are now promoted beyond grade four only after sufficient performance on the Grade Four Proficiency Test and, where necessary, adequate progress in remedial classes during the intervening summer. These data were collected before the implementation of this policy.

variables (employment in agriculture and low occupation status) both have the expected sign and are statistically significant.

With respect to location, while being an urban resident improves ones access to good schools, it is living in the KMA that is statistically important. Not only is the coefficient fairly large, the advantage that children in the KMA have over rural children is almost as large as the advantage that quintile 5 children have over quintile 1 children. In other words, to relocate from a rural community to the KMA, all else constant, would have the same educational impact of moving from below the poverty line to the richest 20 percent. That is clearly a remarkable finding. Widespread access to education is supposedly the basis for moving people out of poverty over time. But with regional disparities in quality as wide as those found here there is little reason to believe that rural people will be able to abandon a life of poverty unless that is rapid investment and restructuring aimed at improving the schools in rural areas.

The issue was raised above that the rural/urban difference could possibly be explained by differences in rural/urban education levels, leading to lower taste for education in rural areas. However, this is clearly not the case. Education differences between rural and urban households cannot explain the difference in the quality of school attended by rural and urban children. When the household's education level is added to the model there is a reduction in the coefficient on the KMA dummy variable of just 10 percent, and the coefficient remains large and statistically significant. In fact, it is the coefficient on quintile 5 that is most effected by the inclusion of education in the model. The coefficient drops by 23 percent. It is therefore reasonable to conclude that there exists serious inequality in access to good primary education by both economic class, and by place of residence regardless of economic circumstances. The household education level gives a big boost to the quality of school one attends, but only if one's household is in the tertiary category. Households in the "some secondary" and "secondary" categories cannot be distinguished from households at the primary level. Knight (2002) shows that only

households at the tertiary level form a distinct strata, while below the tertiary level there is basically homogeneity.

One child variable of particular interest is the impact of the child's current grade on school quality. There appears to be a definite change in school quality at grade 4, and then the grade trajectory remains flat onto grade 6. This result is consistent with the hypothesis that when parents know a child's ability and motivation, and as the GSAT gets closer, parents seek to maximize the child's score by moving the child to a better school, a sort of re-arranging of the investment portfolio. Notice that this re-arrangement takes place at grade 4 when the child is about one-half of the way through the primary education cycle. Among other child variables, foster children attend poorer schools, so do children in households with a high child dependency ratio. It does not come as a complete surprise that children in households with a greater proportion of elderly members attend better schools as it was noted earlier that current research is finding seniors to have a positive impact on household welfare.

Results: School Quality and School Attendance

An issue of particular importance is whether the effort that parents/guardians put into the education of children depends on school quality. In this case effort is measured by the number of days the child is sent to school in the month prior to the survey. School quality is measures by the average performance of the school on the GSAT between 1999 and 2001. A composite measure of school performance is obtained by averaging the scores in English, Mathematics and Science. The intent is to check whether this variable (the school's average output) helps explain the pattern of school attendance. In this sample the average daily attendance is 18.5 days and 27 percent of the children were absent for at least one day.

An econometric concern is whether school quality and school attendance are determined simultaneously by the households. The endogeneity argument would hold that school attendance and school quality are both determined by the household's taste for education. Parents

(guardians) with little interest in education pick poor schools and send their children to school infrequently. Those parents who have a high marginal utility from child education pick good schools and at the same time send their children to school regularly.[19] Hence there should be a positive correlation between school quality and school attendance. The unobserved taste[20] for education should be captured in the residual of the regression predicting school quality and should have a statistically significant coefficient if included in the school attendance regression.

Three sets of results are presented. The first set uses the uninstrumented measure of school quality. The second set of results uses the predicted school quality from the regression presented in Table 8. The identifying restriction is that the child's current grade helps parents make better decisions on school quality but does not independently affect school attendance. The third set of results includes both the predicted values of school quality and the residuals from the first stage regressions as a way of testing whether unobserved taste for schooling affects school attendance.

Looking now at the results, economic status is strongly correlated with school attendance. Children attend school more often as they move to higher consumption quintiles. The numbers are consistent and close across all three models and consistently attain statistical significance. Neither of the other economic variable (employment in agriculture and elementary occupation) attain statistical significance. There is a positive relationship between the age of the household head and attendance, while the sex of the head does not seem to matter. The education level of the household tends to raise attendance but statistical significance is attained only at the tertiary level. The child dependency ratio, while having the expected negative sign is not statistically significant. The elderly dependency ratio is negative and statistically significant. While the presence of elderly household members tends to improve access to school quality, it

[19] Another argument could be that parents pick better schools for smarter children and send them to school regularly, hence school quality and school attendance are determined by a third, unobserved variable, namely child ability. Unfortunately there is not data that can be brought to bear on this issue. This also gets complicated by issues such as whether parents reinforce or try to minimize differences between children.

[20] The household education level is potentially a good proxy for the household taste for education.

simultaneously reduces school attendance. It is possible then that elderly household members, while increasing the households resources, also increase the need for home production and therefore raise the opportunity cost of the child's time.

School quality is clearly an important influence on how often parents send children to school. The coefficient is significant at the one-percent level. The effect of quality is also non-linear, suggesting that a great deal could be gained by focusing on improving those schools that fall at the bottom of the distribution. Using the predicted value of school quality raises the coefficient significantly but does not change any of the other coefficients except for the coefficient on tertiary education. The coefficient on tertiary education changes by a factor of almost three. Notice that the test for endogeneity of school quality and attendance fails miserably. The coefficient on the first stage residuals is small and statistically insignificant.

Concluding Remarks

The issue of quality in education is a tricky one and is more and more occupying the attention of researchers. In less developed countries the issue is of particular importance. Policy makers and research alike have often cast the education question as one of a trade off between the availability of a spot in a classroom and access to a high quality education. Hanushek (1995) has called this focus misleading, if not wrong, for there is mounting evidence to show that it takes more than the existence of the spot in school to motivate continuous interest in education. Because quality of schooling is often so poor the resources poured into education in less developed countries often do not bring the results that policy makers hoped for as in some places dropout rates have remained high, while in others (the current case an example) students continue to score poorly on standardized tests. The mounting evidence that links educational achievement to job performance, productivity, wages and economic growth makes these finding all the more troubling. It is clear that research has not been able to isolate a set of factors that

universally can be manipulated to improve the quality of schools. But that simply means more and more careful study needs to be done in the specific circumstance of each country. What is certain is that satisfactory results will not be forthcoming from the money spent on education in less developed countries until they find a way to provide a better education to children.

One area of research that has not been undertaken, perhaps for a lack of data, is an investigation of the characteristics of the individuals who head the schools and the school systems. In many developing countries, principals and other administrators tend to be teachers who have been promote through the ranks until they reach the top of the hierarchy. While these individuals might be excellent teachers, they might be very poor managers placed in charged of resources. Teachers, and often administrators have no management training and management training is not a criterion for assuming these positions. There is also potential conflict between the objectives of the country's education department and the principal themselves. Anecdotal evidence out of countries like Jamaica, for example, point to instances when the schools resources are exhausted on programs like sports day, of the school's beautification projects, leaving little for other essentials. So a possible area that might bear fruit in attempting to understand the education production process might be to seriously investigate resource usage in schools and re-examine the manner in which the school administrators are selected. Government might also want to make sure their goals and the goals of administrators coincide.

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Appendix: The Construction of the Education Variable

In order to better represent the education level of the household all the information on the education of adults who are no longer in school was utilized. The variable was constructed using a combination of the information on the last school completed and the number of years spent at that school as follows.

a. Persons whose last school is Primary, All Age (1-6) or Junior High (1-6) and Adult Literacy Classes are given a weight of 6.

b. Persons whose last school is All Age (7-9), Junior High (7-9) are given a weight of 9. Also given a weight of 9 are persons whose last school is New Secondary, Comprehensive, Secondary High and Technical but have completed less than five years in those schools. This category also includes persons whose last school is Adult Education and Special School, regardless of the years completed, and those persons whose last school is Vocational/Agricultural with less than three years in those schools.

c. A weight of 11 was assigned to all persons whose last school was New Secondary, Secondary High, Comprehensive or Technical if they have completed 5 or more years in those schools, and Vocational/Agricultural if they have completed 3 or more years.

d. A weight of 15 was given to persons whose last school is University, Other Tertiary (public) and Other Tertiary (private).

e. Persons for whom absolutely no information is available on their schooling were assigned the average years of schooling in the sample and given a weight of 9.

f. A small group of people reported having no education and was assigned a weight of 2.

The household's average education was then determined by adding the weight assigned to each household member and dividing by the number of members used in the computation. Notice that these weights are based on the nominal number of years of schooling completed at each level of education.

Table 1: School Performance by Economic Status of Students

	Q 1		Q 2		Q 3		Q 4		Q 5		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
English	51.1	6	51.7	7	55.5	9	56.9	9.4	62.2	13.8	53.4	11.7
Math	43.7	6.4	44.7	7.1	48.1	9.1	49.5	9.3	54.7	15	45.9	11.6
Science	47.6	6.4	47.9	6.6	52.1	8.6	53.1	9	58.1	13.2	49.8	10.9
Quality[b]	47.5	6.1	48.1	6.7	52	8.8	53.2	9.2	58.3	14	49.7	11.2

[b] "Quality" is the average of English, Mathematics and Science test score. It provides a measure of overall school quality based on the school's output.

Table 2: School Performance by Region

	Kingston Metropolitan Area		Other Urban		Rural Areas	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
English	61.1	12	54.6	8.3	51.7	6.7
Math	53.6	12.2	47.3	8.5	44.4	7.2
Science	56.7	11.3	51	7.7	48.3	7.1
Quality	57.1	11.8	51	8.1	48.1	6.8

Table 3: School Performance by Region and Economic Status of Students

	Rural Poor		Rural Rich		Urban Poor		Urban Rich	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
English	51.1	5.4	55	7.7	51.1	8.1	65.9	14.8
Math	43.6	6	47.2	7.9	44.2	8	58.5	16.3
Science	47.4	6.1	52.1	7.2	48.1	7.4	61.1	14.6
Quality	47.4	5.6	51.4	7.5	47.8	7.8	61.8	15.2

Table 4: Distribution of Students by Economic Resources and Quality of School Attended

	Performance Group			
	English			
Population Quintile	1	2	3	4
Quintile 1	20.00	31.63	34.42	13.95
Quintile 2	21.19	28.48	32.45	17.88
Quintile 3	8.80	28.00	29.60	33.60
Quintile 4	11.19	21.68	24.48	42.66
Quintile 5	6.98	16.28	22.09	54.65
Mathematics				
Population Quintile	1	2	3	4
Quintile 1	21.86	27.91	35.35	14.88
Quintile 2	14.57	32.45	34.44	18.54
Quintile 3	7.20	28.00	32.80	32.00
Quintile 4	10.49	19.58	24.48	45.45
Quintile 5	9.30	19.77	17.44	53.49
Science				
Population Quintile	1	2	3	4
Quintile 1	28.37	22.33	33.02	16.28
Quintile 2	22.52	29.80	27.81	19.87
Quintile 3	8.00	24.00	32.00	36.00
Quintile 4	11.89	16.78	29.37	41.96
Quintile 5	4.65	18.60	23.26	53.49

Table 5: Distribution of Schools by Area and Quality of School Attended

English Language				
	Performance Group			
Area of Residence	1	2	3	4
KMA	14.81	11.52	14.02	53.62
Other Urban	3.70	25.65	13.55	13.04
Rural	81.48	62.83	72.43	33.33
Mathematics				
Area of Residence	1	2	3	4
KMA	13.86	14.81	13.70	50.71
Other Urban	4.95	19.05	18.72	12.80
Rural	81.19	66.14	67.58	36.49
Science				
Area of Residence	1	2	3	4
KMA	11.11	17.18	16.28	47.22
Other Urban	3.17	19.63	20.93	12.96
Rural	85.71	63.19	62.79	39.81

Table 6: Average Characteristics of Households That Rated Schools

	Households with Ranking		Households without Ranking	
Variables	Mean	Std Dev	Mean	Std Dev
Quintile 1	0.26	0.44	0.33	0.47
Quintile 2	0.20	0.40	0.23	0.42
Quintile 3	0.18	0.38	0.18	0.39
Quintile 4	0.24	0.43	0.14	0.35
Quintile 5	0.11	0.32	0.13	0.33
Other Urban	0.10	0.30	0.24	0.43
KMA	0.34	0.47	0.16	0.37
Rural	0.56	0.50	0.60	0.49
Quality	51.31	9.77	50.00	8.42
Math	47.63	10.18	46.34	8.72
Language	55.05	9.86	53.56	8.51
Science	51.25	9.55	50.00	8.39
Education	9.24	1.72	9.18	1.54
Age of Head	46.58	15.27	47.64	15.85
Sex of Head	0.44	0.50	0.51	0.50
School Attendance	18.65	3.22	18.35	3.50

Table 7: Parental Rating of School versus Rank Based on Test Scores

Rank by Parents	Performance Group Based on Test Scores			
	English Language			
	1	2	3	4
Very good	6.00	15.33	34.00	44.67
Good	15.77	25.77	38.08	20.38
Neither	25.49	19.61	37.25	17.65
	Mathematics			
	1	2	3	4
Very good	7.33	14.00	36.00	42.67
Good	13.85	31.54	33.85	20.77
Neither	19.61	25.49	33.33	21.57
	Science			
	1	2	3	4
Very good	5.33	18.00	34.00	42.67
Good	15.38	27.67	43.46	13.46
Neither	25.49	29.41	23.53	21.57

Table 8: Means and Standard Deviation of Variables Used in the Analysis

Sample Size = 677		
Variable	**Mean**	**Std Dev**
Dependent Variables		
Quality	50.83	9.33
School Attendance	18.55	3.32
Economic Status Variables		
Quintile 1	.28	.45
Quintile 2	.21	.41
Quintile 3	.18	.38
Quintile 4	.20	.40
Quintile 5	.12	.32
Agricultural Employment	.21	.40
Elementary Occupation	.17	.38
Household Education		
Average Years Completed	9.22	1.66
Primary	.07	.25
Some Secondary	.56	.50
Secondary	.31	.46
Tertiary	.06	.24
Child Variables		
Grade 1	.17	.37
Grade 2	.18	.38
Grade 3		
Grade 4	.19	.39
Grade 5	.18	.38
Grade 6	.15	.35
Age	8.89	1.90
Sex (Male = 1)	.54	.50
Foster Child	.19	.39
Location		
KMA	.28	.45
Other Urban	.15	.36
Demographic Characteristics		
Age of Head	46.96	15.48
Sex of Head (Male = 1)	.46	.50
Child Dependency Ratio	.27	.45
Elderly Dependency Ratio	.08	.20

Table 9: Determinants of Access to Quality in Primary Education

Sample Size = 677		
Variable	Model 1	Model 2
Constant	58.82***	52.27***
	(2.79)	(2.96)
Quintile 2	0.022	0.46
	(0.89)	(0.86)
Quintile 3	2.543***	2.66***
	(0.98)	(0.95)
Quintile 4	2.87***	2.96***
	(0.96)	(0.94)
Quintile 5	7.55***	5.74***
	(1.17)	(1.17)
Grade 2	1.8	1.61
	(1.12)	(1.09)
Grade 3	1.81	1.9
	(1.37)	(1.33)
Grade 4	4.11***	3.68**
	(1.55)	(1.51)
Grade 5	4.24**	3.67**
	(1.87)	(1.82)
Grade 6	4.4*	3.76*
	(2.3)	(2.24)
Age	-0.808	-0.7
	(0.39)	(0.38)
Male	0.027	-0.07
	(0.62)	(0.60)
Other Urban	0.93	0.97
	(0.91)	(0.89)
KMA	6.31***	5.66***
	(0.82)	(0.81)
Foster Child	-1.65*	-1.53*
	(0.84)	(0.83)
Child Dependency Rates	-1.24***	-1.26***
	(0.48)	(0.47)
Elderly Dependency Rates	2.5	3.05*
	(1.62)	(1.57)
Agricultural Employment	-1.82**	-1.45*
	(0.81)	(0.8)
Elementary Occupation	-2.196**	-1.71**
	(0.81)	(0.80)
Some Secondary		-0.845
		(1.28)
Secondary		-0.41
		(1.35)
Tertiary		8.22***
		(1.75)
R-Squared	**0.28**	**0.33**

*** indicates significance at the 1% level,
** indicates significance at the 5% level,
* indicates significance at the 10% level.

Table 10: Determinants of School Attendance

Sample Size = 655			
Variable	Model 1	Model 2	Model 3
Constant	8.20***	-22.96	-20.95
	(3.16)	(13.64)	(13.92)
Quintile 2	1.37***	1.34***	1.34***
	(0.35)	(0.36)	(0.36)
Quintile 3	1.45***	1.30**	1.31**
	(0.39)	(0.60)	(0.60)
Quintile 4	1.23***	1.12*	1.14*
	(0.38)	(0.62)	(0.62)
Quintile 5	1.34***	1.65	1.64
	(0.49)	(1.07)	(1.07)
Age	0.01	0.02	0.02
	(0.06)	(0.07)	(0.07)
Male	-0.10	-0.07	-0.07
	(0.24)	(0.24)	(0.24)
KMA	0.67**	1.11	1.10
	(0.34)	(0.10)	(0.10)
Other Urban	-0.69*	-0.73*	-0.73*
	(0.36)	(0.40)	(0.40)
Foster Child	0.50	0.50	0.50
	(0.35)	(0.42)	(0.42)
Child Dependency Rates	-0.32	-0.40	-0.40
	(0.20)	(0.30)	(0.30)
Elderly Dependency Rates	-2.34***	-2.22**	-2.24**
	(0.85)	(0.10)	(0.10)
Head Age	0.03**	0.03**	0.03**
	(0.01)	(0.01)	(0.01)
Head Sex	-0.16	-0.24	-0.24
	(0.26)	(0.26)	(0.26)
Quality	0.30***	1.56***	1.48***
	(0.11)	(0.48)	(0.50)
Quality Squared	-0.00***	-0.02***	-0.01***
	(0.00)	(0.00)	(0.00)
Agricultural Employment	-0.30	-0.18	-0.20
	(0.33)	(0.41)	(0.40)
Elementary Occupation	-0.37	-0.30	-0.31
	(0.33)	(0.43)	(0.43)
Some Secondary	0.62	0.65	0.64
	(0.51)	(0.53)	(0.53)
Secondary	0.72	0.68	0.68
	(0.55)	(0.55)	(0.55)
Tertiary	1.08	2.94*	2.84*
	(0.73)	(1.70)	(1.70)
Residual			-0.01
			(0.02)
R-Squared	0.10	0.10	0.10