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## Appendix A. The Jamaica Survey of Living Conditions

### A.1 Introduction<sup>55</sup>

The data used for this research come from the 1990 round of the Jamaica Survey of Living Conditions (JSLC). This data were collected through a partnership between the World Bank and the Government of Jamaica. The Survey of Living Conditions Steering Committee, which is chaired by the Social and Manpower Planning Division of the Planning Institute of Jamaica, directed the survey. This committee was the major decision-making body and it sets the long-term goals of the survey. Various government bodies and local institutions supported the survey. Sample design, fieldwork and data management was the responsibility of the Surveys and Computer Systems Division of the Statistical Institute of Jamaica. Other members of the Steering committee were drawn from the Ministries of Health, of Education and of Labor, Welfare and Sport, and from the faculty of the University of the West Indies.

### A.2 Overview

The JSLC was first conducted in 1988 and continued to 1997. It was first conducted to establish baseline measures of household welfare and then to monitor the impact of Jamaica's welfare program on health, education and nutrition. Jamaica has an on-going quarterly labor force survey (LFS). Households are visited once for the LFS, and then a subset of the households are visited a month later for the SLC. Each JSCL questionnaire includes modules on health, education, nutrition, consumption, anthropometric measurements for all children less than five years old, and housing. The consumption module collects data on daily expenses, consumption expenditures, non-consumption expenses, food expenses, consumption of home production, and consumption of items received as gifts. Since Jamaica is small and has a fairly good transportation network regional variations in prices were expected to be small, hence no price data were collected.

Since the second round of the 1989 survey (1989-2) various topics have received special emphasis over the years, including health, education, housing, fertility and consumption. The 1989-2 survey contains an expanded module for health with a fertility component and surveys of health facilities. The 1990 round included an expanded education module, surveys of schools, teachers and administrators. Achievement test scores in mathematics and reading comprehension were also collected as part of this module. Table A.1 describes the JSLC coverage from 1988 to 1994.

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<sup>55</sup> Since this data were not collected by this researcher the information for this chapter is taken almost verbatim from "Jamaica Survey of Living Conditions (JSLC) 1988-94: Basic Information," Policy Research Department, Poverty and Human Resource Division, The World Bank, September 5, 1996.

**Table A.1 Description of JSLC Coverage**

	Jamaica Survey of Living Conditions		
	Household Questionnaire	Associated JSCL Questionnaire	# of Households
1988	11 Modules		1909
1989-1	14 Modules		2005
1989-2	16 Modules Expanded Health Fertility Module Last Pregnancy Module Activities of Daily Living	Public Primary Health Services Public Secondary and Tertiary Health Services Private Primary Health Services Private Secondary and Tertiary Health Services	3937
1990	14 Modules Expanded Education	Primary and Secondary School Administrators Primary and Secondary School Teachers Achievement Test Scores	1828
1991	14 Modules, Expanded Housing		1786
1992	13 Modules, Focus on Poverty		4485
1993	14 Modules, Expanded Employment and Time Use		1963
1994	14 Modules, Experimental Consumption Modules		1940

### A.3 Survey Information

The information contained in four key parts of the JSLC is discussed below. For a discussion of other parts see the document references in note 1.

#### A.3.1 Roster

Each individual can be identified using the household identification number and the personal identification number. For every year of the survey, the age and sex of each household member are recorded. For the earlier years (1989-1 to 1991), household members over 14 years old were asked their religion, children were assigned their parents' personal identification numbers so that they could be linked easily, and the amount of education completed by non-resident parents were noted. The marital status of all persons over 15 years old was also collected until 1992. The content of the roster for various years is listed in table A.2.

#### A.3.2 Health

The health module was designed to collect the information necessary to measure the cost and the use made of different kinds of health services and facilities. Each

**Table A.2 Content of the JSLC Roster Module**

	Roster
1988	Includes personal identification number, age, sex and household number
1989-1	Adds religion, mother's and father's education level or id number
1989-2	Adds relation to household head, marital status (married, never married, divorced, separated, widowed), partner's id, mother's/father's completed years of schooling
1990	Same as 1989-2
1991	Adds union status (married, common law, visiting, single, none)
1992	Drop's mother's/father's schooling and identification, religion Add receipt of public assistance and question on physical/mental disability Additional module contains questions on Principal Earner's Occupational Status
1993	Same as 1992
1994	Same as 1992, question on physical/mental disability expanded to all household members

**Table A.3 Content of the JSLC Health Module**

	Health
1988	Consultation and expenses related to an illness or injury in the last four weeks Use of preventive services in the past 12 months Status of fertile-aged women
1989-1	Consultation and expenses related to an illness or injury in the last four weeks Cost, source and availability of medicines Preventive services in the last six months
1989-2	Same as 1989-1 plus: Activities of daily living of each household member age 14 and above Fertility Module: number of pregnancies, births, living children, use of contraceptives Last pregnancy detail: prenatal care, delivery, health complications, breast-feeding, maternity benefits
1990	Same as 1989-1 plus: status of fertile-age women
1991	Same as 1989-1 plus: status of fertile-age women and Chronic illness, no preventive services
1992	Same as 1991 plus: Use of prenatal and infant care in public health clinics
1993	Same as 1992 except questions on specific conditions excluded, plus hospital expenses during past 12 months
1994	Same as 1993

household member responds directly to the interviewer, but parents were allowed to respond for young children. Household members were asked to report on one illness or injury sustained over the last month (or the most recent if there were multiple illnesses or injuries). They were also asked about the type, location and cost of any care sought. Other questions gathered information on health insurance coverage, hospitalization, medication and immunization. In most rounds, women aged 15 to 49 were asked questions about pregnancies, birth and breast-feeding in the previous year. The 1989-2 questionnaire included an expanded health survey with more details on use of services and facilities and daily activities. In addition, there was a module on fertility and contraception, and one on the details of the last pregnancy. For a detailed listing of the health data collected in each round see table A.3.

### A.3.3 Education

In the 1988 survey, only persons 3 to 13 years old were included in the education module. Starting with the 1989-2 survey, all household members over age 3 were



included. Respondents were asked what type of school they attended last academic year, the number of years of schooling completed, and whether the school attended supplied food. Whenever school-age children were not attending school, the reason for non-attendance was ascertained, similarly for dropouts.

**Table A.4 Content and Respondents to the JSLC Education Module**

	Education	Respondents
1988	Type of school attended, grade in school, years repeated, school feeding program, reasons for non-attendance, type of school last attended, highest grade completed	Age 3 to 13
1989-1	Same as 1988 Plus: examinations taken and reason for absenteeism Current School: type, travel and distance, school feeding, textbook cost and school expenses.	Age 3 to 19
1989-2	Same as 1988 Adds repeating, living at home	Age 3 & up
1990	Same as 1989-1 with more detail for respondents in each of the following groups Persons not in school with only primary schooling Persons not in school with only secondary schooling Persons presently enrolled in primary school Persons presently enrolled in secondary school Persons still in post-secondary school	Age 3 & up
1991	Same as 1989-2	Age 3 & up
1992	Same as 1989-2, drops question on repeating and attendance	Age 3 & up
1993	Same as 1989-2 plus question on whether or not the child actually took the meal provided as school	Age 3 & up
1994	Same as 1993 plus details on the cost incurred by the household on education of each child	Age 3 & up

#### A.3.3.1 Expanded Education Module

For each household in the 1990 JSLC, the school attended by each child in primary and secondary school was noted. These schools composed the sample for the school survey. For each school, there was to be a school administrator questionnaire. Up to 10 teachers, randomly selected by the head of the school, completed the teacher questionnaire, and achievement tests were to be given to students in those schools that were identified by the survey households. Note that this is not a national survey of schools, it is a survey of schools attended by the household members in the randomly selected enumeration districts (see section 4). Students over 10 years old were also asked whether they had ever taken the national common entrance exam and whether they had passed it.

The school administrator responded to questions on several topics: General Information; Physical Characteristics and Facilities; School Feeding Program; Expenditures on Schooling; Instructional Materials and Guides; Instructional Time; Admission; Completion; Dropout and Repetition; School Organization; and Communication. The teacher questionnaire was completed directly by the teachers. They were asked about their education and training, their teaching experience and about

their workload. Teachers were also asked questions about the pedagogical process, like whether they gave notes through dictation or wrote on the board, about the division of their time in the classroom, and how often they arrive late or missed classes and the reasons for both. Finally, they were asked to rate the quality of the textbooks used in their field.

The California Achievement Test (CAT) test of mathematics computation and reading comprehension were given to children from grades 2 to 12 from the survey households. The students were traced to their schools, taken from their classrooms and tested together. A screening test was given to determine the level of the CAT that was appropriate to the student. Since the sample for the test is household-based, and there were only 1828 households in the sample, the number of students in each grade is small (about 200). This problem was partially solved by using a vertically equated test. Of the many commercially available tests in English reviewed by the Ministry of Education, the CAT was selected on the grounds of technical quality and because it provided the fewest concerns over cultural biases. The reading and mathematics scores are scaled so that they can be compared *as if* all students took the same test.

#### A.3.4 Expenses and Consumption

Questions were asked about several categories of expenditure with varying recall periods. For daily expenses, respondents were asked to recall the amount spent in the week prior to the survey on food and beverages consumed away from home, kerosene, wood, other cooking fuel, personal care items and tobacco products. In 1993, more details on meals consumed away from home were collected. For non-food consumption items, the households were asked about expenditures during the last 30 days for household maintenance items (cleaning supplies etc.), and for the last 30 days and the last twelve months for larger expenditure items like cooking gas, furniture, telephone, repairs, transportation, etc. Respondents also recalled expenditures on various non-consumption expenditures like weddings, funerals, auto and health insurance and taxes.

The housing module inquired into the type of dwelling occupied by the household, the ownership of the dwelling, the facilities that the dwelling included and the amount spent on housing expenses. Households were also asked about ownership, cost and value of durable consumption goods in 15 categories including audio-visual equipment, household appliances and transportation.

#### A.3.5 Constructed Data Sets

Researchers at the World Bank have constructed many data sets that combine various sections of the questionnaire. These data sets have been constructed using the raw data sets under various assumptions. The assumptions for the data sets are outlined in the document referenced in note 1. Household expenditure on food, non-food, housing and other items have been annualized and aggregated into expenditure groups. The annual use value of household durable goods has also been calculated.

**Table A.5 Contents of the JSLC Constructed Consumption Data Sets**

Variable name	Variable Description
HID <sup>A</sup>	Four digit household identification number
HHSIZE	Number of members in household
CLUSTER	Cluster id number, CLUSTER=PARISH*100000+CONSTIT*1000+ENUMDIS
EDSIZE	Enumeration district size
DAILEXP	Daily expenditures
CONSEXP	Consumption expenditures
CONSGFT	Consumption of good received as gifts
NONCONS	Non-consumption expenditures
FOODEXP	Food expenditures
FOODGFT	Consumption of home production and food received as gifts
FOODHPR <sup>B</sup>	Consumption of home production of food
TOTEXP1(88-91)	Total cons. exp.=DAILEXP+CONSEXP+CONSGFT+FOODEXP+FOODGFT
TOTEXP1(92-94)	Total cons. exp. =DAILEXP+CONSEXP+CONSGFT+FOODEXP+FOODGFT+FOODHPR
TOTEXP2	TOTEXP1+NONCONS
MORTGAGE <sup>C</sup>	Annual amount of mortgage payments
PROPTAX <sup>C</sup>	Annual amount of property tax payments
HSREPAIR <sup>C</sup>	Annual cost of house repair
WATER <sup>C</sup>	Annual water bill
ELECTR	Annual electricity bill
RENTPAY	Dummy equal to 1 if rent paid
RENT	Annual rent, paid or imputed
DURSERV <sup>D</sup>	Total annual use value of durable goods
TOTCONS1	Total consumption = TOTEXP1+RENT+DURSERV
TOTCONS2	TOTEXP2+RENT+DURSERV
PCEXP1	Per capita consumption = TOTCONS1/HHSIZE
PCEXP1	TOTCONS2/HHSIZE

<sup>A</sup> Not included in EXP91

<sup>B</sup> Only in EXP92, EXP93, EXP93, EXP94

<sup>C</sup> Not included in EXP91, EXP92, EXP93, EXP94

<sup>D</sup> Not included in EXP88

**Table A.6 Contents of the JSLC Constructed Anthropometric Data Sets**

JSLC Variable Name		Variable Description
1989-1-89/2	1990-94	
HID	HID	Household identification number
PID	PID	Personal identification number
SEX	SEX	Child's sex: 1=male, 2=female
AGE	AGE	Child's age in months
WEIGHT	WEIGHT	Child's weight in kilograms
HEIGHT	HEIGHT	Child's height in centimeters
HAZ	HAZ	Height for age Z-score
WAZ	WAZ	Weight for age Z-score
WHZ	WHZ	Weight for height Z-score
	BMI	Body Mass Index
	FLAG	Flag, index more than six standard deviation from mean

#### **A.4 Sample Design**

The JSLC uses the same sample design as the LFS. The LFS uses a two-stage stratified process designed to select one and one half percent of the dwellings in Jamaica. In the first stage, enumeration districts are selected from a geographic frame and, in the second households are selected from the frame of dwellings in the enumeration districts. Each household in Jamaica is equally likely to be included in the sample. In general, the JSLC surveys one-third of the LFS households. The exceptions are the 1989-2 survey when two-thirds were used, and the 1992 survey (focussing on poverty) when all of the LFS households were revisited in 10 of the 14 parishes and two-third in the other four.

All households in Jamaica are assigned to enumeration districts (EDs) for the purpose of collecting the Population Census. An ED with more than eighty dwellings is called a Primary Sampling Unit (PSU). Whenever a ED contains less than eighty dwellings it is combined with contiguous EDs until there are sufficient dwellings to form a PSU. This was to ensure that the dwellings selected in the second stage come from a large enough universe.

Contiguous PSUs are combined to form Sampling Regions (SRs). The combination is done in such a way that each SR is contained wholly in one of the fourteen administrative regions (called parishes), contains the same number of dwellings, and is composed of homogeneous units (for example urban and rural EDs would not fall into the same SR). Two PSUs are selected from each SR with probability equal to the share of the SR's dwellings that fall into that PSU. These formed the areas for the survey. It is believed that selecting the sample in this way ensures a more even distribution of the sample over all geographic and administrative areas.

## Appendix B. Feasible Generalized Least Squares

This appendix gives a brief summary of the feasible generalized least squares procedure used in chapter 3.

Consider the model

$$(B.1) \quad y = X\beta + \varepsilon,$$

where  $y$  is a vector of  $n$  observations on a variable of interest,  $X$  is an  $n \times K$  data matrix, and  $\varepsilon$  is  $n \times 1$  vector of disturbances. One of the assumptions that is required to estimate this model by ordinary least squares, OLS, (see Greene, 1993) is that

$$(B.2) \quad E[\varepsilon\varepsilon'] = \sigma^2 I$$

or, the model is homoskedastic (the variance of  $\varepsilon$  is constant for all  $i$ ).  $I$  is an  $n \times n$  identity matrix. If equation (B.2) is not satisfied, that is, if

$$(B.3) \quad \text{Var}(\varepsilon) = \sigma_i^2,$$

OLS estimation of equation (B.1) still gives unbiased and consistent estimates,  $b$ , of  $\beta$ . However, the estimates will not be efficient. If  $\sigma_i^2$ 's were known for all  $i$ , they could be used to transform the vector  $y$  and the matrix  $X$ , and OLS estimates of  $\beta$ , using the new (transformed) variables, would be efficient.

When the  $\sigma_i^2$ 's are unknown, it is still possible to get more efficient estimates of  $\beta$  using the two-step procedure outlined below. Let  $b$  represent the OLS estimate of  $\beta$  and  $e$  the OLS residual.

Step 1.

First, equation (B.1) is estimated by OLS and the  $e_i$ 's are obtained.

$$(B.4) \quad e_i = y_i - x_i b,$$

where  $x_i$  is the  $i^{\text{th}}$  vector of  $X$ . Then estimates of the  $\sigma_i^2$ 's are obtained by regressing the squares of the  $e_i$ 's on some function of  $X$ ,

$$(B.5) \quad e_i^2 = F(x_i)\delta + v_i$$

and taking the predicted value  $\hat{e}_i^2 = e_i^2 - F(x_i)\hat{\delta}$  as the estimate of  $\sigma_i^2$ .

Step 2.

In the second step, the vector  $y$  and the matrix  $X$  are transformed using  $\hat{e}_i^2$ , and the new variables are used to obtain new estimates of  $\beta$ . Let  $Ty$  be the transformed dependent variable and  $TX$  the transformed data matrix, then

(B.6)

$$Ty = \begin{bmatrix} \frac{y_1}{\sqrt{\hat{e}_1^2}} \\ \dots\dots\dots \\ \frac{y_n}{\sqrt{\hat{e}_n^2}} \end{bmatrix} \text{ and}$$

$$TX = \begin{bmatrix} \frac{x_1}{\sqrt{\hat{e}_1^2}} \\ \dots\dots\dots \\ \frac{x_n}{\sqrt{\hat{e}_n^2}} \end{bmatrix}$$

This procedure is asymptotically efficient.

## Appendix C. First-stage Regressions for Mother's Marital Status

The Newey procedure outlined in chapter 4 requires that first-stage regressions be estimated to predict the endogenous variable (mother's marital status) using all the exogenous variables. These regressions are presented in table C.1. Each regression (model 1 to model 4) corresponds to the various models that were presented in table IV.4. The regression in model 4 is also the same that was used to predict marital status for the regressions in table IV.5.

In all regressions, a woman who is in a household with high income or high level of wealth is more likely to be a married woman. On the other hand, women are less likely to be married if they are in a household that receives remittances from abroad. Non-rural residency reduces the chance that one is married, but the coefficients are insignificant in most cases. Households that are farther away from a public primary school are more likely to have married women. This is probably a further reflection of the strong effect of rural residency on the probability of marriage.

The probability of marriage does not seem to be greatly affected by the presence and number of children in the household. In each case, the effects are relatively small and in almost all cases the estimates are imprecise. This strengthens the discussion in chapter 3 that it is no longer possible to distinguish between the fertility rates of women in various marital states. Women are more likely to be married if they are in a household with adult males, nothing strange about that.

Older women are more likely to be married. The coefficient on mother's age is positive and significant, though it is relatively small. Religion is one of the most important predictors of a woman's marital status according to these regressions (in all cases the omitted category are women with no religion). Both fundamentalist Christians<sup>56</sup> and non-fundamentalist Christians are significantly more likely to be married than women with no religion. Furthermore, the effect of the fundamentalist religion is almost twice as strong as that of the non-fundamentalist Christian religion.

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<sup>56</sup> Fundamentalist Christians are defined as persons whose religion is Church of God and Pentecostal. The group defined as non-fundamentalist Christians includes Anglican, Baptist, Brethren, Methodist, Moravian, Roman Catholic, Seventh-Day Adventist and United Church of England. A small number of people who gave their religion as Jehovah's Witness and Rastafarian were excluded because it was not clear how they should be categorized.

**Table C.1 Ordinary Least Squares Regressions Predicting Mother's Marital Status**

Variable	Model 1	Model 2	Model 3	Model 4
Constant 1	-2.27*** (.60)	-2.17*** (.56)	-1.73*** (.59)	-1.93*** (.58)
Child's Sex (Female =1)	.059 (.048)	.033 (.048)	.064 (.048)	.067 (.048)
Child's Age	-.0009 (.023)	-.013 (.02)	-.007 (.023)	-.007 (.02)
Mother's Education	.003 (.012)	.003 (.012)	-.001 (.012)	.001 (.012)
Education of oldest household member	.003 (.01)	-.002 (.011)	-.0000 (.011)	.005 (.01)
Log annual expenditure	.17*** (.05)	.21*** (.04)	.13*** (.04)	.16*** (.05)
Household wealth	.056** (.024)	.068*** (.024)	.062** (.024)	.06** (.024)
Remittances	-.036* (.021)	-.055*** (.02)	-.034 (.021)	-.046** (.020)
Kingston resident	-.093 (.066)	-.15** (.067)	-	-.10 (.064)
Other urban resident	-.046 (.074)	-.10 (.074)	-	-.04 (.07)
Distance to nearest All-age School	.01* (.056)	.011* (.006)	-	.009 (.006)
Dist. to nearest Primary	.02** (.078)	.016** (.008)	-	.014* (.077)
Dist. to nearest Prep	.0002 (.004)	-.0002 (.004)	-	-
No. of teenagers (13-19 years old)	-.055* (.032)	-	-.046 (.032)	-.003 (.024)
No. of schoolers (6-12 years old)	-.032 (.037)	-	-.032 (.037)	.011 (.022)
No. of younger siblings	-.004 (.026)	-	.007 (.025)	-
Mother's resident children	.06** (.028)	-	.053* (.028)	-
One adult male present	.27*** (.06)	-	.31*** (.06)	.28*** (.06)
Two adult males present	.32*** (.08)	-	.35*** (.08)	.32*** (.08)
Three adult males present	.34*** (.10)	-	.42*** (.10)	.33*** (.1)
Mother's Age	.008** (.0039)	.0072** (.0036)	.0075* (.0039)	.005 (.0037)
Fundamentalist Christian	.36*** (.08)	.39*** (.09)	.37*** (.08)	.40*** (.08)
Non-Fundamentalist Christian	.2** (.08)	.24*** (.08)	.24*** (.08)	.23*** (.08)
R <sup>2</sup>	.28	.21	.25	.26

Standard errors are in parentheses. \*\*\* indicates significance at the 1 percent level, \*\* indicates significance at the 5 percent level, and \* indicates significance at the 10 percent level.



## VITA

Godfrey A. Gibbison, son of Muriel and the late Ebenezar Gibbison, was born on December 4, 1969 in Contrivance, Jamaica. He graduated from Knox High School and went on to earn a Bachelor of Science degree in Economics from the University of the West Indies and a Master of Science degree in Agricultural Economics from Iowa State University. Prior to his studies at Iowa State University, Godfrey worked as a lecturer in the Commerce Department at the University of Technology and as a tutor in the Department of Economics at the University of the West Indies, both in Kingston, Jamaica. His research interests include household economics, population economics, fertility and child rearing decisions in developing countries, and the economics of family formation. Godfrey is married to Maria Cortez. They hope to settle in Jamaica, preferably with a teaching-related career. Starting January 1999, Godfrey will be Visiting Assistant Professor in the Department of Economics at Radford University.