

Chapter 3. Mother's Marital Status and Child Educational Attainment

III.1 Introduction

A number of ways were discussed in Chapter 2 in which investment in human capital by the Jamaican government can be considered substantial. It was also discussed there a number of ways in which the educational achievement of children in Jamaica is poor in absolute terms and in comparison with other Caribbean countries. These data suggest that Jamaican households are failing to use educational inputs effectively and that the traditional recommendations made to governments in developing countries to provide better and/or more physical inputs (and more qualified teachers) might not be an effective way to improve educational attainment. Glewwe et. al. (1995) estimated a production function for cognitive achievement for Jamaican primary school students. They related cognitive achievement to school characteristics, teacher characteristics, parents' education and household income. They found that few school inputs had a significant impact on cognitive achievement among primary school students. They concluded, "...a focus on inputs alone may be misplaced in school systems with inputs levels as high as those found in Jamaica..."(p. 231).

This chapter suggests that the structure of the household could be an important determinant of the educational attainment of Jamaican children. In particular, we focus on the nature of the relationship between a child's educational attainment and the marital status of the child's mother.²⁰

III.2 The Effect of Family Structure on the Outcome of Children: A Review of the Literature.

To date, most of the work on the effect of family structure or the effect of the strength of the parental attachment on the achievement and demographic outcome of children has been carried out in western developed countries, and most of the evidence has come from the United States. The literature is difficult to summarize because of differences in methodology, in sets of control variables used, and in the measurement and representation of children's outcomes.

Many studies focus on the effect of family disruption (divorce or separation) or growing up in a single parent household on educational attainment. For the U.S., studies include McLanahan (1985), Krein and Beller (1988), Haveman, Wolfe and Spaulding (1991), Astone and McLanahan (1991), Sandefur, McLanahan and Wojtkiewicz (1992), Manski, Sandefur, McLanahan, and Powers (1992). Many studies find that, after controlling for parental income, education, and social class, as well as other observable family and regional characteristics, children who grow up in step-parent/parent families, single parent families or with neither parent are less likely to complete high school than

²⁰ Other demographic characteristics of the household are also examined.

children who spend early adolescence with both parents. These findings have been tested for different ethnic groups and several different data sets. Children from non-intact families also report lower educational expectations from their parents and less monitoring and assistance with schoolwork. These results have been taken to indicate that growing up with only one parent (usually the mother) is an important mechanism in the intergenerational transfer of poverty. It is still unclear whether growing up in a stepparent/parent family is better than growing up in a single parent family. In most studies the effect varies with the outcome that is being modeled.²¹

McLanahan (1985) used logit response models to test the effect of family structure at age 17 on whether a child was in school at age 17 and whether the child graduated from high school. She reports that growing up in a female-headed household increases the risk of poverty in later life. She also finds that “Among whites, economic deprivation and the stress associated with recent family disruption account for nearly all the negative effects of family structure on off-springs’ attainment...” (p. 873). For blacks, her results were mixed.

Krein and Beller (1988) estimate the effects of living in a single parent family on the years of schooling completed, controlling for the length of time spent in that family type and the point in the child’s life when it occurred, as well as parents’ education, family income and other factors. They divided children into three age groups: preschool (0 - 5.5 years), elementary school age (5.5 - 13.5 years) and high school (13.5 – 18 years). Separate least squares regressions were estimated for blacks and whites and for males and females. The following are the general results. The longer the time spent in a single-parent family, the bigger the reduction in the educational attainment of the child. This effect was important for all groups except white females and bigger for men than women. Furthermore, the negative effect of spending some time in a single-parent household is only important if it occurred during the preschool years. One could lose as much as ¼ of one year of schooling for each year spent in a single-parent household.

Manski et. al. (1992) worried that the association between family structure and the outcome of children could be caused by unobservable variables that influence both family structure and children’s outcome. They pointed out that the question that needs to be asked is what would be the outcome of children (measured by high school graduation, say) if the family structure was a randomly assigned treatment. The problem is that the data cannot answer that question. The reason is that the data tell us the outcome of children in non-intact families and the outcome of children in intact families but not how a child who grew up in an intact family would have done had he grown up in a non-intact family and vice versa. In their study they first estimated a parametric model (trivariate probit), which has the vice that strong parametric assumptions have to be imposed on the process generating family structure and child outcome. They went on to use non-parametric models to impose bounds on the effect of family structure on outcome. It turned out that the estimates from the parametric model were almost always consistent

²¹ For example, Sandefur et.al (1992) found that children in stepparent families were slightly more likely to graduate high school than children in single-parent families. However, children in stepparent families had consistently lower probability of college attendance than children in single-parent families.

with the non-parametric estimates and it could be said that that the parametric model did a good job of capturing the effect of family structure.

A Swedish study, a British study, and a study from Bangladesh are highlighted below. In the Swedish study, Jonsson and Gahler (1997) looked at a diverse set of family-type variables. Their data included mothers and fathers who were separated by divorce, separated from cohabiting relationships, widowed, currently cohabiting, and currently married. They also examined cases where parents had formed families after earlier separations. These family structure variables, along with other controls, were used to predict the likelihood that children continued their education beyond compulsory education (age 16), and whether they chose academic education once they decided to continue. They found that all forms of separation, except death, significantly reduced the chance that a child would continue education beyond age 16. One significant result is that cohabiting couples were found to be as good as married couples in getting their children to continue their education.

Using British data, Kathleen Kiernan (1992) presented evidence suggesting that men from step- and lone-mother families and women from step- and lone-father families were more likely to leave school at age 16. They were also more likely to leave home at age 18. The women were more likely to be involved in sexual relations, have a child, and have an extra-marital birth before age 20. This was not true for men of similar circumstances. Kiernan controlled for general ability (using the non-verbal General Ability Test administered at age 11) and social class of origin.

In a rare developing country study Bhuiya and Chowdhury (1997) tried to quantify the effect of a divorce on the chance that children born in the union would survive infancy and childhood (1-4 years) in rural Bangladesh. They found that the occurrence of a divorce significantly increases the chance that these children would die. They estimated a logit model for infants and a discrete time hazard logit for those children whose parents separated during their childhood. They controlled for the education of the mother, the age of the mother at birth, and whether the family lived in areas with certain health intervention programs.

This paper contributes to this literature by looking at the effect of parental marital choices on child outcome from a different socio-economic context than the studies reviewed. First, because the strength of attachment of the parents in non-legal unions is weak it is possible that the children produced by these relationships were unintended.²² Because of this, it is likely that many children are born in situations where there is no plan for their upbringing, including their education. As was suggested at the end of section II.3 and in note 3 of this chapter, this is not an insignificant portion of the children in Jamaica. Hence we would expect that the effect of being in a non-married-couple household persist, even after controlling for differences in economic circumstances among the households.

²² According to the 1997 Reproductive Health Survey conducted by the National Family Planning Board the rate of intended pregnancies in Jamaica is 36 percent.

Second, the effects of growing up with a single parent or the effects of parental separation have been studied extensively in developed countries but there is little evidence from developing countries, and there is reason to believe that the effects of parental attachment may vary across countries. Couples tend to leave their parents' household to form independent households in developed, western countries, which makes the upbringing of children critically dependent on the time inputs and resources of their biological parents. On the other hand, extended or joint families are not uncommon in many developing countries. The burden of child rearing does not solely fall on the shoulders of the parents in such families, and the consequences of conjugal instability on child outcomes may be less severe than in nuclear families. Also, even though the biological mother might be involved in unstable conjugal relationships, little of the instability might get transmitted to the children, if there is enough stability in the household otherwise.

Jamaica offers the potential of unique insights into these issues because of the extensiveness of out-of-wedlock childbearing, the popularity of non-legal unions before age 40, and the absence of the social spurn that attends such practice in other cultures.

III.3 Theoretical Issues

It is important to discuss why children from households in which parents are married might have superior educational attainment than children from households in which parents are not married. While there are several possible explanations for disparities in educational outcome, below a few of the main hypotheses are summarized and some of the testable implications are discussed.

III.3.1 Economic Deprivation

According to the economic deprivation hypothesis, lower educational attainment among children from unmarried parent households is the result of poverty rather than the family structure into which they are born. The incidence of poverty tends to be greater among single parent families and women who are unmarried, and, as is discussed in section III.5, as children get older the wealth and income gaps between married-couple families and unmarried-couple families seem to grow larger. There are several arguments supporting this hypothesis. The first is that since the amount of financial resources possessed by each household type is different, unmarried mothers will not be able to supply additional inputs above what is provided by the government and, therefore, their children are at an educational disadvantage. For example, they might not be able to afford additional reading materials like newspapers.

The second argument is that since unmarried parents are poorer, the mother is more likely to be employed. Child rearing is a time consuming activity, hence married couples might have certain advantages in their ability to allocate time to their children, and to the variety of activities that they can expose their children to. This is potentially important because it is common for children born out of wedlock that the person who the mother claims is the father of the child refuses to accept paternity. In such cases, the

mother has to accept total responsibility for the child. Clearly, being a primary income earner will constrain her ability to rear the child in other aspects. Inadequate supervision might result in less attention being paid to school work, the perception that the mother has lower educational expectations of the child, and behavioral problems in school, all of which result in inferior educational outcome.

The third argument is that the opportunity cost of the child's time to the household in which mothers are unmarried might also be higher, which would encourage mothers to use the child's time for the performance of tasks other than education acquisition. Because mothers have to work they might have to share household duties with their children, which might necessitate early departure from schooling. Older children are especially disadvantaged because they are more likely to become the "baby-sitters" of their younger siblings. Children might also be removed from school for other reasons, such as helping with farm chores or other income generating activities. Even if there are no direct educational costs to the household, poverty raises the opportunity cost of the child's time to the household and the result is low attendance to or early withdrawal from school, which results in lower educational attainment.

If the economic deprivation hypothesis is correct, that the educational achievement differences are not due to family structure but mainly to differences in economic circumstances between the households, then one would expect that after controlling for differences in income and wealth between married couple households and households with unmarried mothers, mother's marital status should not be an important explanatory variable.

III.3.2 Father-Absence Hypothesis²³

The father absence hypothesis argues that low educational attainment of children can be attributed to the continued absence of the father from households in which parents are not married. This view stresses the importance of male role models to the cognitive and emotional development of children. Poor academic performance and early termination of schooling results from poor motivation and inadequate socialization, which results from the absence of the father.

There are two implications of the father absence hypothesis that can be tested easily in this study. The first is that among family types with unmarried mothers, children whose mothers are in common-law union are most likely to be living with their biological father, and are more likely to have an adult male in the household. Hence one should expect that the cognitive achievement of these children is not substantially worse than children with married mothers, and, in any case, should be at least as good as children from other types of unmarried-mother families. Second, the father-absence view would argue that the absence of a male role model is more detrimental for boys than for girls so we should expect the educational attainment of boys to be more negatively affected than that of girls.

²³ McLanahan (1985) discusses this viewpoint.

III.3.3 The Taste for Child-quality Hypothesis

This hypothesis holds that differences in the marital choices of parents reflect differences in taste for child-quality, or differences in demand for child-quality. Becker (1973) suggests that the extent to which parents care about the “quality” of their children might be an important determinant of whether they marry at all, and of the timing and length of the marriage. If a good education is an important quality, it might be expected that children from married couple families get relatively more education than do children from other types of families. This might occur either because married parents allocate their resources between educational inputs and other commodities differently than other types of parents, or because they create a household environment that improves the efficiency with which resources are utilized (their production function for education is different). According to this hypothesis, differences in the educational attainment of children reflect more than just differences in the relative economic position of households; differences in educational achievement reflect the internal resource-allocation choices of the household. In this case, we should expect children from married-couple households to have superior educational attainment than other children, even after controlling for differences in income and wealth and parental education.

There is some evidence to suggest that taste for child-quality and quantity differs among women in different union types in Jamaica. First, even poor married couples are less likely to “pass on” or abandon their children than unmarried parents. Very often unmarried fathers play no part in the lives of their children. Second, it was mentioned in section II.3 that over the last five decades married women have chosen to use modern contraceptive methods to limit their family size and are perhaps now the least fertile among Jamaica women. On the other hand, women who are likely to have more than one partners have not done so. One way to interpret these choices is that married women have adopted these methods in an attempt to lower family size in order to achieve the ideal balance of quantity and quality. Women to whom child quality is less important have chosen not to limit family size. This explanation is somewhat appealing because the cost of oral contraceptives is quite low. Women who enroll in the government-administered program have access to oral contraceptives for as little as 14 cents per month. All other forms of contraception are available through this program. The relatively low cost of contraceptives rules out cost as an inhibition to use.

One counter argument to this hypothesis is that marital status does not reflect differences in fundamental taste for child quality, rather, the difference in demand for educational attainment of children is a function of the education of parents. In other words, more educated parents demand fewer, more educated children and to accomplish that, these parents marry, limit fertility and invest more in the education of their children. However, while this argument should be given some weight, it also implies that the sample of children with married mothers consists mainly of highly educated women, so we should not expect mother’s education to be an important explanatory variable for differences in educational attainment among children with married mothers.

III.4 Econometric Model

This study is primarily interested in whether more human capital is produced in children from households in which the parents are married than in children from households in which the parents are not. The child's human capital is measured by the child's cognitive ability in mathematics and reading comprehension. In the empirical model that will be specified below, there is no direct measure of the time input in the production of human capital because it is not available. However, we will include some variables (like parent's education and household demographic characteristics) that are usually believed to be correlated with the quantity and quality of time input.

Assume that married parents produce human capital according to the linear production function

$$(1) \quad Q_m = \beta_{om} + \sum_{j=1}^k \beta_{jm} X_{jm} + e_m,$$

while unmarried parents produce human capital according to the production function

$$(2) \quad Q_u = \beta_{ou} + \sum_{j=1}^k \beta_{ju} X_{ju} + e_u,$$

where m represents households in which the mother is married, u represents the households in which mother is not married, Q_i represent the average cognitive achievement of children from the different households, X_{ji} are the average level of each input per child and other relevant control variables (like the demographic characteristics of the household), β_{ji} are fixed parameters, e_i are random components of human capital attainment and $i=m,u$ and k is the number of inputs. According to this model, married and unmarried parents could produce different levels of human capital either because they invest different quantities of inputs into its production, because they create different environments for their children, or because the efficiency with which the inputs are utilized is different in the two types of households. Differences in the parameters, for example, indicate differences in the efficiency with which the two types of households produce human capital.

The framework outlined above suggests that each household purchases a set of inputs X_{Q_i} from the market, which is then combined with its technology and time inputs to produce a certain amount of child quality Q_i . It should be clear that the levels of the inputs purchased are as much functions of the household technology as they are functions of the household's taste (Becker, 1965). In other words, the household-selected inputs in the education of children are endogenous; they depend on the household's taste for education, its efficiency in the education process and the child's innate ability.²⁴ One way to get consistent estimates of the structural parameters in this case would be the use of a two-step procedure. In the first stage input demand equations are estimated. These predicted demand levels would then be used in the estimation of the structural model in

²⁴ Rosenzweig and Schultz (1983) outlined these arguments in the context of child health. Perhaps a clearer way to state the argument is that there are unobservable variables (tastes, child ability), and since these variables are correlated with the input levels but are omitted from the regression, the parameter estimates will be biased.

the second stage (two-stage least squares).

There are several reasons why this approach might be difficult to apply in this context. The first is that it is difficult to specify a parsimonious set of inputs into the production of human capital. With many endogenous inputs we will require a large set of instruments and a large sample size to obtain consistent and reliable estimates of the structural parameters. There are also some important measurable inputs that the data set might not provide. Since it is reasonable to expect that the quantities of inputs demanded are correlated, there is a high chance of estimating biased parameters due to omitted variables. The third problem is that, at least in the Jamaican context, there are not many out-of-pocket costs for primary education. Where the government provides a substantial portion of the schooling inputs, the market prices for some inputs might either not exist, or are not meaningful. The most significant cost to the household might be the opportunity cost of the child's time, a cost that has no market valuation in Jamaica, there being no child labor market for young children. For these reasons a reduced form model is estimated to capture the salient relationships between household and community variables and the educational attainment of children.

III.5 Data and Variables

The data for this study come from the 1990 round of the Jamaica Survey of Living Conditions. This is a nationally representative survey of 1828 households. A household roster records the relationship of the household members to the household head, along with age, sex and religion of the household members. In addition, for each child, it records whether the natural mother and father of the child are household members and their completed schooling. Also, all persons 15 years and older were asked about their union status (married, common law, etc.), and whether the current partner is a household member.

As a means of assessing the cognitive skills of students, the California Achievement Test (CAT) in mathematics and reading comprehension was administered to students in grades 2 to 13. Children from each survey household were traced back to their schools and were tested according to their educational level.²⁵ For several reasons (particularly absenteeism) it proved difficult to find a good portion of the children at school and in the end test scores were collected for only 508 of the 1151 primary and 541

²⁵ A diagnostic test was administered to determine the appropriate test that should be given to each student.

of the 780 secondary school students.²⁶ Routine data cleaning and missing values result in final samples of 321 primary and 232 secondary school students.

Table III.1 Means and Standard Deviations: Primary School Students

Variable	Full Sample		Mother Married		Mother Unmarried	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Dependent Vars.:						
Reading Score	515	145	532	135	505	151
Math Score	607	136	615	138	602	136
Individual:						
Age (Years)	9.06	1.72	9.15	1.73	9.0	1.71
Sex (Female=0)	.40	.49	.48	.50	.35	.48
Grade	4.3	1.69	4.3	1.64	4.3	1.72
First Test	.81	.39	.84	.36	.79	.41
Mother:						
Married	.37	.48	-	-	-	-
Common Law	.32	.47	-	-	.51	.50
Visiting	.19	.39	-	-	.31	.46
Single	.11	.31	-	-	.18	.38
Parents' Education	8.53	2.17	8.3	2.3	8.66	2.09
Mother's Age	34.9	6.75	37.6	7.08	33.3	6.0
Household:						
Log Annual Expenditure	10.27	.64	10.36	.64	10.21	.64
Wealth (x000)	.85	1.56	1.0	1.4	.77	1.65
# Adult Males	1.08	.94	1.24	.88	.98	.96
# Adult Females	1.52	.89	1.43	.82	1.57	.93
# Teenagers	1.20	1.25	1.45	1.36	1.05	1.14
# Schoolers	2.12	1.06	2.09	1.09	2.14	1.04
# Infants	.96	1.11	.86	1.05	1.02	1.14
Community:						
Rural	.56	.50	.63	.48	.52	.50
Urban	.18	.39	.16	.37	.20	.40
Kingston Metro	.26	.44	.20	.40	.28	.45
Sample Size	321	-	124	-	197	-

²⁶ Children not tested are more likely to be urban (48 percent), more likely to be male (53 percent), but equally likely to be from a primary or all-age school as those who were tested. This suggests that there might be some selection in who took the exam. One of the reasons that the percentage of the expected population that took the test is so low is the prevalence of absenteeism in Jamaican schools. Ideally, one would like to control for the probability of taking the exam in the analysis. Unfortunately, it is not possible in this case to find an instrument that affects the probability of taking the exam that does not at the same time affects one's test score. The reason is that any variable that affects school attendance on the day the exam was given, probably affected attendance in the past, and therefore affects test scores. If children from higher socio-economic status were more likely to be tested then this will bias the effect of marriage towards zero since marriage and socio-economic status are positively correlated.

Table III.2 Means and Standard Deviations: Secondary School Students

Variable	Full Sample		Mother Married		Mother Unmarried	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Dependent Vars.:						
Reading Score	665	99	683	93	646	101
Math Score	728	85	738	89	717	79
Individual:						
Age (Years)	13.8	1.65	13.86	1.61	13.76	1.68
Sex (Female=0)	.40	.49	.40	.49	.39	.49
Grade	8.78	1.74	8.77	1.64	8.8	1.84
First Test	.80	.40	.90	.30	.70	.46
Mother:						
Married	.51	.50	-	-	-	-
Common Law	.25	.43	-	-	.50	.50
Visiting	.12	.33	-	-	.25	.44
Single	.12	.33	-	-	.25	.43
Parents' Education	7.79	2.15	7.88	2.24	7.7	2.05
Mother's Age	39.0	7.17	41.2	7.01	36.6	6.58
Household:						
Log Annual Expenditure	10.42	.67	10.57	.62	10.27	.7
Wealth (x10 ⁻⁴)	1.05	1.58	1.35	1.83	.73	1.44
# Adult Males	1.16	.96	1.38	1.0	.93	.86
# Adult Females	1.46	.72	1.5	.75	1.42	.70
# Teenagers	2.07	1.17	2.14	1.22	2.01	1.11
# Schoolers	1.42	1.09	1.34	1.16	1.51	1.01
# Infants	.76	.87	.75	.86	.78	.89
Community:						
Rural	.54	.50	.57	.50	.51	.50
Urban	.20	.40	.22	.42	.18	.39
Kingston Metro	.26	.44	.21	.41	.31	.46
Sample Size	232	-	118	-	114	-

Descriptive statistics for the variables included in the model are presented in table III.1 and table III.2 for the primary- and secondary-school samples respectively. To save space, only the data for the primary school sample will be discussed. The dependent variables are the scaled scores on the reading comprehension and mathematics tests. For the primary-school sample the mean reading score is 515 and the mean mathematics score is 607. On average a student whose mother is married scored 27 points higher on the reading comprehension exam and 13 points higher on the mathematics exams. The sample is 60 percent female, which reflects the fact that female students were more likely to be tested than male students were. The average child is 9 years old and is in the fourth grade. In an attempt to increase the number of children who were tested the interviewers visited the schools a second time to test students who were not tested the first time. Because this second test occurred six months after the first, a binary variable, FIRSTEST, indicating when the test was taken, is included in the model.

An important variable in this study is the marital status of the child's mother. In this sample 37 percent of the mothers are married, 32 percent are in common-law unions, 19 percent are in visiting unions, and 11 percent are single. Hence about one-half of the unmarried mothers are in common-law unions. In order to capture some aspects of the home environment the parents' education is often used as an explanatory variable. Mother's education has been found to be an important predictor of child educational attainment in several studies.²⁷ Because most fathers do not live with their children we cannot use father's education as an explanatory variable. Father's education is known for fewer than half the children, is typically only available when the parents are married, and when it is available it is usually the same as the mother's education. Even if father's education was available in more instances it is not clear that it should be used when the father is not a household member and perhaps not a significant factor in the child's "home-environment". Hence I focus only on mother's education.

A number of household variables are included in the model to capture both the level of household's resources and the competition for, and control of, resources within the household. As a measure of household wealth, the value of household consumer durable goods is used. The means for this variable suggest that there are important differences in wealth between households where mothers are married and where mothers are not married. On average, the value of durable goods in households where mothers are married is 1.3 times the value in households where mothers are not married. In both cases the standard deviation is fairly large (1.4 and 1.7 times the respective means) indicating that substantial wealth differences exist within each group. On the other hand, living with an unmarried mother does not necessarily mean lower welfare. Average annual expenditure for households with married mothers is only 9 percent higher than for households with unmarried mothers.

Men and women are believed to have different preferences for child goods (child health, education and clothing) and adult goods in the household. In general, it is expected that the more men there are in the household the more likely is it that they are the major income earners and the more control they will have over the household's resources. If women place greater weights on child goods than men, we would expect that where there are more women (and greater female provision and control of resources) it should improve the chances that children will do well at school. For these reasons the number of adult males and the number of adult females in the household are included.²⁸ The typical households has about 40 percent more females than males, and where mothers are unmarried, the household has about 60 percent more females than males.

The household age structure is utilized in order to capture the competition for resources in the household. It is expected that children have lower educational attainment when there are many other children competing for the household's financial resources and the time of the adult members of the household. The number of children 6 to 12

²⁷ See Haveman, Robert and Barbara Wolfe (1994). *Succeeding Generations: On the Effects of Investments in Children*, Russell Sage Foundation, New York.

²⁸ An adult is defined as anyone over 20 years old.

years old is used as a measure of the competition among primary school age children. Similarly, when there are infants in the household the value of the older children's time as household help (for example as babysitters) increases, which might reduce the time available for school and school-related activities. There are some differences in the means for these variables among married and unmarried mothers (more teenagers when the mother is married, more infants and schoolers when she is not) reflecting the strong effect of age on marital status in Jamaica.²⁹

Community variables are meant to capture access to educational infrastructure and exogenous tastes for education. Rural children are expected to have lower test scores than urban children because they tend to live farther from school and rural transportation is not well developed. Also, since their parents are more likely to be farmers, they probably spend more time away from school and more time on the farm. In other words, the implicit cost of schooling is higher for rural children. On the other hand, children are active participants, alongside their parents, in Kingston's "side-walk vending" industry, so it is not clear that, on average, children in Kingston will have higher test scores than rural children. Rural children comprise 56 percent of this sample and they are more likely to have mothers who are married.

The general patterns for the characteristics of the two types of households are the same in the secondary sample. However, there are a few points that are worth mentioning. The first is that, while only 37 percent of primary-school children have married mothers, 51 percent of secondary-school students have a married mother. Still, the data suggest that at age 14 there is only a 50 percent chance that a child will have a married mother. The other observation is that it appears that the resource differences mentioned above accentuate over time. On average, households in the secondary-school sample in which mothers are married own 85 percent more durable goods (compared to 30 percent in the primary-school sample) and annual household expenditure is 35 percent higher than households with unmarried mothers (compared to 9 percent in the primary sample).

III.6 Results

Separate models were estimated for students in primary school (primary-school sample) and students in secondary schools (secondary-school sample). The dependent variables are the child's test scores in reading comprehension and mathematics computation (indicated respectively by the table headings). In all cases the explanatory variables are the same. In studies of this sort, grade attainment is commonly treated as an endogenous variable and the two-stage procedure would also be applied. However,

²⁹ This is not simply the trade-off between the number of children a woman has and the quality of the education she intends for each of them. The number of children in a household often differs from the number that the main decision-maker has. This could be true for two reasons. When many women live together, which is often the case, mainly for economic reasons, each will contribute to the household's child count. The other reason is the prevalence of the practice known as "child shifting" where children are sent to live with grandparents or other relatives as a means of easing financial pressures at home.

because promotion is largely automatic at all levels of the Jamaican school system this was not done here.³⁰ The standard errors of the estimates are in parentheses.

The approach followed in estimating these results is that suggested by Spanos (1986) and McGuirk, Driscoll and Alwang, (1993) MDA. Basically, the estimation starts out by specifying the most general model for the production of cognitive achievement. This model is tested in the manner suggested by MDA to determine whether all the statistical assumptions of ordinary least squares are satisfied. Once a valid statistical model is found for the data using this general model, an attempt is made to find a model with a reasonably small set of explanatory variables that still satisfies all the OLS assumptions. These tests suggested that the model is heteroskedastic. To correct for this, all the results reported here have been estimated using the feasible generalized least squares approach outlined in Greene (1993)³¹.

III.6.1 The Primary-School Sample

Table III.3 contains the results for several specifications of the model for reading comprehension. The first column is the full model. This model includes the number of children in the household in different age categories. These variables are omitted from subsequent specifications of the model because they are likely to be endogenous to child quality since child-quality and the number of children a woman has as determined simultaneously. If they are indeed endogenous then the parameter estimates from model 1 are biased. In column 3, the model is further constrained by restricting most of the continuous variables to have linear effects.

In all three models an individual's grade is an important predictor of reading comprehension test scores, and so is the child's sex. The reading ability of girls is significantly better than that of boys. However, once grade is controlled for, age does not appear to be important. Among the characteristics of the mother, her age and education are positive and significant predictors of educational achievement. One's test scores are also significantly better when one's mother is married. It is noteworthy that mother's marital status still has a significant effect on cognitive ability even though mother's age is controlled for. Married women typically start their fertility later than unmarried women so when we compare children within a particular age range it is likely that mothers who are married are also older.

The number of adult males and adults females was included in the model to capture the likely control of financial resources in the household. It is usually suspected that men and women have different taste for child outcome and therefore the allocation of the household's resources between the purchase of goods that benefit adults and good that benefit children is likely to depend on who controls resources in the household. The

³⁰ Promotion rates for all grades in primary school is 95% or more except for grade five where the dropout rate is 8%. Promotion rates range from 92 to 95% in secondary schools except grade 10 where the dropout rate is 14%.

³¹ This procedure is outlined in detail in Appendix B.

Table III.3 Regression Results: Primary-School Sample Reading Comprehension, N=306

Variable	Model 1	Model 2	Model 3	Variable	Model 4
Constant	.01 (.45)	.39 (.41)	.70*** (.24)	Constant	.91* (.48)
Grade 3	27.42 (23.86)	8.87 (25.09)	13.09 (23.55)	Grade 3	20.51 (26.5)
Grade 4	115.49*** (21.13)	135.28*** (22.84)	152.09*** (21.43)	Grade 4	133.40*** (25.0)
Grade 5	132.56*** (30.87)	119.95*** (30.44)	121.28*** (27.72)	Grade 5	120.78*** (31.60)
Grade 6	204.23*** (32.03)	173.04*** (33.52)	193.82*** (31.44)	Grade 6	216.46*** (36.49)
First test	-31.35 (23.55)	-41.53* (23.68)	-37.3 (22.78)	First test	-4.85 (23.28)
Sex (Male = 0)	85.55*** (20.68)	67.87*** (19.31)	80.88*** (16.92)	Sex (Male = 0)	93.09*** (21.55)
Age	35.12 (31.38)	-20.51 (29.42)	-12.65* (7.05)	Age	-5.41 (6.96)
Age ²	-2.40 (1.63)	.44 (1.49)		Wealth	6.69** (3.29)
Wealth	14.39 (10.74)	10.01 (11.08)	10.84*** (3.06)	Log Annual Expenditure	52.14** (20.91)
Wealth ²	-.70 (.96)	-.12 (1.00)		Mother's Ed.	1.47 (4.05)
Log Annual Expenditure	5.06 (28.70)	61.55** (25.29)	38.77* (20.85)	Mother's Age	2.54** (1.09)
Mother's Ed.	18.18 (18.24)	4.42 (18.79)	6.66** (2.95)	Common-law	-67.02*** (24.73)
Mother's Ed ²	-.97 (1.1)	.08 (1.16)		Visiting	-34.06 (23.38)
Mother's Age	7.92 (6.74)	7.58 (6.96)	5.58*** (1.16)	Single	-68.60* (36.06)
Mother's Age ²	-.06 (.09)	-.05 (.1)		Urban	18.40 (17.80)
Married	37.68** (17.29)	33.57* (18.32)	41.63** (15.87)	Kingston	-16.01 (21.03)
Urban	19.22 (17.05)	31.06* (17.6)	32.25* (16.68)	Adults Males	-21.75** (9.64)
Kingston	-34.71* (19.91)	-38.01* (21.43)	-36.17* (20.52)	Adult Females	14.86 (10.65)
Adults Males	-31.77*** (8.41)	-31.32*** (8.34)	-35.71*** (7.61)		
Adult Females	23.97** (9.32)	14.62** (8.83)	19.12** (7.74)		
Teens (13-19)	-5.2 (5.3)				
Schoolers (6-12)	-12.91** (5.98)				
Infants (0-5)	-16.94*** (5.45)				
R ²	.35	.32	.32		.32

Standard errors are in parenthesis. *** Indicates significance at 1%, ** indicates significance at 5%, and * indicates significance at the 10% level.

Table III.4 Regression Results: Primary-School Sample Mathematics Computation, N=300

Variable	Model 1	Model 2	Model 3	Variable	Model 4
Constant	-.73 (.75)	.13 (.85)	.52 (.49)	Constant	.37 (.50)
Grade 3	45.81** (19.84)	32.97 (21.34)	37.29* (20.85)	Grade 3	43.02** (20.81)
Grade 4	122.84*** (22.22)	117.25*** (24.68)	128.03*** (23.83)	Grade 4	132.94*** (23.57)
Grade 5	183.26*** (29.95)	162.46*** (34.18)	160.99*** (30.36)	Grade 5	165.89*** (30.83)
Grade 6	215.61*** (30.57)	202.00*** (31.57)	212.35*** (31.93)	Grade 6	219.4*** (31.7)
First test	-2.46 (18.66)	-11.39 (19.19)	-10.42 (18.63)	First test	-10.13 (18.89)
Sex (Male = 0)	28.28 (18.55)	32.48* (16.95)	35.16** (13.97)	Sex (Male = 0)	35.51** (13.89)
Age	66.59* (40.39)	39.96 (38.92)	-2.55 (6.77)	Age	-3.27 (6.80)
Age ²	-3.5 (2.16)	-2.06 (2.07)		Wealth	10.96*** (3.31)
Wealth	-12.59 (10.71)	6.31 (10.89)	12.74*** (3.17)	Log Annual Expenditure	64.58** (24.66)
Wealth ²	2.07** (.99)	.62 (.96)		Mother's Ed.	7.43** (2.84)
Log Annual Expenditure	46.2 (40.64)	40.14 (41.94)	60.17** (25.18)	Mother's Age	6.84 (7.96)
Mother's Ed.	-19.37 (13.32)	-26.92** (13.23)	6.87** (2.97)	Mother's Age ²	-.09 (.11)
Mother's Ed ²	1.63* (.84)	2.15** (.84)		Common-law	-19.97 (14.3)
Mother's Age	5.59 (7.49)	8.89 (8.49)	6.41 (7.90)	Visiting	1.27 (19.27)
Mother's Age ²	-.07 (.10)	-.12 (.12)	-.08 (.11)	Single	-25.47 (24.22)
Married	21.72* (12.99)	13.58 (13.27)	16.00 (13.08)	Urban	-16.76 (18.92)
Urban	-4.58 (19.69)	-8.8 (23.85)	-19.1 (18.62)	Kingston	-41.56** (20.52)
Kingston	-20.39 (25.88)	-34.46 (27.82)	-45.02** (20.41)	Adults Males	-11.63 (9.6)
Adults Males	-5.18 (8.82)	-9.13 (9.43)	-10.81 (8.98)	Adult Females	11.63 (8.45)
Adult Females	20.88** (8.15)	14.72* (7.78)	14.87* (7.63)		
Teens (13-19)	-10.1** (4.99)				
Schoolers (6-12)	-13.47** (6.04)				
Infants (0-5)	-18.11*** (5.43)				
R ²	.43	.40	.39		.39

Standard errors are in parenthesis. *** Indicates significance at 1%, ** indicates significance at 5%, and * indicates significance at the 10% level.

more adult females there are in the household the more likely it is that they are earn a major portion of the household's income. This hypothesis receives strong support in all the models presented. Students appear to lose a significant number of points per adult male in the household but gain a significant number of points per adult female. The estimates are fairly stable in all specifications. A competing explanation could be that the more women there are in the household the more adult-time will be available for household chores and the more time available for school-age children to spend on school-related activities.

Another set of household demographic variables, the number of children in different age categories, perhaps captures the competition for financial resources and the attention of adults in the household. While the estimated parameters are all negative, only the effect of the number of infants and schoolers is precisely estimated. The omission of these variables from the other models did not have any noticeable impact on the parameter estimates.

Household wealth and annual per capita expenditure both significantly improve educational attainment, though the gains from each appear to be small. Students gain between 10 and 14 points per \$10,000 in wealth. Turning now to the household location variables, being a Kingston resident consistently reduces one's test score while being an urban resident improves one's test score, but the estimates are only slightly precise in most cases.

Table III.4 contains three identical models for mathematics computation. As with reading, grade is an important predictor of one's score. These results are similar to those reported by Glewwe et. al. (1995). Sex is an important predictor of one's math score, but the estimates are not consistent across all models. Holding current grade constant, older children tend to score lower than younger children. In contrast with the regressions for reading ability, mother's age is an important predictor of math ability score but mother's marital status is not, although marital status has a positive coefficient. One explanation for this difference could be that mathematical competence is an innate trait while reading is taught, so whatever advantage children get from having married parents is less important for their ability to learn mathematics. Mother's education has a positive and significant impact on math score. The impact of mother's education on math ability is about as strong as that on reading.

Math computation score is higher the higher the number of adult females in the household, which again provides support for the resource control/allocation hypothesis (or the time allocation hypothesis). The number of adult males has almost no effect. Among the child demographic variables, the number of infants and number of children of primary-school age and the number of teenagers have significantly negative effects on test score. As with reading, math ability is significantly higher among children from wealthier households and households with higher annual income per person.

III.6.2 The Secondary-School Sample

A comparison of table III.3 and table III.5 indicates that the pattern of the results is similar for the secondary- and the primary-school samples for reading comprehension. Girls score significantly better in reading comprehension than boys, but the advantage for girls in secondary school is much smaller than the advantage they enjoyed in primary school.³² Among primary-school students, the effect of age was rather tame, and this stayed about the same among the secondary school students, though age was not a significant predictor of secondary reading score. The effect of age does not appear to be sensitive to the specification of the model. On the other hand, relative to grade 7, current grade does seem to have a big impact on reading ability.

Having a married mother gives a secondary school student a substantial advantage over students whose mothers are not married. Both mother's age and education have positive coefficients but neither is significant. Students from households with higher per capita annual income score higher at reading and the same appears to be true for students from households with more wealth. As is true for the primary-school sample, the effect of both wealth and income are relatively small. Reading score is higher the more adult females there are in the household while the number of adult males hardly matters. Having children from all three child demographic groups reduces reading attainment, but only the number of primary-school age children has a significant impact. It is interesting that in both samples the largest negative impact of household composition is associated with the number of household members who fall in the next lower age category while the number of persons who fall into one's own age category is negative but not significant. It is possible that the former outcome is picking up the "babysitter effect" while the latter is picking up the "resource competition effect", which motivated the inclusion of these variables in the model. Students who live in Kingston and other cities tend to do better than rural children.

The regressions predicting mathematics computation scores for secondary-school students are in table III.6. There are some striking ways in which the results of these regressions contrast with those for reading comprehension. First, current grade matters little for math computation. Second, the advantage that girls enjoyed before all but disappears. The effect of age is also not as clear as it was in the reading ability regressions. Mother's marital status and mother's age both have significant effects on math ability. The effect of having a married mother is positive while math score has a positive but diminishing (concave) relationship with mother's age. This pattern is exactly the same as with the reading comprehension regressions. Mother's education also has a positive and significant effect on test scores for mathematics. The household's financial situation is an important predictor of math score. Household wealth has significant, positive effect on math score, the effect of income is positive but not significant. The number of adult females also raises score significantly. The number of primary-school age children in the household significantly reduces one's score. The estimated effects of

³² This could be the case if only the brightest boys survive to secondary school. While the issue of selection of different sorts has been raised before it is unlikely that much can be done about it in this case.

Table III.5 Regression Results: Secondary-School Sample Reading Comprehension, N=214

Variable	Model 1	Model 2	Model 3	Variable	Model 4
Constant	.54 (.59)	.35 (.48)	.40 (.36)	Constant	.39 (.35)
Grade 8	9.29 (18.03)	3.77 (16.84)	6.05 (16.35)	Grade 8	5.52 (15.95)
Grade 9	33.85* (19.12)	30.42* (17.74)	30.55* (16.87)	Grade 9	28.11* (16.15)
Grade 10	47.13** (23.86)	34.55 (21.94)	34.77* (21.08)	Grade 10	32.68 (20.79)
Grade 11	67.42** (26.79)	67.01** (26.19)	67.27** (25.25)	Grade 11	62.98** (24.75)
First test	19.11 (15.25)	11.41 (14.33)	17.99 (12.92)	First test	14.51 (13.36)
Sex (Male = 0)	34.31*** (9.15)	29.64*** (9.58)	30.01*** (9.37)	Sex (Male = 0)	29.82*** (8.89)
Age	21.0 (22.02)	27.61 (21.67)	27.91 (19.98)	Age	26.47 (20.37)
Age ²	-.77 (.77)	-1.01 (.76)	-1.00 (.71)	Age ²	-.93 (.73)
Wealth	4.90 (9.31)	9.99 (8.97)	8.45*** (2.49)	Wealth	8.24*** (2.68)
Wealth ²	.48 (1.47)	-.08 (1.43)		Log Annual Expenditure	40.27** (18.89)
Log Annual Expenditure	47.16** (21.0)	37.36* (20.68)	39.13** (18.93)	Mother's Ed.	1.59 (1.62)
Mother's Ed.	12.84 (8.81)	6.27 (7.95)	1.41 (1.65)	Mother's Age	10.21* (6.02)
Mother's Ed. ²	-.88 (.62)	-.36 (.56)		Mother's Age ²	-.13* (.07)
Mother's Age	8.58 (6.25)	8.71 (6.17)	8.21 (6.07)	Common-law	-35.44** (14.14)
Mother's Age ²	-.11 (.07)	-.11 (.07)	-.10 (.07)	Visiting	-39.19*** (18.13)
Married	34.62** (15.74)	27.89** (13.31)	26.85** (12.34)	Single	-5.40 (15.11)
Urban	17.55 (12.45)	14.46 (12.2)	14.55 (11.71)	Urban	10.1 (11.62)
Kingston	24.39* (13.18)	19.04* (11.82)	19.1* (11.34)	Kingston	12.13 (11.25)
Adults Males	-.11 (5.46)	-2.36 (5.26)	-3.25 (5.14)	Adults Males	-2.29 (5.0)
Adult Females	15.05** (6.25)	19.47*** (6.13)	20.86*** (5.44)	Adult Females	19.97*** (5.85)
Teens (13-19)	-5.47 (3.75)				
Schoolers (6-12)	-9.00** (3.87)				
Infants (0-5)	-2.91 (5.28)				
R ²	.40	.37	.37		.38

Standard errors are in parenthesis. *** Indicates significance at 1%, ** indicates significance at 5%, and * indicates significance at the 10% level.

Table III.6 Regression Results: Secondary-School Sample Mathematics Computation, N=219

Variable	Model 1	Model 2	Model 3	Variable	Model 4
Constant	-.79*** (.25)	-.68*** (.23)	-.33 (.23)	Constant	-.19 (.22)
Grade 8	-7.49 (15.08)	-25.08 (16.33)	-21.37 (16.63)	Grade 8	-15.11 (16.21)
Grade 9	-22.09 (14.31)	-19.79 (16.16)	-8.6 (16.49)	Grade 9	-1.42 (16.11)
Grade 10	14.22 (18.29)	-7.09 (17.49)	10.26 (18.27)	Grade 10	8.09 (16.23)
Grade 11	27.99 (18.90)	-10.97 (20.11)	3.46 (21.55)	Grade 11	4.64 (20.0)
First test	11.45 (14.57)	4.04 (11.43)	7.79 (12.09)	First test	13.92 (12.04)
Sex (Male = 0)	7.09 (9.41)	1.73 (9.17)	8.9 (9.74)	Sex (Male = 0)	10.59 (8.87)
Age	44.68*** (15.25)	21.87 (16.53)	30.53* (16.61)	Age	31.44* (16.74)
Age ²	-1.42*** (.52)	-.42 (.56)	-.8 (.57)	Age ²	-.79 (.57)
Wealth	18.38** (7.14)	14.28** (7.17)	7.45** (2.9)	Wealth	7.75*** (2.81)
Wealth ²	-1.22 (.96)	-.82 (1.03)		Log Annual Expenditure	11.31 (18.54)
Log Annual Expenditure	6.72 (18.71)	25.64 (20.86)	16.45 (19.7)	Mother's Ed.	.06 (1.61)
Mother's Ed.	22.69*** (6.31)	21.81*** (7.33)	-1.03 (1.65)	Mother's Age	19.02*** (4.87)
Mother's Ed ²	-1.89*** (.46)	-1.65*** (.51)		Mother's Age ²	-.25*** (.06)
Mother's Age	15.72*** (5.55)	16.37*** (5.25)	17.95*** (5.0)	Common-law	-35.83*** (9.37)
Mother's Age ²	-.21*** (.07)	-.21*** (.06)	-.23*** (.06)	Visiting	-29.65** (13.24)
Married	19.77** (8.67)	25.84*** (8.56)	23.58** (8.76)	Single	11.26 (12.77)
Urban	-9.26 (9.80)	5.63 (10.47)	13.63 (10.48)	Urban	14.26 (10.06)
Kingston	22.62* (12.89)	21.81* (11.92)	14.28 (12.26)	Kingston	6.49 (12.12)
Adults Males	-3.3 (5.52)	-4.07 (5.61)	3.95 (5.69)	Adults Males	7.98 (5.54)
Adult Females	28.14*** (6.58)	24.8*** (5.08)	23.87*** (5.10)	Adult Females	13.78** (5.53)
Teens (13-19)	-.46 (4.15)				
Schoolers (6-12)	-7.59* (4.04)				
Infants (0-5)	-4.79 (4.4)				
R ²	.36	.31	.31		.31

Standard errors are in parenthesis. *** Indicates significance at 1%, ** indicates significance at 5%, and * indicates significance at the 10% level.

place of residence are all imprecise (Kingston residency has a positive and significant impact in some cases).

III.6.3 Separating the Marriage Effect

III.6.3.1 Marriage v Other Unions

So far the discussion has focussed on the effect of the dichotomous variable married/not married. It was stated earlier, however, that there are several types of conjugal unions in which people bear children. Treating the effect of marriage in the manner that it has been so far constrains the effect of having a mother in each type of union to be the same. In this section an attempt is made to disentangle the “marriage effect” by replacing the single variable with three binary variables that represent the three alternative marital states. These results are in the right panel of tables III.3 to III.6. In all cases the omitted category is legal marriage.

In the model for reading comprehension among primary school students, children whose mothers are in common-law unions and children whose mothers are single score significantly lower than children whose parents are married. Children whose mothers are in visiting unions score less than children with married mothers but the coefficient failed to attain significance. For math computation, the effects are less clear because none of the variables attain significance, though both the common-law variable and the variable for single mothers have negative coefficients. It is interesting that this pattern emerges because it was discussed in section II.3 that women in visiting unions tend to start their fertility earlier than married women but have fewer children than women in common-law unions and about the same number of children as married women. It is possible that when children are young those whose mothers are in visiting unions have so few children that mothers can actually compensate for the “marriage effect”.

The secondary-school sample presents a very different picture. Having a mother in either common-law or visiting union significantly reduces one’s score for both mathematics and reading comprehension. Furthermore, while the common-law effect has either remained stable or declined (compared with the effect in primary school) the effect of having a mother in a visiting union appears to get worse. In other words, while having a mother in the visiting union does not seem to put one at a disadvantage (compared to children with married mothers) when one is in primary school, it does appear to put one at a significant disadvantage by the time one gets to secondary school. That the common-law union has a consistently negative effect gives some support for the hypothesis in section III.3 that the differential adoption of modern contraceptive practices among married women and women in common-law unions is a reflection of differential demands for child quality. Visiting unions tend to be short lived, compared with either marriage or common-law unions, and women who practice this union type tend to have several different visiting unions throughout her lifetime. It appears that there might be a cumulative effect of conjugal instability, which could be what is reflected in the results that children in visiting unions perform worse than children whose mothers are married, as they get older.

III.6.3.2 Analysis of the Marriage Gap

In this section, a further attempt is made to understand the effect of having a married or unmarried mother on one's cognitive ability by dividing the samples into sub-samples containing children who all have married mothers and children who all have unmarried mothers. Separate parameter estimates are computed for each sub-sample (see equations 1 and 2). Because the secondary-school sample is so small, this exercise will only be conducted for the primary-school students. Even so, the number of children with married mothers in the primary-school sample is also small, and this should be taken into consideration when interpreting the results. The computed parameters and standard errors are in table III.7 for reading comprehension and table III.8 for math computation.

For reading comprehension, the parameter estimates for children with married mothers are not substantially different than those for children with unmarried mothers in many cases. However, students whose mothers are married appear to gain substantially more per unit of income the household has, though they seem to gain less per unit of household wealth. Also, whereas location seems to matter less among students with unmarried mothers, it does seem to matter among students whose mothers are married. Children whose mothers are married appear to have better reading ability in urban areas but not in Kingston, using rural children as the base. The numbers of adult males have substantial effects whether the child's mother is married or not but the number of adult females only matters when the mother is not married. The significant positive effect of having adult females in the household when the child's mother is not married is not too surprising since these children are more likely to be living with men who are not their fathers. For math computation, girls do better than boys only when the child is with an unmarried mother. Again, area or residence appears to have large effects when the child's mother is married but not when she is unmarried. One thing that is noteworthy is how little difference there is in the standard errors of the parameter estimates when we compare children whose mothers are married and those whose mothers are not. This is true whether we look at reading comprehension or math computation. In other words, we do not seem to be getting more inefficient estimates in the smaller sample. In any case, the pattern of the coefficients do not vary in such a way to allow one to make a definite judgement on the manner in which the characteristics of households in which parents are married affect children differently than when the parents are not married.

III.6.4 Empirical Results v. Theoretical Hypotheses

Three theoretical explanations were outlined in section III.3 for how mother's marital status could affect the educational attainment of children. Each hypothesis gives rise to a number of testable implications. How did each hypothesis fare with the empirical results? The economic deprivation hypothesis says that the main reason for differences in the educational attainment of children with mothers in different marital states is differences in the economic situation of the household type. Therefore, if the household's economic circumstances are adequately accounted for, the marital status of mothers should have no effect on educational outcome. The results show that both household income and wealth significantly improve the educational attainment of

Table III.7 Decomposing the Marriage Gap: Primary-School Sample Reading Comprehension

Variable	Mother Married	Mother Not Married
Constant	-.11 (.25)	.09 (.29)
Grade 3	61.21* (32.03)	12.53 (31.56)
Grade 4	172.39*** (30.63)	122.22*** (32.46)
Grade 5	189.28*** (36.75)	121.62*** (42.05)
Grade 6	254.12*** (38.41)	168.38*** (43.08)
First test	-38.15 (35.59)	-9.83 (27.34)
Sex (Male = 0)	61.67*** (22.01)	59.01** (22.03)
Age	-24.14** (9.39)	2.22 (9.69)
Wealth	.99 (6.68)	9.49** (4.36)
Log Annual Expenditure	125.74*** (28.49)	34.0 (28.9)
Mother's Ed.	7.44 (4.56)	5.62* (3.39)
Mother's Age	1.55 (1.37)	3.88** (1.58)
Urban	37.09* (21.81)	9.79 (21.96)
Kingston	-71.86** (31.34)	51.31* (26.00)
Adult Males	-37.82*** (13.28)	-45.66*** (7.99)
Adult Females	7.06 (12.54)	26.81** (10.99)
N	113	193
R ²	.50	.29

Standard errors are in parenthesis. *** Indicates significance at 1%, ** indicates significance at 5%, and * indicates significance at the 10% level.

Table III.8 Decomposing the Marriage Gap: Primary-School Sample Mathematics Computation

Variable	Mother Married	Mother Not Married
Constant	.18 (.35)	1.04 (.73)
Grade 3	51.99* (30.85)	39.79 (27.18)
Grade 4	158.27*** (29.61)	126.49*** (31.05)
Grade 5	220.06*** (45.99)	126.32*** (34.59)
Grade 6	297.02*** (44.18)	166.33*** (36.69)
First test	-83.54** (38.92)	12.36 (22.36)
Sex (Male = 0)	5.84 (16.71)	40.9** (17.66)
Age	-39.82*** (10.10)	11.75* (7.04)
Wealth	-1.22 (4.49)	15.19*** (4.82)
Log Annual Expenditure	160.84*** (30.57)	77.64** (34.92)
Mother's Ed.	-8.11** (3.53)	4.66 (5.53)
Mother's Age	18.55* (9.52)	-11.46 (9.57)
Mother's Age ²	-.30** (.12)	.21 (.14)
Urban	91.42*** (20.07)	-42.86** (20.03)
Kingston	-94.94*** (20.59)	-32.13 (27.96)
Adult Males	-.47 (9.61)	-8.49 (10.46)
Adult Females	15.25* (8.22)	12.22 (8.87)
N	110	190
R ²	.47	.41

Standard errors are in parenthesis. *** Indicates significance at 1%, ** indicates significance at 5%, and * indicates significance at the 10% level.

children, so economic deprivation is an important source of variation in educational outcomes. However, in all cases the effects are relatively small (between 10 and 14 points per \$10,000 in wealth) and the effect of mother's marital status is still large and positive. Also, table III.1 shows that annual expenditure is not significantly higher for households with married mothers for children in primary school. Hence, economic

deprivation cannot account for all of the difference in educational attainment.³³

The father-absence hypothesis predicted that the absence of fathers should affect boys more severely than girls, and that the common-law union should be relatively close to marriage in its effect on educational achievement. It is difficult to evaluate this hypothesis using these results. Girls clearly have higher test scores than boys in all regressions, but that is true even among students with married parents (see table III.7). Also, the primary-school sample was divided into two sub-samples, one with girls only and one with boys only and these models were estimated (results not shown). Mother's marital status had no effect on scores in the sub-sample of boys.³⁴ Besides, there are good alternative explanations for the superior educational attainment of girls. Since girls are more likely than boys to support their parents when they grow old, it is possible that parents give more education to their female children than to their male children. Furthermore, children whose mothers are in the common-law union (the case where, among unmarried persons, the father is most likely to be resident with their children), have consistently lower test scores than children with married parents.

Table III.8 provides the only clear instance when the result could be said to support the father absence hypothesis. Within married-couple households there appears to be little difference in the score of boys and girls in math computation, while girls have significantly higher scores when the parents are unmarried. So, one would have to say the results are inconclusive.

Finally, the taste-for-child-quality hypothesis says that the marital status of a child's mother represents differences in taste for child quality among parents. Therefore, if we have two women, one married and the other unmarried, all things equal, we should expect the married mother to place more emphasis on the human capital of children than the unmarried mother. According to the results, the marital status effect is more than a resource effect. This effect cannot be explained by differences in the education level of married and unmarried mothers. Tables III.1 and III.2 show that married and unmarried mothers have the same number of years of education on average. If all married women were educated women then mother's education should be unimportant when we compare the test scores of children with married mothers. However, in table III.7 and III.8 the effect of mother's education is clearly non-zero. Therefore, heterogeneous taste for child-quality does seem to play an important role in explaining variations in child educational attainment across households.

III.7 Conclusion

This chapter presented evidence that, at least for reading comprehension, children with married mothers have an advantage over children from other households. This

³³ Of course, the marital status variable could be accounting for differences in time available for teaching children in the different types of households.

³⁴ One reason for the lack of effect could be that there is a selection problem. If only the brightest boys were selected by this sample then few things will have an effect of educational attainment.

analysis was carried out holding constant a number of individual, household and community characteristics. Among children in primary schools, ones with mothers in common-law unions were doing significantly worse than ones with married mothers, and among secondary school students, both the common-law union and the visiting union had significant negative effects on attainment. To the extent that these results are true they suggests that the Jamaican government might need to engage in more active social policy that discourages out-of-wedlock child bearing. This might either be in the form of incentives for people to reduce the age at marriage or incentives that put penalties on men and women who have children out of wedlock. More concrete recommendations must await a more complete analysis of fertility behavior in Jamaica. Some suggestions are discussed in chapter 5.

In this chapter, the marital status of the child's mother was assumed exogenous because these exams were one-shot exams, the results of which were not reported to parents and should therefore have no effect on their behavior regarding marriage. In chapter 4, the effect of mother's marital status on child educational outcome is studied using the child's performance on the common-entrance exam as the measure of child's attainment. One major task of chapter 4 is to investigate whether the marital status of the child's mother could be dependent on the child's ability. That is to say, unmarried mothers with high ability children are more likely to marry than unmarried mothers with low ability children, after the child's quality is revealed. The performance on the common-entrance exam is perhaps the appropriate measure of child quality to study endogenous marriage choices because having a child who passes this exam is likely to represent a significant shock to the household's potential wealth trajectory. We turn now to these issues.