Critical Decisions at a Critical Age

ADOLESCENTS AND YOUNG ADULTS IN LATIN AMERICA

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and Manuelita Ureta
Editors

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CHAPTER ONE

Adolescents and Human Capital Formation

Suzanne Duryea, Alejandra Cox Edwards and Manuelita Ureta[1]

Adolescence typically refers to the teen years, or ages 13 to 19. It is said that adolescence is a time of enormous opportunity and enormous risks; scientists believe that the way in which teens spend these years has a crucial impact on the final development and structure of the brain.[2] Where adolescents live, moreover, can shape the way they spend their time and the decisions they make. In the Latin American region, it is estimated that 95 percent of adolescents live with their parents and/or other adults (Andersen, 2002), which suggests that adolescents' opportunities regarding basic living standards and access to schools are strongly influenced by the household where they reside.

This book uses data from 18 Latin American countries to describe the choices adolescents make in three areas of behavior: their time allocation

[1] Suzanne Duryea is a Research Economist at the Inter-American Development; Alejandra Cox Edwards is a Professor of Economics at California State University, Long Beach; and Manuelita Ureta is a Professor of Economics at Texas A&M University.

[2] Researchers are investigating how the brain changes during adolescence and into adulthood. Different centers of the brain, each with distinctive roles, sometimes are at odds with one another. While the amygdala—a seat of emotion and impulse—may be urging action, the frontal cortex is considering the repercussions that action might have. (See, for example, the work of Giedd, Blumenthal, Jeffries et al., 1999.) Deborah A. Yurgelun-Todd, director of neuropsychology and cognitive neuroimaging at McLean Hospital in Belmont, Massachusetts, believes that society can encourage young teenagers to develop the frontal lobe by teaching them to think rationally, because it is possible that the frontal lobe only starts maturing at age 17 to 19. (See Yurgelun-Todd and Renshaw, 1999, and Baird, Gruber, Cohen et al., 1999.)

toward school and work, their sexual behavior and fertility, and their adoption of adult roles as they marry or cohabitate. The analysis pays particular attention to the accumulation of human capital, which is generally considered to be a key determinant of living standards at the individual level and social progress at the aggregate level.

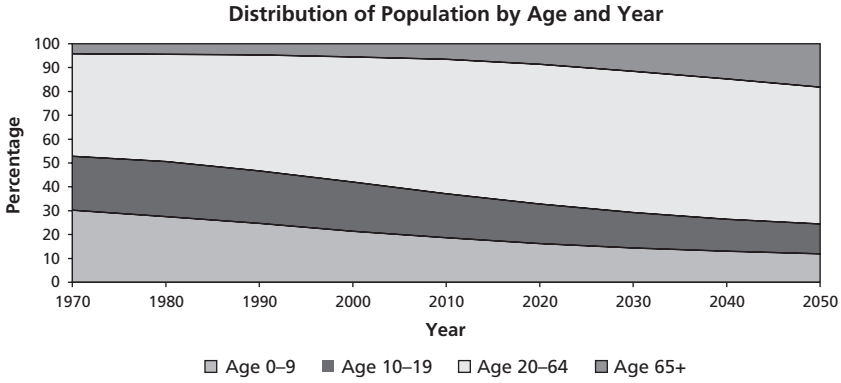
There is enough data from household surveys throughout the region to make it possible to examine adolescents' choices regarding schooling, work, and marital status. The effect of household characteristics and other general economic conditions on school attendance and labor force participation can also be measured. Information on teen sexual activity, birth control practices and fertility rates, however, is scarce. In Chapter 2 of this book Flórez and Núñez examine Demographic and Health Surveys data that address precisely these issues, offering a first look at the patterns of teenage behavior in six Latin American countries.

The Demographics of Adolescents

In the year 2000 approximately 21 percent of the Latin American population was aged 10 to 19 according to UN population estimates. Comprising such a considerable share of the population, the current generation of adolescents is widely recognized as vital to the region's future. As countries progress through the demographic transition,[3] the share of the young and adolescent population falls, leading to an aging population, as shown in Figure 1.1. As a consequence of declining fertility rates, the population share of the very young has been declining steadily since 1970. Table 1.1 shows the trends in the relative size of the adolescent populations across Latin American and Caribbean countries. While the share of the population ages 10–19 remained high in most countries over the period 1970–2000, Figure 1.1 and

[3] The Centro Latinoamericano y Caribeño de Demografía (CELADE) classifies the population structure of countries in one of four stages: (i) the first stage is characterized by slow population growth (approximately 2.5 percent) resulting from both high fertility and high mortality rates; (ii) in the second stage population growth rises (to approximately 3 percent) because fertility remains high while mortality rates decline, particularly among infants; (iii) in the third stage mortality rates remain low and fertility rates decline, thereby lowering population growth rates (to approximately 2 percent); (iv) finally, in the fourth stage fertility and mortality rates are both low, and population growth rates stabilize (at about 1 percent).

Figure 1.1. Distribution of Population in Latin America by Age and Year



Source: Centro Latinoamericano y Caribeño de Demografía (CELADE), 1998.

Table 1.1 both demonstrate that in the majority of countries over the period 2000–2010, the share of the population in this age group will fall.

The demographic transition does not unfold in all Latin American and Caribbean countries at the same time. As noted by Duryea and Székely (2000), Nicaragua, Honduras, Guatemala, Belize, Paraguay, Bolivia and Haiti are clearly in the second stage of the demographic transition, with the highest population share of the youngest age groups. There are two groups of countries in the third stage of transition, with differences that merit a split into two groups. The "younger" countries in the third stage are El Salvador, Ecuador, Mexico, Venezuela, Peru, Dominican Republic, Colombia and Costa Rica and the "older countries" in the third stage are Panama, Jamaica, Brazil, Chile and Argentina. Finally, there are five countries that have a very low proportion of individuals between the ages of zero and 14—the Bahamas, Trinidad and Tobago, Cuba, Barbados, and Uruguay—and are classified in the fourth stage.

The different stages in the demographic transition are reflected in the age structure of the populations. For example, as shown in Table 1.1, 24.2 percent of Nicaragua's population belonged to the 10–19 age group in 2000, while only 15.6 percent of Uruguay's population belonged to this age group.

In any case, for a large number of countries ongoing changes in the age composition of the population represent a "window of opportunity" in the first part of the twenty-first century, as a relatively larger share of working individuals can invest in human capital accumulation for a relatively smaller

Table 1.1. Percentage of Total Population Age 10–19 in Latin American and Caribbean Countries 1970–2050

Country	1970	1980	1990	2000	2010	2020	2030	2040	2050
Argentina	18.4	17.0	18.9	17.9	16.7	15.7	14.3	13.2	12.3
Bahamas	21.1	25.2	21.3	19.0	18.2	15.7	14.5	13.0	12.4
Barbados	23.9	21.7	18.0	15.4	12.7	11.1	10.2	10.2	10.2
Belize	25.2	25.7	24.2	23.5	22.0	19.0	16.9	14.2	12.8
Bolivia	22.4	22.5	22.7	22.0	22.3	19.7	17.8	16.3	14.6
Brazil	23.1	23.0	21.3	20.5	17.0	15.6	13.8	12.5	12.0
Chile	22.1	22.7	18.7	17.8	16.9	14.9	14.2	13.3	12.4
Colombia	24.2	25.1	21.9	20.1	19.1	16.8	15.4	14.3	13.2
Costa Rica	24.2	24.7	19.7	21.1	18.1	15.3	13.7	12.6	11.7
Dominican Republic	23.7	25.5	22.4	22.0	18.9	17.7	16.1	14.5	13.3
Ecuador	23.0	23.2	23.1	21.7	19.7	17.1	15.3	13.9	12.6
El Salvador	23.4	24.1	25.5	21.4	20.4	18.4	16.0	14.6	13.1
Guatemala	23.5	23.4	24.1	24.2	23.5	22.1	19.6	17.1	15.0
Haiti	21.9	22.4	22.3	26.1	21.9	21.2	19.8	17.3	15.4
Honduras	23.3	24.2	23.9	23.7	22.9	20.3	18.0	16.0	14.3
Jamaica	22.2	25.0	22.1	21.1	18.7	16.3	14.6	13.0	11.9
Mexico	23.1	24.1	24.9	21.5	19.3	16.7	14.6	12.7	11.7
Nicaragua	24.4	24.1	24.4	24.3	23.5	20.9	18.5	16.7	14.8
Panama	22.5	23.8	22.0	19.7	18.1	17.1	15.3	14.1	13.0
Paraguay	25.0	23.8	21.7	23.2	21.5	20.0	18.8	17.0	14.8
Peru	22.5	23.3	22.8	21.2	19.9	17.2	15.4	13.8	12.6
Trinidad and Tobago	24.8	23.7	20.0	21.3	14.2	12.9	12.8	11.5	11.2
Uruguay	17.0	16.7	17.3	15.6	15.5	14.6	13.6	12.9	12.0
Venezuela	23.3	23.9	21.7	21.2	19.2	17.1	15.5	13.9	12.5
Regional Total	**22.6**	**23.0**	**22.0**	**20.6**	**18.4**	**16.6**	**14.9**	**13.4**	**12.5**

Source: World Population Prospects UN—Population Division Database—2002 revision.

fraction of school-age individuals. Yet, changes in household environment present new challenges. As reported in Duryea, Edwards and Ureta (2001), the region has seen an important increase in female labor force participation, particularly among women age 30–50, likely increasing the proportion of teenagers whose activities are generally unsupervised by adults.

Taking advantage of this window of opportunity is important for the Latin America region since, from an international perspective, the region has made strikingly slow progress in education. Table 1.2 uses household-level data to organize the population of individual Latin American countries by

Table 1.2. Distribution of Population 25 Years and Older by Education Level in the 1990s by Country (Proportions)

	A	B	C	D		
Country and year	**No education**	**Primary**	**Secondary**	**Higher**	**(A+B)/ (C+D)**	**Mean years of schooling**
Brazil 95	20.84	45.37	25.59	8.19	1.96	5.24
Chile 94	6.66	43.72	33.31	16.30	1.02	8.79
Colombia 95	10.10	45.26	34.42	10.23	1.24	6.44
Costa Rica 95	8.25	53.33	23.74	14.67	1.60	7.03
Dominican Republic*	43.80	36.00	11.10	9.10	3.95	—
Ecuador 95	12.05	47.80	25.47	14.68	1.49	7.10
El Salvador 95	30.20	51.35	10.71	7.74	4.42	4.85
Guatemala*	52.70	37.00	5.90	4.50	8.63	—
Honduras 96	26.01	52.00	8.29	13.70	3.55	4.70
Jamaica*	4.20	64.20	28.60	3.10	2.16	—
Mexico 94	20.24	44.23	23.58	11.95	1.81	6.23
Nicaragua 93	33.98	40.28	18.59	7.15	2.89	4.35
Panama 95	6.91	38.53	38.09	16.47	0.83	8.45
Paraguay 95	7.50	62.85	21.95	7.70	2.37	6.09
Peru 96	14.14	33.89	39.26	12.70	0.92	7.20
Trinidad and Tobago*	5.60	62.30	28.60	3.50	2.12	—
Venezuela 95	12.03	40.68	34.06	13.23	1.11	7.20
Cross-Country Average	15.76	39.94	20.56	8.75	2.10	6.44
Argentina 96[1]	1.59	48.08	29.03	21.29	0.99	9.49
Bolivia 95[2]	11.69	24.08	39.75	24.48	0.56	8.82
Uruguay 95[3]	3.60	48.56	33.42	14.42	1.09	8.02
Cross-Country Average	5.63	40.24	34.07	20.06	0.88	5.92

Source: Authors' calculations from household survey data.

*Calculations from Barro and Lee (1996).

Notes: 1. The surveys for Argentina include only the Greater Buenos Aires area.

2. The surveys for Bolivia include only urban areas.

3. The surveys for Uruguay include only urban areas.

schooling in the 1990s. As with the age structure, there are large differences among countries. For instance, in Guatemala about 53 percent of the population aged 26 or older has no schooling, and less than 5 percent has attained higher education. In contrast, in Costa Rica less than 10 percent has no education, while about 15 percent has completed some higher education. In Jamaica and Trinidad and Tobago, educational attainment is concentrated among those with primary and secondary schooling. These countries have the smallest proportions of uneducated and highly educated individuals, while more than 90 percent of the population has primary or secondary education.

Table 1.2 shows that individuals with secondary education and above are still a minority in the region. The data provide an idea about the stock of education in Latin American countries, but they do not say much about trends in educational attainment in the region, which are generally poor. Using household survey data, Table 1.3 presents mean years of schooling for individuals aged 10, 15, 18 and 25 in ten countries in the region at two points in time, and reveals that education policies have been only moderately successful in raising student achievement. For instance, in the early-to mid

Table 1.3. Mean Schooling Levels by Gender for Various Ages and Countries

	Age 10		Age 15		Age 18		Age 25	
	Boys	Girls	Boys	Girls	Boys	Girls	Men	Women
Brazil								
1981	1.22	1.43	3.86	4.21	5.08	5.42	5.58	5.78
1999	2.13	2.34	5.38	5.88	6.74	7.58	7.02	7.23
Chile								
1987	4.27	4.39	8.44	8.52	9.83	9.91	10.13	10.05
1998	3.20	3.25	7.68	7.91	9.91	10.10	11.55	11.54
Colombia								
1999	2.87	2.94	6.59	7.00	7.84	8.70	8.08	8.77
Costa Rica								
1981	[1]	[1]	6.63	6.79	7.39	7.83	7.67	8.03
2000	2.71	2.86	6.40	6.61	7.41	8.15	7.53	8.10
Ecuador								
1998	3.56	3.74	7.03	7.30	8.23	8.78	9.36	9.11

(*continued*)

Table 1.3. Mean Schooling Levels by Gender for Various Ages and Countries (continued)

	Age 10		Age 15		Age 18		Age 25	
	Boys	Girls	Boys	Girls	Boys	Girls	Men	Women
El Salvador								
1999	2.33	2.40	5.40	5.67	6.70	6.90	8.18	7.66
Honduras								
1989	1.88	1.91	4.74	4.98	4.99	5.51	5.46	5.65
1996	2.56	2.94	5.61	6.00	5.50	6.41	5.82	6.24
Mexico								
1984	2.86	2.91	6.45	6.88	7.65	7.23	7.68	6.70
2000	3.51	3.63	7.68	8.01	9.00	9.14	9.38	9.50
Nicaragua								
1993	2.07	2.37	4.47	5.90	5.02	6.15	5.66	5.92
2001	2.32	2.52	5.50	5.93	5.32	6.97	6.30	6.70
Panama								
2000	3.39	3.57	7.54	8.02	9.28	9.62	10.35	10.89
Paraguay								
1999	2.80	2.85	6.36	6.58	8.13	8.46	8.36	8.12
Peru								
1985	3.50	3.22	6.98	6.77	8.42	8.12	9.21	8.69
2000	4.07	3.84	7.84	7.85	9.61	9.71	10.69	10.78
Venezuela								
1981	2.77	3.05	5.95	6.64	7.07	7.83	7.37	7.26
1999	3.63	3.78	7.14	7.61	8.21	8.88	8.57	9.33
Argentina[2]								
1980	3.39	3.58	7.33	8.16	9.55	9.84	10.00	10.20
1999	3.46	3.57	7.86	8.13	9.87	10.05	10.76	11.39
Bolivia[3]								
1986	4.13	3.85	7.98	7.69	10.28	9.54	10.08	9.37
1999	4.04	3.92	8.11	8.02	10.23	9.86	10.38	10.60
Uruguay[3]								
1981	3.23	3.31	7.75	7.65	8.92	9.04	9.64	9.51
2000	3.48	3.69	7.95	8.03	9.13	9.72	10.11	11.07

Source: Calculations from household surveys.

Notes: 1. These surveys do not report schooling for 10-year-olds.

2. The surveys for Argentina include only the Greater Buenos Aires area.

3. The surveys for Bolivia and Uruguay include only urban areas.

1980s, a typical 15-year-old Latin American completed 6.9 years of schooling, and by the late 1990s that average had only increased to 7.4 years.[4] A 15-year-old who begins school at a normal age and proceeds through school without dropping out or repeating a grade should have completed nine years of education. Therefore, a large gap remains between potential and actual educational attainment.

The gap between potential and actual educational attainment is even wider among 18-year-olds who should have completed 11 or 12 years of schooling. The average for 18-year-olds in the early to mid 1980s was 8.3, while this average increased marginally to 9.07 in the late 1990s. The gap between potential and actual educational attainment for 18-year-olds is between five and six years in some countries. Nicaragua and Honduras present the biggest lags in attainment, followed by Mexico, Colombia, Venezuela and Costa Rica. The notable exceptions are Chile, Uruguay and Argentina, where the gaps are much smaller.

Data and Methodology

The studies that appear in subsequent chapters are based on household surveys for 17 or fewer Latin American countries. In Chapter 2, Carmen Elisa Flórez and Jairo Núñez examine teenage childbearing. The authors use nationally representative household survey data from the Demographic and Health Surveys (DHS). The DHS surveys are aimed primarily at gathering information on family planning and child and maternal health. The study includes the six Latin American and Caribbean countries for which a survey is available for the second half of the 1990s: Bolivia, Brazil, Colombia, Guatemala, Peru and the Dominican Republic. Fortunately, the six countries cover nearly the full range of observed values for economic, social and demographic indicators among all countries in the region. The DHS surveys employ almost identical questionnaires in all countries, facilitating comparisons. The questionnaire includes a birth history and questions on age at first marriage and first intercourse for all women in the household aged 15 to 49. Given the limitation on the age of the survey respondents, the study focuses on young women aged 15 to 19.

[4] Based on the unweighted country average for nine countries with data in the 1980s and late 1990s in Table 1.3.

The authors document levels and trends in teenage childbearing, and they probe into the possible causes underlying these patterns. Their analysis relies on a variety of statistical tools: simple descriptive statistics, logit models, multilevel analysis, and continuous-time hazard models. Specifically, their research improves on prior analyses because it includes controls for regional factors, it estimates separately the effects of given factors on sexual activity and on childbearing, and it compares the determinants of the timing of first birth and premarital birth.

The remaining studies presented in this book are based on a harmonized data set produced by the Research Department of the Inter-American Development Bank (IDB) based on household surveys conducted by the statistical agencies of each country. As such, when a household appears in the sample for a given country, information is collected on all household members by interviewing a knowledgeable adult. With exceptions noted below, the sample designs yield nationally representative samples; in many cases the sample sizes are quite large relative to the overall population. The calendar year in which the surveys were collected differs between countries, though all were collected in the late 1990s. The countries and survey years are: Argentina (96), Bolivia (97), Brazil (97), Chile (96), Colombia (97), Costa Rica (97), the Dominican Republic (96), Ecuador (98), El Salvador (98), Guatemala (98), Honduras (98), Mexico (96), Nicaragua (98), Panama (97), Paraguay (98), Peru (97), Uruguay (97) and Venezuela (97).

Early childbearing is of particular concern because of its implications for the accumulation of human capital. Adolescents who become mothers are at elevated risk of interrupting their schooling permanently. More generally, the manner in which adolescents spend their time and effort will have important implications for their overall level of skills as they become adults. Thus, a natural next topic in this examination of the behavior of adolescents is time allocation decisions, which are examined in Chapter 3. The study, by Naercio Aquino Menezes-Filho, uses the harmonized data for 17 countries (Guatemala is omitted). The focus of the study is the allocation of adolescents' time to labor market work, school attendance and all other activities combined. The authors document current adolescents' levels of school enrollment rates and their labor force participation rates in the 17 countries in the study. The surveys collect data on school enrollment and on labor force participation, regardless of the enrollment status of the adolescents. Thus, the authors are able to pay particular attention to the incidence of

working-while-studying among those aged 12 to 19. To shed light on the determinants of micro- and macro-level factors on the time allocation of adolescents, the authors pool the individual-level data for all countries and use multinomial logit regression. Their analysis allows them to gauge the importance of family factors and country-level factors in the decision to only work, work and study, or only study.

As adolescents and young adults gradually leave school for good, they are faced with a new set of decisions. They must choose whether to look for work, and upon finding employment, they must decide how much to work. Also, they will make choices regarding the occupation and the industry where they will work. Josefina Bruni Celli and Richard Obuchi examine this transition from school to work in Chapter 4. The authors use the harmonized data for 17 countries (Guatemala is omitted). Their study begins with a descriptive analysis of patterns of entry and consolidation of young adults in the labor force. The authors then analyze the determinants of young adults' earnings, focusing on the returns to schooling and experience, and factors such as occupation and industry of employment, and gender effects. The latter analysis uses logit estimation and regression analysis.

Chapter 5 takes a broad view, and in a sense encompasses the studies of fertility, time allocation, and arrival in the labor market of adolescents, by examining the process whereby adolescents become adults. The authors, Carlos Filgueira, Fernando Filgueira and Alvaro Fuentes, present evidence on the modal ages at which young individuals join the labor force, marry and leave the educational system. In addition to analyses that use descriptive statistics, the authors use factor analysis and estimate hazard rates to uncover evidence on the links between the adoption of "adult roles" (work, marriage) and the likelihood of an adolescent leaving the educational system by given ages. The authors use a subset of the harmonized data, including data for Chile, Honduras, Uruguay and Venezuela, which represent a variety of stages in the demographic transition. Chile and Uruguay belong to the subset of countries in Latin America and the Caribbean that have advanced or nearly completed their demographic transition. Venezuela belongs to the group of countries whose demographic transition is underway but not completed or close to completion, and Honduras is at a very early stage in its demographic transition. The four countries, then, span the range of the data in terms of their current stage in the demographic transition, which makes them valuable choices for comparative study.

Finally, the study appearing in Chapter 6 examines the factors that determine the school grade-by-age attainment of adolescents in order to construct an index of social mobility. In countries with low social mobility the accumulation of human capital yields low returns for those at the bottom of the social scale. As such, low social mobility helps perpetuate the inter-generational transfer of poverty. The author, Lykke E. Andersen, uses the household surveys for the 18 countries in the harmonized data set described above. She uses regression analysis to estimate schooling gaps and a variance decomposition to construct the mobility index. The study also examines the correlation in the mobility index with an array of important measures, including income inequality, GDP per capita, urbanization rates and pupil-teacher ratios in secondary schooling.

Findings

Chapter 2 presents the findings of Flórez and Núñez, who use Demographic and Health Surveys data for the late 1990s for six countries—Bolivia, Brazil, Colombia, Guatemala, the Dominican Republic and Peru—to examine teenage childbearing. Among the young generation of women ages 20–24 in the recent surveys, a startling average of 22 percent of urban women are mothers by age 19, and an even higher average of 40 percent of rural women. Since the 1950s most Latin American and Caribbean countries have experienced a fertility transition, and previous analysis has shown that most of the reduction has occurred among women aged 25 to 30. As a result, the fertility structure shifted from a late to an early peak, and by the end of the 1990s, the maximum fertility was observed among women aged 20 to 24. Nonetheless, changes in adolescent fertility do not mirror changes in fertility for other age groups. Adolescent fertility has remained almost constant in some countries and declined in others; in still other countries, however, adolescent fertility has shown signs of increasing.

The probability of becoming a mother by age 19 increased across generations of women in the rural areas of Bolivia, Brazil and Peru as well as in urban Brazil. The probability did not decline in the rural areas of Guatemala, Colombia and the Dominican Republic, or in the urban areas of Bolivia, Colombia and Guatemala. Within the 12 geographic areas, declines were observed only for urban areas of Peru and the Dominican Republic, despite general gains in the educational attainment of youth, as

seen in the increase in mean schooling for 18-year-olds shown in Table 1.3. Overall, the contribution to total fertility by women aged 15 to 19 has increased in almost all of the six countries examined.

In the period examined, the late 1990s, teenage fertility levels vary considerably across the countries included in the study. For example, the proportion of adolescents aged 15 to 19 who are mothers is about 18 percent in Guatemala and the Dominican Republic, compared to 10 percent in Peru. In general, differences in teenage fertility levels correlate primarily with education of the teenager, region of residence, and area of residence (i.e., an urban/rural distinction): early childbearing is the norm in rural areas and among adolescents with no education. In fact, education shows such a pronounced negative effect on teenage childbearing that the risk of having a first birth among women with 11 to 13 years of education is 58 percent lower than the risk observed among women with 0 to 3 years of education. When teenage childbearing does occur, however, the causes vary. In Guatemala and the Dominican Republic high teenage fertility rates result from high rates of early marriage. In Colombia and Brazil, on the other hand, premarital sexual activity is responsible. Finally, the main deterrent to early childbearing in the countries examined is use of family planning.

The high and stable adolescent fertility rates in Guatemala and the Dominican Republic are driven by high rates of early marriage and an unmet demand for family planning. In the remaining countries, the authors find that teenage fertility rates have risen in rural areas while they have remained constant or declined in urban areas, exacerbating the rural/urban differential.

The econometric analysis yields several important findings. First, additional education and improved socioeconomic level of the household have a negative effect on the rates of premarital childbearing and of first childbearing among adolescents. Interestingly, these factors operate by increasing the age at which adolescents become sexually active. This suggests that education, or the lack of it, becomes all the more important when teenagers are exposed to changes in household environment. For example, rural-urban migration would expose rural teenagers to an environment where teenagers are generally more sexually active, while a divorce in the family or a loss in family income would expose teenagers to less supervision. In all of these cases, increased opportunities to engage in sexual activity will or will not increase the probability of teenage births depending on the indi-

vidual levels of schooling. Another factor that operates through the same channel of increasing the age at which adolescents become sexually active is regional context (regional teenage fertility rate): high regional teenage fertility increases the rates of first birth and premarital birth by lowering the age at which adolescents become sexually active.

Second, marriage is a strong correlate of adolescent fertility, but the direction of causality differs across countries. In Bolivia the positive effect of marriage on the hazard of first birth is partly due to the fact that teenage pregnancy results in marriage in order to legitimize the child. Third, living in an urban area tends to lower the age of initial sexual activity, but it has no effect on the rate of premarital birth. Country conditions (cultural and inherent characteristics) have an effect on the overall rate of premarital birth mostly through their effect on the rate of premarital birth among sexually active girls. Last, family planning factors, at the individual and regional levels, have important effects on the overall timing of first birth and premarital birth.

In Chapter 3, Menezes-Filho uses household surveys for 17 Latin American countries, dividing the sample into age groups and focusing on adolescents aged 12 to 13 and those aged 16 to 17 in order to examine individual time allocation decisions. The author uses a categorical variable that classifies time allocation into four mutually exclusive options: (1) the adolescent is not studying and is not in the labor market (i.e., either working or looking for a job), (2) the adolescent is studying and not in the labor market, (3) the adolescent is not studying and is in the labor market, and (4) the adolescent is studying and is in the labor market. The econometric analysis estimates the individual allocation decision as a function of micro variables that vary across individuals and households, and aggregate variables that are country specific.

The overall picture that emerges from the analysis is one of large cross-country variations in the percentage of adolescents in school. However, within this variation the authors find reason to be cautiously optimistic because more than 75 percent of individuals aged 12 to 13 are studying in each and every country examined. Differences among countries and between regions within countries rise with adolescents' age. Only 60 percent of adolescents aged 16 to 17 are actually going to school, and the cross-country variation is significant. For example, 20 percent of individuals in this age group are students in the rural areas of Honduras, Nicaragua, while 80 percent of this age group is going to school in urban Bolivia and the Dominican Republic.

The analysis of time allocation by adolescents yields several important findings. First, the estimates suggest that parental education is the most important factor, after controlling for other household and country characteristics; the effect is most pronounced for adolescents aged 16 to 17. A rise in parental years of schooling increases the probability that an individual will "only study" and lowers the probability of all other outcomes, especially the probability of "only work." The estimated probability of "only study" for those aged 16 to 17 ranges from 30 percent for adolescents whose parents are illiterate to 85 percent for the offspring of college graduates. The effect is also important among individuals aged 12 to 13. The obvious policy conclusion is that a boost in education can have dramatic effects for future generations in terms of productivity and growth.

Second, total household income has an impact on time allocation, after controlling for other household and country characteristics, but the effects are statistically significant only for adolescents aged 16 to 17. An increase in monthly household income from US$200 to US$10,000 (the inter-quartile range) raises the probability of "only study" from 50 percent to about 80 percent. Also, an increase in household income lowers the probability of "only work." For the younger group, those aged 12 to 13, the effect is small, which means that family income is not an important factor for schooling decisions at this stage of the life cycle. The authors note that, once they control for parental education, the income effects can be regarded as a proxy for transitory shocks to income.

Third, another important determinant of schooling and working decisions is the number of younger children in the household, especially for adolescents aged 16 to 17. For those aged 16 to 17, the probability of "only study" drops from about 60 percent to 20 percent when the number of younger siblings increases from 1 to 10, holding everything else constant. For those aged 12 to 13 the corresponding figures are 85 and 70 percent.

Fourth, the authors do not find significant effects on the time allocation decisions if the head of household works independently (self-employed) or if the adolescent lives in an extended family. However, two factors—being a male and residence in an urban area—have tangible impacts on the probability of work. For the older group of adolescents, males are 20 percent more likely to be working than are females, and persons living in rural areas are 10 percent more likely to be working than residents of urban areas.

Fifth, turning to country-level macroeconomic variables, two factors matter the most. For those aged 16 to 17, increments in per capita GDP of US$1,000 will raise the probability of "study only" by about 5 percent; the estimated effect is approximately linear. In addition, the probability of "study and work" drops from about 60 percent when per capita GDP equals US$1,000 to about 5 percent when per capita GDP reaches US$10,000.

Last, the youth unemployment rate has an effect, and unlike the other factors discussed up to now, the effect is more pronounced for the youngest age group examined: those aged 12 to 13. The probability of the outcome "only study" rises from 68 percent in countries with low unemployment (about 3 percent) to about 80 percent in countries where the youth unemployment rate reaches 20 percent, with the effect stabilizing after that. The outcome whose probability is most reduced with increases in unemployment is "working and studying." Its probability drops from 30 percent in low unemployment countries to about 1 percent in countries where the unemployment rate is very high.

The study presented in Chapter 4, by Bruni Celli and Obuchi, addresses the labor market experience of young adults in the region. Using simple averages of the 18 country-level participation rates by age and gender, the authors show that by age 15, 35 percent of males and 18 percent of females work. By age 25, these fractions are up to 92 and 57 percent, respectively. Broad patterns of behavior emerge across most countries included in the study, with three salient regularities. First, the labor force participation rates of young men and women with 10 or more years of schooling grow rapidly and continuously throughout young adulthood, that is, from age 18 to age 25. This pattern does not extend to individuals with nine or fewer years of schooling. In their case, labor force participation rates grew very slowly for men, and diminish slightly after reaching a local peak (in the early to mid-twenties) for women.

Second, school attainment plays a more important role as a (potential) determinant of labor force participation for women than it does for men. In the case of men, participation rates converge at a common level, about 95 percent, as they reach their late twenties, regardless of their schooling levels. Labor force participation rates of women with low and high schooling levels cross briefly when women are aged 21, and subsequently diverge as the women enter their mid-twenties. Third, women with 12 or fewer years of schooling experience small decreases in labor

force participation rates after attaining local peak rates during young adulthood.

The multinomial logit estimates yield essentially the same findings as the descriptive analysis. On the subject of unemployment, the estimates suggest that unemployment probabilities differ by age and educational attainment during young adulthood. In early (ages 18 to 20) and mid young adulthood (ages 21 to 22), the groups exerting the most pressure for entry into the labor market are those with the highest educational attainment, and they experience the highest unemployment probabilities. This pattern, though, applies only to individuals with 12 or fewer years of schooling: by age 22, the unemployment probabilities for men with higher education are lower than for men with 6 to 12 years of schooling. Thus, men with college-level education are more easily absorbed by the market than are men with middle levels of school attainment. The probability of employment in the informal sector of the economy decreases, and the probability of employment in the formal sector increases, as age and school attainment increase jointly.

The wage regressions yield four main findings. First, the estimated rate of return to schooling for young adults is higher than for late adolescents and prime-aged adults. The estimated rates are 18.7, 12.5, and 14.5 percent, respectively. Second, the same pattern emerges for the return to work experience. Third, the estimated gender difference in earnings is about 18 percent for late adolescents and young adults, and it grows considerably, to 25 percent, for prime-aged adults. Finally, there is a premium for employment in the formal sector.

Filgueira, Filgueira and Fuentes, the authors of Chapter 5, argue that the educational behavior of youth ought to be considered as a specific component of the more general process of transition to adulthood, or emancipation, that each individual undergoes during adolescence. During this stage there are four important transformations in an adolescent's life, which can be sketched in terms of four dichotomies concerning role changes: study or not, incorporation into the labor market or not, marriage or not, and parenthood or not. The authors use IDB data to examine the patterns of family formation, work and education in Uruguay, Chile, Venezuela and Honduras for individuals aged 12 to 29.

There are four main findings. First, there are pronounced differences across countries in the ages when young individuals move into the adult

roles of working and marrying for the first time. The differences are quite clearly linked to the demographic stages the countries occupy, which in turn are closely related to level of economic development and the supply of educational services. Further, the country differences in the timing of school-leaving, labor market entrance and age at first marriage persist when young adults are classified according to their socioeconomic status and gender. The authors conclude that the household educational climate is particularly important in reducing the hazard of early drop-out from school. Extended households do not greatly influence the drop-out hazard for men, but they do reduce the hazard for young women and increase the risk of dropping out in older cohorts. This suggests that extended households do indeed operate as a risk-pool mechanism that distributes domestic burdens differentially across age groups, especially for women. Work, marriage and number of children in the family are positively associated with leaving the educational system at all ages. Furthermore, employment and marriage, as expected, become more important risk factors in older age groups. A finding that is consistent with previous claims and that relates to Chile and Uruguay should also be highlighted. Marriage is a significantly larger risk factor for women in Chile than in Uruguay.

Second, socioeconomic status (or "class") and gender interact in their role as determinants of emancipation paths, and the interaction effect differs across countries. The evidence points to "dual emancipation patterns" depending on the individual's class and gender. Yet, the distinct patterns tend toward convergence at higher levels of income within countries and higher levels of economic development across countries.

Third, overall demographic trends also matter. The trends have an effect on the role and importance of extended family living arrangements that, in turn, matter for school retention rates. Countries in the early stages of the demographic transition face large obstacles when attempting to improve the supply of educational services, but they enjoy a higher incidence of individuals living in extended families who benefit from the protective function that such living arrangements provide. As countries develop and undergo further demographic transitions, extended family living arrangements become less prevalent. Chile, however, has experienced pronounced declines in fertility rates and in the incidence of extended family living arrangements and yet has managed to increase the overall school attainment of young cohorts. It is not clear how Chile accomplished this.

Uruguay's experience is the opposite of Chile's experience: low-income individuals in Uruguay have very "modern" roles and family structures alongside a very weak demand for educational services.

Fourth, the main finding is that there are strong links between structural factors, emancipation patterns and school attainment so that policies aimed only at improving the supply of educational services will likely fail to improve young individuals' school attainment. Policies that have an impact on the reproductive patterns of young women, labor market regulation of youth labor and school attendance, and high school curricula, making them compatible with labor market participation, appear to be the most promising courses of action.

A common finding across chapters is that household characteristics are a key determinant of teenage behavior. In particular, more educated parents have teenagers who attain higher levels of schooling, and more schooling, in turn, mitigates the risk of pregnancy among sexually active teens. These findings send a clear message with respect to the long-term benefits of expanding education among the young. Yet, is it the case that the children of less-educated parents can attain high education levels? This is the topic of Chapter 6. Andersen examines the degree of social mobility in Latin American countries, using as a proxy for social mobility the importance of family background in determining the education of teenagers. If family background is important, Andersen argues, social mobility is low.

The key concept used in Andersen's study is that of a "schooling gap," which is defined as the difference between actual and "potential" highest grade completed. Potential highest grade completed is defined as current age minus the modal school starting age. Thus, the schooling gap measures years of missing education. Andersen's sample includes all teenagers who live at home (with at least one parent) and she regresses their schooling gaps on two family background variables (adult household income per capita, and the maximum of father's and mother's education) and a variety of other variables that might be relevant in explaining schooling gaps (age, age of head parent at birth of the child, dummies for the presence of older sisters, older brothers, younger sisters, or younger brothers, a dummy for a non-biological relation to the household head, a dummy for female-headed households, a dummy for single-parent households, a self-employment dummy for the family head, average regional income, and average regional education). She then uses the Fields decomposition (Fields, 1996) on the

regression results to calculate the percentage of the total variance in schooling gaps that can be explained by the two family background variables.

The main finding is that countries in the Southern Cone of South America—Chile, Argentina, Uruguay and Peru—have the highest measured rates of social mobility, compared to Guatemala and Brazil, which are the least socially mobile countries in the sample. Social mobility appears to be positively correlated with GDP, overall school attainment, and high rates of urbanization, but it is not related to income inequality within a country.

The analysis also reveals differences in opportunities within the family: resources are diverted away from older siblings (especially girls) toward younger siblings. Also, it is an advantage to be born late in the lifecycle of the parents. In a majority of the countries in the sample, teenage girls have significantly smaller schooling gaps than do boys. Yet, girls are not significantly more mobile than are boys.

Policy Implications

The evidence presented in this book calls attention to several policy areas. The importance of formal education in improving lifetime opportunities available to adolescents is a common theme throughout. As indicated by Menezes-Filho in Chapter 3, only 60 percent of adolescents aged 16 to 17 are actually going to school, and the cross-country variation is significant. Low household income increases the hazard of dropping out of school, but an adolescent who works is more likely to remain in school, other things being equal. Thus, countries must examine critically the degree to which labor market rules and regulations, and their enforcement if any, discourage teenage part-time work in the region. For example, minimum wages are known to be more binding for new entrants, fringe benefits such as paid vacations make part-time workers relatively more expensive than full-time workers, and benefits such as maternity leave make the expected hiring cost of women higher than that of equivalent men. Findings reported in this book are consistent with the idea that rules governing formal employment are inadequate and lead to discrimination against the young, women and part-time workers. For example, in Chapter 4 Bruni Celli and Obuchi report that the probability of being located in the informal sector is highest among adolescents and young adults. In addition, throughout young adulthood, the

proportion of employed women with six to nine years of education in the informal sector is consistently higher than that of men, and as women age, this feature tends to accentuate. Easing these regulations may have an important effect in encouraging adolescents to remain in school after they enter the labor force, or return to school at a later age. Similarly, Filgueira, Filgueira and Fuentes call attention in Chapter 5 to the role of the household educational climate in reducing the hazard of early drop-out from school, and they identify some mitigating factors. For example, they report that extended households appear to protect young women but increase the risk of drop-out among older women. This finding suggests that older sisters are called upon to care for younger siblings and are more likely to drop out of school at an early age. The finding also echoes previous literature that highlights the importance of gender roles in the time allocation decisions of various household members. Gender roles are slow to change, but school schedules and academic calendars can be modified to work with this reality. Just as the labor market will better serve the preferences of and constraints faced by adolescents and young adults by offering more part-time jobs, schools will better serve the preferences of constraints faced by adolescents and young women by offering part-time sessions.

A third area that calls for policy attention is the finding that adolescent fertility has remained almost constant in some countries, declined in others, and shows signs of increasing in some countries. More importantly, given the reduction in fertility rates among adult women, the contribution to total fertility by women aged 15 to 19 has increased in almost all countries examined. Flórez and Núñez show that increased schooling along with improved household income have a negative effect on the rates of premarital birth and of first childbearing at younger ages. Interestingly, these factors operate by increasing the age at which adolescents become sexually active, which suggests that education, or the lack of it, becomes all the more important when teenagers are exposed to changes in household environment. For example, rural-urban migration would expose rural teenagers to an environment where teenagers are generally more active sexually, or a divorce in the family or a loss in family income would expose teenagers to less supervision. In both cases, the increased opportunities to engage in sexual activity will or will not increase the probability of teenage births depending on the individual levels of schooling. Another factor that operates through the same channel of increasing the age at which adolescents become sexually active is

regional context (regional teenage fertility rate): high regional teenage fertility increases the rates of first birth and premarital birth by lowering the age at which adolescents become sexually active. These findings suggest that adolescents from low-income households that experience rural-urban migration or significant changes in the composition of the household, are good candidates for targeted interventions that prevent teenage pregnancy. If these adolescents are in school, interventions can be designed at the school level and combined with health-related services. If these adolescents have dropped out of school, interventions have to be designed at the community level.

CHAPTER TWO

Teenage Childbearing in Latin American Countries

Carmen Elisa Flórez and Jairo Núñez[1]

The biological aspects of adolescence, such as entry into puberty, have been acknowledged as a time of transition in almost all societies. The duration and defining characteristics of adolescence vary across time, cultures and socioeconomic situations. As societies develop, though, the period of transition between childhood and adulthood tends to be prolonged.

In many Latin American countries, and particularly in urban areas, the adolescent experience is becoming increasingly pronounced as a distinct stage of the life cycle, as in more economically developed countries (Singh and Wulf, 1990). Adolescence for many Latin American young people is no longer an abrupt transition from childhood to adulthood, but rather a stage of life that is being continually extended and includes the ages of 10 to 24. A number of authors have reviewed the development of the biological and social definitions of adolescence in the Latin American context. Monroy de Velasco (1985, citing Havighurst, 1972) suggests that adolescence is a function of the culture of origin and that in Latin America it is still an urban phenomenon. She notes that while in rural areas of the developed world adolescence is a stage of life for young people, in Latin America rural youth experience puberty without going through adolescence. In some societies, puberty is the only distinguishing characteristic of an adolescence that marks an abrupt change to adulthood. Torres-Rivas (1988) presents a complementary set of conclusions after reviewing the development of adolescence in several Latin American countries. He suggests that while adolescence has always existed in a biological sense, its socio-cultural sphere is more a function of economic development, structural transformation and

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modernization. In some societies, children progress directly to adulthood. This may be particularly true of families and communities where children are unable to advance beyond basic levels of education and progress directly into the labor market.

During the adolescent period there is a psychosocial change through which the individual undergoes a process of development and maturation in personality, sense of identity, capacity for abstract thought and role in the family and community environment (Suárez Ojeda et al., 1985; Elliott and Feldman, 1990). Adolescence may be divided into early, middle and late substages. The first stage roughly corresponds to ages 10 or 11 through 14 when profound physical and social changes coincide with puberty. The middle stage is sometimes the final stage and usually goes from age 15 to 17. It is a stage of increasing independence from parents and family. School dropout or early pregnancy may make this stage shorter. The last stage may extend as far as the late twenties for those youth who remain in the school system or who accomplish other goals that may delay their entry into the workforce and family life (Elliott and Feldman, 1991; Crockett and Petersen, 1994).

Youth and adolescence are periods of transition in which young people make a number of long and short-run choices that define their current and future health and well-being, as well as how they will spend their time as adults. The series of evolutionary experiences may include the acceptance of their sexuality, the formation of peer alliances, the pursuit of independence from parents and adults, the search for economic security and independence, the choice of an occupation and the means to learn that occupation, the development of skills and concepts for participation in civic activities, the pursuit of responsible social conduct, preparation for marriage and family life, and the development of values (Monroy de Velasco, 1985).

The decisions adolescents make will strongly affect their educational attainment and employment opportunities. Teenage pregnancy and childbearing is a matter of special interest due to the socioeconomic consequences of this behavior. There is also evidence that teenage fertility has negative economic, social and health consequences for young mothers as well as for their children.[2] For example, a panel established by the National

[2] See Buvinic (1998), Burt (1998), Gage (1995), Alan Guttmacher Institute (1997) Singh and Wulf (1990), and Hayes (1987).

Research Council (Hayes, 1987) concluded, "Women who become parents as teenagers are at greater risk of social and economic disadvantage throughout their lives than those who delay children until their twenties. They are less likely to complete their education, be employed, to earn high wages, and to be happily married" (pp. 138). In addition, Gage (1995) concluded that "Teenage women suffer from higher rates of pregnancy complications than older women and their babies also suffer from low birth weight and heightened risks of mortality" (p. 35). For these reasons, this chapter tries to document trends in teenage fertility levels and to analyze the demographic and socioeconomic determinants of fertility for some Latin American countries.

The data derive from the Demographic and Health Surveys (DHS), an international research effort coordinated by Macro International in cooperation with national governments and organizations, and funded by the United States Agency for International Development. DHS are large nationally representative household surveys whose main purpose is to inquire about family planning and child and maternal health. The surveys are ideal for comparison since they have been carried out using a nearly identical questionnaire in all countries. The questionnaire contains a birth history of all household women aged 15–49 as well as questions on age at first marriage and first intercourse. DHS data are used from six Latin American countries—Bolivia, Brazil, Colombia, Guatemala, Peru and the Dominican Republic—for which there is available data for the second half of the 1990s; the omission of some countries naturally limits the global generalizations that can be drawn. In a similar vein, this chapter is limited in scope by the population covered in the available surveys. While the experience and needs of all adolescents are important, the DHS concentrates primarily on women aged 15 and older, and this chapter necessarily shares those limitations: adolescents younger than 15 are not included. Thus, given the data set used, adolescents are broadly defined as young women aged 15–19.

The selected countries display great diversity in economic, social and demographic indicators such as per capita income, poverty conditions, stage of the demographic transition, secondary school enrollment, and degree of urbanization (Table 2.1). Thus, whereas Brazil has almost completed the fertility transition (low fertility level), Guatemala and Bolivia are still at an intermediate stage (high fertility levels). The other countries, Peru, Colombia and the Dominican Republic, can be classified in a stage of advanced transition (medium to low fertility levels). The selected countries also show

Table 2.1. Economic, Demographic and Social Indicators for Selected Latin American Countries

	Economic	Demographic				Social			
Country	GDP US$/ 1990–1997[a]	TFR 1990/95[b]	IMR 1990/95[b]	e0 1990/95[b]	% Adolesc. 1995[b]	% Urban 1995[b]	ISES-women 1995[c]	% HH bel PL 1997[a]	IDH 1995[d]
Brazil	3,214	2.5	47.2	66.4	21.4	78	na	29	15
Peru	2,139	3.4	55.5	66.7	22.5	71	67	37	13
Colombia	1,442	3.0	35.2	68.6	21.1	72	72	45	14
Dominican Rep.	1,104	3.1	42.0	69.6	21.2	57	47	32	22
Guatemala	964	5.4	51.1	62.6	24.5	39	23	na	26
Bolivia	892	4.8	75.1	59.3	22.4	60	34	na	14

Source: [a]CEPAL, 1999, Panorama Social 1998.
[b]CELADE, 1999, Boletín Demográfico No. 63.
[c]Population Action International, 1998.
[d]PNUD, 1998, Desarrollo Humano.

TFR = Total Fertility Rate.
IMR = Infant Mortality Rate (per thousand).
e0 = Life expectancy at birth.
% Adolesc. = % 10–19 years.
ISES = Index of secondary school enrollment.
IDH = Indice de Desarrollo Humano (Human Development Index).
% HH bel PL= % households below Poverty Line.

different degrees of development. By 1997, the inequalities across countries are significant: the per capita Gross Domestic Product (GDP) of Brazil ($3,214, the richest among the selected countries) is 3.6 times the GDP of the poorest country, Bolivia ($892), and 3.3 times the GDP of the next poorest country, Guatemala ($964), as shown in Table 2.1. In general, countries with the lowest income levels also display the lowest percentages of people living in urban areas, the highest infant mortality rates, the lowest indexes of secondary school enrollment and the highest total fertility rates. Regardless of where people live, the economic resources available to them may determine the level of education that young people receive and the health and social services to which they have access.

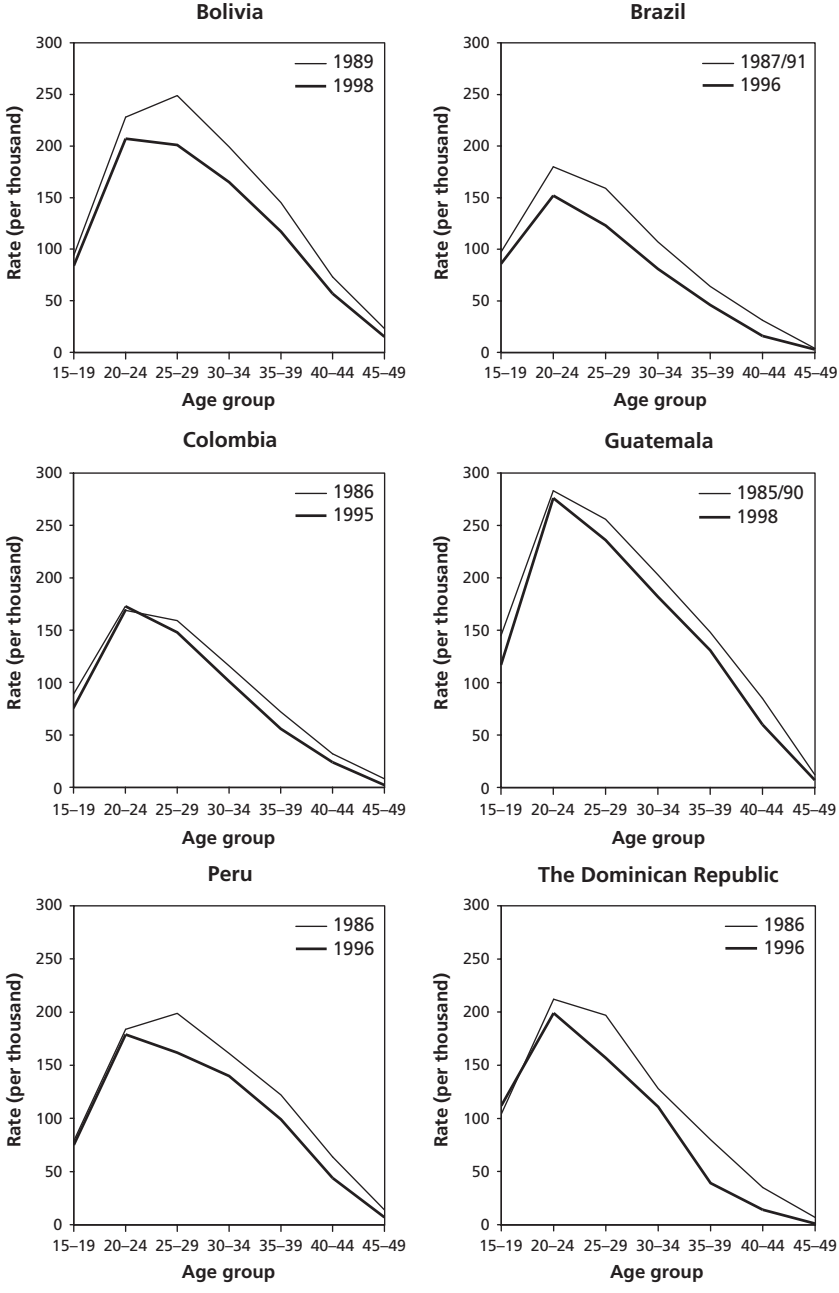
Levels and Trends in Teenage Fertility

Teenage Fertility and the Fertility Transition

In most countries in the region, fertility rates remained relatively high and stable throughout the first half of the twentieth century, with Total Fertility Rates (TFR) reaching an average of six children per woman.[3] Then, around the late 1960s, total fertility began to decline sharply. By that time, "most countries in the region have begun to show unequivocal signs of having entered into a stage of fertility transition" (Chackiel and Schkolnik, 1996, p. 5). By the period of 1985 to 1990, the average TFR for the region was around 3.6 children per woman. Although the pace and timing of the fertility decline differed among countries, there is an association between its level and the structure of fertility rates. "A decline in fertility levels is accompanied by a rejuvenation of [their] age structure" (Chackiel and Schkolnik, 1996, p. 9). This means that fertility declines have occurred largely among women over 25–30 years old, whereas the decline among younger women has been significantly less than that experienced by older women; this has shifted the fertility structure from a plateau or a late peak to an early peak. In general, by the end of the 1990s, age-specific fertility showed a typical pattern of an early peak, with a maximum between 20–24 years old (Figure 2.1).

[3] Total Fertility Rate (TFR) is the average number of children a woman would have during her reproductive period according to the age-prevailing specific fertility pattern.

Figure 2.1. Trends in Age Specific Fertility Rates in Selected Latin American and Caribbean Countries



Source: Chackiel and Schkolnik (1996) and authors' calculations.

Although declines in TFRs have been significant in most Latin American countries, adolescent fertility has not changed at the same pace: in some countries it has stayed practically constant, in others it has declined (but less markedly than among older women) and in others it may have increased. Thus, age-specific fertility rates indicate that the contribution to total fertility by women in the 15–19 age group has risen in almost all countries.

Adolescent Fertility Levels

The levels of teenage fertility in the late 1990s differ among the selected countries.[4] Peru shows the lowest adolescent fertility indicators: a fertility rate of 75 per thousand, 10.9 percent of women 15–19 years old and 1.7 percent of those 15 years old are mothers, and the mean number of children ever born (CEB) among those 15 to 19 years of age is 0.13.[5] On the other hand, Guatemala and the Dominican Republic show the highest teenage fertility levels: fertility rates above 110 per thousand, around 18 percent of adolescents are mothers and the mean number of CEB is 0.24. The other countries, Bolivia, Brazil and Colombia are in the middle: a total fertility rate of 84–89 per thousand, 11–14 percent of adolescents are mothers and a mean number of CEB of 0.16-0.18 (Table 2.2). The socioeconomic circumstances surrounding adolescent fertility levels are so diverse that they defy generalization. For example, although Bolivia is one of the poorest countries in the sample, with the highest total fertility rate and infant mortality rate and one of the lowest indexes of secondary school enrollment among women, it is not the country with the highest teenage fertility indicators. Likewise Brazil, the richest country, with the lowest total fertility rate and the highest proportion of urban population, is not the country with the lowest adolescent fertility level. Peru, though not the country with the highest female secondary school enrollment, has the lowest adolescent fertility. On the contrary, Guatemala, one of the poorest countries, with the lowest female secondary school enrollment, is one of the countries with the highest adolescent fertility.

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[4] The charts and tables are organized according to the proportion of adolescent mothers. Thus, Peru, the focus country with the smallest proportion of adolescent mothers, is always represented at the top of the chart or table. The Dominican Republic and Guatemala, the focus countries with the largest proportion of adolescent mothers, are always at the bottom.

[5] Teenage fertility rate is measured as the number of births per 1,000 women aged 15–19 years.

Table 2.2. Teenage Fertility Indicators in Selected Latin American Countries

			Women aged 15		Women aged 15–19	
Country	Year	Fertiliy rate*	% Mothers	Mean # CEB**	% Mothers	Mean # CEB**
Peru	1996	75	1.7	0.016	10.9	0.131
Bolivia	1998	84	2.5	0.031	11.5	0.152
Brazil	1996	86	3.1	0.033	14.3	0.176
Colombia	1995	89	3.1	0.033	13.5	0.164
Guatemala	1995	126	2.7	0.027	17.5	0.228
Dominican Rep.	1996	112	3.3	0.031	18.3	0.239

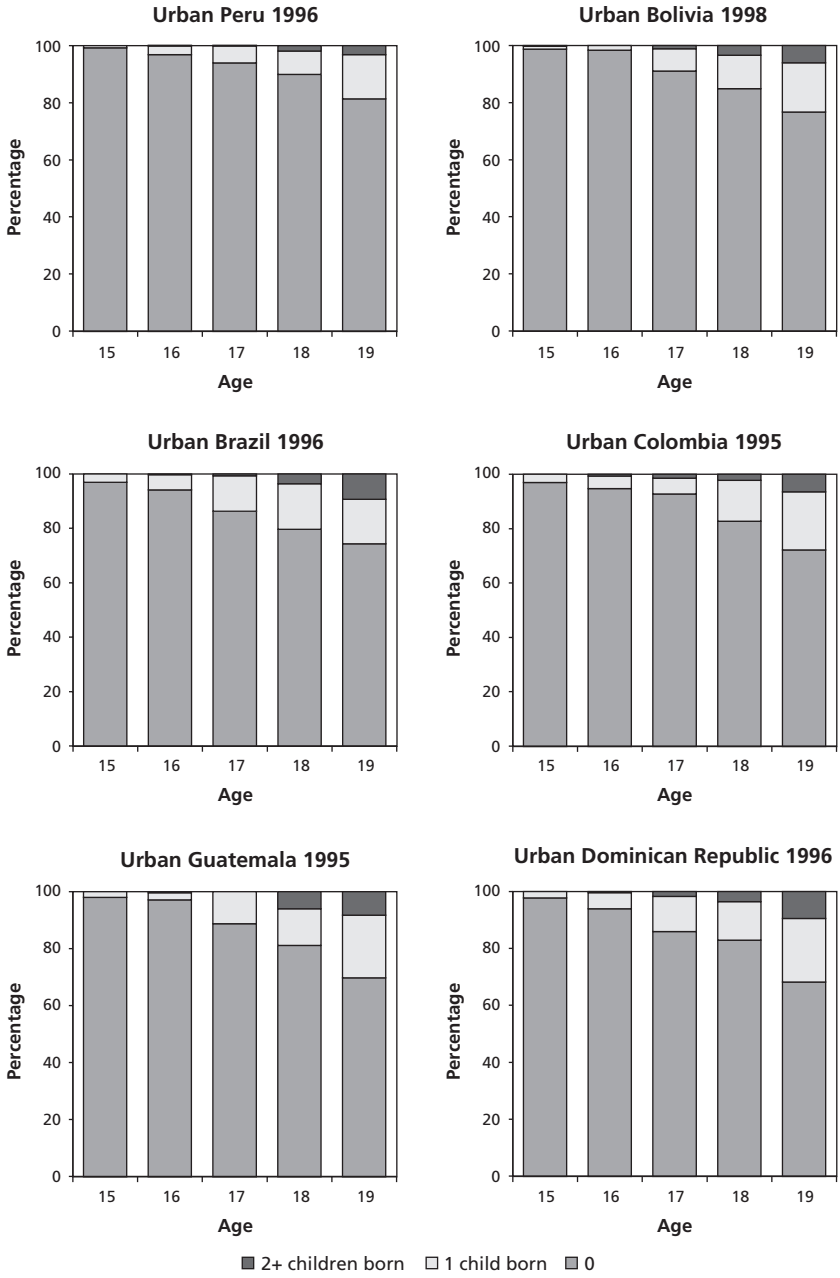
Source: DHS.
*Per thousand. Refers to three years before the survey.
** CEB: Children ever born.

In most of the countries considered, having a child before the age of 15 is rare, and typically fewer than 2 percent of women give birth by this age. In rural Bolivia, however, a little more than 5 percent of women aged 15 are already mothers (Figure 2.2a). Bearing a child at 17, 18 or 19 years of age, however, is a more common experience, especially for rural women. While childbearing before age 18 is uncommon in urban areas, 25 to 30 percent of rural women 18 years old and almost 50 percent of rural women 19 years old are mothers in all countries (Figures 2.2a-b).

The social context of adolescent fertility not only varies across countries but also within countries, as teenage fertility is generally higher in rural than in urban areas. Urban women may delay the birth of their first child because they have better access than rural women to education and jobs, and thus more reason to wait before starting a family. However, the rural/urban difference varies across countries, ranging from 2.5 in Peru to 1.5 in Guatemala and Brazil (Figure 2.3). These differentials make Peru the country with the lowest urban adolescent fertility and Brazil the country with the lowest rural adolescent fertility. Guatemala and Dominican Republic show the highest levels in urban as well as in rural areas.

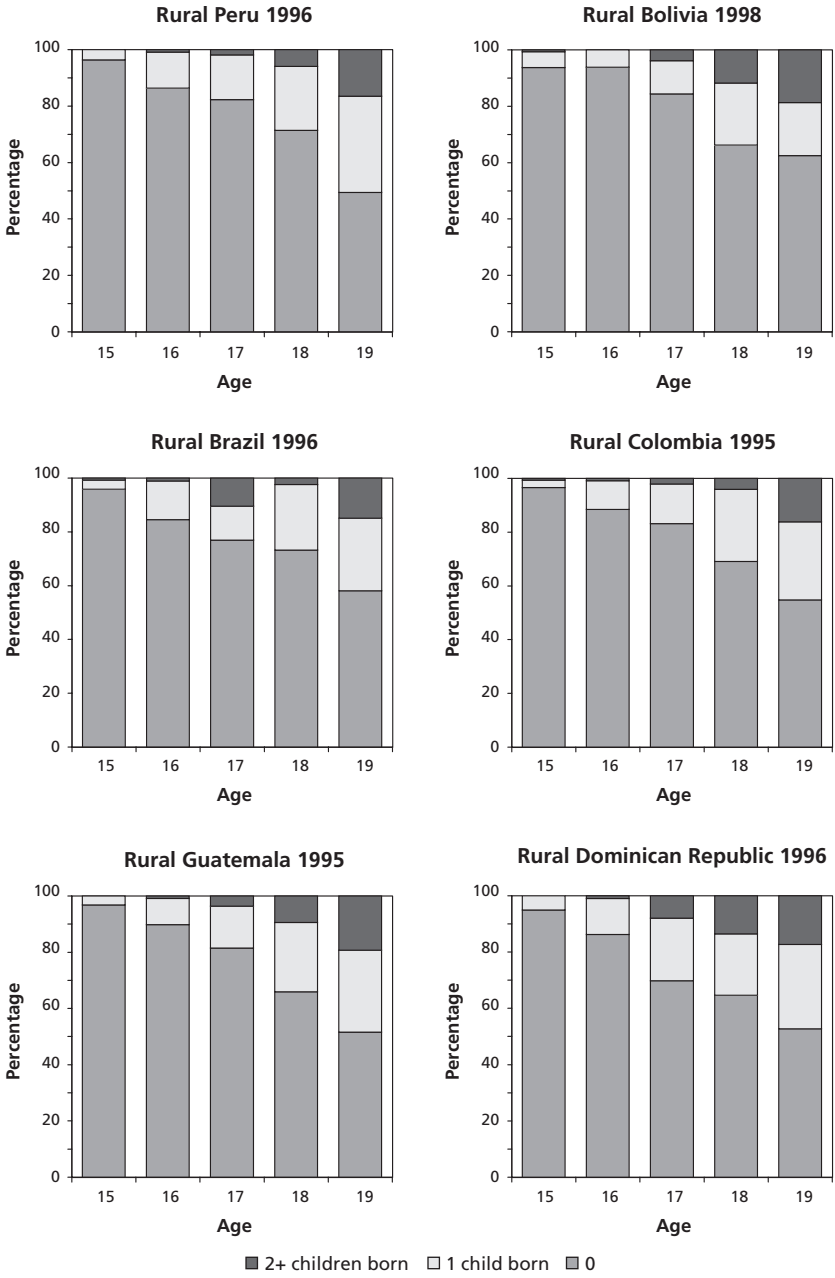
Urban adolescent fertility shows a higher variation across countries than rural fertility does. In urban areas, the teenage fertility rate ranges from 55 per thousand in Peru to 99 in Guatemala. The range of variation in rural areas is from 122 in Brazil to 160 in the Dominican Republic. In all selected countries, rural adolescent fertility seems to be the norm: 40 percent to

Figure 2.2a. Distribution of Adolescents by Number of Children Ever Born at Each Age in Urban Areas of Selected Countries



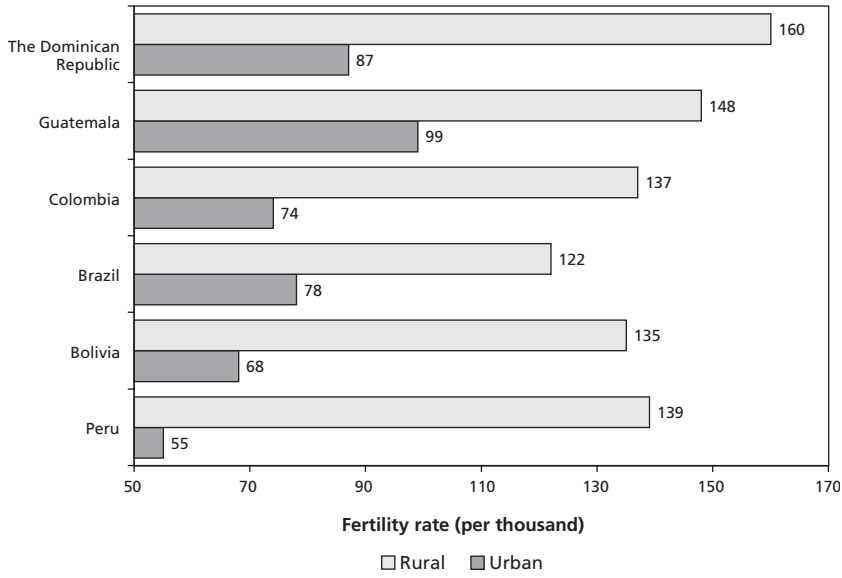
Source: Demographic and Health Surveys (DHS).

Figure 2.2b. Distribution of Adolescents by Number of Children Ever Born at Each Age in Rural Areas of Selected Countries



Source: DHS.

Figure 2.3. Teenage Fertility Rate by Area of Residence in Selected Latin American Countries



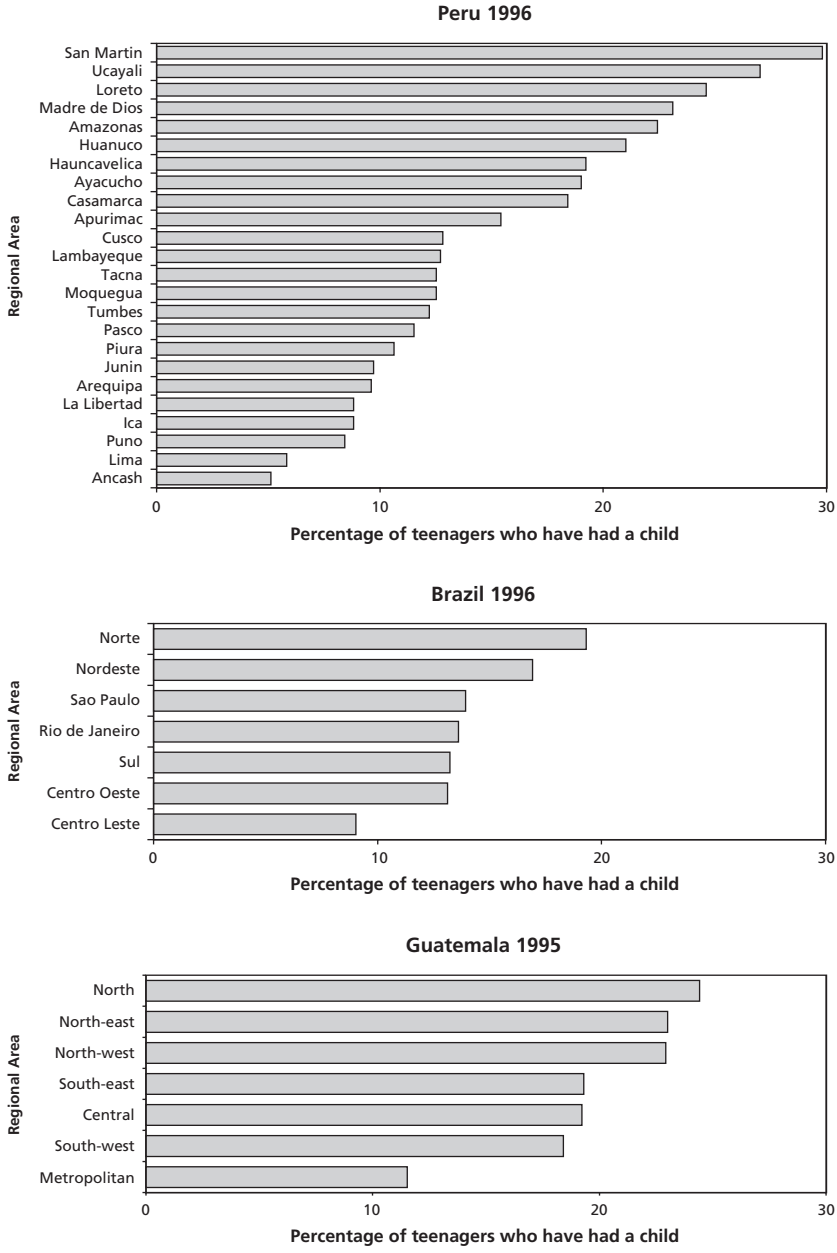
Source: Authors' calculations based on DHS.

50 percent of 19-year-old women have already had their first child and nearly 20 percent have had at least two children (Figure 2.2a).

Region of residence, coinciding at least in part with the urban-rural difference, is also an important factor in teenage fertility differentials in all countries (Figures 2.4a and 2.4b). However, the regional differences vary across countries: they are stronger in Peru, Bolivia and Colombia, but lower in Guatemala, the Dominican Republic and Brazil. It seems that the higher the teenage fertility level, the lower the regional differences. Regional differentials are higher in Peru and Bolivia where the lowest teenage fertility was observed. In contrast, Guatemala and the Dominican Republic have lower regional differences but higher adolescent fertility levels.

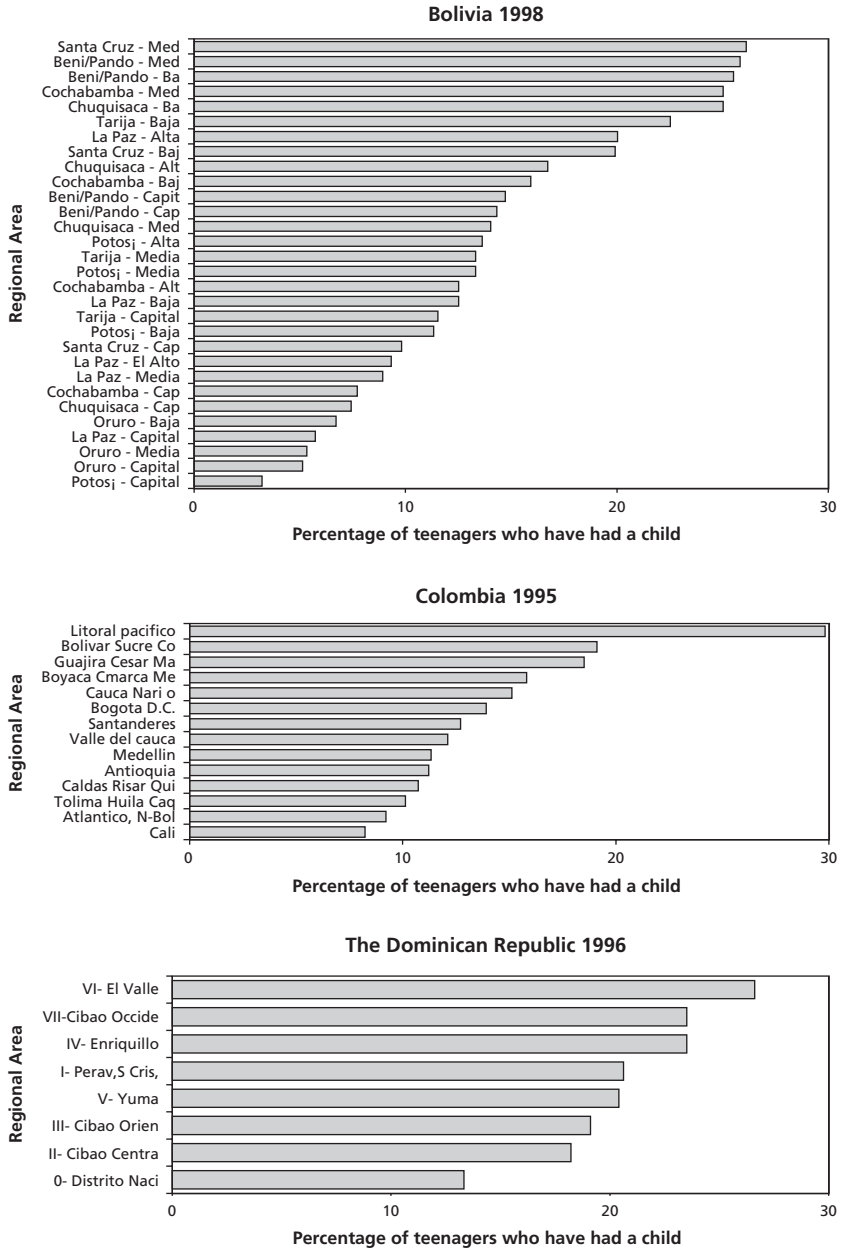
In all countries, education is another variable that clearly differentiates teenage fertility: high levels of education are universally associated with low early childbearing (Figure 2.5). As a woman's level of education increases, she becomes more likely to obtain accurate information about health care and contraception, and thus better prepared to plan her pregnancies. Indeed, in every country, the proportion of adolescent mothers is

Figure 2.4a. Teenage Fertility by Region: Peru, Brazil and Guatemela



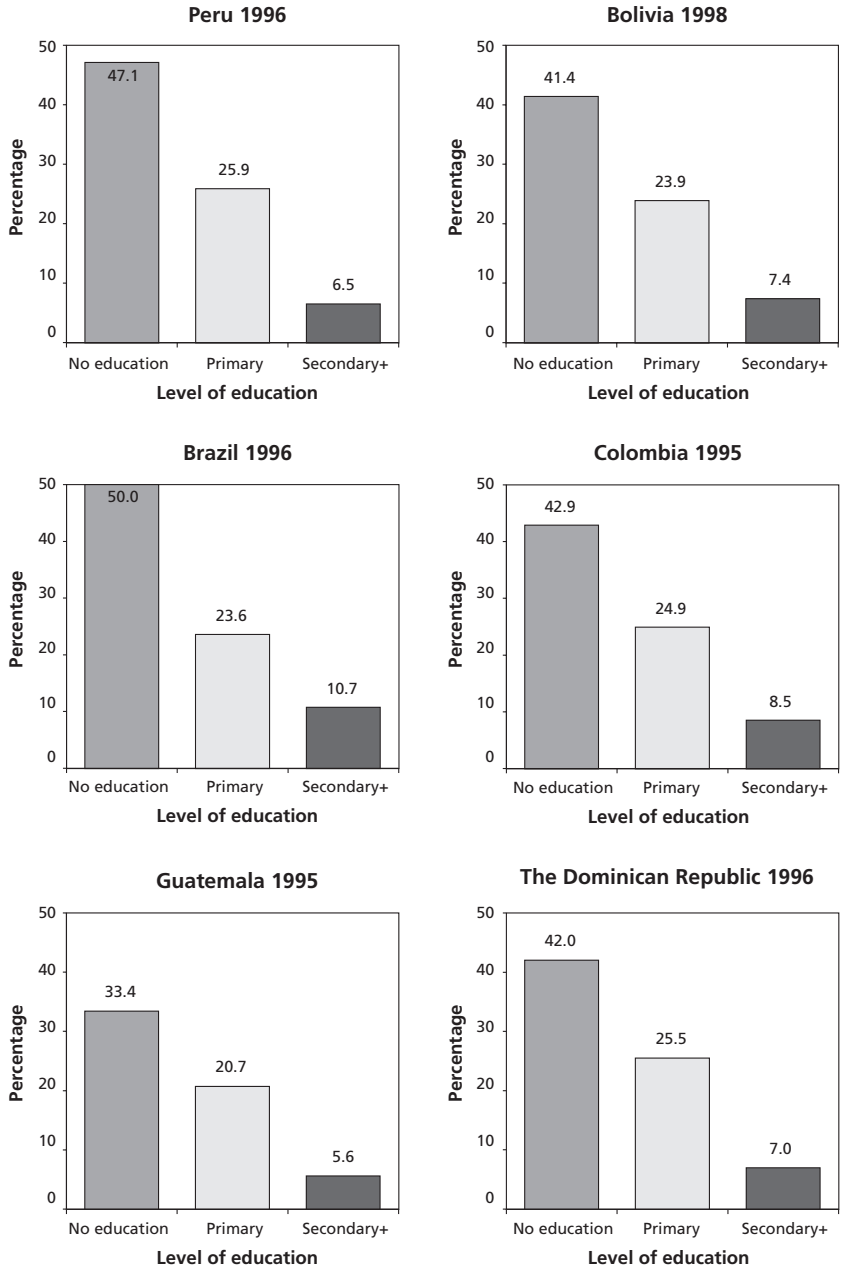
Source: DHS.

Figure 2.4b. Teenage Fertility by Region: Bolivia, Colombia and the Dominican Republic



Source: DHS.

Figure 2.5 Proportion of Adolescent Mothers by Level of Education in Selected Countries



Source: DHS.

five to six times higher among non-educated adolescents than among adolescents with at least some secondary education.

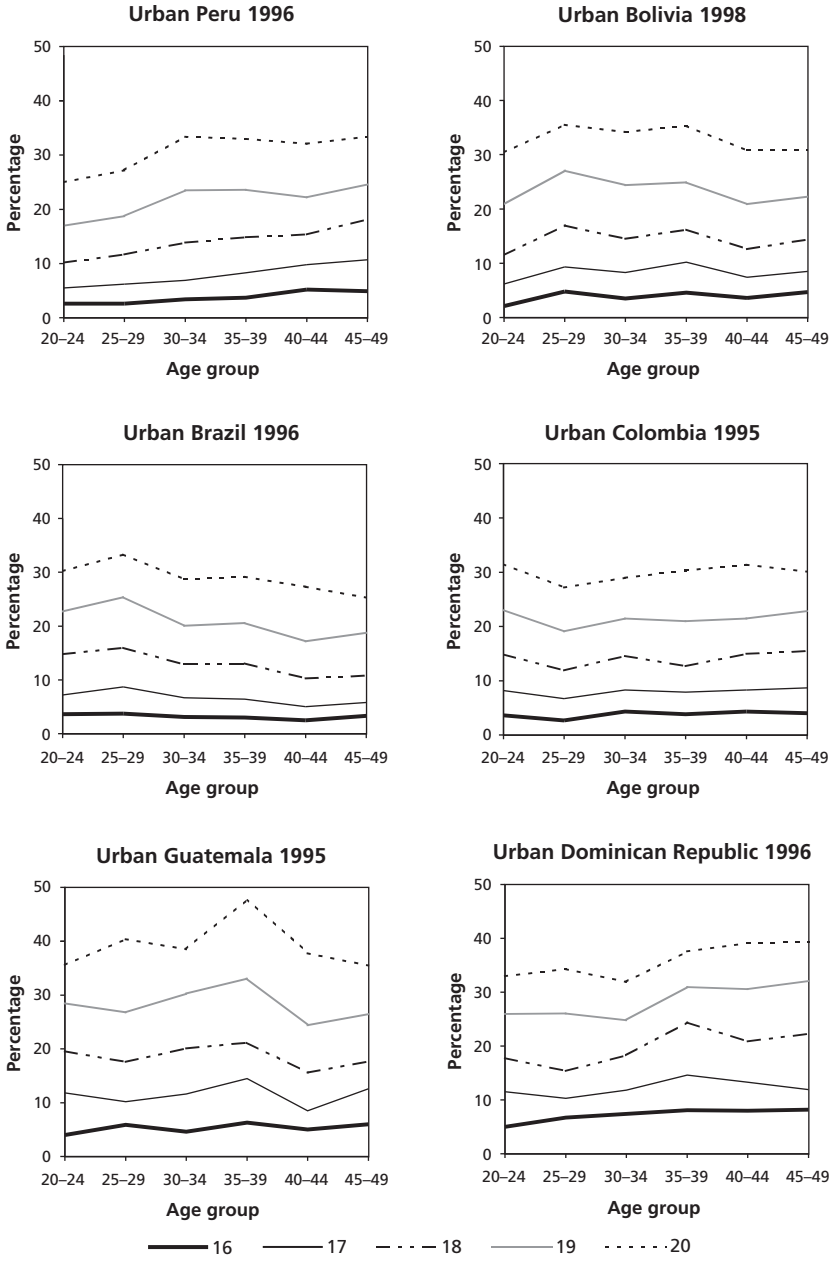
Trends in Teenage Fertility

The fertility of women aged 15–19 is censored information, since members of this cohort have not completed the age interval, and they may or may not have had children before the end of that period. Thus, to obtain more accurate information and measure trends in adolescent fertility, it is better to use the previous experience up to a given age (17 or 20 years) of women aged 20 years or more, by five-year age groups. Instead of looking just at cumulated indicators by that specific age (17 or 20), it is possible to look at the pattern at each age up to that particular age (17 or 20).

Trends in teenage fertility cannot be generalized. Figures 2.6a-b and 2.7 show that early childbearing has different patterns of change across countries by area of residence. In general, there are three different patterns. First, in Brazil and Colombia, where the proportion of women who bear their first child at each age has increased in both rural and urban areas, the change has been lower in urban areas (Figures 2.6a-b). A second pattern occurs in Bolivia and Peru, where urban adolescent fertility by age has recently declined and rural adolescent fertility has increased. The case of Bolivia is outstanding since rural teenage fertility there shows the largest increase among all countries considered: the proportion of women with a child born by age 20 increases from 32 percent to 54 percent. The third pattern prevails in Guatemala and the Dominican Republic, where adolescent fertility by age shows an erratic trend with little change in urban and rural areas. The three different patterns of change have a common characteristic: teenage fertility has increased or remained constant in rural areas but has declined or remained constant in urban areas, leading to an increase in rural/urban differences.

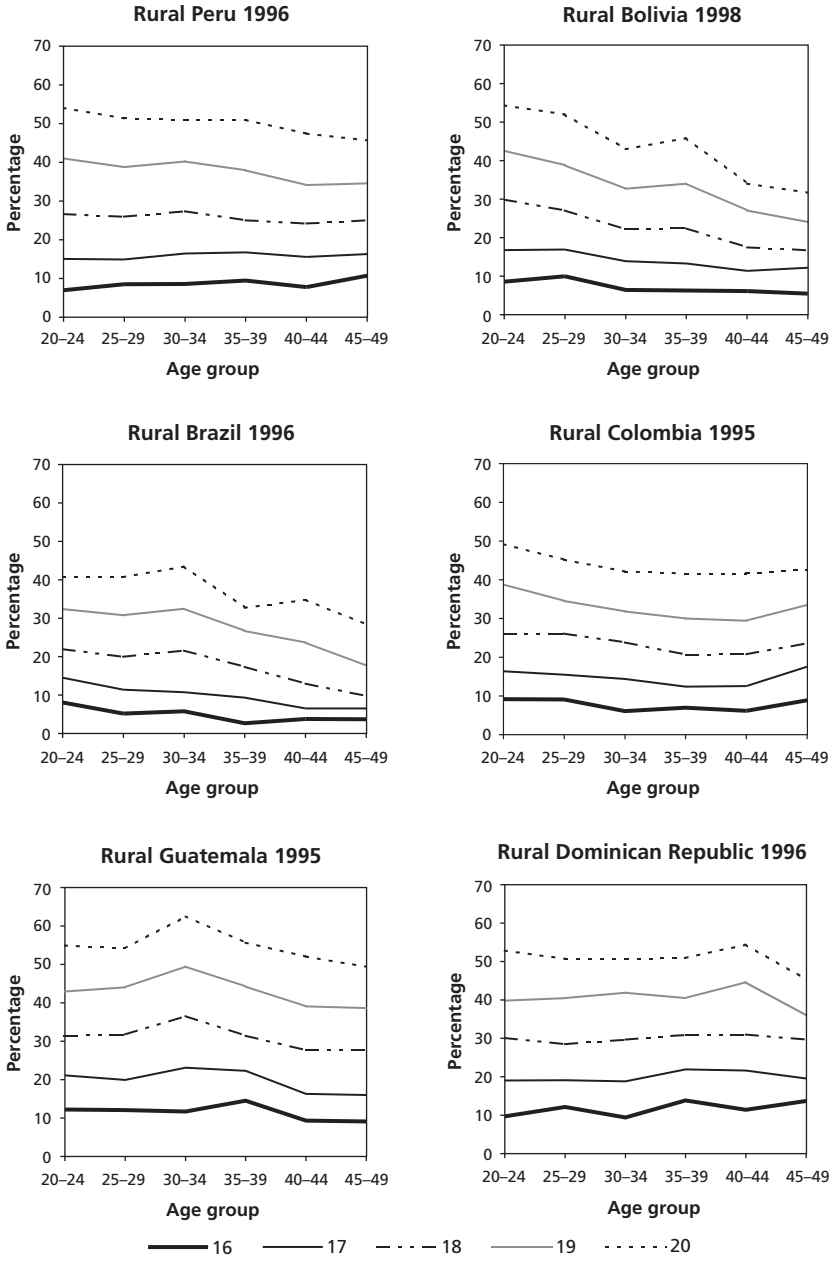
In addition to the general pattern of teenage fertility change, there is the change observed at the very early ages of 16 to 17 years, where adolescent fertility has the most negative impact. Guatemala and the Dominican Republic, with the highest levels of fertility at these ages, do not show a clear pattern of change: it seems fertility stays at high levels with no tendency to decline (Figures 2.6a-b and 2.7). Brazil and Colombia, on the contrary, show important increases in early rural teenage fertility from older to younger age

Figure 2.6a. Proportion of Women with a Child Born by Exact Age 16 to 20, by Age Group in Urban Areas of Selected Countries



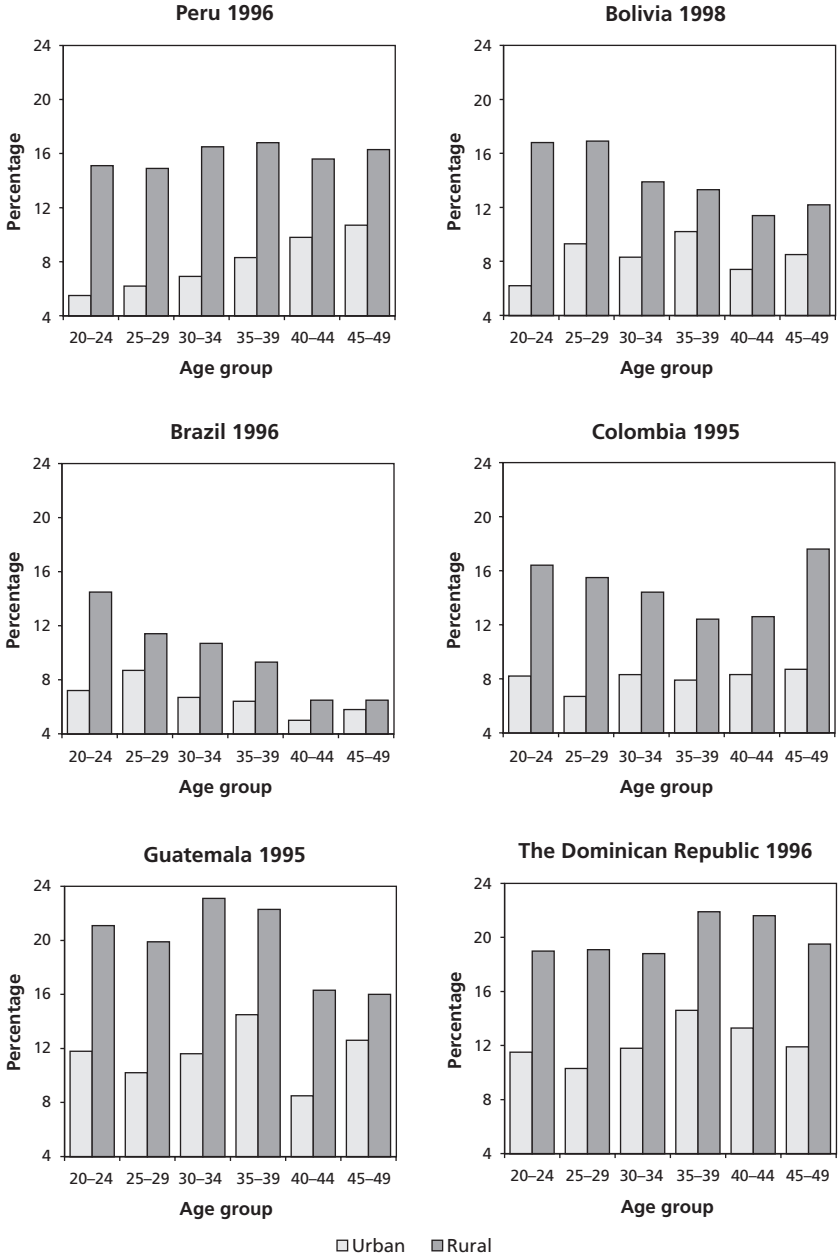
Source: Authors' calculations based on DHS.

Figure 2.6b. Proportion of Women with a Child Born by Exact Age 16 to 20, by Age Group in Rural Areas of Selected Countries



Source: Authors' calculations based on DHS.

Figure 2.7. Proportion of Women with a Child Born by Exact Age 17 by Age Group in Urban and Rural Areas of Selected Countries



Source: Authors' calculations based on DHS.

cohorts (Figure 2.7). In Peru, early childbearing has declined in urban areas but remained almost constant in rural areas. In Bolivia, rural early childbearing has increased, but childbearing shows some decline in urban areas. In any case, as is the case for the whole adolescent period, rural urban differentials in early teenage fertility have increased from older to younger age cohorts (Figure 2.7).

The Proximate Determinants of Teenage Fertility

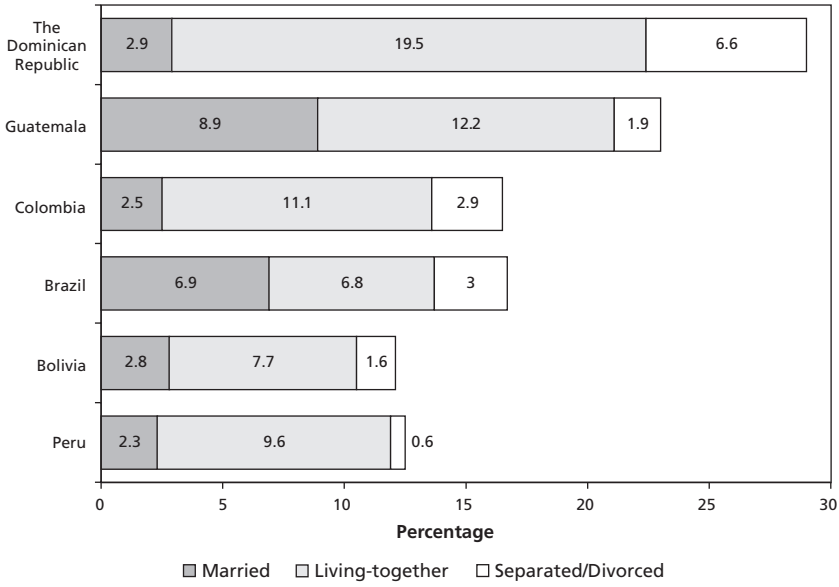
Seeking to identify all the factors that intervened between the norms and social structure of a society and its level of fertility (hence the term proximate variables), Davis and Blake (1956) identify groups of factors related to exposure to the risk of pregnancy, to conception and to gestation. Later developments included post-partum infecundity and focused only on those factors which were both major determinants of the level of fertility and, at the same time, varied across population groups: marriage, contraception, abortion and post-partum infecundity (Moreno and Singh, 1996). Although the last two are important variables, they are not considered here because of the lack of information. As in the case of teenage fertility, the level and pattern of change are considered of the two proximate determinants: marriage and contraception.

Marriage and Pre-Marital Sexual Activity

The exposure to the risk of pregnancy (exposure to intercourse) is determined by marriage[6] patterns as well as by sexual activity among those not married. Early marriage is one factor contributing to high levels of teenage fertility. The proportion of ever-married adolescents varies across countries in the same direction as adolescent fertility, ranging from a low of 12 percent in Peru and Bolivia to highs of 29 percent in the Dominican Republic and 23 percent in Guatemala (Figure 2.8). Like early childbearing, early marriage is more common in rural than in urban areas (Table 2.3). The timing of a first union or marriage is strongly associated with a woman's

[6] The term "marriage" here includes legal (legally or religiously sanctioned), consensual and cohabiting unions.

Figure 2.8. Percentage of Ever-Married Adolescents by Marital Status in Selected Countries



Source: Authors' calculations based on DHS.

educational attainment: women who have reached secondary education marry later than women without a basic education (Figure 2.9). The lowest proportion of urban ever-married adolescents is observed in Peru (8.4 percent) where the lowest urban teenage fertility was observed. The Dominican Republic, the country with the highest teenage fertility, also shows the highest proportion of ever-married adolescents in urban areas (24 percent) as well as in rural areas (38 percent). It seems then that the exposure effect on teenage fertility is not negligible, as one would expect in very advanced stages of the fertility transition when fertility control is widespread.

In most of the selected countries, as in other Latin American countries, adolescents do not legalize the first union. The importance of consensual unions among couples ranges from a high of 87 percent in the Dominican Republic and 81 percent in Peru and Colombia to a low of 50 percent in Brazil (Figure 2.8). Goldman and Pebley (1981) have shown that almost half of couples in consensual unions in several Latin American countries eventually legalize their union, suggesting that de facto unions might be serving as trial marriages. This behavior is also suggested in all the selected coun-

Table 2.3. Distribution of Adolescents by Marital Status, by Area of Residence in Selected Countries

(Percentage)

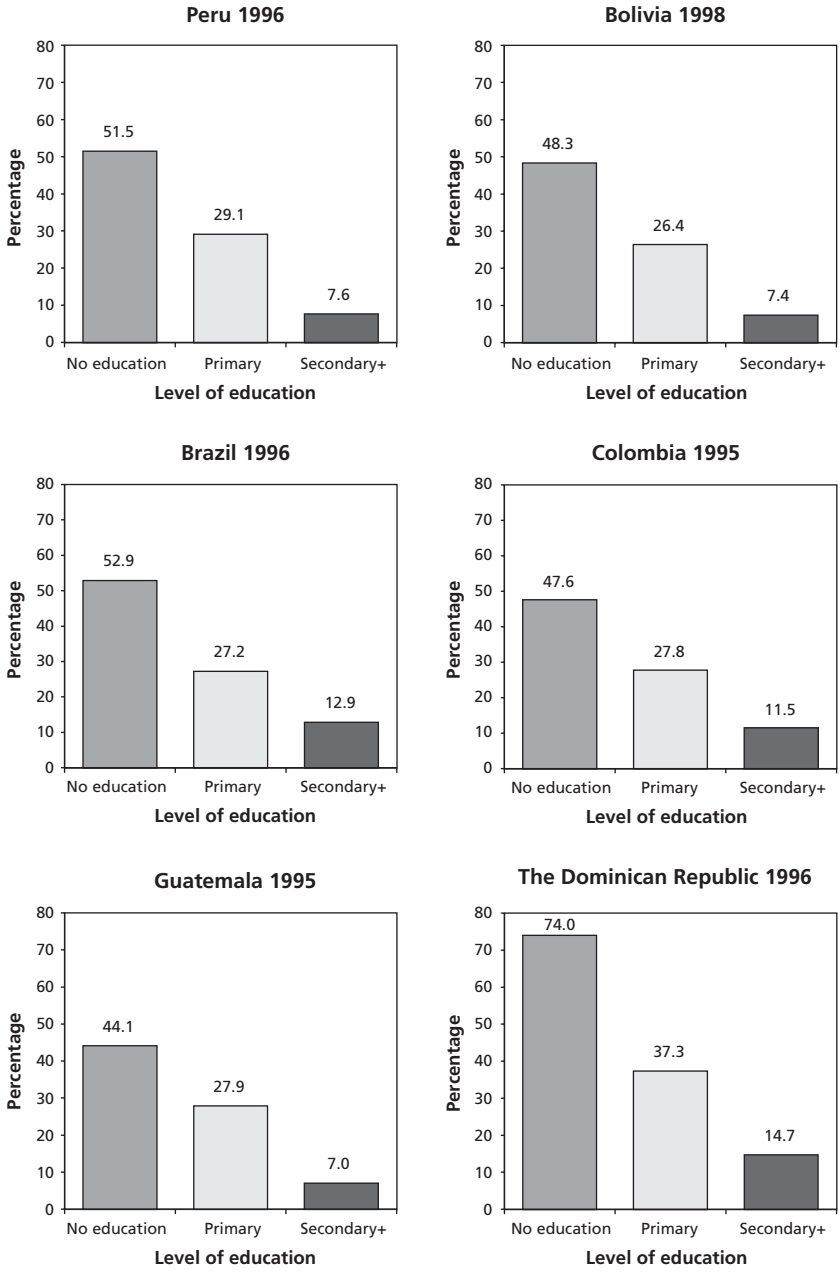
Country	Area	Never married	Married	Living together	Separated divorced	Total
Peru	Urban	91.6	1.4	6.5	0.5	100.0
	Rural	75.3	5.1	18.8	0.8	100.0
Bolivia	Urban	90.4	2.4	5.5	1.7	100.0
	Rural	79.8	3.8	15.1	1.3	100.0
Brazil	Urban	85.0	6.1	6.0	2.9	100.0
	Rural	75.8	10.5	10.1	3.6	100.0
Colombia	Urban	85.3	2.2	9.4	3.1	100.0
	Rural	77.5	3.3	16.3	2.9	100.0
Guatemala	Urban	84.4	6.4	7.1	2.1	100.0
	Rural	70.9	10.9	16.4	1.8	100.0
Domin. Rep.	Urban	76.1	3.0	15.0	5.9	100.0
	Rural	62.1	2.7	27.6	7.6	100.0

Source: Authors' calculations based on DHS.

tries: consensual unions are more common among the younger than among the older adolescents (Figures 2.10a-b). The high instability of many consensual unions, especially in early months of the union (Rosero-Bixby, 1996; Guzmán, Hakkert and Contreras, 2000) results in a higher proportion of divorced/separated adolescents in the Dominican Republic than in the other countries (Figure 2.8).

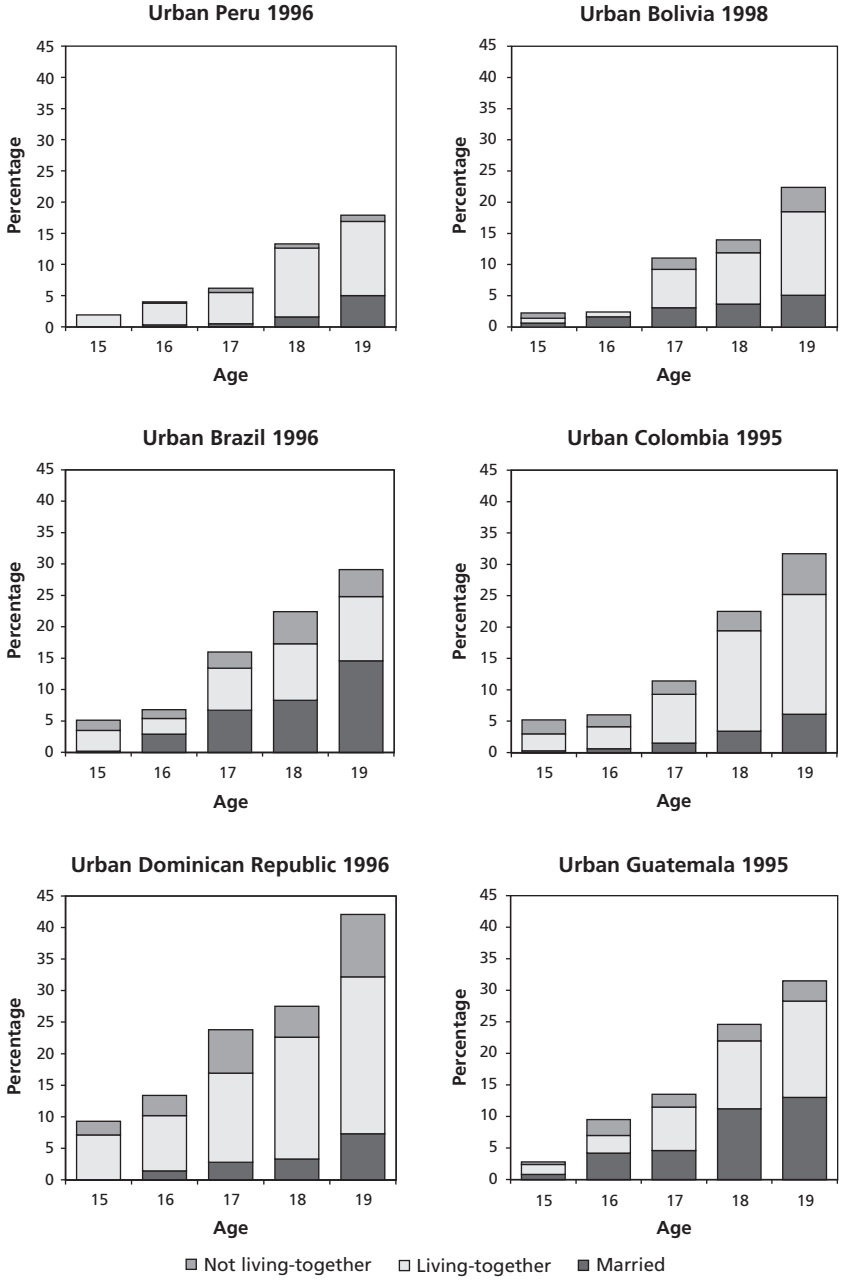
Unlike teenage fertility or marriage patterns, the importance of consensual unions does not show a consistent urban/rural differential across countries. In Bolivia, Guatemala and the Dominican Republic, consensual unions are more common in rural than in urban areas, while in Peru consensual unions are more common in urban than in rural areas (Figures 2.10a-b). In Brazil and Colombia, rural and urban rates are about the same. A relationship does seem to exist between the legal status of the union and teenage fertility: urban Peru and the Dominican Republic show similar proportions of couples in consensual unions, but the rate of teenage childbearing in urban areas of the Dominican Republic is 1.8 times the rate observed in Peru. Even more, although consensual unions are more common in urban (82 percent) than in rural (78 percent) Peru, rural teenage fertility is 2.5 times the urban rate.

Figure 2.9. Proportion of Ever-Married Adolescents by Level of Education in Selected Countries



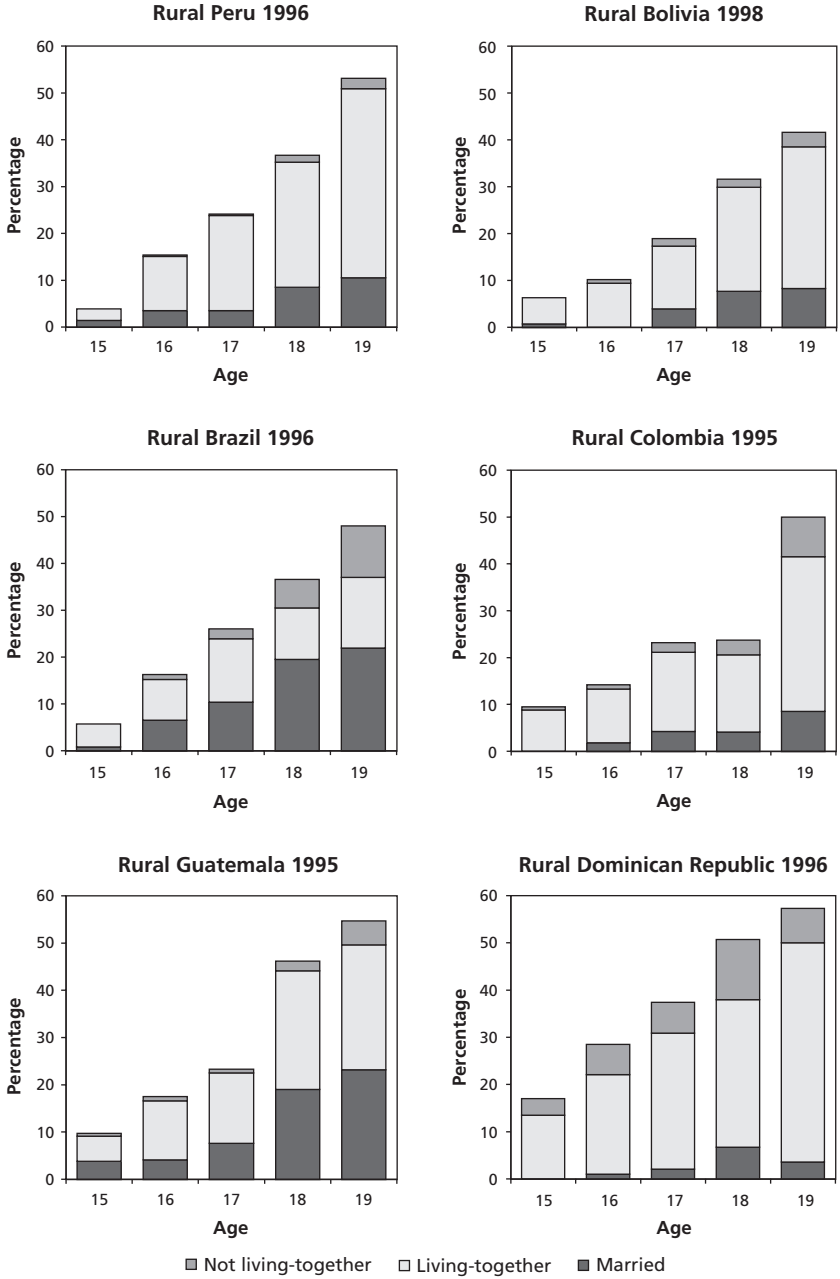
Source: Authors' calculations based on DHS.

Figure 2.10a. Distribution of Ever-Married Adolescents by Marital Status and Age in Urban Areas of Selected Countries



Source: Authors' calculations based on DHS.

Figure 2.10b. Distribution of Ever-Married Adolescents by Marital Status and Age in Urban Areas of Selected Countries



Source: Authors' calculations based on DHS.

Looking at marriage experience by age up to age 20 by five-year age groups makes it possible to identify marriage trends across countries by area of residence. Marriage trends are in agreement with early childbearing trends. They show the same three patterns of change. First, in Brazil and Colombia, the proportion of ever-married rural adolescents has increased by age, but there is only a small and erratic trend in urban areas. Second, in Bolivia and Peru, the proportion of ever-married by age has declined in urban areas but increased in rural areas. In urban areas, in both countries, the proportion ever married by age 20 declines from 40 percent to 30–33 percent. In rural Bolivia, this proportion increases from 39 percent to 53 percent (Figure 2.11). Third, in Guatemala and the Dominican Republic, the proportion ever married by age changes widely but in an erratic way, both in urban and rural areas. The three different patterns of change have a common characteristic: the proportion ever married by age 20 has increased or remained constant in rural areas but declined or remained constant in urban areas. In almost all countries this has led to an increase in rural/urban differences. Although fertility and marriage show the same patterns of change, marriage has changed at a slower pace in Peru, Bolivia, Brazil and Colombia, suggesting that marriage is not the dominant proximate determinant regulating teenage fertility in those countries. In Guatemala and the Dominican Republic teenage marriage and fertility have changed at a similar pace, indicating that in those two countries marriage may be the dominant proximate determinant of adolescent fertility.

Marriage at very early ages (up to age 17) is more common in Guatemala and the Dominican Republic: marriage rates are twice as high in these two countries as in the others (Figure 2.12). However, the marriage pattern shows a declining trend from the middle-aged to the younger cohorts, both in urban and rural areas. Peru and Bolivia share this marriage pattern of change although they have lower marriage rates. In Brazil and Colombia, marriage at early ages does not change much in urban areas but it increases in rural areas (Figure 2.12). Once again, early marriage is positively related with early childbearing, but the slower pace of change (at least in four out of the six selected countries) suggests that very early marriage is not the dominant proximate determinant of very early childbearing.

While most sexual activity among adolescent women occurs within marriage, sexual experimentation before marriage is tolerated in some countries, and the risk of pregnancy depends on the frequency of intercourse.

Figure 2.11. Proportion of Ever-Married Women by Exact Age 20 and by Age Group in Urban and Rural Areas of Selected Countries

Source: Authors' calculations based on DHS.

Figure 2.12. Proportion of Ever-Married Women by Exact Age 17 and by Age Group in Urban and Rural Areas of Selected Countries

Source: Authors' calculations based on DHS.

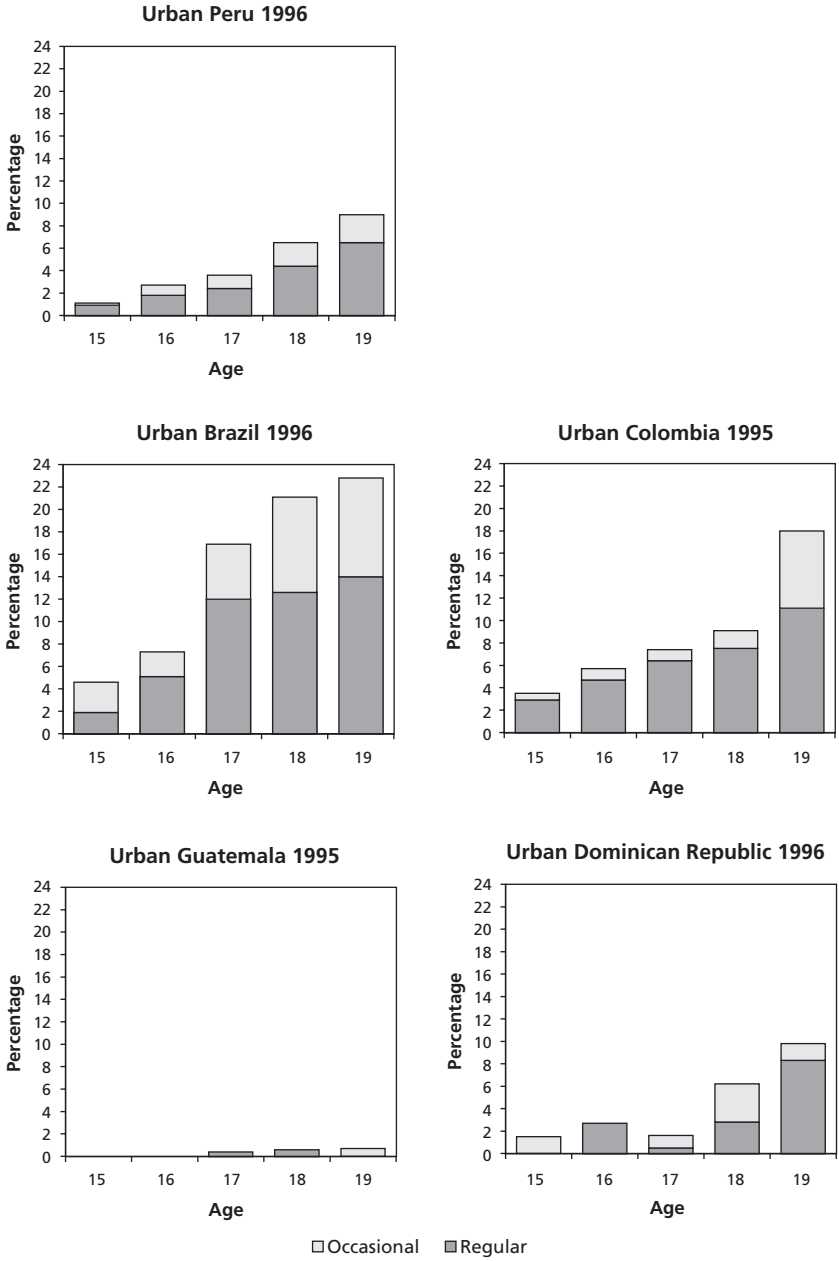
Figures 2.13a-b show that in Brazil and Colombia, both in urban and rural areas, there is a significant proportion of never-married women with a regular sex partner. In the Dominican Republic and Guatemala, on the other hand, premarital sexual activity is insignificant. In Peru, urban adolescents show only a low percentage of regular premarital sexual activity, and it is negligible in rural areas. Greater acceptance of premarital coital relationships among adolescents in Brazil and Colombia may be linked to their advanced stage in the fertility transition, and specifically to the widespread availability of contraceptives in these two countries, as will be discussed below.

Given the higher rates of premarital sexual activity in Brazil and Colombia, these two countries are the ones with higher proportions of adolescents who have had first intercourse (Figure 2.14) while they are not the countries with higher proportions of ever-married adolescents. Exposure to pregnancy is affected not only by marriage but also by premarital intercourse, and early sexual behavior is more common in rural than in urban areas in all countries. Differences across countries in sexual activities are consequently more pronounced in urban than in rural areas. Thus, the proportion of rural adolescents who have had first intercourse ranges from 26 percent in Bolivia to 33 percent in Colombia, but in urban areas it goes from 16 percent in Bolivia to 31 percent in Brazil. These important differences across countries require of the analysis of not only first marriage but also first intercourse patterns as a fertility determinant.

The age pattern of entry into sexual activities has changed, both in urban and rural areas, in the same direction as marriage patterns. However, in Brazil and Colombia, the changes in sexual activity have been more pronounced than the changes observed in marriage and childbearing, particularly in urban areas, indicating that in these two countries, sexual activity is one dominant proximate determinant regulating teenage fertility. For example, the proportion of women who have had first intercourse by age 20 increased from 26 percent to 55 percent in urban Brazil and from 36 percent to 55 percent in urban Colombia. This may be highly related with the higher rates of premarital sexual activity among never-married adolescents observed in these two countries.

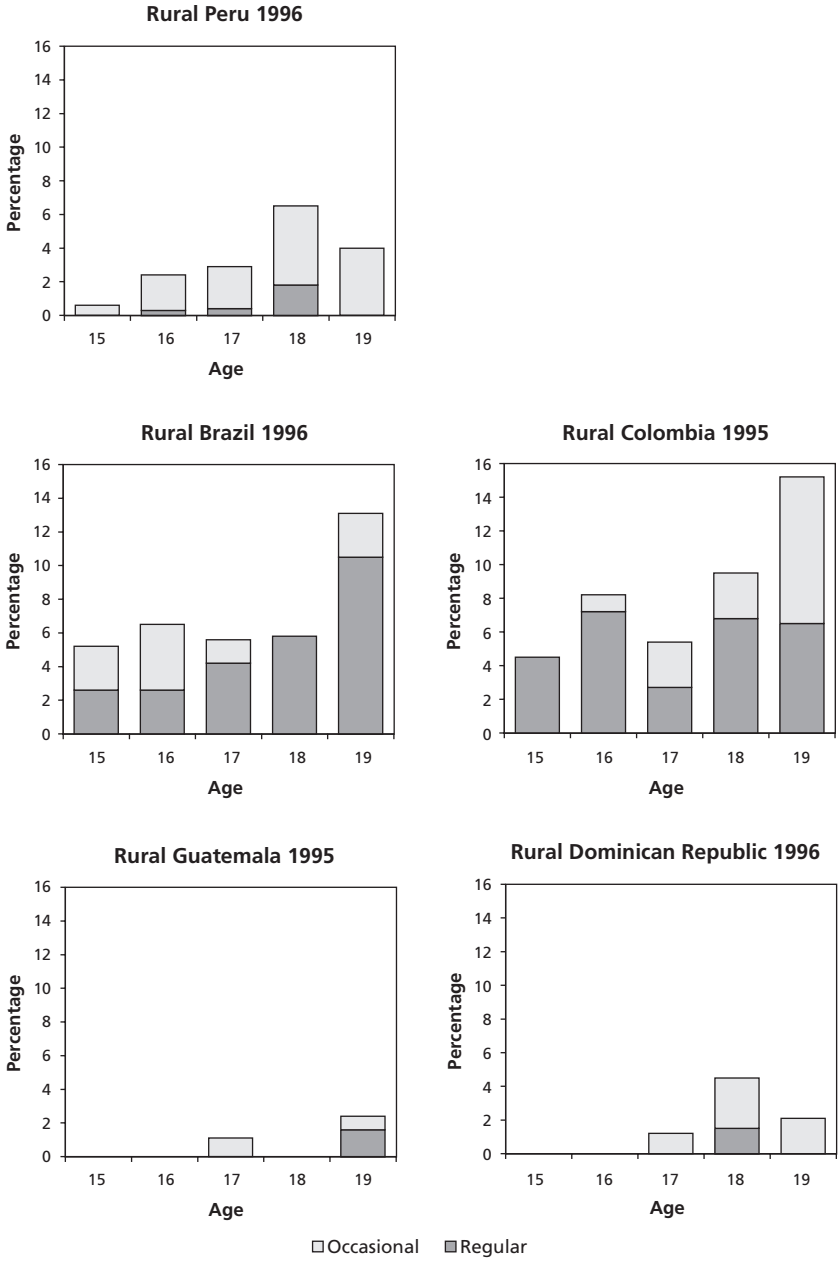
Figure 2.15 shows entry into sexual activity, marriage and childbearing among adolescents. Although women aged 15–19 are a censored cohort, it is still important to analyze the early entry into these three activities since they may produce differences in cumulative fertility at older ages. Two facts

Figure 2.13a. Proportion of Never-Married Adolescents with a Sex Partner by Age in Urban Areas of Selected Countries



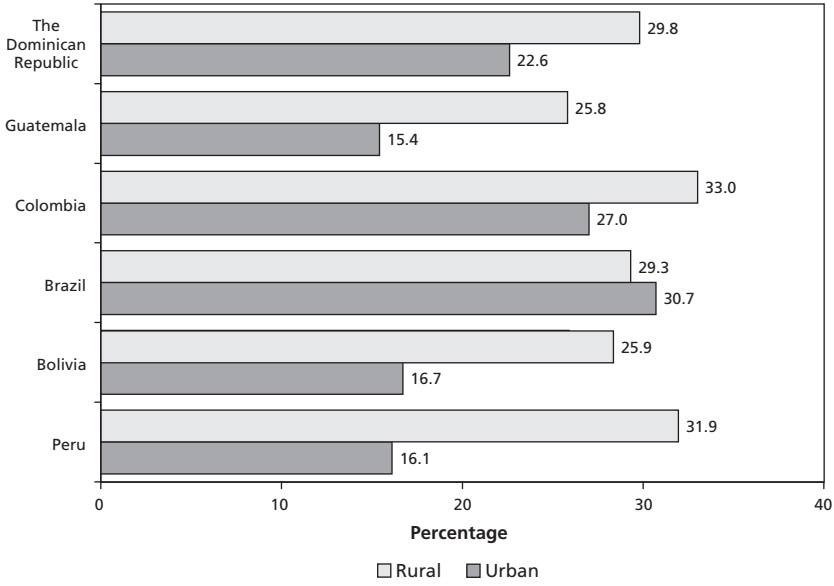
Source: Authors' calculations based on DHS.

Figure 2.13b. Proportion of Never-Married Adolescents with a Sex Partner by Age in Rural Areas of Selected Countries



Source: Authors' calculations based on DHS.

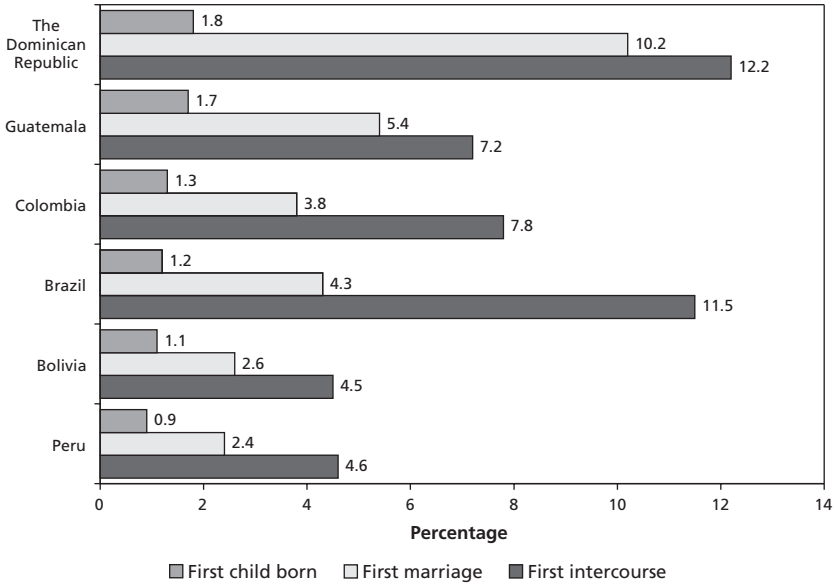
Figure 2.14. Proportion of Adolescents Who Have Had First Intercourse in Urban and Rural Areas of Selected Countries



Source: Authors' calculations based on DHS.

emerge. First, there is a relationship between early marriage and early childbearing: the higher the proportion of adolescents married by age 15, the higher the proportion of adolescents who bear their first child by the same age. However, there is not a clear relationship between early sexual activity and early childbearing: early intercourse is not associated with a higher proportion of teenage mothers. This would imply that most early adolescent childbearing occurs within marriage. Second, the difference between entry into sexual activity and into marriage is lower in the countries where fertility is higher: the Dominican Republic and Guatemala. Two things may be happening. One, in those two countries sexual activity occurs mostly within marriage. That is, the effect of exposure to pregnancy (sexual activity) acts mainly through marriage. This makes sense since the Dominican Republic and Guatemala are in an intermediate stage of the fertility transition where contraception is not widespread and sexual activity occurs primarily within the marital union. Second, pregnancy and marriage are closely related but the timing of these two events is not clear: it may be that marriage occurs

Figure 2.15. Proportion of Adolescents Who Have Had First Intercourse, First Marriage and First Child Born by Exact Age 15



Source: Authors' calculations based on DHS.

because of pregnancy or that pregnancy occurs just after marriage. As will be discussed below, the first explanation applies to both Guatemala and the Dominican Republic.

Knowledge and Use of Family Planning

Many factors influence whether an adolescent woman uses birth control. Her marital status and her desire to have a child are important determinants, although in some settings community norms may have an important influence as well. Whether a young woman hoping to avoid pregnancy practices birth control will depend upon both her awareness that contraceptive methods exist and the degree to which these methods are available to her. Access to birth control methods and to health care are critical; a young women may wish to practice contraception, yet not be able to obtain the information, supplies and services she needs (Alan Guttmacher Institute, 1998).

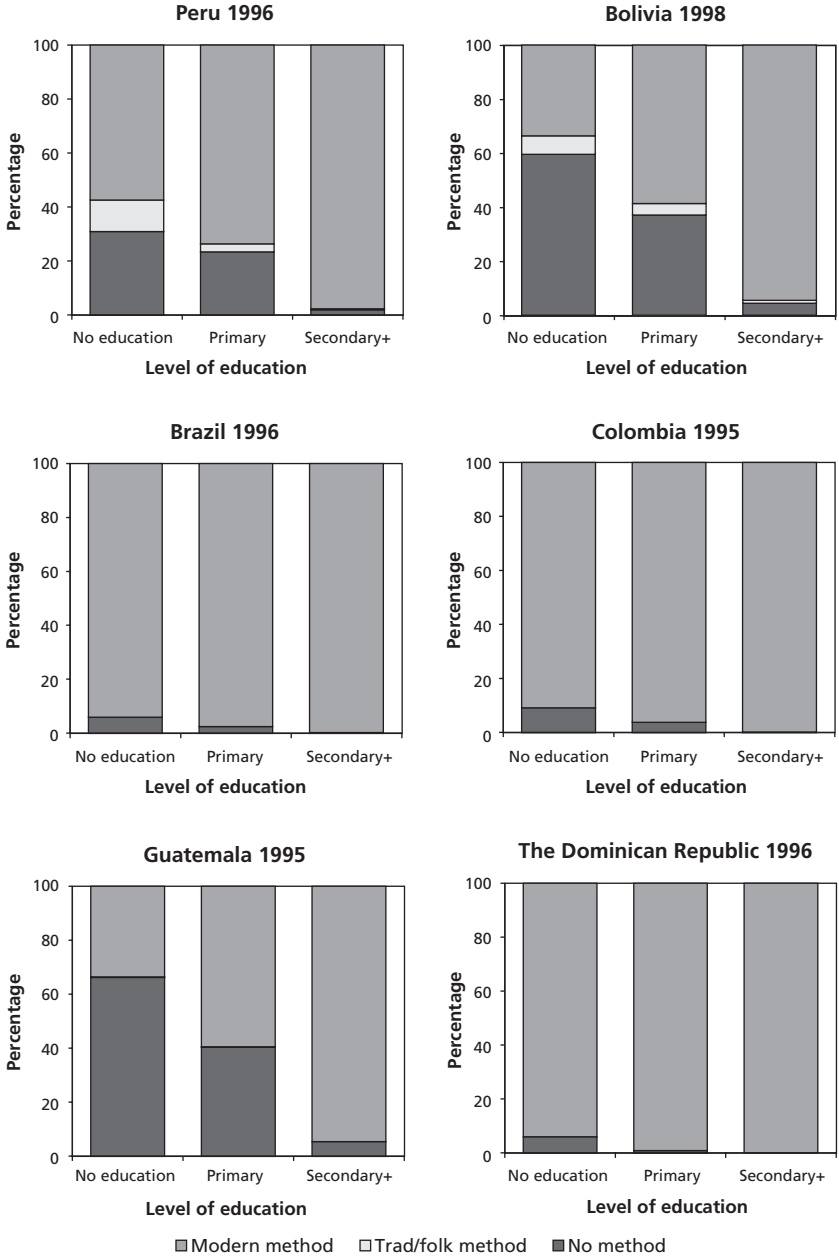
In general, knowledge of family planning methods is almost universal among adolescents, with the exception of Guatemala, a country with high

teenage fertility, where almost one-third do not know any method. In the other countries, at least 85 percent of adolescents know a modern method. This knowledge is practically universal (above 98 percent) in the Dominican Republic, Colombia and Brazil. By educational level, however, the knowledge of family planning methods differs, especially in Bolivia and Guatemala, where almost two-thirds of non-educated adolescents do not know any method. In contrast, in Brazil, Colombia and the Dominican Republic, knowledge of family planning is almost universal independently of the level of education (Figure 2.16). However, knowing that a particular method exists does not mean that a young person knows how to use the method properly. Lack of knowledge or skill in using contraceptives is a prime cause of method failure among young people. Consequently, adolescents are more likely than adults to experience accidental pregnancies during their first year of contraceptive use (Alan Guttmacher Institute, 1998).

Use of birth control among adolescents differs widely across countries. Among those currently married, the proportion currently using a family planning method ranges from a low of 12 percent in Guatemala to a high of 55 percent in Brazil (Figure 2.17). In the Dominican Republic and Bolivia about one-third of married adolescents use contraceptives, while that percentage is as high as 46–49 percent in Peru and Colombia. Contraception is linked to premarital sexual activity. Indicating their desire to avoid pregnancy, sexually active unmarried adolescents are more likely than married adolescents to practice birth control throughout all countries: use of family planning methods is higher among adolescents who are not married but sexually active than among currently married adolescents (Figure 2.17). The differences are lower in those countries where contraceptives are widespread, as in Brazil, Peru and Colombia. In contrast, they are especially high in the Dominican Republic, Bolivia and Guatemala where contraception is less common. For example, in the Dominican Republic 65 percent of currently married adolescents do not use any method, while this is true of only 28 percent of those not married but sexually active.

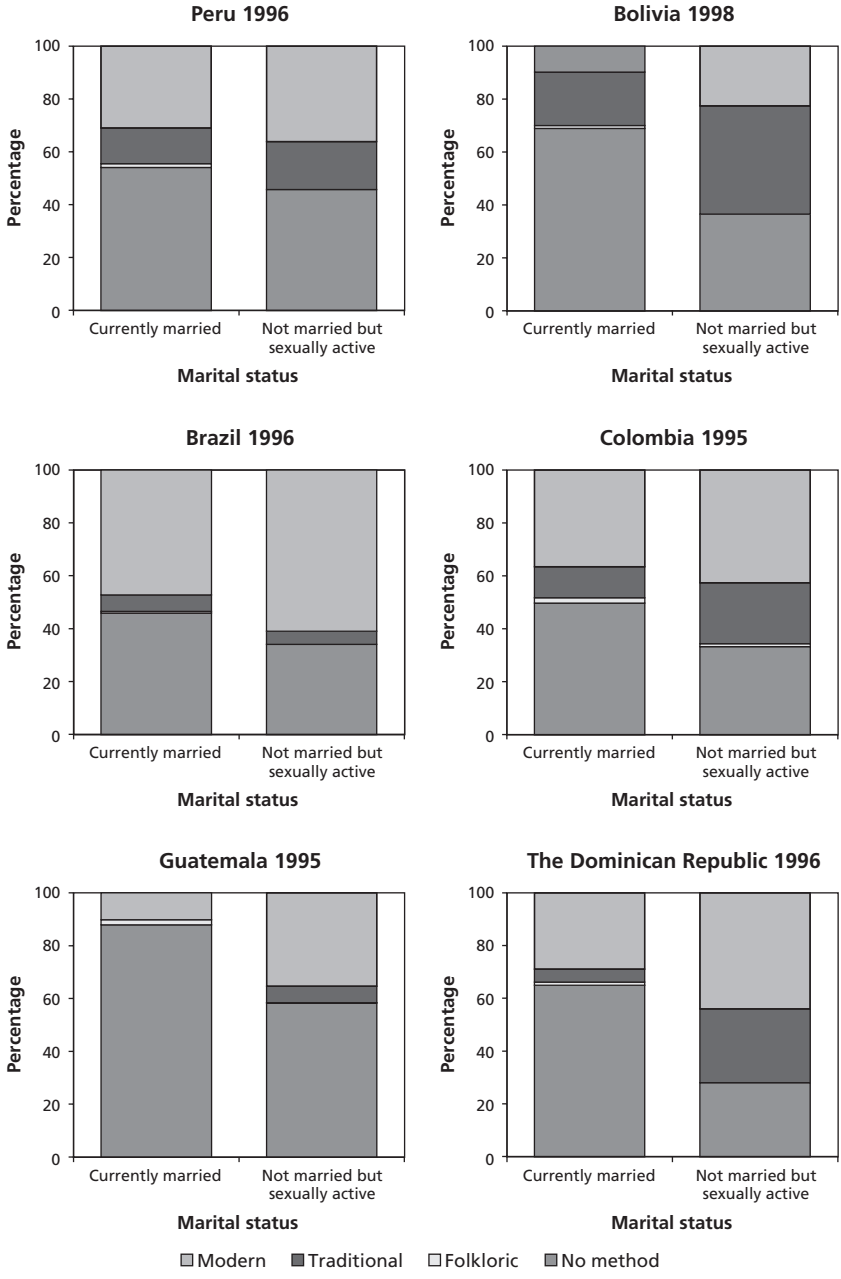
The type of method used also varies across countries. In most of the countries, with the exception of Bolivia, modern methods are more used than traditional methods. The increasing use of modern methods of birth control among adolescent women results in part from strong nationwide efforts to increase access to family planning services carried out in most Latin American countries since the end of the 1960s. The level of contraceptive

Figure 2.16. Knowledge of Family Planning Methods Among Adolescents by Education in Selected Countries



Source: Authors' calculations based on DHS.

Figure 2.17. Distribution of Adolescents by Current Use of Family Planning Method by Marital Status in Selected Countries



Source: Authors' calculations based on DHS.

use and the type of method used are related not only to the existence and strength of public and private program supplies but also to the existence of other actors in the supply-side of contraception such as pharmacies. In Bolivia and Guatemala, for instance, family planning programs are not vigorously undertaken, and pharmacies play an even smaller role in this area than official programs (Mundigo, 1996). Colombia presents the opposite situation, with both strong official programs and an important role for pharmacies in providing modern methods of birth control. Brazil and Peru occupy an intermediate position, with weak official programs but an important role for pharmacies in supplying over-the-counter methods (Mundigo, 1996).

With the exception of Guatemala, family planning demand among currently married adolescents ranges between 65 and 75 percent in the countries considered.[7] Although Bolivia is in an intermediate stage of the fertility transition, the family planning demand among married adolescents is as high as the level observed in the Dominican Republic or Colombia, countries in a more advanced stage of the fertility transition (Figure 2.18); Bolivia may thus be poised for an accelerated fertility transition, with numerous implications for public policy. In contrast, in Guatemala only two out of every five married adolescents want to use contraceptive methods (40 percent). The low level of family planning demand and contraceptive use in Guatemala may be associated with its stage of the demographic transition, an intermediate stage in which contraception is less accepted and less practiced by couples. It seems that in this country fertility among adolescent women is highly valued and sexual activity among unmarried individuals is strongly discouraged, such that young women seeking to obtain birth control may be denied access to available methods.

The proportion of unmet need varies across countries, ranging from a high of 70 percent in Guatemala to much lower levels of 22 percent in Colombia, 25 percent in Brazil and 28 percent in Peru.[8] Bolivia and the Dominican Republic display intermediate levels of unmet need at 52 per-

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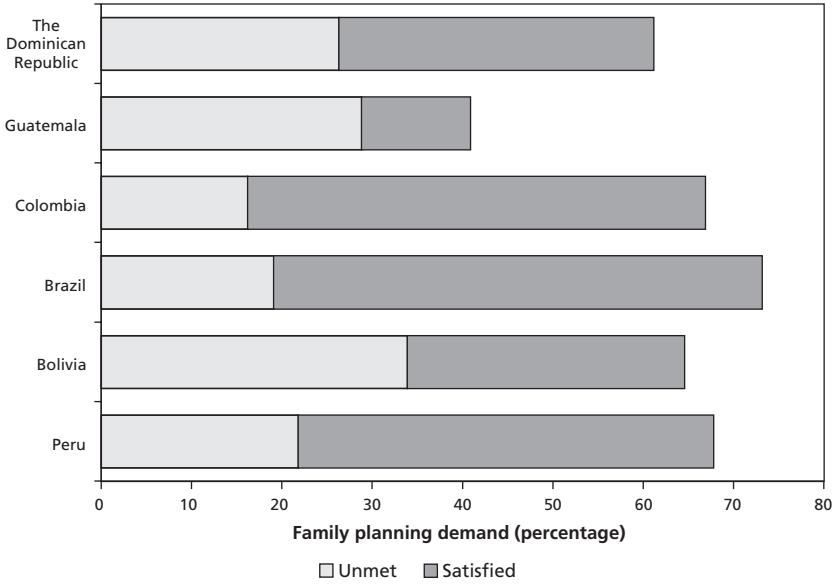
[7] Total family planning demand includes: 1) women with unmet need for family planning, 2) women currently using any family planning method, 3) pregnant women who had been using a method. The last two constitute the satisfied demand. Unmet family planning includes: 1) pregnant women whose pregnancy is unwanted because they did not want more children or because they wanted the child later, 2) fecund women not using any method and who do not want more children or want more children but at least two years ahead (Profamilia, 1995).

[8] (Unmet need)/(total demand).

Figure 2.18. Family Planning Demand Among Currently Married Adolescents in Selected Countries

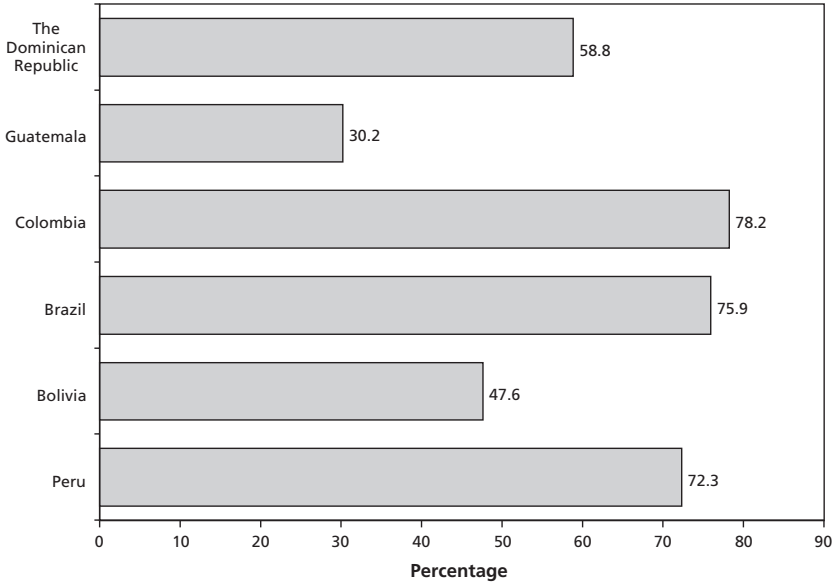


Source: DHS.

cent and 41 percent, respectively (Figure 2.19). Guatemala, one of the countries with the highest teenage fertility, is the country with the lowest family planning demand and the highest unmet need. The high level of unmet need is related to a low supply of contraception, the result of both weak family planning program efforts and a low supply of over-the-counter methods. The moderate levels of unmet need of family planning in Bolivia and the Dominican Republic may be related to different factors on the supply side. In Bolivia, very weak family planning program efforts may explain the short supply. In the Dominican Republic, where program efforts have been moderate, the shortage may result from the lesser role played by pharmacies.

With the exception of the Dominican Republic, family planning demand is higher in urban than in rural areas among both currently married and unmarried adolescents (Figures 2.20a-b). Among unmarried adolescents, family planning demand as well as contraception use is higher in Brazil and Colombia, the two countries that showed the highest proportion of premarital sexual activities. On the contrary, Guatemala, a country where

Figure 2.19. Percentage of Family Planning Satisfied Demand among Currently Married Adolescents in Selected Countries



Source: Authors' calculations based on DHS.

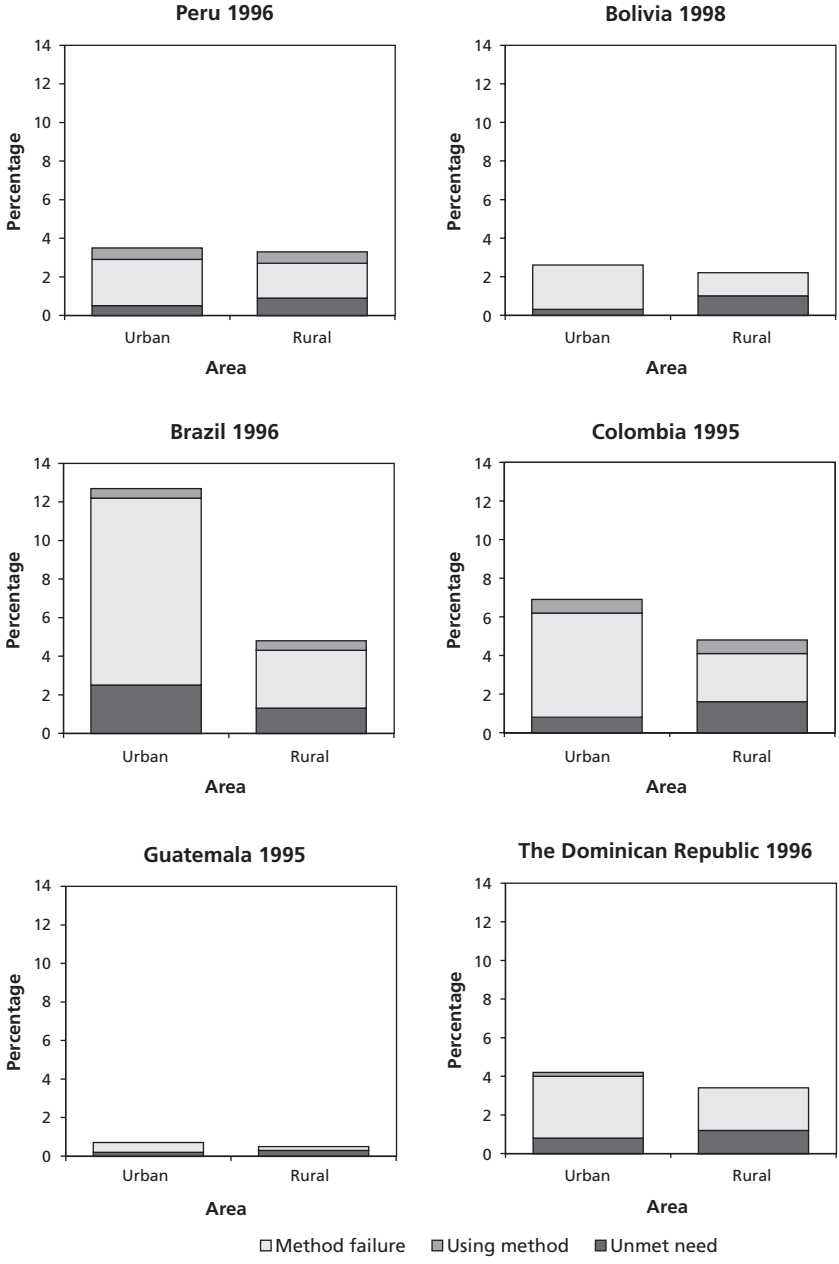
sexual activity occurs mostly within the marital union, shows a negligible demand of family planning among unmarried adolescents. Thus, the higher occurrence and acceptability of premarital sexuality during adolescence seems to be linked to the widespread availability of contraceptives.

Contraceptive use is higher in urban than in rural areas but unmet need is similar, leading to a higher percentage of satisfied demand in urban than in rural areas both among currently married and unmarried adolescents. The urban-rural differences in the percentage of satisfied demand are particularly striking in Guatemala. This can again be explained by the country's weak family planning program effort, as such programs usually reach urban areas first, with subsequent dissemination in rural areas. Family planning use, and in particular the use of modern methods, is higher at higher levels of education (Figure 2.21); this can be linked to greater knowledge and acceptability of these methods among more educated adolescents.

Figure 2.20a. Family Planning Demand among Currently Married Adolescents in Urban and Rural Areas of Selected Countries

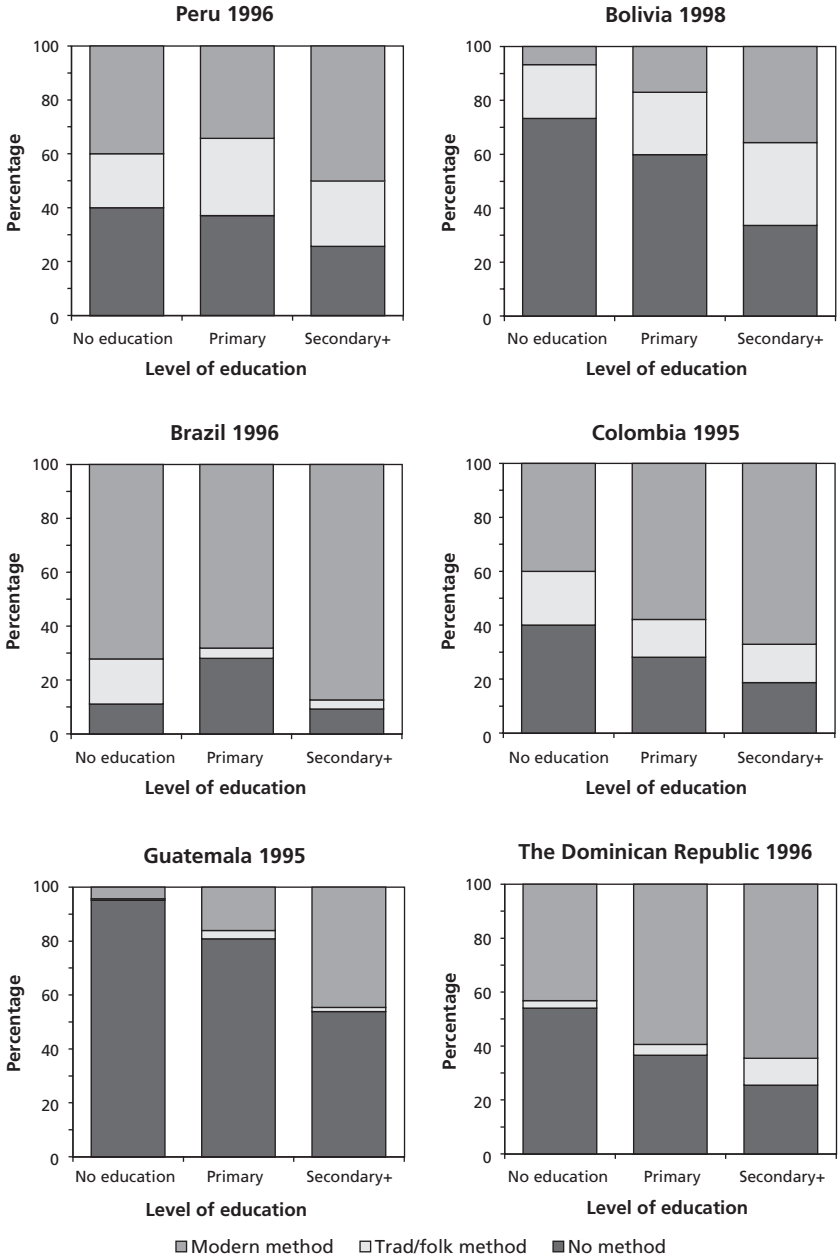
Source: Authors' calculations based on DHS.

Figure 2.20b. Family Planning Demand among Unmarried Adolescents in Urban and Rural Areas of Selected Countries



Source: Authors' calculations based on DHS.

Figure 2.21. Use of Family Planning Methods Among Ever-Married Adolescents by Education in Selected Countries



Source: Authors' calculations based on DHS.

Issues of Early Motherhood

The data presented thus far suggest that both exposure to pregnancy risk (through marriage and/or intercourse) and contraceptive use play an important role in teenage fertility level and trends. The scatterplots in Figure 2.22 show a positive correlation among exposure-time (measured in months since first intercourse) and teenage fertility level that is stronger with marriage than with intercourse; this can be explained by the higher proportion of satisfied demand of family planning among not-married than among currently married adolescents. One would expect that the effect of exposure-time becomes less important as fertility control is widely accepted and used. One method of fertility control is abortion. However, as Guzmán, Hakkert and Contreras (2000) note, in most Latin American countries a premarital pregnancy is more likely to result in marriage than abortion, leading to an increase in adolescent fertility.[9]

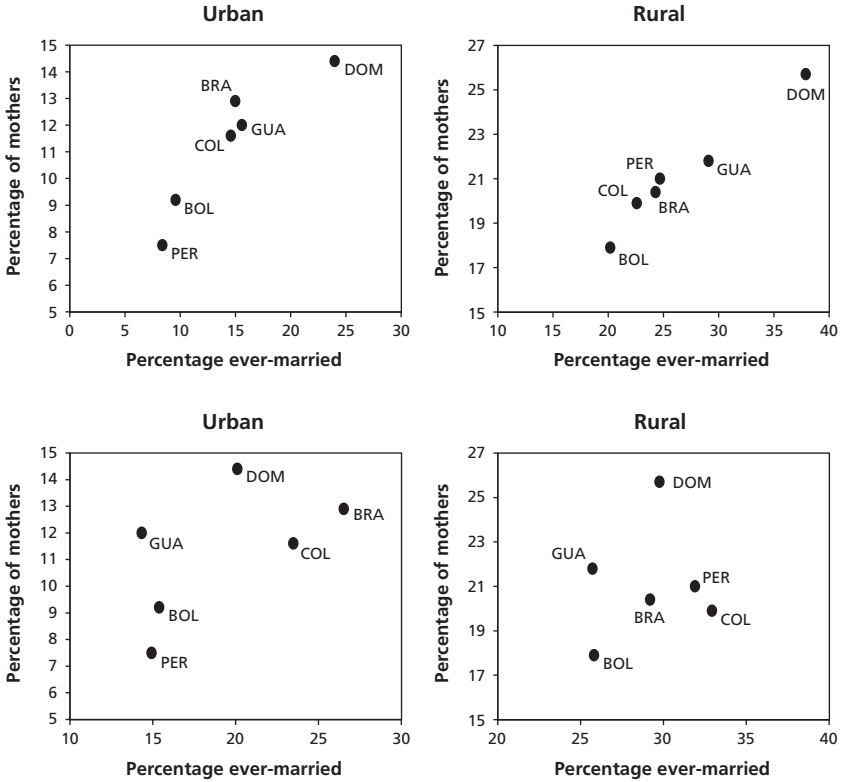
In most of the countries, teenage fertility has increased in rural areas but has declined or remained almost constant in urban areas. In order to estimate the impact of exposure-time on teenage fertility, we use the method of decomposition of fertility changes into marriage patterns and marital fertility components (Rosero-Bixby, 1996). The following equation was used then to estimate the amount of change between women aged 40–44 and women aged 20–24 in the proportion of adolescent mothers by age 20, attributable to changes in the proportion of women ever married by age 20, C_m:

$$C_m = \frac{\left[(f_0 / m_0) + (f_1 / m_1)\right] * (m_1 + m_0)}{2(f_1 - f_0)}$$

where the subscripts (0,1) refer to the age groups (0 = 20–24, 1 = 40–44), f is the proportion of adolescent mothers and m is the proportion ever married. The relation between marriage and fertility assumes that births occur within

[9] In general, abortion has a higher incidence among adults than among adolescents in Latin American countries. Colombia and Cuba are the only two countries in the region where the incidence of abortion is higher among adolescents than among adult women (Guzmán, Hekker and Contreras, 2000).

Figure 2.22. Exposure-Time and Teenage Fertility Levels in Urban and Rural Areas of Selected Countries



Note: BOL = Bolivia COL = Colombia GUA = Guatemala
BRA = Brazil DOM = Dominican Republic PER = Peru

Source: Authors' calculations based on DHS.

the marriage exclusively. Since premarital sexual activity is also important in some countries, the same equation was used to estimate the impact of the proportion of women who have had first intercourse by age 20 (C_i) on teenage fertility. Table 2.4 shows the results. In urban areas, marriage has made meaningful contributions to somewhat important teenage fertility reductions in Peru and the Dominican Republic, and the impact of intercourse patterns is particularly important in Brazil. In Peru, the proportion of adolescent mothers declined from 32 percent to 25 percent, and marriage patterns contributed to this decline by an estimated 43 percent, while

Table 2.4. Teenage Fertility and the Change Explained by Changes in Exposure-Time in Urban and Rural Areas of Selected Countries

Country	% Child born by age 20		% Ever-married by age 20		% Intercourse by age 20		Exposure-time contribution*	
Area	**(40–44)**	**(20–24)**	**(40–44)**	**(20–24)**	**(40–44)**	**(20–24)**	**Cm**	**Ci**
Urban								
Peru	0.321	0.250	0.378	0.305	0.538	0.464	0.432	0.298
Bolivia	0.308	0.304	0.413	0.335	0.534	0.472	0.026	0.015
Brazil	0.273	0.302	0.376	0.374	0.364	0.555	–0.004	0.358
Colombia	0.314	0.315	0.386	0.372	0.396	0.549	–0.001	0.010
Guatemala	0.378	0.356	0.477	0.471	0.486	0.439	0.010	0.082
Dominican Republic	0.391	0.330	0.524	0.467	0.417	0.431	0.253	–0.073
Rural								
Peru	0.475	0.541	0.545	0.597	0.697	0.704	0.305	0.033
Bolivia	0.341	0.544	0.459	0.534	0.544	0.635	1.341	1.370
Brazil	0.348	0.408	0.460	0.449	0.357	0.442	–0.055	0.484
Colombia	0.417	0.493	0.495	0.543	0.493	0.655	0.319	0.984
Guatemala	0.521	0.550	0.671	0.628	0.553	0.519	–0.103	–0.099
Dominican Republic	0.544	0.528	0.698	0.677	0.506	0.504	0.026	0.003

Source: Authors' calculations based on DHS.
Cm = share of women ever married by age 20
Ci = share of women who have had first intercourse by age 20

intercourse patterns contributed 30 percent; thus, both marriage and intercourse patterns contributed in the same direction to teenage fertility decline in Peru. The proportion of urban adolescent mothers increased in Brazil from 27 percent to 30 percent, and intercourse patterns contributed to this increase by an estimated 36 percent, whereas marriage did not contribute. It seems then that the increase in teenage fertility in Brazil occurred mainly outside of unions. In the Dominican Republic, on the other hand, marriage patterns accounted for 25 percent of the decline in fertility, whereas intercourse patterns counterbalanced larger changes in fertility among sexually active adolescents (note the negative sign in C_i). In the other countries, the contributions of marriage and intercourse have contributed less than 10 percent to changes in early childbearing, a much more modest share.

In rural areas, neither marriage nor intercourse contributed to the small changes in adolescent fertility observed in Guatemala and the Dominican Republic. In Bolivia and Colombia, intercourse patterns as well as marriage made meaningful contributions to the increase in rural teenage fertility. The important increase in rural teenage fertility observed in Bolivia appears to have been caused mainly by a marriage and a sexual activity boom among adolescents. The similar levels of C_m and C_i suggest that marriage and sexual activity are closely tied but it does not say anything about the timing of those two events: it may be that marriage occurred soon after pregnancy, or pregnancy occurred soon after marriage. The first situation seems to be the case in Bolivia as we will see later in this paper. In contrast, one third of the increase in teenage fertility in rural Colombia is explained by marriage but almost all is explained by change in intercourse patterns. It seems then that part of the increase in rural adolescent fertility in Colombia has occurred outside marriage with its negative consequences.

Both marriage and intercourse patterns have been important factors in teenage fertility, especially in rural areas. However, not always have they contributed in the same direction or with the same intensity in fertility change. In some countries, both marriage and intercourse contributed to teenage fertility reductions, as in the case of urban Peru. In others, they both contributed to teenage fertility increases, as in rural Bolivia. There are also countries where the contribution to teenage fertility change mainly came from intercourse patterns, whereas marriage patterns made modest, if any, contributions, such as in Brazil and in Colombia. The differential contribu-

tions of marriage and intercourse patterns to teenage fertility change in each country suggest changes in unmarried parenthood. Although the proportion of never-married mothers declines with age, it is important to see the trend in the proportion of mothers whose first child is born out of wedlock (never married plus negative interval).[10] Clearly, urban and rural Brazil and Colombia show a steady increase in this proportion, meaning that unmarried motherhood among teenagers has increased, which is in agreement with the important role played by intercourse in fertility increase. In urban and rural areas of Guatemala and the Dominican Republic, this proportion is small and has remained almost unchanged, implying that non-marital childbearing has never been common. In Bolivia and Peru, premarital fertility has increased only in recent cohorts and only in urban areas but it has always been at relatively high levels both in urban and rural areas (where around 20 to 30 percent of mothers had their first child out of wedlock).

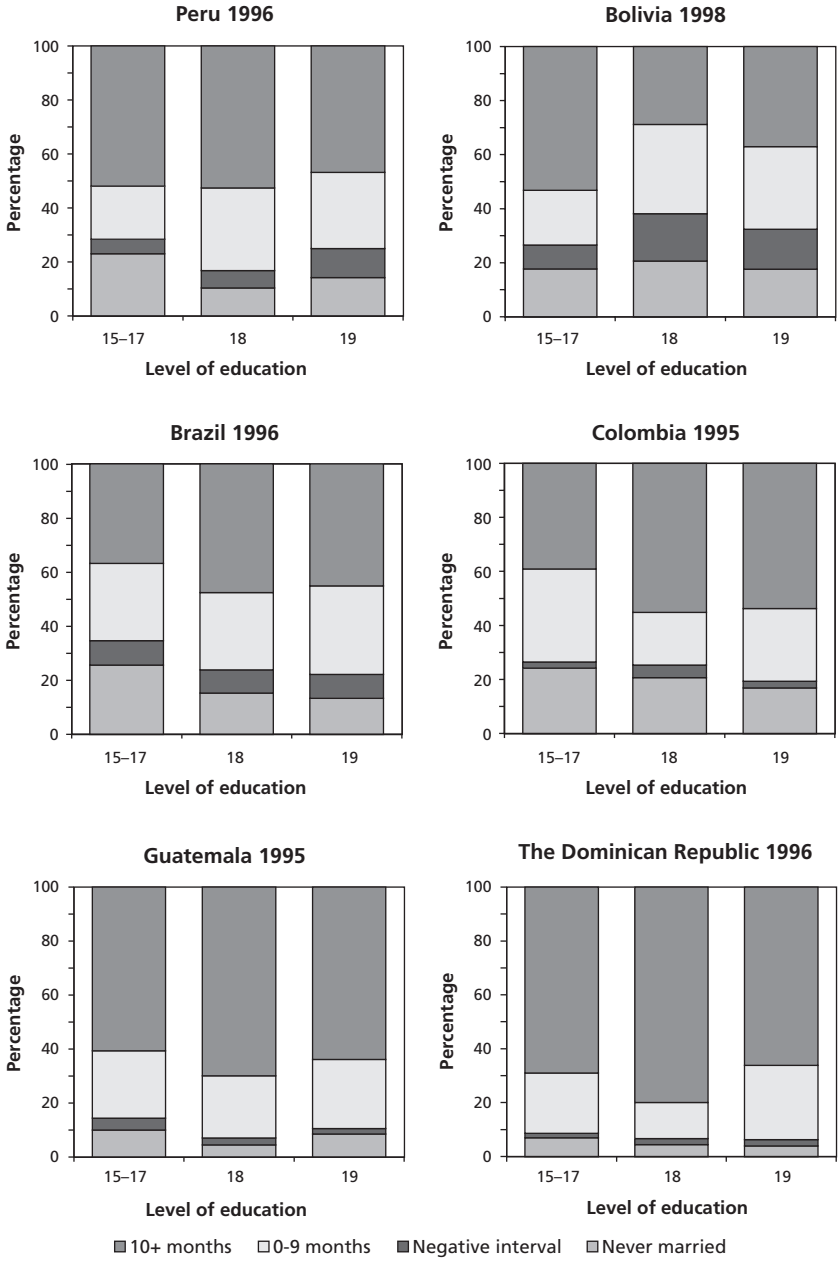
Data thus far suggest that levels and trends of teenage premarital fertility vary widely among countries, ranging from low and constant levels in Guatemala and the Dominican Republic to high and increasing levels in Brazil and Colombia. However, how does it vary within the adolescent group? Is premarital fertility as important among 18–19-year-olds as among 15–17-year-olds? The consequences of early childbearing are more negative the earlier the age of childbearing. Figure 2.23 shows the distribution of adolescent mothers by first marriage to first birth interval by age. Once again, Brazil and Colombia show an increasing importance of premarital fertility among teenagers: approximately 25 to 35 percent of 15–17-year-olds and 20 percent of 19-year-olds had their first child out of wedlock. Guatemala and the Dominican Republic have the lowest and almost constant levels of premarital fertility: less than 10 percent of adolescents had their first child out of wedlock, implying that in these two countries most teenage fertility occurs within marriage.

Premarital births are determined by the differential pattern between first marriage and first live birth conception.[11] Figure 2.24 shows those patterns for adolescents aged 18–19 years, and they indicate that in only two out of the six countries considered, Guatemala and the Dominican

[10] First marriage to first birth interval is negative if birth occurs before marriage.

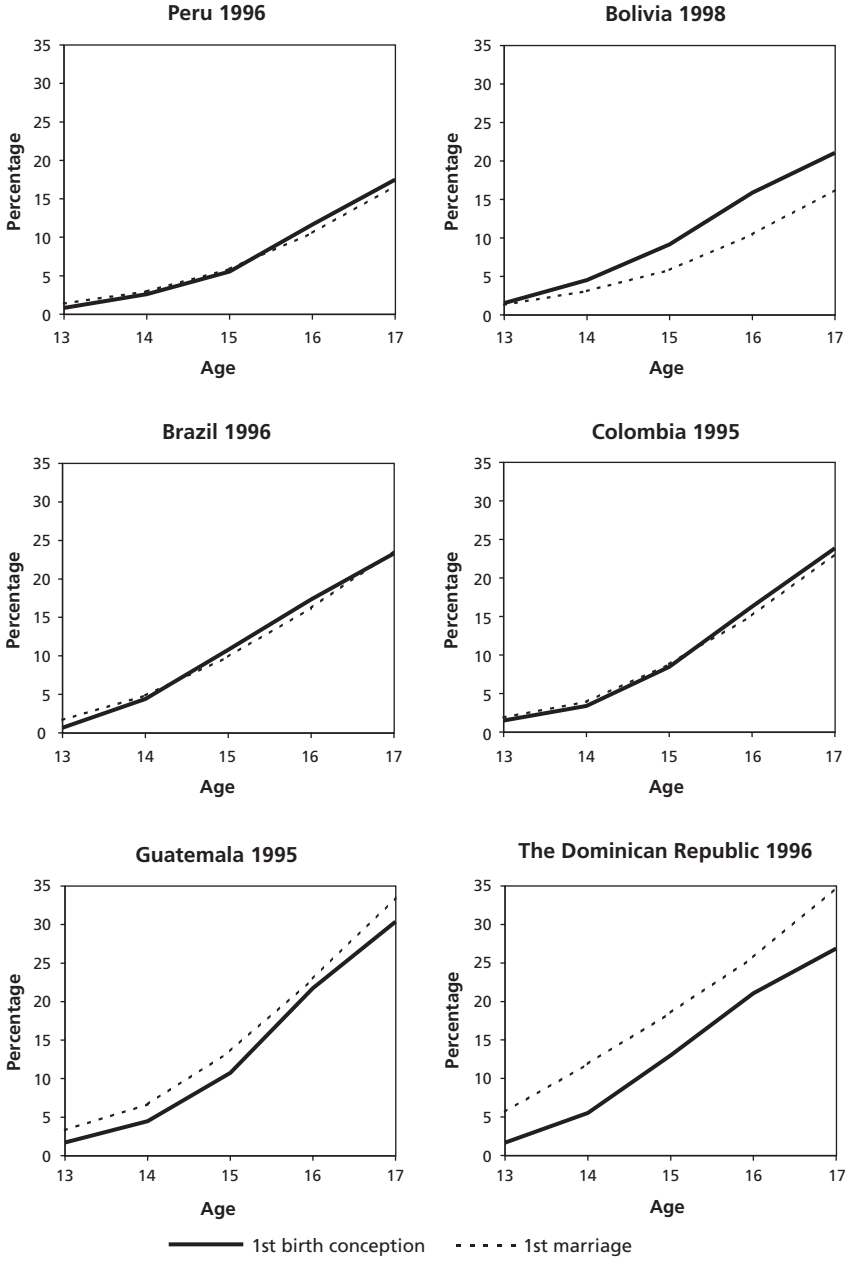
[11] First live birth conception pattern by age was estimated by subtracting nine months from the age at first birth.

Figure 2.23. Distribution of Adolescent Mothers by Marriage to First Birth Interval by Age in Selected Countries



Source: Authors' calculations based on DHS.

Figure 2.24. First Marriage to First Live Birth Conception Patterns by Age for Adolescents Aged 18–19 Years in Selected Countries



Source: Authors' calculations based on DHS.

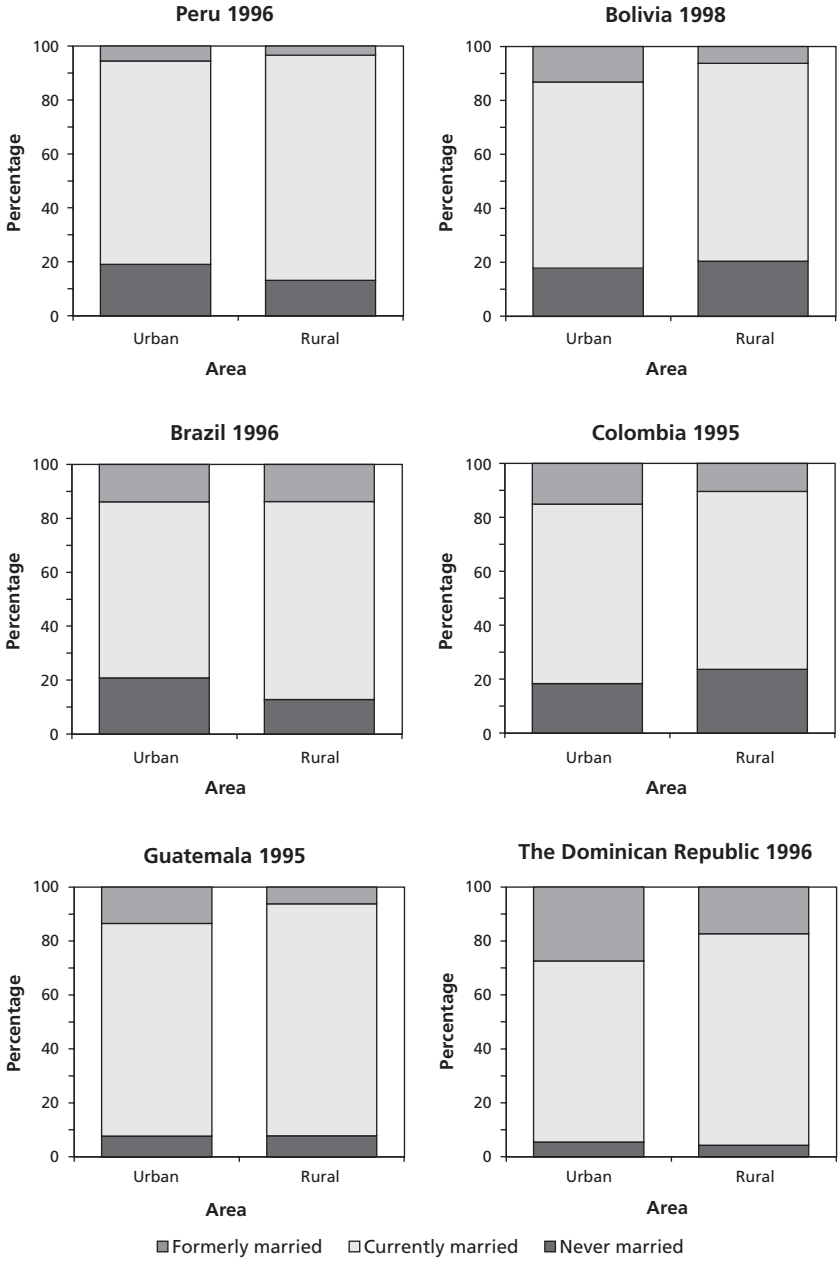
Republic, is there a positive interval between first marriage and conception of first birth; the interval is higher in the Dominican Republic than in Guatemala. This implies that in these two countries, which have the highest teenage fertility, births occur within marriage. In Colombia, Brazil and Peru, countries with lower teenage fertility, first marriage and first birth conception occur almost at the same time, which implies that adolescents formalize the union as soon as they know they are pregnant or they get pregnant as soon as they get married. In Bolivia, one of the countries with moderate teenage fertility, there is a negative interval between first marriage and first birth conception, evidencing a high incidence of premarital births.

Single adolescent mothers may formalize a union once the first child is born. Figure 2.25 shows the distribution of adolescent mothers by current marital status. Guatemala and the Dominican Republic, where births occur predominantly within marriage, show the lowest proportion of single adolescent mothers: 4 to 8 percent of adolescent mothers are never married, both in urban and rural areas. In Brazil and Peru, the proportion of never-married adolescent mothers is higher in urban than in rural areas: 20 percent of urban and 13 percent of rural adolescent mothers are never married. In Bolivia and Colombia, the proportion of single mothers is somewhat higher among rural than urban adolescent mothers: 18 percent in urban areas and 20–24 percent in rural areas.

There is empirical evidence suggesting that, when first marriage or similar relationship occurs at younger ages, consensual unions are particularly prone to disruption (Singh and Wulf, 1990). There is also evidence of the negative relationship between marital separation or divorce and either a premarital birth or premarital pregnancy (Gage, 1995). The Dominican Republic, where consensual unions are most common, shows the highest incidence of marital disruption among adolescent mothers, both in urban and rural areas: almost 30 percent of urban adolescent mothers were formerly married (Figure 2.25). Peru, on the contrary, presents the lowest incidence of marital disruption among adolescent mothers: less than 5 percent of mothers were formerly married.

Thus, although the Dominican Republic shows the lowest proportion of never-married adolescent mothers, the common norm of consensual unions leads to a high proportion of formerly married adolescent mothers, resulting in a high incidence of adolescent mothers rearing their children alone.

Figure 2.25. Distribution of Adolescent Mothers by Marital Status in Urban and Rural Areas of Selected Countries



Source: Authors' calculations based on DHS.

The Socioeconomic Determinants of Teenage Fertility

Data thus far have shown variation in teenage fertility levels across countries and different patterns of teenage fertility change. Adolescent fertility levels do not show a consistent relationship with the socioeconomic conditions of the countries. Exposure-time to pregnancy (marriage and sexual activity) and contraceptive use, two proximate determinants, have had important, but not equal, effects on teenage fertility levels and trends by country. Although there are common patterns across countries in youth fertility differentials and their proximate determinants, according to urban/rural area, region and level of education, teenage fertility varies across countries even when these factors are controlled for. It is thus necessary to analyze the socioeconomic and demographic factors that determine teenage fertility behavior.

A Conceptual Framework

Most theoretical models of adolescent behavior relate individual variables, family statuses and other factors to the likelihood of pregnancy or to the likelihood of a live birth, based on theories of social behavior such as socialization theory, social control theory, problem behavior theory and rational choice/opportunity cost theory. Gage (1995, pp. 7–8) summarizes these perspectives as follows:

- Models derived from problem behavior theory state that adolescent behaviors, including premarital childbearing, are a function of individuals' personality system and their perceived environment. Thus, sexual activity, childbearing and unmarried motherhood among adolescents are perceived to be a reflection of low self-esteem and internal locus of control, and low aspirations and expectations regarding the attainment of salient goals.
- Socialization and social control perspectives view adolescence as a trouble-prone period during which children need to be constrained by parents. These perspectives relate adolescent behavior to family statuses and events. The socialization perspective hypothesizes that women who grow up in a mother-only family during childhood are

socialized in ways that produce a high risk of premarital birth, while the social control perspective hypothesizes that the number and types of adults present during the adolescent years are important predictors of the likelihood of premarital birth.

- Rational choice/opportunity cost theory maintains that teenage childbearing may not be deviant or mistimed in certain populations, but is rather a response to underlying socio-structural constraints and opportunities. Early childbearing is viewed as a strategically planned life-cycle event that enables socially disadvantaged women to take care of their infants under the protection of their families of origin. Thus, in some communities, those teenagers who are believed to have the academic potential to overcome the social and economic barriers to upward mobility are actively discouraged from bearing children during their teenage years.

According to these theoretical models, adolescents decide whether or not to have a child depending upon their family status (economic condition), the environment in which they were raised, economic and school opportunities, personal characteristics, and supply of family planning methods.

Several explanatory variables have been identified in the literature to represent those conditions. The level of a woman's education has shown a strong correlation with fertility regulation among both adult and adolescent women and, as discussed above, more educated adolescents have lower teenage fertility. However, although higher levels of education are associated with lower teenage childbearing, the direction of the causality is less clear among adolescents than among adult women. Adolescent women may delay childbearing in order to complete their formal education, but teenage mothers may also be forced to leave school early upon having a child. In the present analysis, education is measured as a categorical variable in order to capture non-linear effects of schooling on fertility. Five categories were used: 0-3, 4-7, 8-10, 11-13 and 14-16 years of education.

Marriage has proven to be an important proximate determinant of teenage fertility in the selected countries. Since the age of first marriage is known for each woman, marital status is included as a time-varying variable

to proxy for high exposure-time to the risk of childbearing. Use of contraception is also an important proximate determinant of fertility. Although knowledge and use of contraception in DHS refers only to the situation at the time of the interview, providing only a crude measure of contraceptive efficacy, it is meaningful to measure contraceptive use. Therefore, unmet need for family planning was used as a variable reflecting the combined effect of supply and demand factors: desire to use contraception versus the access to contraception.

Elsewhere in the literature, as well as in this chapter, place of residence has proven to be an important influence on teenage fertility. In general, levels are lower in urban than in rural areas. Likewise, women's household income has been shown to affect fertility regulation. The literature indicates that a teenager growing up in a poor family is more likely than a girl growing up in a middle/high-class family to initiate sexual activity at an early age and to become a single parent at an early age (Hogan, 1985). Unfortunately, DHS surveys do not include information on the income of all household members. Total income has been measured through proxy variables such as household appliance possession (radio, television, refrigerator) and access to public services (water, electricity, toilet availability).

The gender of the household head is also used to consider the effect of socialization factors (family status) on teenage fertility. Some studies (Hogan, 1985) present evidence that teenagers growing up in female-headed households initiate sexual intercourse at an earlier age and are more likely to attain adult status through single motherhood than teenagers from other family situations. Although this variable refers to the actual household, the recent history of the teenagers considered makes it possible to use this variable.

The regional context also influences fertility behavior. For example, a woman living in a region of high fertility is expected to have a higher probability of becoming a mother at an early age than a women living in a region of low fertility. Three regional variables were considered: the level of teenage fertility (proportion of adolescent mothers), the proportion of adolescent women using family planning methods (demand side), and the proportion of adolescent women with unsatisfied demand for family planning methods (supply side).

A Simple Logit Model

A simple logit model was used as a first approximation to the analysis of the socioeconomic determinants of teenage fertility.[12] Two logit models were estimated, grouping women into ages 15 to 17 years old and 18 to 19 years old. Those groups were constructed given their different childbearing behaviors: bearing a child at 18 or 19 years of age is a common experience, whereas childbearing before age 18 is uncommon.

The results of simple logit models indicate that the effect of the variables are not always the same across countries, and the effects are significant in some countries but not in others (Table 2.5). In most of the countries, however, as was expected, the probability of being a mother increases with age, decreases with years of education, and significantly increases with marriage. Improving household conditions, in general, decreases the probability of childbearing at early ages. The regional context of fertility, the supply and demand conditions of family planning also affect the probability of being a mother in the expected direction: the higher the level of regional fertility, the lower the regional use of family planning, and the higher the unmet need for family planning, the higher the probability of early childbearing (Table 2.5).[13]

In the simple logit models it is assumed that the effect of a variable is the same across regions (and also across countries in the first column). The usual way to overcome this assumption is to add, as independent variables, a set of dummy variables for each region and/or country. If the effect of the variables is expected to vary between regions, such dummies should interact with each independent variable. A great advantage of DHS surveys is that, because of their size, samples are representative at the level of small regions: among the six countries there are significance levels in 92 regions. Although it would be inefficient to use 92 regional dummy variables in the model and multiply them by the 10 independent variables, the regional/country context cannot be ignored, as disregarding regional structures is to assume, as many previous statistical analysis have done, that the individual

[12] The independent variable takes the value of one if the woman has at least one child born and zero if she has not.

[13] Logit models were also estimated using urban residence as a dummy variable. However, the results were not statistically significant.

Table 2.5. Estimated Coefficients from a Logit Model for Teenage Fertility in Selected Countries

Variable	Total	Bolivia	Brazil	Colombia	Domin. Rep	Guatemala	Peru
Women 15–17 years old							
Age	0.3102***	0.2819	0.2356	0.1593	0.6357***	0.4491**	0.3580**
Education	–0.0615***	–0.0118	–0.1548**	–0.0008	–0.0395	0.0731***	–0.2340***
Married	2.6178***	2.2330***	2.5733***	2.6364***	2.1861***	2.1928***	3.2001***
Exposure time	1.2374***	1.6455***	1.0005***	0.9235***	1.2643***	2.1643***	1.2394***
Unmet Need of F.P.	0.0243	0.2958***	–0.0193	0.3432***	0.5229***	–0.0429	–0.5164*
Water Availability	–0.1951**	–0.2051***	–0.5792**	–0.6148***	–0.0428	0.6260**	–0.0746
Hh Appliances (refrigerator)	–0.3245**	–0.7049***	0.1489	–0.8031**	–0.7197*	–0.6569***	0.3252
Regional Fertility Rate	0.0520**	0.1738***	0.2449**	–0.0018	0.2226***	0.0177	0.0791*
Regional Use of any Method	–0.0039***	–0.0595**	0.0105	0.0160	–0.0300***	–0.0867***	–0.0293***
Regional Unmeet Need F.P.	–0.0739***	–0.1447***	–0.1351***	–0.0097	–0.1144***	–0.0590**	–0.1021***
Constant	–9.1208***	–9.4415**	–8.6572**	–6.1695**	–16.1065***	–12.7682***	–9.0242***
Women 18–19 years old							
Age	0.2180**	–0.1053	–0.1031	–0.1737	0.7533**	0.3159***	0.3904**
Education	–0.0288*	–0.0801*	–0.1483***	–0.0653***	0.0047	0.0507	–0.0328***
Married	2.6884***	2.7378***	2.5606***	2.1835***	2.6685***	2.6042***	3.1859***
Exposure time	0.8697***	0.9079***	0.7346***	0.9530***	0.7224***	1.4928***	0.8040***
Unmet Need of F.P.	0.2153*	0.6791**	0.1086*	0.4125***	0.2762**	0.4345***	–0.3551
Water Availability	0.0529	0.0728	0.5128*	–0.4040***	0.1618	–0.0837*	0.1075
Hh Appliances (refrigerator)	–0.5366***	0.1265	–0.6898**	–0.6254**	–0.7418**	–0.3537***	–0.3958*
Regional Fertility Rate	0.0279***	0.0662***	0.0858	0.0496**	–0.0032	–0.0419	0.0576***
Regional Use of any Method	–0.0041*	–0.0321***	–0.0028*	–0.0079*	0.0651	0.0748	–0.0265**
Regional Unmeet Need F.P.	–0.0332**	–0.0672**	–0.1082***	–0.0917*	0.0271	0.1387**	–0.0626*
Constant	–7.8218***	–1.5572	–2.2274	0.1333	–19.7249***	–11.0593**	–11.1065***

Source: DHS and authors' calculations.

*p < .05; **p < .01; ***P < .01

observations are independent. On the other hand, samples selected in two stages, such as the DHS, generate some correlation between observations related with regions: individuals from the same region are expected to be more alike in terms of characteristics and behaviors than those from different regions. There can be a higher correlation between women with different characteristics living in the same region, for instance than the correlation between women with similar characteristics living in different regions. If these regional effects were ignored, the estimations of standard errors would be biased (underestimated). The use of multilevel or hierarchical models, which include group or regional effects, solves these problems.

Continuous-Time Hazard Rate Models

The logit models estimated in previous sections use the cross-sectional information obtained in the DHS pregnancy history data to predict whether a woman has a first child by the survey date. However, given that the data is subject to right censoring (i.e., some adolescent women have not had yet their first child by the survey interview), those techniques produce biased estimates (Hogan, 1985). To avoid this statistical problem, and because the normal assumption in a variable measuring time is not reasonable, a continuous-time hazard rate model is used to estimate the probability of an adolescent having a first birth. Additionally, it is desirable to analyze the effect of demographic, socioeconomic and contextual variables on the hazard rate of first childbearing. This model estimates the instantaneous rate of transition from the origin state j (i.e., childless) to the destination state k (i.e., having a first child) at time t as a function of the independent variables of interest, using all the information obtained in the birth history of each woman.

In order to analyze the hazard rate for a first birth, it is obviously necessary to know when women are at risk. Since the timing of first sexual intercourse is known, and given that the risk of having a birth is zero before the first sexual intercourse, the analysis in this case was divided into two steps. First, a model is estimated that considers the rate of first childbearing; the effects are then isolated into components due to differentials in initial sexual activity and to differentials in the rate of childbearing among the sexually active. Models were thus estimated of the net effect of the independent variables on the rate of first childbearing, on the rate of initial sexual inter-

course and on the rate of first childbearing among the sexually active. The isolation procedure makes it possible to identify the main source of the effects of the independent variables on the rate of first childbearing. In other words, does the effect of a specific variable act mainly through initiation of sexual intercourse or through first childbearing among those sexually active?

In the general model for the rate of childbearing, the risk period begins with the onset of puberty. Since the exact age of the onset of puberty is not known, it is assumed that all women enter the risk period at the age of 10. However, since the timing of puberty may vary considerably among women, especially across countries, several models were estimated using different ages for the onset of puberty. Still, ages 10, 11 and 12 produced very similar results. This implies that the probability of having a first birth is not very sensitive to the exact beginning of puberty.[14]

Isolating the effects implies, in turn, two further steps. In the first step, the hazard rate of first sexual intercourse is modeled by assuming that all women enter the risk period at the age of 10. In the second step, the hazard rate of having a first birth is modeled by assuming that the risk period begins with the woman-specific date of the first sexual intercourse. This two-step analysis elaborates the specification for each risk period and therefore provides richer information about the occurrence of each dependent event. Certain covariates may affect the first event (first sexual intercourse) but not the second (first birth among the sexually active). In the same way, certain other covariates, such as knowledge or use of contraceptives, may affect only the second event.[15]

In order to search for a better specification of the continuous-time hazard rate models, three alternative parametric characterization of time dependence were used: Weibull, Exponential and Gompertz. The model selection was based on the Akaike Information Criteria (AIC) test, which permits comparisons among parametric non-nested models. The result of the test demonstrated that the Weibull distribution best fit the data.[16]

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[14] Although age 10 may seem to be a very low age, it was used since women are observed who already have had a child born by that age.

[15] Hogan and Kitagawa (1985) used this two-step approach on the analysis of premarital pregnancy.

[16] Since the form of the hazard function is known, it is preferable to use a maximum likelihood estimation (parametric model) rather than a partial likelihood estimation procedure (semi-parametric model).

The results of the analysis are reported in Table 2.6. Each of the independent variables displays the expected association with the rate of first birth (first column). Education shows a strong negative effect on teenage childbearing, especially up to 11–13 years of education (Figure 2.26). Thus, the risk of having a first birth among women with 11–13 years of education is 58 percent lower than the risk observed among those women with 0–3 years of education. This result, which is in agreement with the literature on the determinants of fertility (Lam and Duryea, 1999; Schultz, 1993), may indicate not only increased ability to control fertility among more educated adolescents, but a negative effect of women's education on desired early childbearing.

Additionally, adolescent women living in an urban place of residence have a lower rate of childbearing, although the effect was neither large nor statistically significant.[17] Net of other effects, adolescents with unmet family planning need have rates of childbearing 12.7 percent higher than girls with satisfied family planning need. Thus, increasing the ability of adolescents to realize their childbearing aspirations (decrease of unwanted births) would permit a decline in teenage childbearing rate.

Family structure indicates that teenagers from male-headed households experience a rate of first birth 11 percent lower (0.894) than adolescents in female-headed households. Thus, socialization in a female-headed family, with lax parental supervision, may enhance the acceptability of early and premarital sexual activity, and early and single parenthood. Girls living in lower-income households (measured by the lack of households assets: radio and refrigerator) experience a higher rate of childbearing than adolescents living in higher-income households. On the other hand, possession of a radio is associated with a 10 percent decrease in the childbearing rate. This negative effect may reflect not only the household's economic class, but also its cultural level. Radio as a mass media may be playing a role in promoting social change with respect to attitudes about reproductive behavior and life aspirations.

The effects of the regional context indicate positive effects of the level of fertility and the level of unmet family planning need on the rate of childbearing. Each percentage increase in a region's level of teenage fertility or in the proportion of unmet family planning need increases the childbearing

[17] A chi-square test that the variable was zero was accepted with a 0.5501 probability.

Table 2.6. Estimated Hazard Ratios from Continuous-Time Hazard Models for the Risk of First Birth and Initial Sexual Intercourse for Adolescent Women

	Model (Weibull distribution)		
Variables	**First birth**	**Initial sexual intercourse**	**First birth among sexually active**
Years of education			
0–3 (ref)	1.00000	1.00000	1.00000
4–7	0.88523*	0.66191***	1.09911
8–10	0.62338***	0.33955***	1.05987
11–13	0.41801***	0.18009***	1.01012
14–16	0.40215	0.24811***	1.23371
Women's characteristics			
Urban (ref = no)	0.97284	1.16793***	0.99334
Age at first intercourse			1.00633***
Unmet need of family planning (ref = no)	1.12713**		0.92582
Household			
Has radio (ref = no)	0.89769**	0.74140***	0.99741
Has refrigerator (ref = no)	0.93835	0.68921***	0.90483
Sex of household head (ref = female)	0.89389*	1.07545*	0.90590
Regional			
% women with children	1.01731***	1.04860***	0.99289
% using family planning	0.99542		1.02024
% unmet need of family planning	1.01404*		0.98981
Country			
Bolivia (ref)	1.00000	1.00000	1.00000
Brazil	0.96429	2.01854***	0.57940***
Colombia	0.78385	1.87716***	0.61618**
Dominican Republic	0.34284***	1.83816***	0.16356***
Guatemala	0.30857***	0.83490***	0.21783***
Peru	0.66558**	1.23680***	0.69700*

(*continued*)

Table 2.6. Estimated Hazard Ratios from Continuous-Time Hazard Models for the Risk of First Birth and Initial Sexual Intercourse for Adolescent Women (continued)

	Model (Weibull distribution)		
Variables	**First birth**	**Initial sexual intercourse**	**First birth among sexually active**
Married and country interactions			
Married-Bolivia (ref) (time dependent)	48.81061***		8.47618***
Married-Brazil	0.63871		1.842876***
Married-Colombia	0.95545		2.232751***
Married-Dominican Republic	2.06120**		8.865427***
Married-Guatemala	2.23380***		7.060362***
Married-Peru	1.04560		1.682408***
LR χ^2	10,059.16***	2,291.36***	5,184.43***
d.f.	23	14	24
N	18,028	18,013	4,920

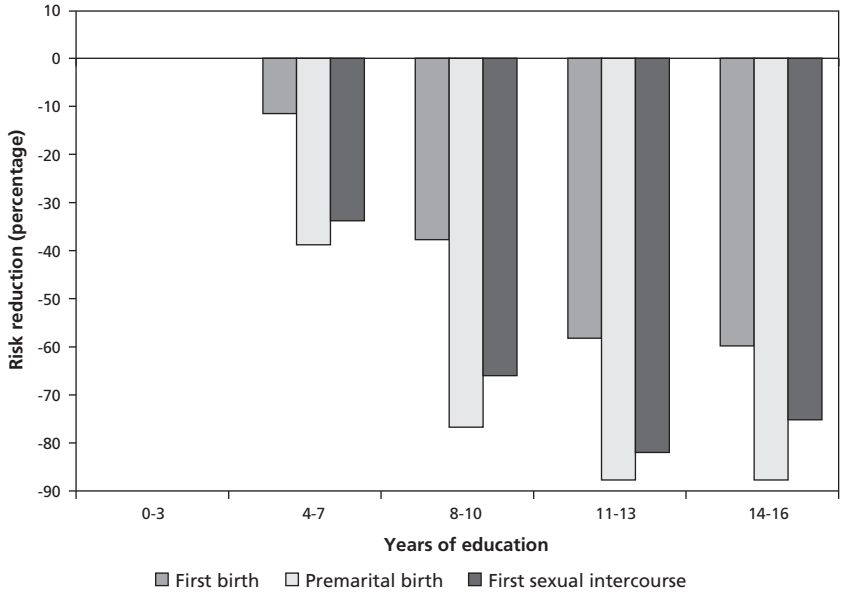
Source: Authors' calculations based on DHS.
* p < .05; ** p < .01; ***p < .001.

rate by 1.7 percent and 1.4 percent, respectively. This is also indicated by the effect of dummy country variables on the rate of childbearing. For example, net of other effects, adolescents from Peru experience a childbearing rate 33.5 percent lower (hazard ratio = 0.665) than those living in Bolivia.

As discussed above, while marriage plays an important role in adolescent fertility, marriage patterns differ across countries. In order to consider these effects, the interaction variable marriage-country was included.[18] In Bolivia, for instance, the results indicated that, as soon as adolescents get married, their rate of childbearing becomes 48.8 times higher. This result must be interpreted carefully; while it may suggest that marriage is an important proximate determinant of Bolivian teenage fertility, it may also represent the fact that teenage pregnancy sometimes prompts a marriage to legitimate the child. Since Bolivian adolescents show a negative interval between first marriage and first birth conception, the high increase in fertility risk with marriage may be interpreted as marriages undertaken to legit-

[18] Marriage was used as a time-varying variable (single/married) since the date at first marriage is known. Being married and living in Bolivia is the reference category.

Figure 2.26. Effect of Education on the Risk of First Birth and First Sexual Intercourse among Adolescents



Source: Authors' calculations based on DHS.

imate a birth. Being married in the Dominican Republic or Guatemala, though, increases the risk of having a first child twice as much as in Bolivia. However, adolescents in these two countries have a positive interval between first marriage and first birth conception, indicating that marriage is the determinant event.

To what extent are these overall differentials in the rate of adolescent childbearing due to differing rates of initial sexual intercourse and to differing rates of childbearing among those sexually active? Table 2.6 also present the results of the models for the rate of initial sexual intercourse (second column) and the rate of first birth among those sexually active (third column). The net effects of most of the independent variables are stronger and more significant in the model of initial sexual intercourse. All the coefficients of schooling are negative, stronger and statistically significant, implying that education plays an important role on the rate of initial sexual intercourse. For example, women with 11–13 years of education have an 82 percent lower risk of initial sexual intercourse than among adolescents with 0–3 years of education. Teenagers living in urban areas have

a rate of initial sexual intercourse 16.7 percent higher than the rates observed among rural adolescents. Better socioeconomic conditions in the household (possession of radio and refrigerator) reduce the rate of initial sexual intercourse by about one-fourth. Sex of the household head, however, did not show the expected result: living in a household headed by a male increases the risk of initial sexual intercourse by 7.5 percent. Additionally, adolescents living in a regional context of high teenage fertility have higher rates of initial sexual intercourse; each additional percentage increase in teenage fertility increases the rate of initial sexual intercourse by 4.8 percent. The country context also strongly affects the rate of sexual activity: girls in Brazil, Colombia and the Dominican Republic have an initial rate of sexual intercourse that is 84 to 100 percent higher than the rates observed among those living in Bolivia. Adolescents living in Guatemala, on the contrary, have rates of sexual activity 17 percent lower than the rates of those living in Bolivia. Thus, Bolivia and Guatemala present contexts that discourage the timing of initial sexual intercourse relative to the other countries.

When the model is restricted to sexually active adolescents (Table 2.6, column 3), only country context and marriage-country interactions variables have persistent effects on the rate of first childbearing. Bolivia has a cultural context that leads to higher risk of having a first birth among sexually active adolescents. On the contrary, the Dominican Republic's and Guatemala's cultural contexts favor lower rates of childbearing among sexually active adolescents. However, being married in the Dominican Republic and Guatemala increases the risk of first childbearing among sexually active adolescents in relation to Bolivia, indicating the important role played by marriage in adolescent fertility in the cultural context of those two countries. Age at first intercourse was introduced as a control variable, and it suggests that the later a girl initiates sexual activity, the higher the rate of first childbearing.

The estimated coefficients in the models used suggest that the large impact of education and household socioeconomic conditions on the overall rate of first childbearing occurs because these variables have a large effect on the age at which adolescents become sexually active. Their effect on the rate of first childbearing among those sexually active is smaller and it is not significant. In the same way, the positive regional effect of high fertility on the overall rate of first birth acts mainly through initial sexual intercourse.

On the contrary, the effects of regional contexts, such as living in a specific country, are larger and more statistically significant for the rate of initial intercourse than for the rate of childbearing among sexually active girls. Even more, they have counterbalancing effects: raising the rate of initial sexual intercourse but lowering the overall rate of childbearing. Likewise, place of residence has a positive and significant effect only on the risk of initial sexual intercourse, as living in an urban area increases that risk. These results may be understood in light of the regional/environmental effects of the availability and acceptability/use of family planning methods, as higher regional/local unmet family planning need strongly increases the overall rate of first birth. Thus, the earlier timing of initial sexual intercourse in urban areas is offset by greater use of contraception.

Teenage parenthood is generally deleterious for both mother and child. But unmarried teenage parenthood is even worse, becoming a critical social issue because of its negative potential impacts on both mother's and child's short-term and long-term health and socioeconomic success. For that reason the analysis was further divided to consider the socioeconomic determinants of premarital births. Table 2.7 presents the results.

The estimated coefficients indicate larger and stronger effects of almost all the independent variables on the timing of premarital birth than on the overall timing of childbearing. For example, the effect of education is quite strong: adolescents with 11–13 years of education have an 88 percent lower risk of premarital birth than girls with only 0–3 years of education. In general, increasing schooling and improving households' socioeconomic conditions decreases the rate of premarital birth, as these variables affect the age at which girls become sexually active. These variables have smaller and much less significant effects on the rate of premarital birth among sexually active adolescents. On the contrary, the family context acts mainly through its effect on the timing of premarital birth among those sexually active girls. Girls living in male-headed households have premarital birth rates that are 38 percent lower than those observed among girls in female-headed households. This results mainly from the variable's effect on the rate of premarital births among the sexually active. This large effect supports findings elsewhere in the literature that socialization in a female-headed family may enhance the acceptability of single parenthood.

Table 2.7. Estimated Hazard Ratios from Continuous-Time Hazard Models for the Risk of Premarital Birth and Initial Sexual Intercourse, Adolescent Women

	Model (Weibull distribution)		
Variables	**Premarital birth**	**Initial sexual intercourse**	**Prem. birth among sexually active**
Years of education			
0–3 (ref)	1.00000	1.00000	1.00000
4–7	0.61204***	0.66191***	0.94000
8–10	0.23256***	0.33955***	0.71142
11–13	0.12259***	0.18009***	0.64541
14–16	0.12336*	0.24811***	0.57945
Women's characteristics			
Urban (ref = no)	1.09528	1.16793***	0.87067
Age at first intercourse			0.97230***
Unmet need of family planning (ref = no)	2.53866***		0.57327***
Household			
Has radio (ref = no)	0.70764**	0.74140***	0.84049
Has refrigerator (ref = no)	0.65873***	0.68921***	0.89061
Sex of household head (ref = female)	0.62596***	1.07545*	0.62020***
Regional			
% women with children	1.06296***	1.04860***	0.98453
% using family planning	0.95425		1.06983
% unmet need of family planning	1.04157**		0.98280
Country			
Bolivia (ref)	1.00000	1.00000	
Brazil	0.75620	2.01854***	0.65300*
Colombia	0.59581*	1.87716***	0.65796
Dominican Republic	0.23258***	1.83816***	0.22342***
Guatemala	0.20527***	0.83490***	0.20109***
Peru	0.51469***	1.23680***	0.71492
LR χ^2	410.97***	2291.36***	196.49***
d.f.	17	14	18
N	18,023	18,013	4,669

Source: Authors' calculations, based on DHS.
* p < .05; ** p < .01; ***p < .001.

Satisfying the need for family planning is the independent variable that has the largest (negative) effect on the overall rate of premarital childbearing. This variable, however, has the opposite effect on the rate of premarital birth among sexually active women, among whom unmet family planning need decreases the rate of premarital birth by 43 percent. This may be due to the fact that unmet need is measured at the moment of the interview (the ideal would be at time of first intercourse or first pregnancy) and/or to the fact that it does not reflect contraceptive efficacy. An adolescent who uses a contraceptive method may not be doing so properly.

Regional contexts indicators have large and strong effects on the rate of premarital birth. Living in an urban area lowers the age of initial sexual intercourse, but its effect on the rate of premarital birth is not statistically significant. The conditions of urban areas, in relation to rural areas, give girls greater control over their fertility: sexually active girls have a lower rate of premarital birth in spite of an earlier age of initial sexual intercourse. Country conditions (cultural and inherent characteristics) affect the rate of premarital birth largely through the rate of premarital birth among sexually active girls, which offsets the effect of country conditions on the rate of initial sexual intercourse. Thus, although girls living in Bolivia have one of the lowest rates of initial sexual intercourse, they have the highest rate of premarital birth among sexually active women, and the highest overall rate of premarital birth. Girls living in Guatemala and the Dominican Republic present the lowest rates of overall premarital birth and the lowest rate of premarital birth among sexually active girls, although they present a very different timing of initial sexual intercourse.

Summary and Conclusions

Most Latin American countries have been experiencing a fertility transition since the middle of the last century. However, adolescent fertility has not changed at the same pace as fertility in the other age groups: in some countries it has stayed practically constant, in others it has declined but the change has been less than that experienced by older women, and in others it may have increased. Changes in the age fertility pattern indicate that the contribution to total fertility by women in the 15–19 age group has risen in almost all countries. Given that teenage childbearing is generally deleterious

for both mother and child, this chapter has attempted to describe the differentials in levels and trends in early childbearing across Latin American countries and to analyze its proximate and socioeconomic determinants.

The importance of adolescent fertility can hardly be overstated, as high rates of adolescent childbearing have long-term implications for societies as well as individuals, and in this regard Latin America presently faces both great peril and opportunity. Certain aspects of the situation of women are gradually improving in the region, though with uneven progress across and within countries. As the fertility transition progresses, women are increasingly able to pursue roles and activities outside of the home that include extended study and participation in the formal economy. The changes in family structure that have occurred at roughly the same time, however, have meant that adolescent fertility has increased even while the support systems traditionally available to mothers are weakening. The share of extended-family households is diminishing, which means that mothers have less assistance in childcare and other domestic tasks; the increase in the number of single mothers, moreover, suggests that at least some of them must raise and support children without help from fathers. Both of these developments clearly increase the burden on young mothers: even as they must provide and care for children, the obligations of childcare, along with consequences such as fatigue and illness, constrain young mothers' educational attainment, complicate their insertion into the labor force and compromise their labor force attachment. In addition, children frequently replicate their parents' patterns of family structure, educational attainment and work as they enter adulthood—particularly in the case of the same-sex parent. Unchecked increases in adolescent fertility may thus result in the intra-generational transmission of poverty, with consequences ranging from misery and marginalization among large sectors of the population to increasing crime and even social unrest.

A more immediate threat associated with adolescent fertility is the transmission of HIV/AIDS, as adolescents who bear children are by definition sexually active. Pregnancy, moreover, means that either no contraceptive has been used or that contraceptives have failed or been used improperly, with the accompanying risk of exposure to HIV. From an epidemiological perspective, adolescent women represent a link in the cycle of HIV transmission in Latin America, a link that is a significant share of the population. Again, the implications are social, economic and political as well

as personal. The spread of HIV can further strain health care systems that are already inadequate in some countries, and widespread use of effective treatments for the disease is simply beyond the fiscal means of many developing countries. Finally, AIDS-related disability and mortality can deprive children of their primary caregivers and rupture family and community networks, with untold psychological and social effects.

As widespread adolescent childbearing presents a variety of public problems, a multifaceted policy response is required. The most immediate and obviously useful measure, and one that requires relatively limited expenditures, is increasing the availability of information on family planning methods and increasing access to various methods of family planning, as well as providing sex and sexual health education. Initiatives should target not only adolescent girls, but also sexually active adolescent boys and young men, particularly in regard to condom use. Since cultural taboos on discussing sexual topics remain strong in some countries and regions, public agencies may be uniquely positioned to further family planning and sex education precisely because of their "impersonal" nature and their independence from family and community norms. Additionally, as family structures change and urbanization progresses, demand for these types of information and services are likely to grow.

Policy initiatives can further include public information campaigns involving the risks and long-term consequences of adolescent childbearing. For significant portions of the population, of course, such campaigns are unnecessary, as higher educational levels and norms of delayed gratification largely curtail adolescent fertility among these groups; from a political perspective, these may also be the sectors that oppose such initiatives as a waste of public resources. At-risk individuals, though, particularly adolescents who have not yet internalized values of deferred gratification or long-term planning, may need less-than-subtle reminders of these risks and consequences.

A final policy area, involving substantial short-term investment but far greater returns, entails improving the quality as well as the quantity of the educational supply, and also the quantity and quality of after-school and recreational activities. Such initiatives are especially important in rural areas, where adolescent fertility has been rising. Expanded educational and recreational programs must not, however, merely be seen as an increase in structured and supervised time to distract adolescents from sexual activity.

Instead, these programs can serve to increase adolescents' human capital, thus expanding their life choices and providing an incentive to engage in long-term planning; the literature indicates that fertility risks decline among adolescents who remain in school.

Two underlying issues in this area must be emphasized. First, educational supply alone, whether in number of schools or length of school day, is not enough to reduce teenage childbearing; demand must be stimulated by improving the quality of education so that adolescents and families view remaining in school as worthwhile. Second, the state is not the only actor to consider in this area. Community-based and non-governmental organizations, particularly in indigenous areas, can prove particularly responsive to local needs and capable of earning popular support.

Finally, incentives to parents must be incorporated into policies involving education and the reduction of fertility. In turn, two types of parents must be considered: parents of adolescents, and adolescents who are already parents. Both types of parents may respond to the incentives provided by conditional cash transfer (CCT) programs, which have already achieved some success in Latin American countries. CCTs provide payments based on compliance with specific goals such as school attendance and regular medical care, and they are often structured to discourage fertility by diminishing payments for children beyond a certain number or those born after the date of enrollment. In addition to CCTs, adolescent parents can benefit from the expansion of childcare opportunities, which can encourage continued education and curtail additional births. The quality of childcare, however, like that of education, must be sufficient to stimulate demand.

CHAPTER THREE

Adolescents in Latin America and the Caribbean: How Do They Decide to Allocate their Time?

Naercio Aquino Menezes-Filho[1]

Income distribution and poverty are generally more serious problems in Latin American and Caribbean countries than they are in more developed areas of the world (see Ravaillon and Chen, 1997, for example). Many recent studies relate these problems to factors such as education, demography, industrialization (Kuznets hypothesis) and macroeconomic policy.[2] The literature on the importance of human capital in economic development is particularly large.[3]

In order to better understand the differences in human capital accumulation across countries it is essential to look at the framework surrounding the household decisions related to youth labor supply and education, that is, their time allocation decisions. These decisions are fundamental to the future of poverty and inequality outcomes in Latin America and the Caribbean. Moreover, the diversity of situations faced by the youth and adolescents in this region does make a comparison among its different countries very fruitful, perhaps providing the identification conditions needed for careful empirical work to be carried out.

Most analysis related to schooling decisions has focused on a single country or used aggregate data for several countries. An exception is Behrman, Duryea and Székely (1999), but their focus is on the macro conditions and their permanent effects on schooling attainment. In contrast,

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[2] See Higgins and Williamson, 1999; Agénor, 1998; Bourguignon and Morrison, 1998; Deininger and Squire, 1998; among others.

[3] See Behrman, Duryea and Székely (1999) and the references therein.

this chapter compares the process determining the time allocation decisions in several Latin American and Caribbean countries using comparable micro data, for different age groups, while using the same methodology and incorporating both household-level and aggregate-level variables in the analysis.

The closely related theme of child labor is receiving more and more attention in economics. Basu and Pham (1998) set up the theoretical foundations for the field. This is summarized, together with some empirical evidence in Basu (1999). In a recent survey on the subject, Psacharopoulos (1997) concludes that child labor contributes significantly to household income, although it is associated with a reduction in school attainment. Psacharopoulos and Arraigada (1989) find that school participation is positively related with household resources and negatively with demand for household labor, and Jenen and Nielsen (1997) find for Zambia that poverty forces households to keep their children out of school. In the case of Peru, Patrinos and Psacharopoulos (1997) emphasize that the number and age structure of siblings have important effects on schooling decisions.

Using Demographic Health Surveys (DHS), Filmer and Prichett (1998) provide a comprehensive study on the effects of household wealth on educational attainment in 35 countries. They find that, while the poor have lower attainment rates than the rich all around the world, the gap varies substantially among countries, ranging from 10 grade levels in India to two in Zimbabwe and the Philippines.[4] In the Latin American countries studied, the authors find that the gap is around four years of education and, although poor people do have basic education, they drop out much more frequently than the rich. However, the authors include only five Latin American and Caribbean countries in their analysis and do not control for household background variables that may be important determinants of school attendance, given the brief review of the literature above.

A careful analysis of the differences in the rates of school attendance across different countries, along with their main similarities, can shed light on important issues related to the expected level of education of the labor force in the near future, as well as all the consequences associated with low and unequally distributed levels of education. Moreover, it can highlight

[4] As the DHS do not measure income, Filmer and Pritchett (1998) construct a wealth measurement using principal components analysis based on household characteristics. This measurement should be correlated with permanent income.

policy recommendations aiming at improving the levels and quality of education in Latin America. With these objectives in mind, the main aim of this chapter is to examine and compare the microeconomic and macroeconomic determinants of time allocation decisions across 17 Latin American and Caribbean countries using household-level data. The emphasis is on the comparison between family and country effects in order to understand which is more important to school attendance: the country where one lives or one's family conditions.

Data and Specification

The principal data used in this chapter are drawn from the household surveys for 17 Latin American countries, compiled and standardized by the Inter-American Development Bank (IDB). Behrman, Duryea and Székely (1999) discuss this data set at length, comparing it with others that are more widely used, such as sources from the United Nations Educational, Cultural and Social Organization (UNESCO), but this data set should also be considered in relation to its main advantages and disadvantages. The countries studied here (followed by the survey year in parentheses) are Honduras (1998), Nicaragua (1998), El Salvador (1998), Brazil (1997), Mexico (1996), the Dominican Republic (1996), Venezuela (1997), Bolivia (1997), Paraguay (1998), Ecuador (1998), Colombia (1997), Costa Rica (1997), Chile (1996), Panama (1997), Peru (1997), Uruguay (1997), and Argentina (1996). Unfortunately, the surveys for Argentina and Uruguay cover only urban areas, and the surveys for Venezuela do not have an urban/rural identifier. The main problem with this data set, though, is the time series variation in the conduction of the survey, so it is necessary to assume that the relationships observed are equilibrium relationships not affected by cyclical variations. The econometric exercise below includes cyclical variables to control for business cycles effects on the time allocation decisions.

The sample was divided into four age groups: 12-13, 14-15, 16-17 and 18-19. The dependent variable (Time Allocation) is always defined as a categorical variable so that one of the following four values can be assumed:

- 0 if the adolescent is not studying and is not in the labor market (either working or looking for a job). This is the base (excluded) category.

- 1 if the adolescent is studying and not in the labor market.
- 2 if the adolescent is not studying and is in the labor market.
- 3 if the adolescent is studying and is in the labor market.

The variables used in the econometric analysis below can be divided in two groups: micro variables (that vary across households) and aggregate variables (country specific). Below is a definition of the variables to be used in the exercises, a rationale for their presence in the equation, and an explanation of their predicted effect on the time allocation decisions. The equation to be applied to the data is:

$$\begin{aligned} Allocation = {} & \alpha + \beta_1.age + \beta_2.gender + \beta_3.fincome + \beta_4.impyA\_h + \beta_5.nads + \\ & \beta_6.nchild + \beta_7.finch + \beta_8.fnads + \beta_9.finc2 + \beta_{10}.finch2 + \\ & \beta_{11}.finads2 + \beta_{12}.educpar + \beta_{13}.occup + \beta_{14}.urban + \beta_{15}.compos \\ & + \beta_{16}.perc\_u + \beta_{17}.\ln pop + \beta_{18}.desemp + \beta_{19}.depend + \beta_{20}.GDP \end{aligned}$$

The variables are defined as follows:

- *age*: is a dummy defining the specific individual age within each age group (the omitted category is the younger age). This variable is expected to have a positive impact on the outcomes associated with the working status, since older children are more likely to be required to help their families in work and/or to have dropped out of school after failing to pass a grade level.
- *gender*: defines the gender of the adolescent. For cultural and sociological reasons, boys are more likely to be working and girls to be at home, helping younger siblings. The predicted effect on the studying outcome is uncertain.
- *fincome*: is total family income (excluding the adolescent's income) converted into 1995 dollars using purchasing power parity (PPP). This variable is predicted to have a positive effect on schooling since, in the presence of credit constraints, poorer households are less likely to be able to meet the direct and indirect costs of education. It should be noted that, conditional on parental education (see below), this variable is expected to reflect mainly transitory shocks to income.

- *impyA_h*: is a variable identifying the households for which total family income was imputed. The imputation procedure was used because the number of missing values for individual incomes varied a great deal across countries, which raised concerns regarding non-random mismeasurement of income.[5]
- *nads*: is the number of persons in the household older than eight (excluding the adolescent). The predicted effect of this variable is ambiguous. On the one hand, it can increase the probability of the working outcomes because, conditional on family income, the higher the number of persons present in the household, the higher the need for resources. On the other hand, the older people in the household may take care of younger children, freeing others to go to school.
- *nchild*: is the number of children in the household younger than eight. This variable is included in order to capture the number of children in the household who need care. This will tend to increase the adolescent's probability of staying at home to help with child-raising or working to help with the family budget, since family income earned by adults is being controlled for.
- *Finch*: is an interaction between family income and the number of children in the household. This variable is included to examine the possibility that family income is more important in households with a high number of children.
- *Finads*: is an interaction between family income and the number of persons older than eight.
- *Finc*2: is family income squared to allow for possible non-linearities in the relationship between income and time allocation.
- *Finch*2: is an interaction between family income squared and the number of children of the household.
- *Finads*2: is an interaction between family income squared and the number of persons older than seven.
- *educpar*: is the maximum parental education. This variable is expected to have a positive impact on the adolescent's schooling

[5] The imputation procedure was carried out by the IDB. Details are available from the authors upon request.

outcomes for various reasons. It is a proxy for permanent family income, and it may also indicate that the family has more information on returns to education. Finally, educated parents can help children's performance in school, which may lower drop-out rates. This proxy is used because it seems that one highly educated parent is enough to feed these effects through to the child, even if the other parent has a lower level of education. Moreover, there are many single-parent households in the sample.

- *occup*: is a dummy defining the occupation of the head of the household, taking the value of 1 if the head is an independent worker (self-employed or manager) and 0 if he or she is an employee or is currently unemployed. This variable is predicted to have a positive effect on the probability associated with working outcomes, as it may increase the availability of labor market opportunities for the adolescent.
- *urban*: is a dummy taking the value of one if the adolescent lives in an urban area. This variable is predicted to have a positive impact on studying because of the availability and better quality of schools in urban areas and because of adolescent agricultural work in rural areas.
- *compos*: is the household composition (1 represents a nuclear family and 0 designates an extended family).

The macro variables were taken from the World Bank Development Indicators (1998). The main macro variables are defined as follows:

- *gdp*: is the country per-capita gdp (converted into 1995 dollars using PPP). It is expected that richer countries will have a higher percentage of children in school, perhaps because of greater resources devoted to human capital formation.
- *depend*: is the dependency ratio, defined by age structure of the population: [(n<15 or n>65)/15<n<65], where n is the size of population in each group. It is expected that the higher the dependency ratio, the higher the outcomes associated with working, since adolescents may have to work to support those who are not in the labor force.
- *pop*: is log (population size) to capture possible scale effects.

- *urban*: is the urbanization rate.
- *youth unemployment rate*: is unemployment of those between 12 and 19 years old, which attempts to capture cyclical effects that mainly affect youth. The predicted effect of this variable is to increase the schooling probability, since a high unemployment rate will mean that the labor market is not very attractive and therefore represents a good opportunity to invest in human capital.

Econometric Methodology

The problem of time allocation decisions can be modeled within the following structure:

Choices: $j = 0,1,2,3$

Households: $i = 1,2,\ldots, N$

Regressors: $p = 1,2,\ldots, P$

Linear predictor for household i: $X_i\beta_j$

Probability of household i choosing j:

$$\Pr(Y_i = j) = P_{ij} = \frac{\exp(X_i\beta_j)}{1+\sum_{k=0}^{J}\exp(X_i\beta_k)}$$

Vector of Probabilities (for all households in the sample):

$$\Pr(Y = j) = P_j = \frac{\exp(X\beta_j)}{1+\sum_{k=0}^{J}\exp(X\beta_k)}$$

Estimation of this model through maximum likelihood is fairly straightforward (see Greene, 1993, p. 667).[6] The mean predicted probabilities were computed by calculating the average of individual probabilities:[7]

[6] Stata software was used to perform all the procedures described in this section.

[7] This approach was preferred to computing the probability at the average values of the regressors.

$$\overline{\hat{P}}_j = \frac{1}{N}\sum_{i=1}^{N}\hat{P}_j$$

where $\hat{P}_j$ is computed for each household, using the observed values of the regressors. To compute the marginal effects of a regressor X_p, the other variables were fixed for each household at their actual values, and various values for X_p were then imputed over the sample range:

$$\left\{\overline{\hat{P}}_j \middle| x_p = x_{p,\min}, \overline{\hat{P}}_j \middle| x_p = x_{p,z}, \ldots, \overline{\hat{P}}_j \middle| x_p = x_{p,\max}\right\}$$

$\overline{\hat{P}}_j$ is then graphed as a function of $x_{p,z}$.

Data Description

Table 3.1 presents some descriptive statistics on the variables used in the analysis, including the overall mean, variance, and a decomposition of the variance into within-country and cross-country components. In time allocation decisions, about 62 percent of adolescents in the sample (age 12 to 19) are studying only, whereas the rest of them are roughly evenly split among the three other states. One can notice as well that most of the observed dispersion occurs within countries, which is generally true for all the other variables as well.

The description of the household variables shows firstly that the average number of younger children is less than one, with a standard deviation (s.d.) of about 1.2. Moreover, the average number of adults is quite high at 4.31, with a s.d. of 4.12. Mean total monthly family income is about US$1,000, with an s.d. of around US$2,300 due almost exclusively to variation across households within countries, which reflects the wide income distribution that prevails in most of these countries.[8] Mean parental education is about seven years of schooling, with an s.d. of 4.5, and again about 90 percent of the variance comes from inside the countries. Finally, about 70 percent of the families live in urban areas. In conclusion, one can say that the countries in our sample look fairly homogeneous, with most of the variation observed

[8] It is important to emphasize that the sample only includes households with adolescents age 12 to 19.

Table 3.1. Descriptive Statistics

Variable	Mean	Total variance	Between countries	Within countries
Allocation				
Not working, not studying	0.10	0.087	0.001	0.086
Not working, studying	0.62	0.235	0.011	0.223
Working, not studying	0.16	0.136	0.002	0.133
Working, studying	0.12	0.104	0.007	0.096
Individual (12–19)				
Age	15.29	4.997	0.010	4.987
Years of schooling	6.58	8.744	1.037	7.707
Gender (1 = male, 0 = female)	0.52	0.250	0.000	0.250
Household				
Number of children	0.70	1.531	0.065	1.466
Number of adults	4.31	17.537	1.486	16.052
Family income (dollars 1995 using PPP)	1,025.56	5,301,708.81	257,320.56	5,044,388.25
Composition (1 = nuclear, 0 = extended)	0.78	0.174	0.003	0.171
Parental Education*	6.97	20.801	2.184	18.617
Occupation (1 = independent worker or employee, 0 = others)	0.34	0.224	0.005	0.219
Geographic				
Urban (1 = urban areas, 0 = rural areas)	0.70	0.226	0.058	0.168
Aggregate Variables				
Urbanization rate (%)	74.39	161.75	161.754	—
Population size (log)	17.18	1.874	1.874	—
Youth unemployment rate	18.01	100.170	100.170	—
Dependency ratio	0.62	0.007	0.007	—
Per-capita gdp (dollars 1995 using PPP)	5,704.2	7,636,100.31	7,636,100.31	—

Source: IDB Household Surveys and author's calculations.
*Maximum parental education.

among households arising from the high level of inequality that prevails in most of Latin America.

The description of the data set is concluded by looking at the behavior of the aggregate variables.[9] As shown in Table 3.1, the urbanization rate is 75 percent (which confirms the micro information), the mean population size is around 29 million, the average youth unemployment rate (calculated from the micro data) is about 18 percent (and shows a great deal of variation among the countries), the dependency ratio is 0.62, and the mean per-capita GDP is about US$5,700, with an s.d. of around US$2,300. If the mean GDP is divided by 12, a monthly GDP estimate of US$475 is obtained, which compares with the mean per capita family income (calculated from the micro data) of around US$200. This result appears reasonable, especially since only a fraction of the total sample was used.

Time Allocation

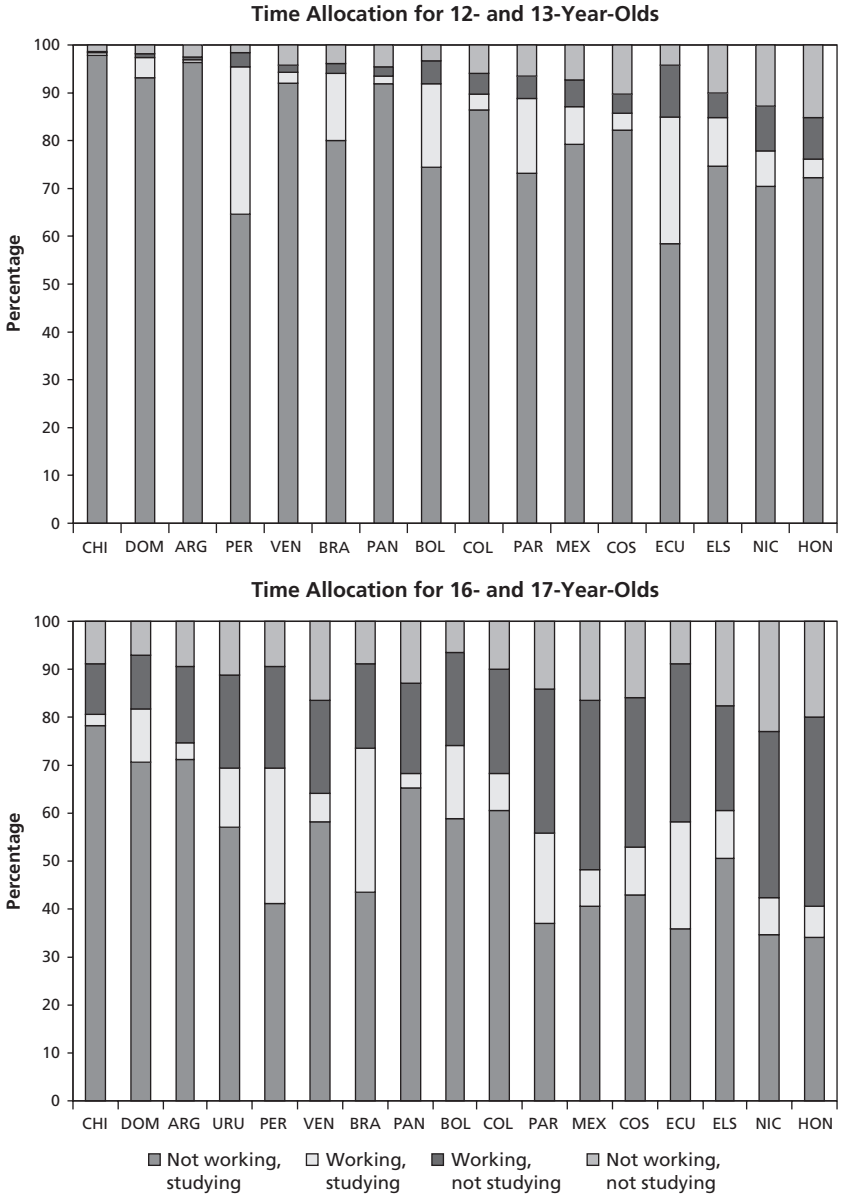
Figure 3.1 presents a description of the time allocation decisions of adolescents at two different stages of their life cycle (12-13 and 16-17).[10] First, it is clear that the countries differ with respect to the percentage of adolescents in each of the four possible states defined in this chapter. These differences must be viewed, though, in light of several restrictions on the data: i) "work" here also encompasses the cases where the individual is looking for a job as well as employment, ii) the Argentinean data refer to greater Buenos Aires, and iii) Uruguayan data refer to urban areas only, and in that country only data for adolescents aged 14 and above are available.

Keeping in mind the restrictions above, the countries are ordered in terms of the percentage of individuals in each age group who are studying, independently of their working status. In the first age group (12-13), Chile, the Dominican Republic, Argentina, Peru, Venezuela, Brazil, Panama, Bolivia and Colombia have more than 90 percent of young adolescents in school, whereas Paraguay, Mexico, Costa Rica, Ecuador, and El Salvador have between 80 percent and 90 percent, and Nicaragua and Honduras have

[9] This information comes from the World Bank's Development Indicators.

[10] All results will be presented only for two of the four age groups for the sake of brevity. The results for the other two age groups (14-15) and (17-18) are available upon request.

Figure 3.1. Time Allocation



Note: ARG = Argentina
BOL = Bolivia
BRA = Brazil
CHI = Chile
COL = Colombia
COS = Costa Rica
DOM = Dominican Republic
ECU = Ecuador
HON = Honduras
MEX = Mexico
NIC = Nicaragua
PAN = Panama
PER = Peru
PAR = Paraguay
ELS = El Salvador
URU = Uruguay
VEN = Venezuela

Source: IDB Household Surveys and author's calculations.

between 70 percent and 80 percent.[11] It is important to note, however, that some countries have very high shares of adolescents studying and working at the same time, even at this tender age. The countries with the most notable rates are Peru (30 percent), Ecuador (25 percent), and Paraguay, Bolivia and Brazil (all 15 percent).

In the 16-17 age group there is, as expected, a greater percentage of working adolescents. The countries where 70 percent or more of individuals are studying, independently of working status, are Chile, the Dominican Republic, Argentina, Uruguay, Peru, Brazil and Bolivia. These countries seem to be doing well in terms of school attendance. The countries in an intermediate position, with between 50 percent and 70 percent of adolescents in school, are Venezuela, Panama, Colombia, Paraguay, Costa Rica, Ecuador and El Salvador. The countries with less than 50 percent in school are Mexico, Nicaragua, and Honduras.

The overall picture that emerges from the analysis is one of cautious optimism. Latin America does seem to be doing relatively well in terms of the education of young adolescents (12-13), since more than 75 percent of the individuals in this age group are studying in each and every country examined in this study. The problem remains with the education of the older group (16-17), those that should be in high school, although on average only 60 percent of adolescents are going to school. Moreover, the differences among countries and between regions within countries (not shown here) are pronounced, ranging from about 20 percent of students in the rural areas of Honduras, Nicaragua, and for females in Mexico, to 80 percent in urban Bolivia and the Dominican Republic, for both males and females.

Income Inequality and Time Allocation

In a recent survey on growth and inequality, Aghion, Caroli and García-Peñalosa (1999) emphasize the harmful effects that inequality can have on growth. The argument is that, in the presence of imperfect capital markets, (human) capital investments can remain below optimal levels, since some agents end up with relatively high levels of marginal productivity but with-

[11] For a thorough study on the rapid improvement in school retention rates in El Salvador, see Cox Edwards and Ureta, 1999.

out the funds necessary to undertake investments. With the data set in hand, one can investigate whether this relationship holds true in different Latin American countries, that is, whether within-country income inequality is correlated with school attendance. This relationship will be considered in relation to the controls described above.

Figures 3.2 and 3.3 relate the time allocation decisions of adolescents (12-13 and 15-16) to the location of their families in the income distribution. In the younger group, time allocation seems to be correlated with income per capita, especially in relation to the time devoted to work. This correlation, however, varies widely across countries. For example, in Chile, Argentine, the Dominican Republic and Venezuela, almost everyone is in school, regardless of family income.

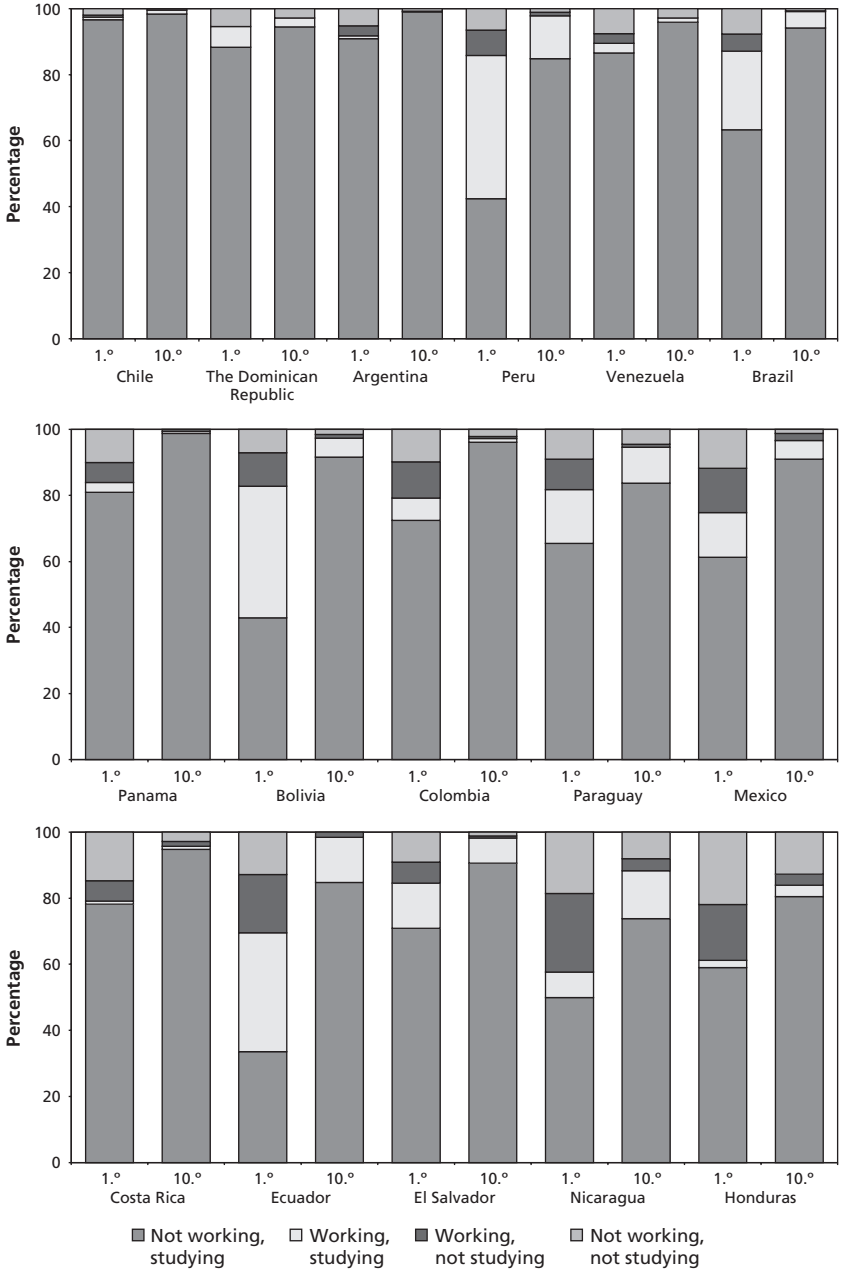
Another clear pattern is that adolescents from families at the bottom of the distribution are much more likely to be working as well as studying. This probably means that credit constraints are binding and could lead to higher drop-out rates as those children grow older. This seems to be the case in Peru, Brazil, Bolivia, and Ecuador. For most of the other countries, the children in the poorest families are more likely to be working full time, with no time dedicated to formal schooling, or working and studying at the same time, as compared to children in the richest families.

For the older group (Figure 3.3) the differences in time allocation between the extremes of the income distribution are more dramatic. While average school attendance for the tenth decile is 80 percent, at the bottom of the distribution this number is closer to 40 percent. In some countries, like Honduras, Nicaragua, Mexico and Costa Rica, this figure falls to only a little above 20 percent.

The ratio between the percentage of adolescents attending school among those in the top and those in the bottom of the income distribution is computed as an indicator of poor intergenerational mobility.[12] The countries with the highest ratios are Nicaragua (3.8) and Mexico (3.5). A middle group, with a differential between 2 and 3, is composed of Costa Rica (2.7), Bolivia (2.8) and Panama (2.6). Ecuador (2.3), Honduras (2.3) and Uruguay (2). In the other countries access to education is more equitably distributed.

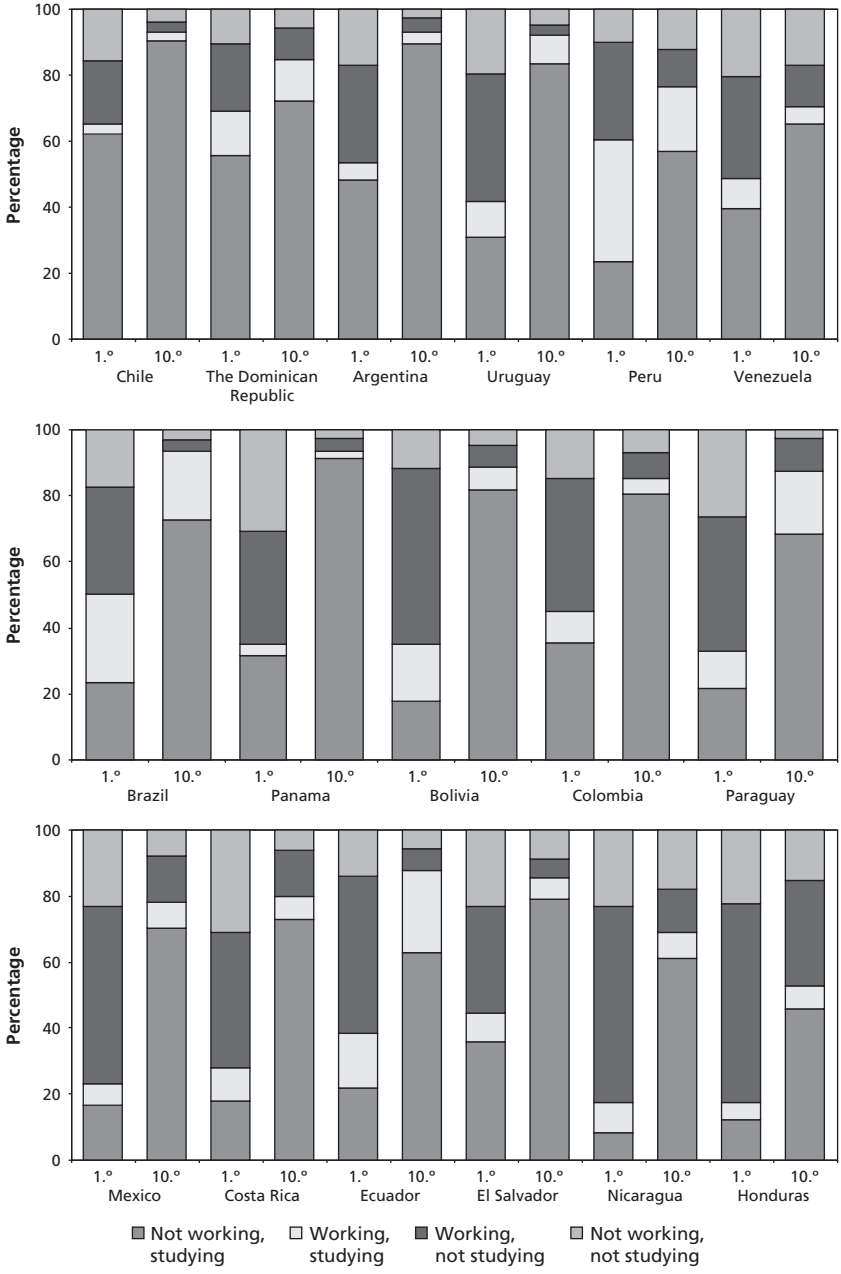
[12] Of course, this is only a raw indicator, since other possible determinants of school attendance are not being controlled for.

Figure 3.2. Time Allocation and Household Per Capita Income for 12- and 13-Year-Olds



Source: IDB Household Surveys and author's calculations.

Figure 3.3. Time Allocation and Household Per Capita Income for 16- and 17-Year-Olds



Source: IDB Household Surveys and author's calculations.

Results

Before the results are described, it is necessary to emphasize the limitations of the present approach. A number of available country level variables are included in order to capture more precisely the micro effects and to explain the impact of the aggregate variables themselves. However, it is possible that variables such as youth unemployment rates and per capita GDP are correlated to other omitted country-level effects. Household-level variation is additionally used to include country fixed effects and control for all time-invariant country-specific determinants of the time allocation decisions, but the coefficients on the micro variables do not change significantly.[13]

Estimated Coefficients

Tables 3.2 and 3.3 present the coefficients (standard errors) estimated by the multinomial logit regression for each of the three outcomes, relative to the omitted category "not working and not studying." Interestingly, the results are similar for both age groups. One can note that most of the coefficients were precisely estimated, with the important exceptions of family income for both age groups and of family composition and population for the youngest group. Moreover, the results have the predicted signs. For example, older children seem less likely to be studying and males more likely to be working. The number of younger children seems to depress the probability of studying, while parental education and living in urban areas have the opposite effect.

Fit of the Model

Figures 3.4 and 3.5 describe the fit of the estimated models, comparing the observed frequencies with the average predicted probabilities, and with the predictions using only the micro variables, for each outcome in each country. This assesses the ability of the model estimated with the pooled data to explain the resulting time allocation decisions in all the different countries. If the fit is good enough, it will mean that there is a common relationship

[13] The results are available from the authors upon request.

Table 3.2 Regression Results: 12-13

	Multinomial regression					
	Not working, studying		Working, not studying		Working, studying	
Variables	**Coef.**	**Std. error**	**Coef.**	**Std. error**	**Coef.**	**Std. error**
Age 13	–0.540	0.045	0.363	0.071	–0.216	0.055
Gender	0.365	0.045	1.486	0.074	1.201	0.056
Fincome (×10,000)	–1.50	1.30	2.90	2.20	0.77	1.50
Impy A_h	–0.208	0.085	–0.163	0.125	–0.296	0.111
Nads	0.038	0.012	–0.018	0.020	–0.020	0.014
Nchild	–0.135	0.023	0.043	0.033	–0.033	0.028
Finch (×10,000)	3.00	1.30	0.93	2.30	0.94	1.50
Finads (×10,000)	9.90	3.70	–26.0	8.10	2.50	4.40
Finc2 (×10,000,000)	1.70	1.20	2.40	1.70	0.81	1.30
Finch2 (×10,000,000)	–1.00	0.59	–1.10	1.10	–0.61	0.68
Finads2 (×10,000,000)	–5.90	3.30	–3.20	7.70	–2.70	3.80
Educpar	0.170	0.008	–0.032	0.013	0.081	0.009
Occupation	0.152	0.048	0.508	0.073	0.878	0.058
Urban	0.498	0.050	–0.561	0.082	–0.358	0.062
Composition	–0.084	0.059	–0.068	0.089	–0.048	0.073
Urbanization rate	0.024	0.004	0.029	0.006	0.083	0.006
Population (log)	0.014	0.030	0.019	0.051	0.058	0.044
Unemployment rate	–0.037	0.005	–0.052	0.008	–0.154	0.007
Dependency ratio	–1.045	0.416	–1.821	0.690	–9.794	0.603
GDP (×10,000)	1.30	0.190	–1.00	0.360	–3.00	0.290
Constant	0.320	0.640	–1.173	1.091	2.430	0.920

Source: IDB Household Surveys and author's calculations.
Notes: (not working, not studying) is the comparison group.
Cases = 46,332.
Prob > χ^2 = 0.0000.
Log likelihood = –22,870.521.
Pseudo R^2 = 0.1908.

between the independent variables and the time allocation decisions in all the countries under study.

Significant differences between the predicted and the observed outcomes mean that there are unobserved, perhaps institutional effects that make a country deviate from a predicted outcome. Moreover, by assessing the specification that includes only the micro variables, the figures examine whether household characteristics can adequately explain schooling and work decisions, without the need for country-specific variables.

Table 3.3. Regression Results: 16-17

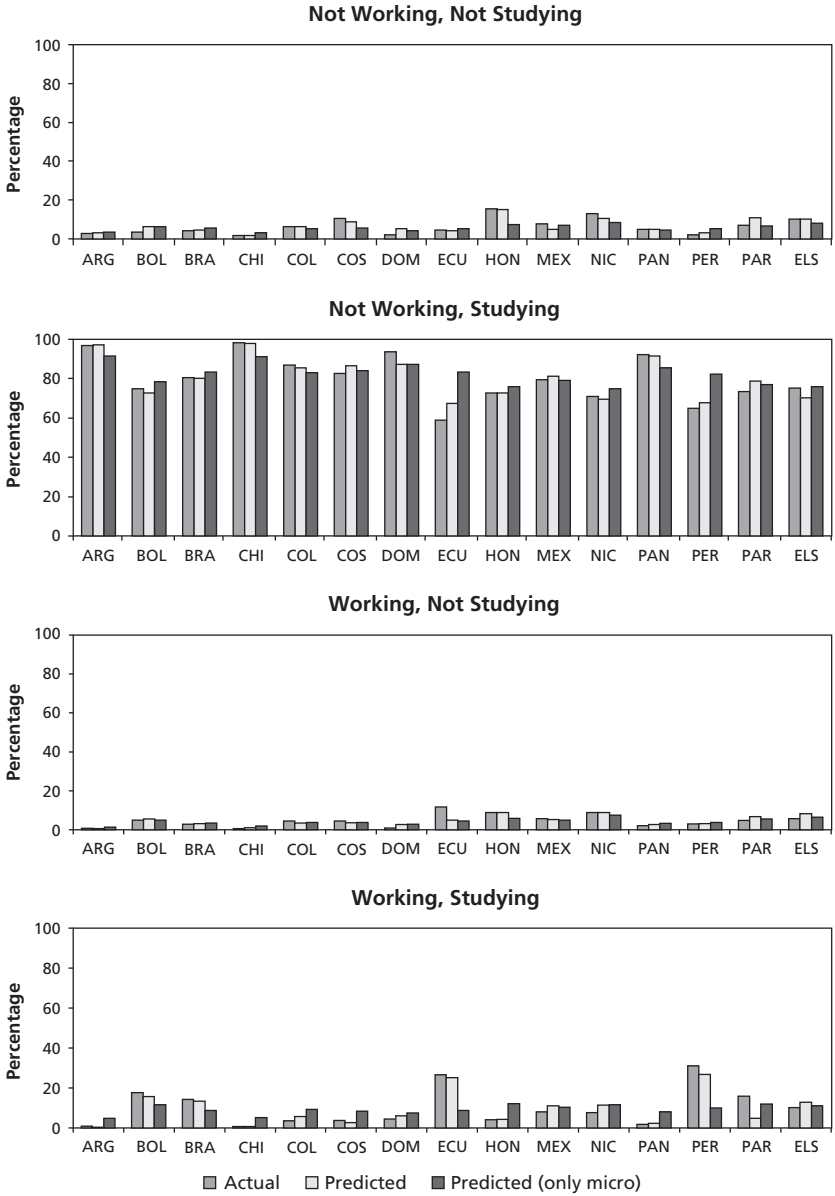
	Multinomial regression					
	Not working, studying		Working, not studying		Working, studying	
Variables	**Coef.**	**Std. error**	**Coef.**	**Std. error**	**Coef.**	**Std. error**
Age 17	–0.335	0.034	0.291	0.038	–0.010	0.040
Gender	0.406	0.035	1.613	0.039	1.134	0.042
Fincome (×10,000)	–0.730	0.760	1.100	0.860	0.830	0.960
Impy A_h	–0.432	0.075	–0.230	0.079	–0.209	0.095
Nads	0.007	0.006	0.016	0.006	–0.019	0.009
Nchild	–0.204	0.021	–0.005	0.021	–0.112	0.026
Finch (×10,000)	2.70	0.80	–1.70	0.94	0.63	0.99
Finads (×10,000)	7.30	1.90	–0.45	2.30	3.00	2.20
Finc2 (×1,000,000,000)	3.70	7.00	–3.20	8.40	–3.00	9.20
Finch2 (×1,000,000,000)	–8.20	7.20	5.40	8.50	1.40	9.40
Finads2 (×1,000,000,000)	–0.18	8.80	1.70	9.90	–9.30	9.60
Educpar	0.167	0.005	–0.038	0.006	0.083	0.006
Occupation	0.014	0.037	0.143	0.041	0.330	0.044
Urban	0.482	0.040	–0.282	0.043	0.249	0.048
Composition	0.251	0.041	0.272	0.045	0.317	0.050
Urbanization rate	–0.002	0.003	0.005	0.003	0.045	0.004
Population (log)	0.094	0.021	0.058	0.024	0.115	0.028
Unemployment rate	–0.007	0.004	0.012	0.004	–0.042	0.005
Dependency ratio	–1.023	0.334	–0.226	0.364	–8.835	0.481
GDP (×10,000)	3.70	0.120	–8.60	0.140	–4.00	0.170
Constant	–0.848	0.480	–1.274	0.538	1.898	0.674

Source: IDB Household Surveys and author's calculations.
Notes: (not working, not studying) is the comparison group.
Cases = 43,309.
Prob > χ^2 = 0.0000.
Log likelihood = –42,228,044.
Pseudo R^2 = 0.1725.

In general, the complete model is able to predict quite well the observed frequencies for the two age groups and four outcomes in Latin America and the Caribbean.[14] The only significant deviation in the younger group of adolescents occurs in Ecuador, where the percentage who are only

[14] This might be not totally unexpected, given that the complete model includes the effect of some aggregate variables, especially per capita GDP, which are good predictors but do not necessarily provide a good explanation.

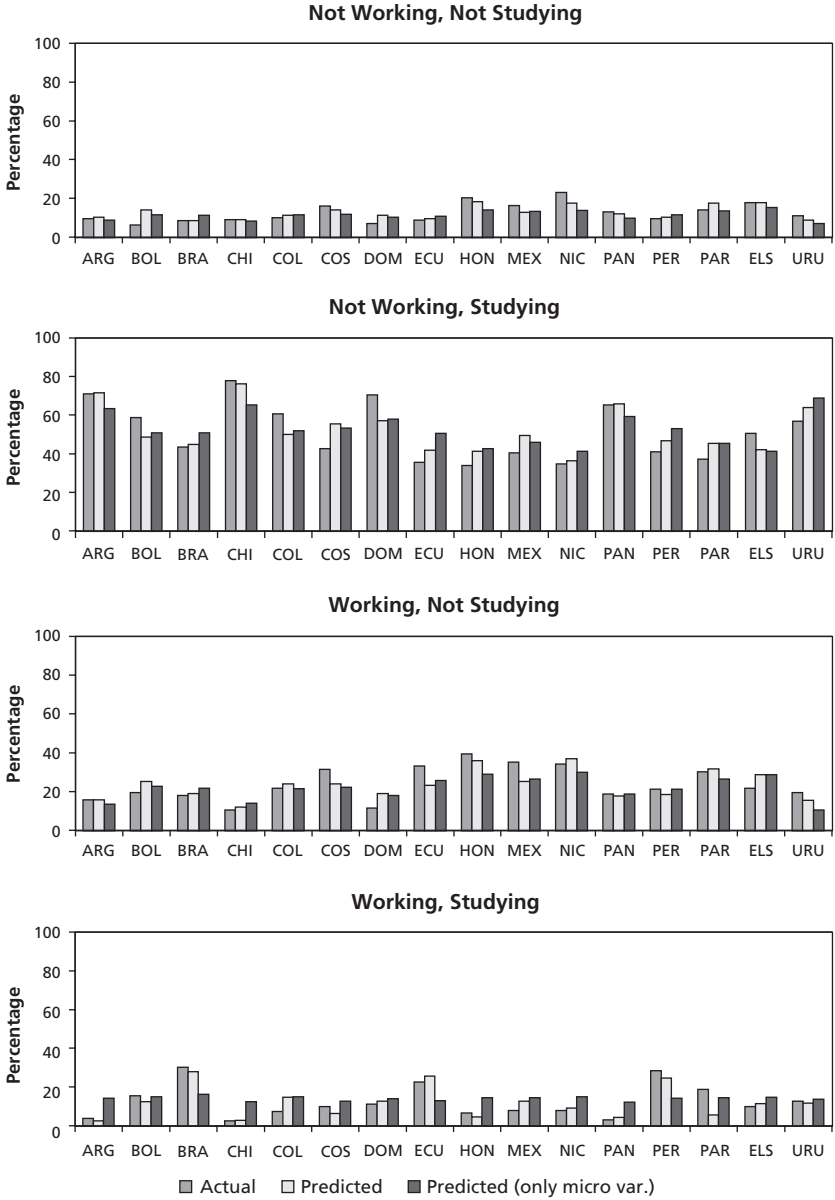
Figure 3.4. Fit of the Model for 12- and 13-Year-Olds



Note: ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHI = Chile, COL = Colombia, COS = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, HON = Honduras, MEX = Mexico, NIC = Nicaragua, PAN = Panama, PER = Peru, PAR = Paraguay, ELS = El Salvador

Source: IDB Household Surveys and author's calculations.

Figure 3.5. Fit of the Model for 16- and 17-Year-Olds



Note: ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHI = Chile, COL = Colombia, COS = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, HON = Honduras, MEX = Mexico, NIC = Nicaragua, PAN = Panama, PER = Peru, PAR = Paraguay, ELS = El Salvador, URU = Uruguay

Source: IDB Household Surveys and author's calculations.

working is higher than predicted by the model; this is also reflected in a lower rate of individuals only studying.

The micro variables (individuals and household) are also able to predict quite well the time allocation decisions of young adolescents. The main failures occur again in Ecuador and in Peru, which display a low share of adolescents studying only, given their household characteristics. This situation is also reflected in a high rate of adolescents working and studying at the same time.[15]

The complete model is also able to predict quite well the time allocation decisions of the 16-17 age group, as shown in Figure 3.5. This is perhaps surprising given the high variability in behavior across countries in this age group. The main deviations from predicted outcomes occur in Bolivia, Colombia, the Dominican Republic and El Salvador, which feature higher-than-expected levels of "studying only." On the other hand, in Costa Rica, Ecuador, and Mexico, the share of adolescents studying full time falls below the model's predictions. Conversely, the share of adolescents only working is higher than what the model would predict.

It is further found that, for most countries studied, the predictions using only the micro variables are close to the predictions that use the whole model. This means that the family and household characteristics are an important determinant of the time allocation decisions observed in some countries. A closer examination of the regression results should reveal which of these variables are most important.

One way to examine the cases where the micro model cannot explain as well as the complete model is to look at the "working and studying" outcome. In countries such as Argentina, Chile, Honduras, and Panama, the aggregate variables are important in explaining the small percentage of adolescents attending school and working at the same time. In the case of Paraguay, however, the micro variables predict the observed percentages more accurately than does the complete model. On the other hand, Brazil, Ecuador and Peru have, as shown before, a higher-than-predicted percentage of adolescents in this group, perhaps because of institutional aspects intrinsic to these countries.

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[15] It is important to note, however, that this could be due to methodological differences in the way that the household surveys consider people to "be in the labor market."

Main Effects

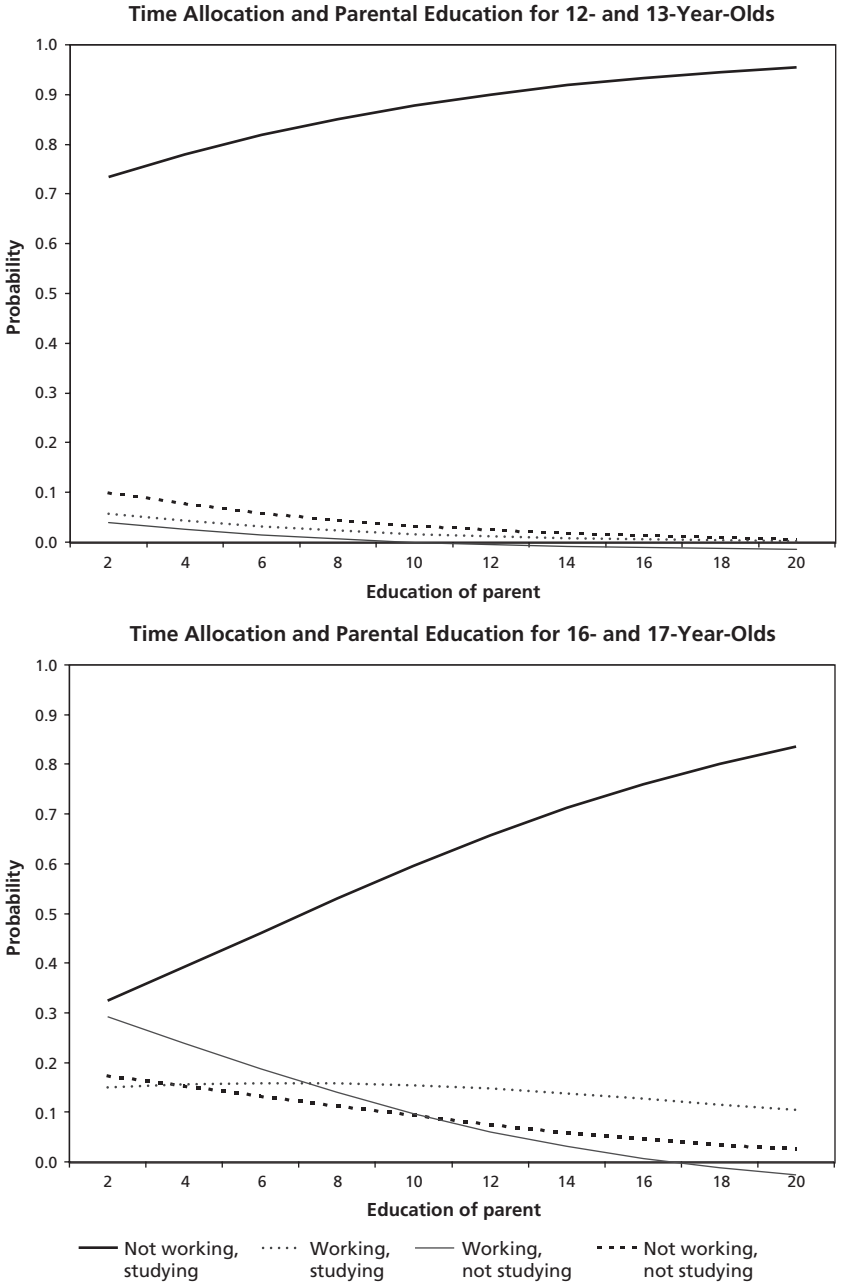
Figures 3.6 to 3.10 describe the effects of the main variables included in the multinomial logit regression for the two age groups examined here. The impact of parental education is the first variable considered, and this seems to be one of the most important determinants of adolescents' time allocation decisions in Latin America and the Caribbean. This remains true even after other household and country confounding effects are controlled for. Moreover, the effect seems most intense among the 16-17 age group.

An increase in parental years of schooling raises the probability of the "only studying" outcome at the expense of all the other possibilities, particularly the "only working" alternative. The estimated probability of "study and not work" in the 16-17 age group ranges from about 30 percent for those whose parents are illiterates to about 85 percent for children of college graduates. The effect is also important among younger children. The obvious policy conclusion is that a boost in education can have dramatic effects for future generations in terms of productivity and growth.

Total income also has an impact on the allocation of time, even after controlling for countries' per capita GDP and for the number of younger and older people in the household. Interestingly enough, this impact is only significant among older adolescents in the 16-17 age group. For them, the probability of the "study only" outcome increases from 50 percent to about 80 percent when family income rises from US$200 to US$10,000 (which is the observed inter-quartile range). Increasing family income also reduces the percentage of children working and not studying. In the younger group the effect is quite small, which means that family income is not an important factor for schooling decisions at this stage of the life cycle. It is important to emphasize that, once parental education is controlled for, income effects can be regarded as a proxy for transitory shocks to income.

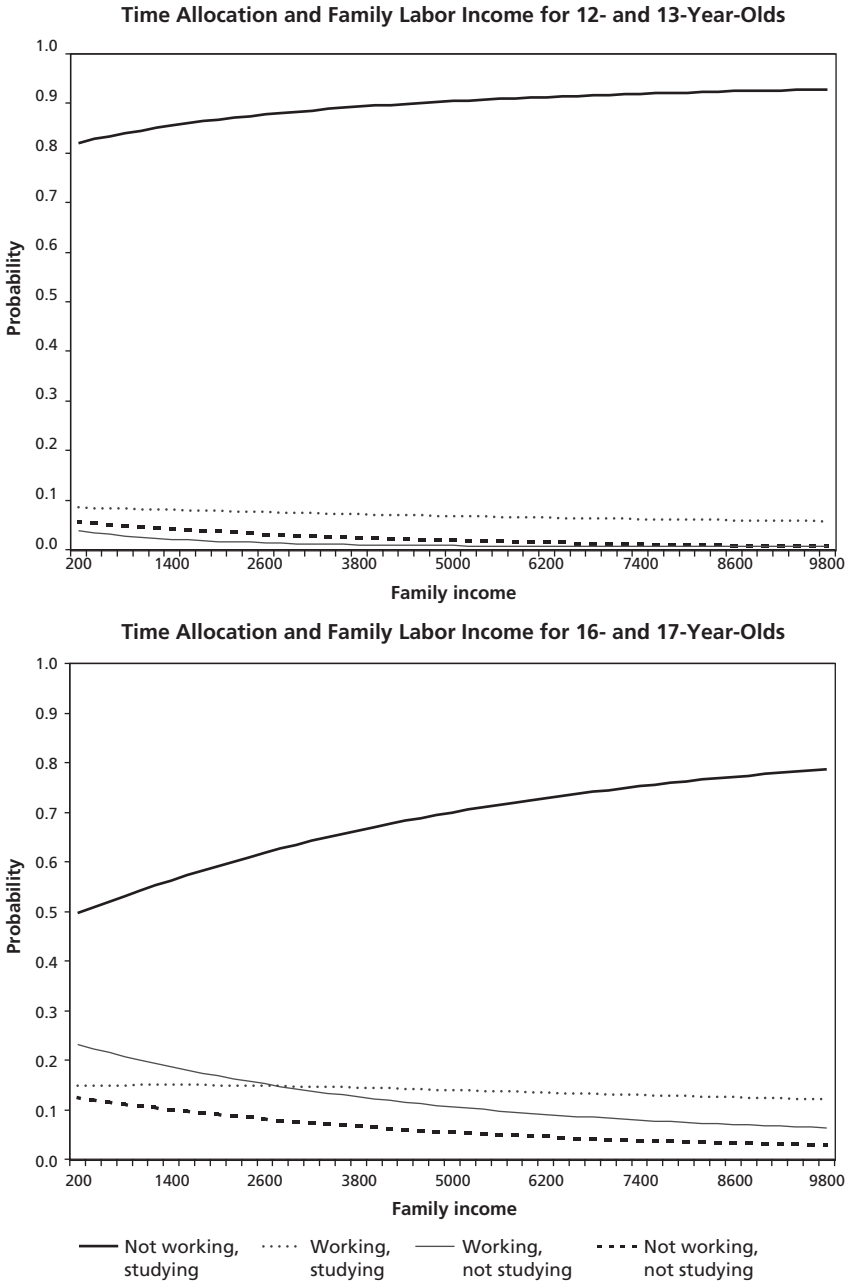
Another very important determinant of the schooling and working decisions, especially for those 16 and 17 years of age, is the number of younger children in the household. As shown in Figure 3.7, for members of this group in typical households, the probability of "studying only" declines from 60 percent to about 20 percent when the number of younger siblings goes from 1 to 10. For 12- and 13-year-olds the equivalent figures are 85 percent and 70 percent, respectively. All other outcomes are more likely in this case, especially "working and not studying." It therefore seems that the

Figure 3.6a. Regression Results: Parental Education and Household Income



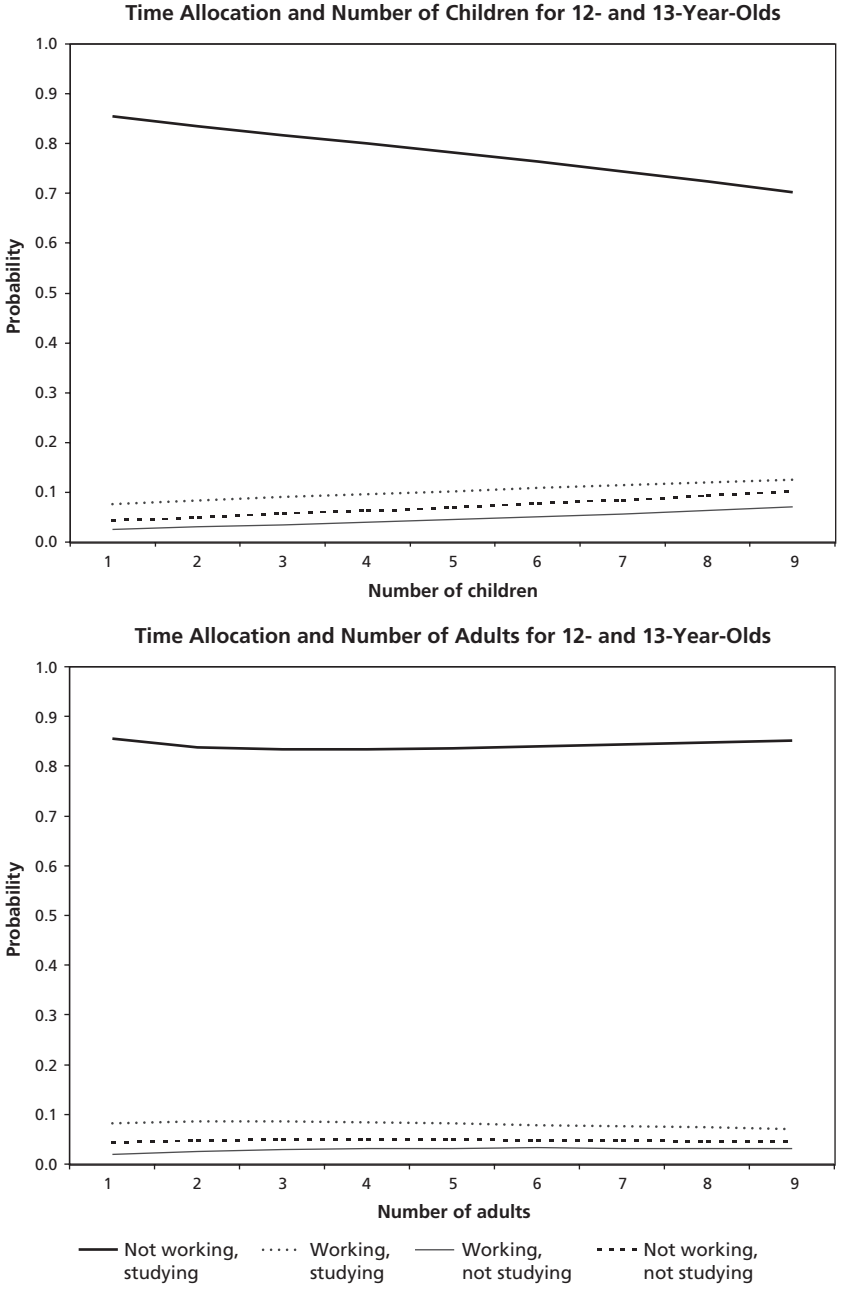
Source: IDB Household Surveys and author's calculations.

Figure 3.6b. Regression Results: Parental Education and Household Income



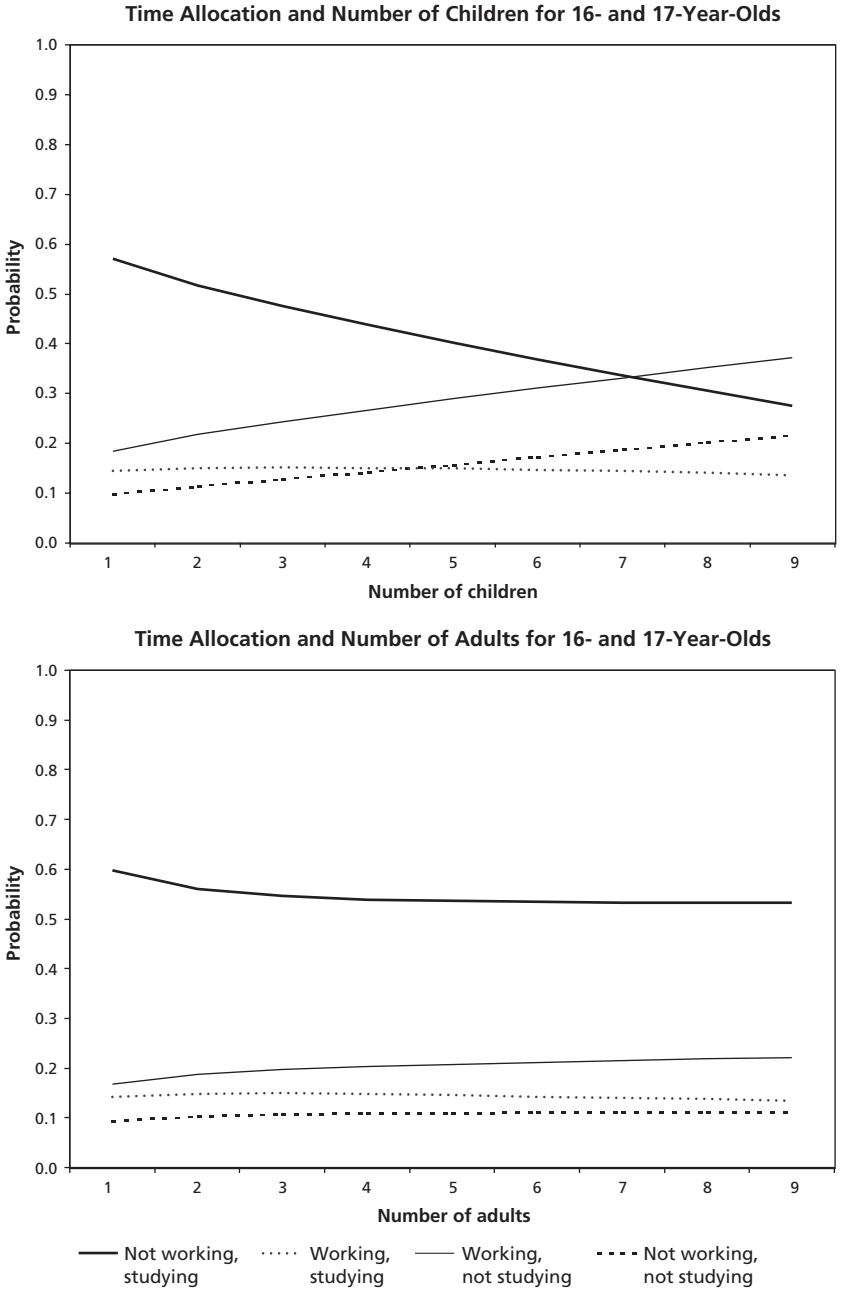
Source: IDB Household Surveys and author's calculations.

Figure 3.7a. Regression Results: Number of Children and Number of Adults



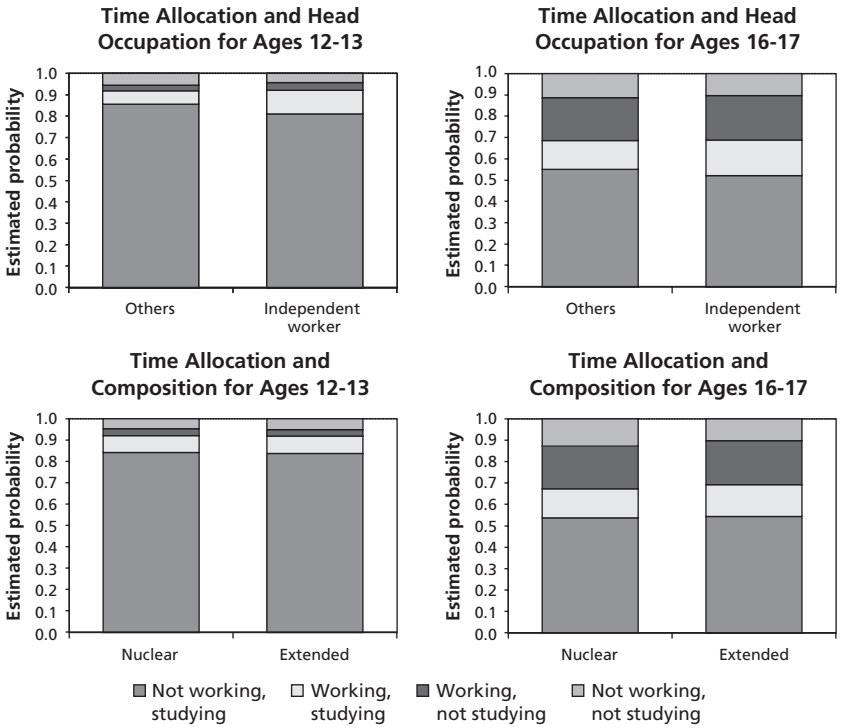
Source: IDB Household Surveys and author's calculations.

Figure 3.7b. Regression Results: Number of Children and Number of Adults



Source: IDB Household Surveys and author's calculations.

Figure 3.8. Head Occupation and Household Composition

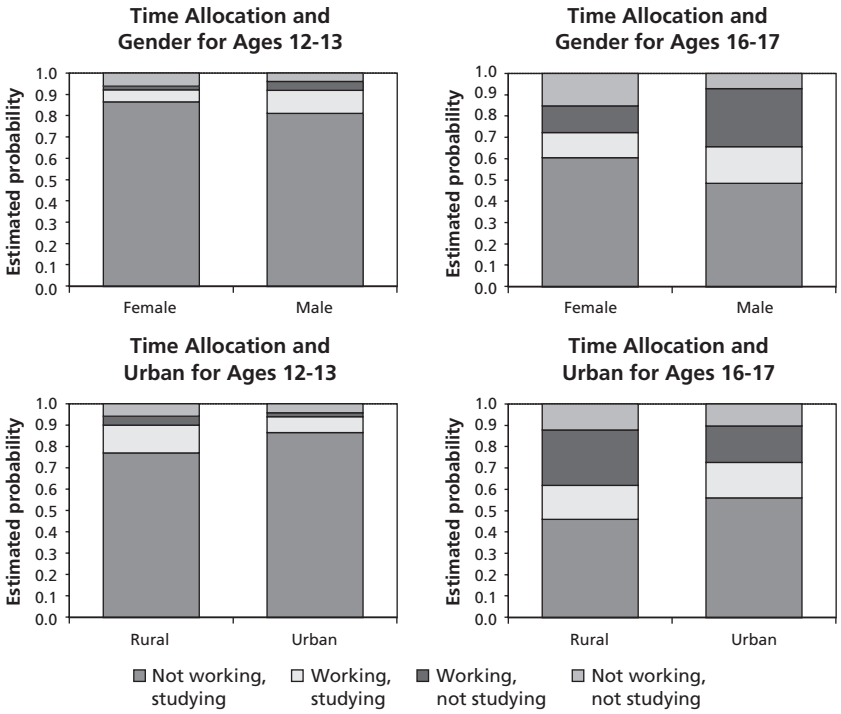


Source: IDB Household Surveys and author's calculations.

presence of a large number of younger children forces adolescents to go to work in order to help with the family budget. On the other hand, the number of children older than 8 does not have an important impact on time allocation decisions, increasing slightly the probability of the "working only" outcome for those between 16 and 17 years of age.

Likewise, family composition and the occupation of the head of household have only very small effects. As Figure 3.8 shows, neither having a self-employed head of household nor living in an extended family has important effects on the time allocation decisions. Figure 3.9, however, shows that being male and living in rural areas both significantly increase the likelihood of going to work. For the 16-17 group, males are 20 percent more likely to be working than females, whereas those living in rural areas are about 10 percent more likely to work than their urban counterparts.

Figure 3.9. Regression Results: Gender and Urban Areas

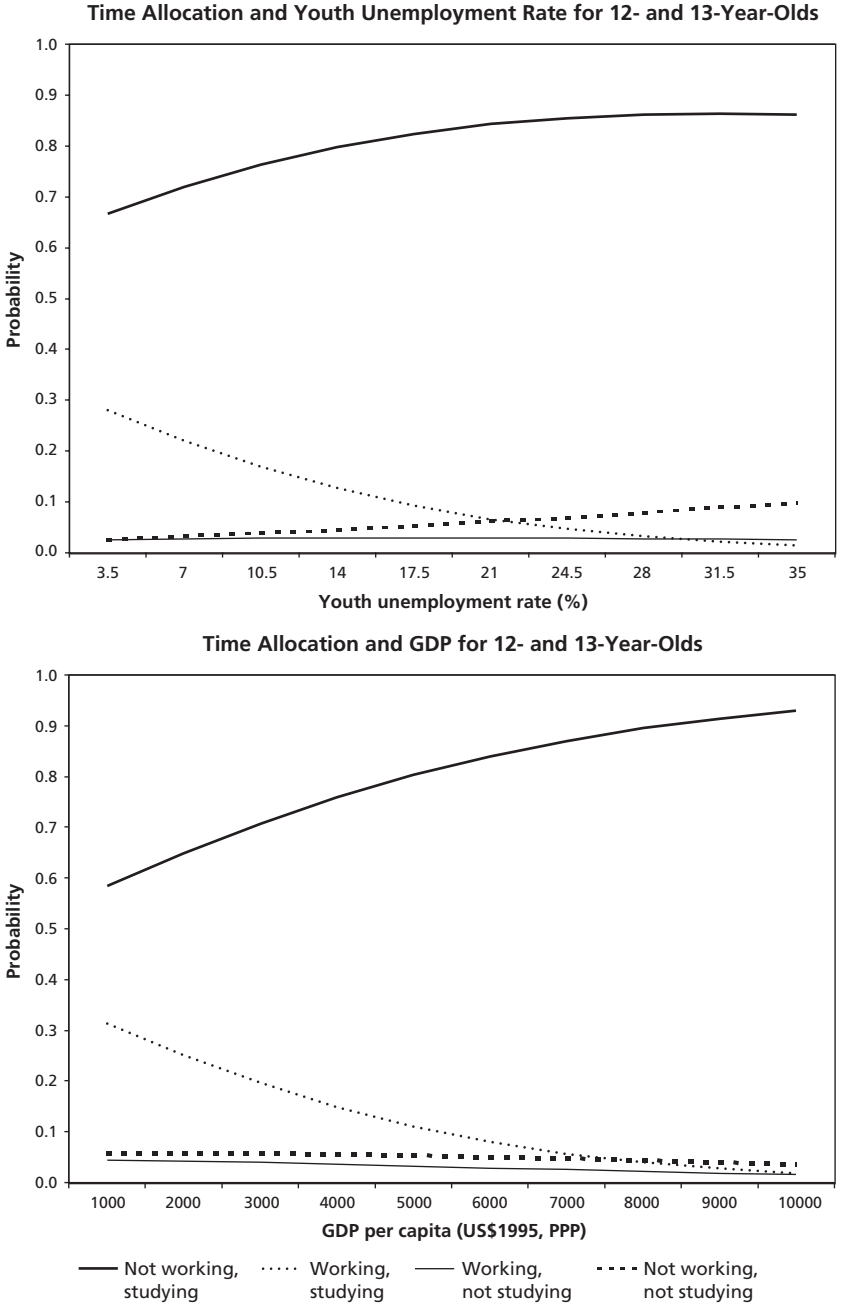


Source: IDB Household Surveys and author's calculations.

Among the country-specific macro variables, one of the most important in determining time allocation decisions is, as expected, GDP per capita (Figure 3.10). The higher the country GDP per capita, the higher the percentage of adolescents in both age groups who study and do not work. For 16-17 year olds, for example, each additional US$1,000 of GDP per capita linearly increases the probability of "studying only" by about 5 percent. The significant effect is to reduce the probability of the "studying and working" outcome from 60 percent (at a per capita GDP of US$1,000) to about 5 percent when per capita GDP reaches US$10,000.

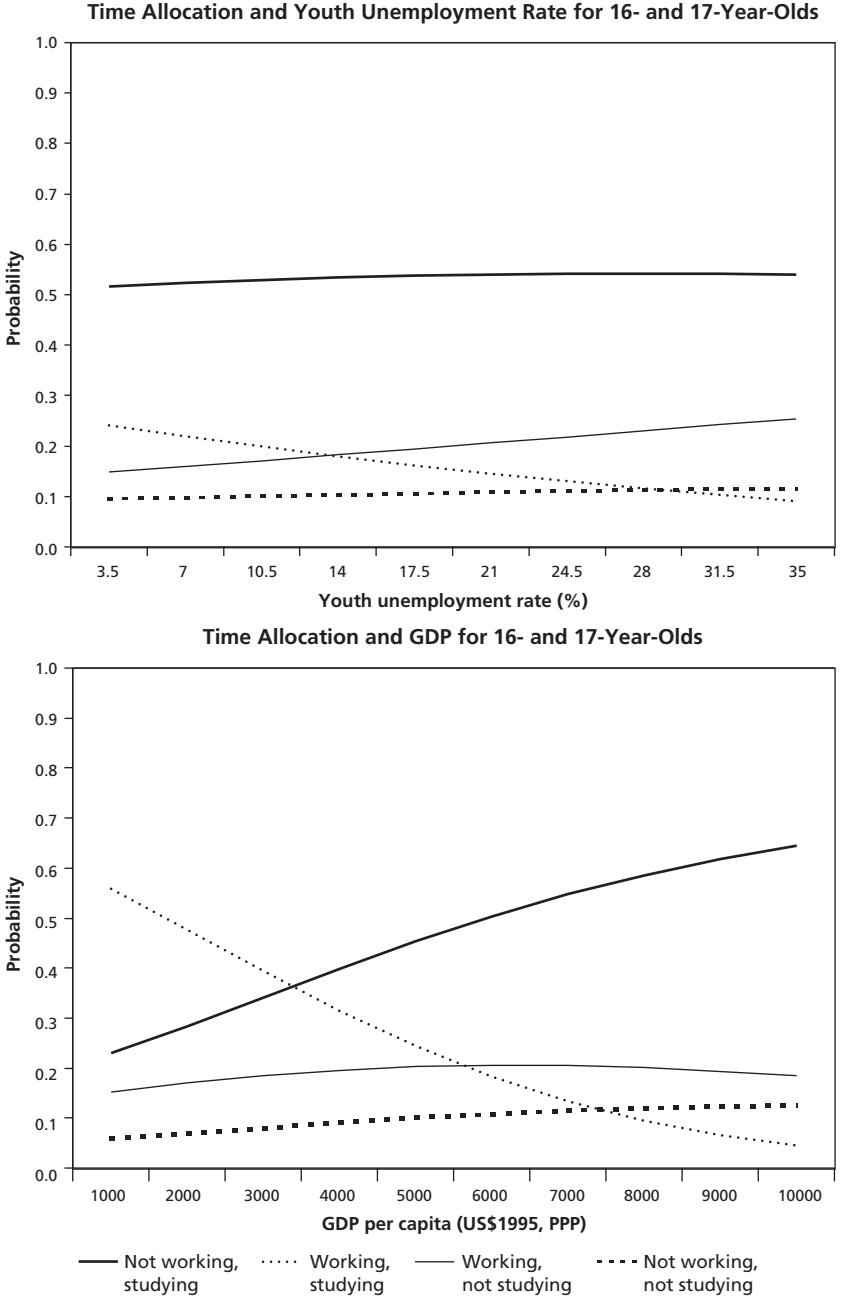
Youth unemployment also has an important impact on schooling, but in this instance the effect is more noticeable among younger adolescents. For the 12-13 group, the likelihood of the outcome "studying only" rises from about 68 percent in countries with low unemployment (about 3 percent) to about 80 percent in countries where the youth unemployment rate reaches

Figure 3.10a. Regression Results: Unemployment Rate and GDP



Source: IDB Household Surveys and author's calculations.

Figure 3.10b. Regression Results: Unemployment Rate and GDP



Source: IDB Household Surveys and author's calculations.

20 percent; the effect stabilizes thereafter. The outcome most depressed by youth unemployment is "working and studying," which falls from a rate of 30 percent in low unemployment countries to about 1 percent in countries where the youth unemployment rate is very high.

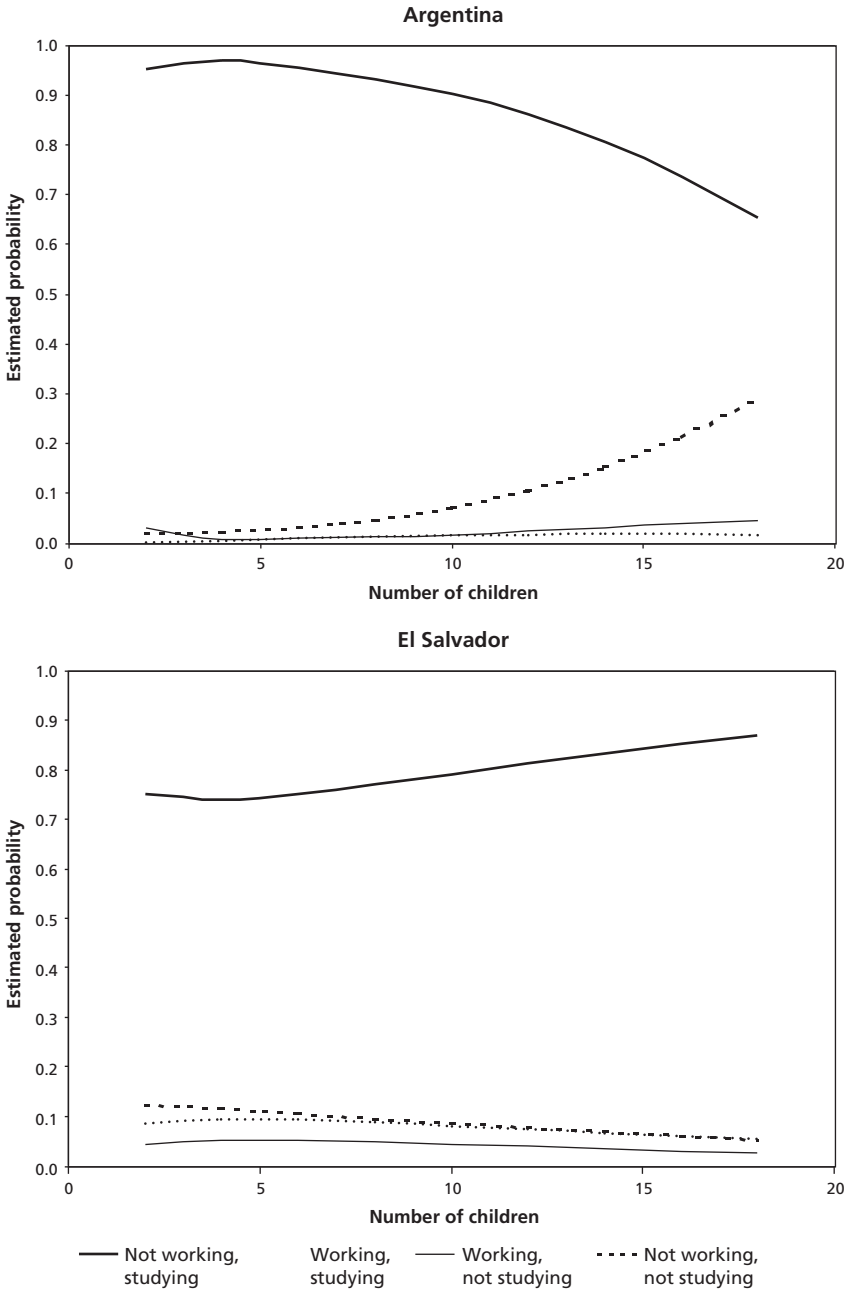
Country-Specific Results

An important question is whether the results obtained so far reflect an aggregation of different relationships between household characteristics and time allocation decisions taking place in different countries or whether there is a uniform pattern in the determinants of these decisions. In order to answer this question, separate regressions were run, using the same specification as before, for each of the countries in the sample. The results, interestingly enough, did not vary greatly from those presented so far. Some significant differences were, however, observed across countries.

Figure 3.11, for instance, shows that there is a great deal of cross-country variation in the effect of an increase in the number of younger siblings on the time allocation decisions of younger adolescents (12-13). In Argentina, such an increase reduces the likelihood of studying full time and increases the probability of the "not working, not studying" outcome. In Colombia and Colombia and El Salvador, though, the result is a slight increase in the probability of studying only. In Ecuador the effects are very complex, but they indicate a decline in the percentage of adolescents working and studying at the same time and an increase in the share of those who are only working. These cross-country differences also occur in the older group, as Figure 3.12 demonstrates.

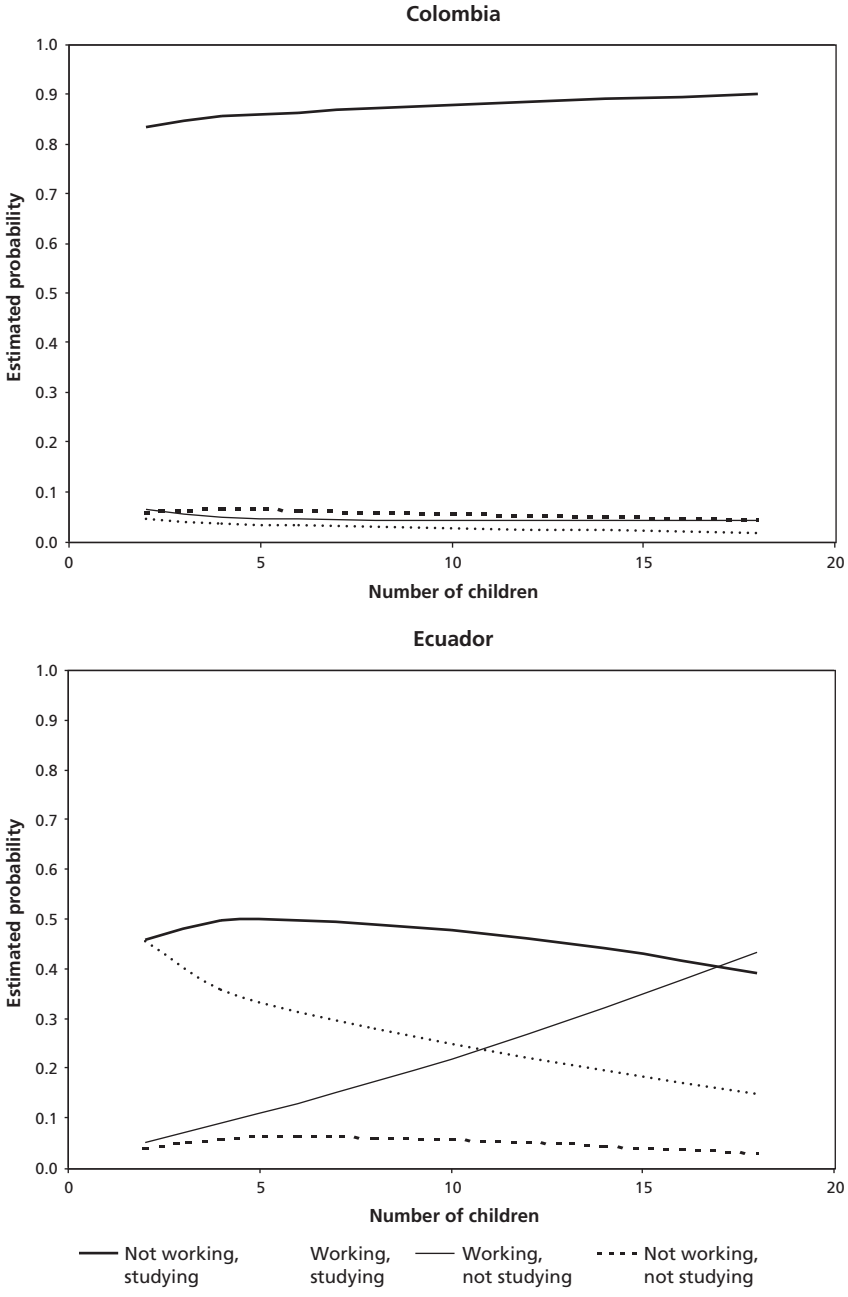
The effects of household composition also differ across countries, as shown in Figure 3.13. Household composition has little impact on time allocation in Honduras and Costa Rica. In Ecuador, though, living in an extended family increases the likelihood of working and studying at the same time, and in Paraguay this type of household increases the probability of neither studying nor working. Finally, as Figure 3.14 demonstrates, having a self-employed father has a variety of effects: increasing the probability of studying only among 16- and 17-year-old adolescents in Venezuela, while raising the likelihood of working and studying in Uruguay, of working only in Honduras, and of doing neither in Paraguay.

Figure 3.11a. Probabilities Related to Number of Children for 12- and 13-Year-Olds



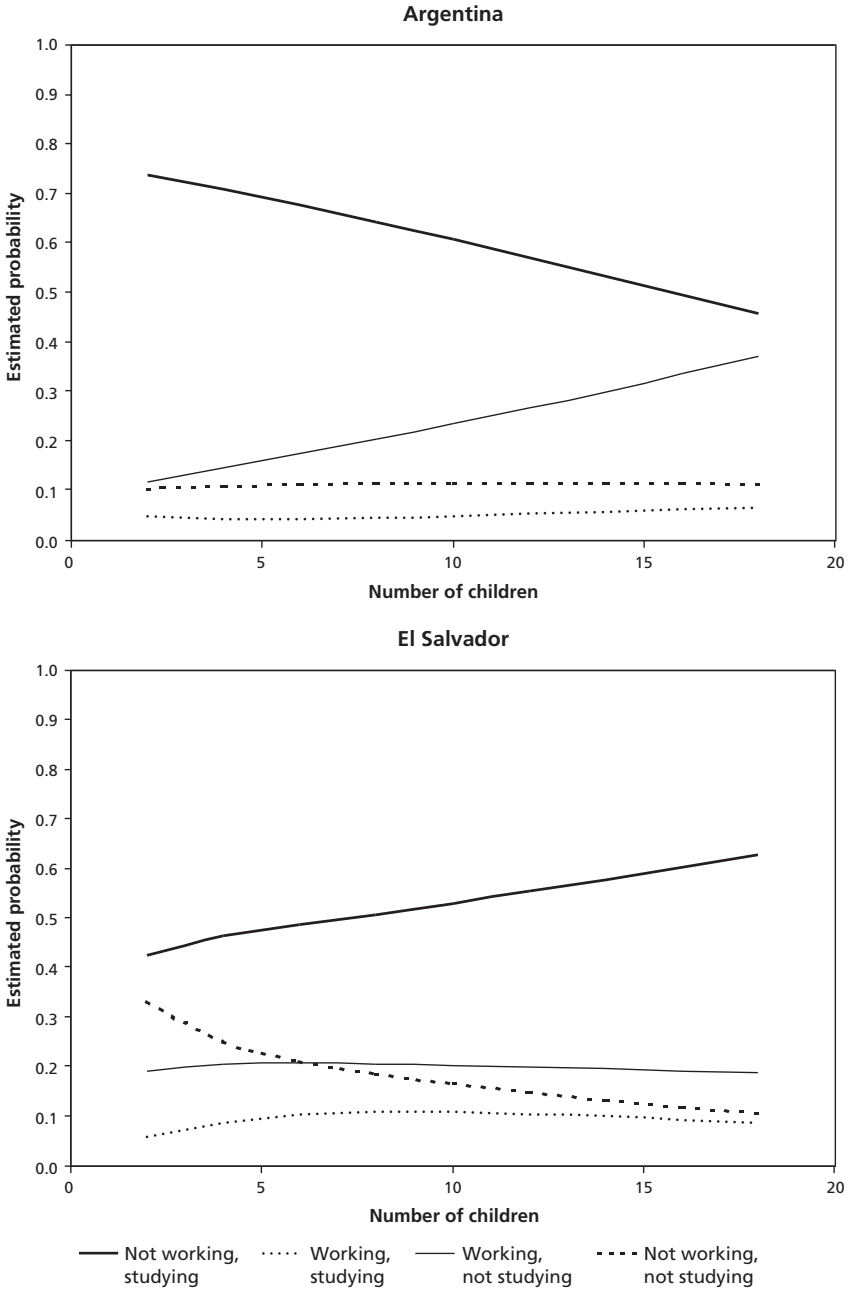
Source: IDB Household Surveys and author's calculations.

Figure 3.11b. Probabilities Related to Number of Children for 12- and 13-Year-Olds



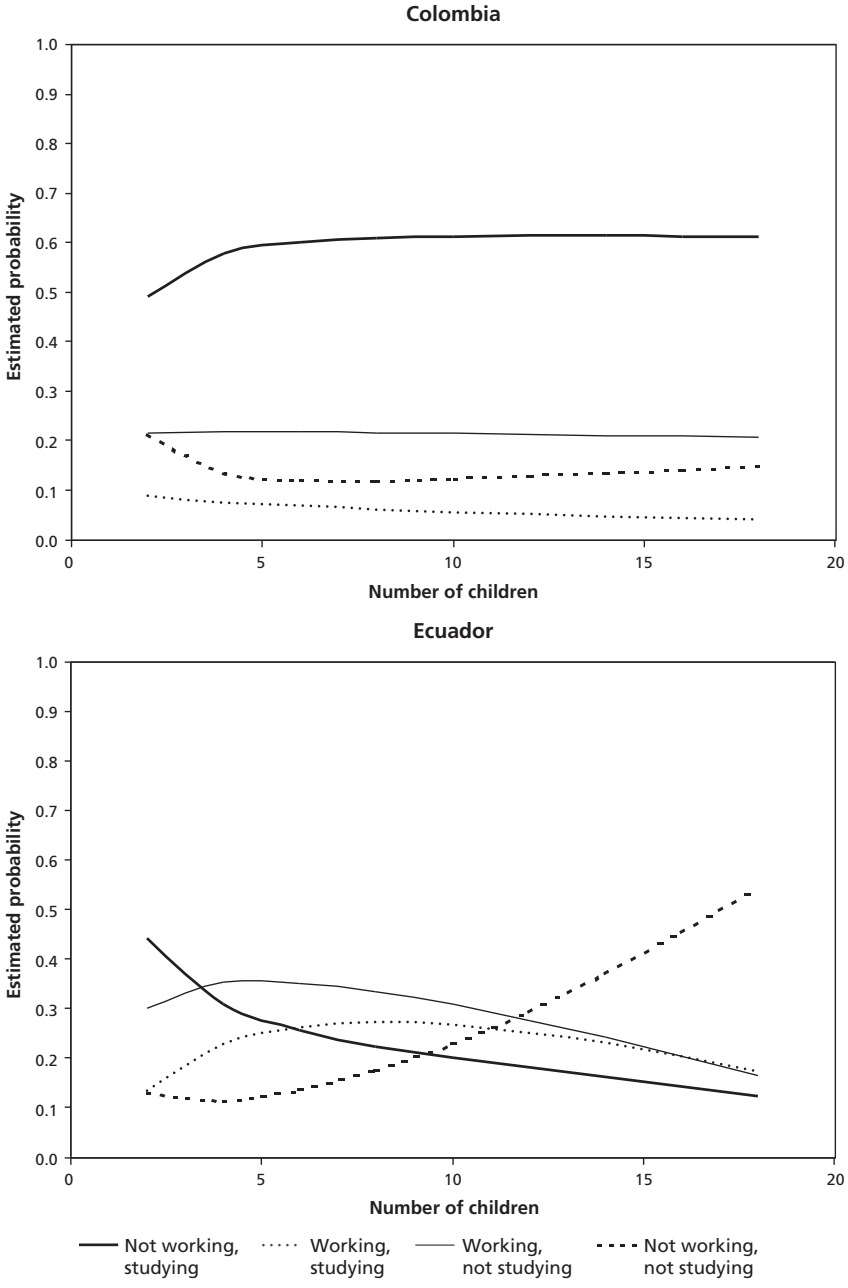
Source: IDB Household Surveys and author's calculations.

Figure 3.12a. Probabilities Related to Number of Children for 16- and 17-Year-Olds



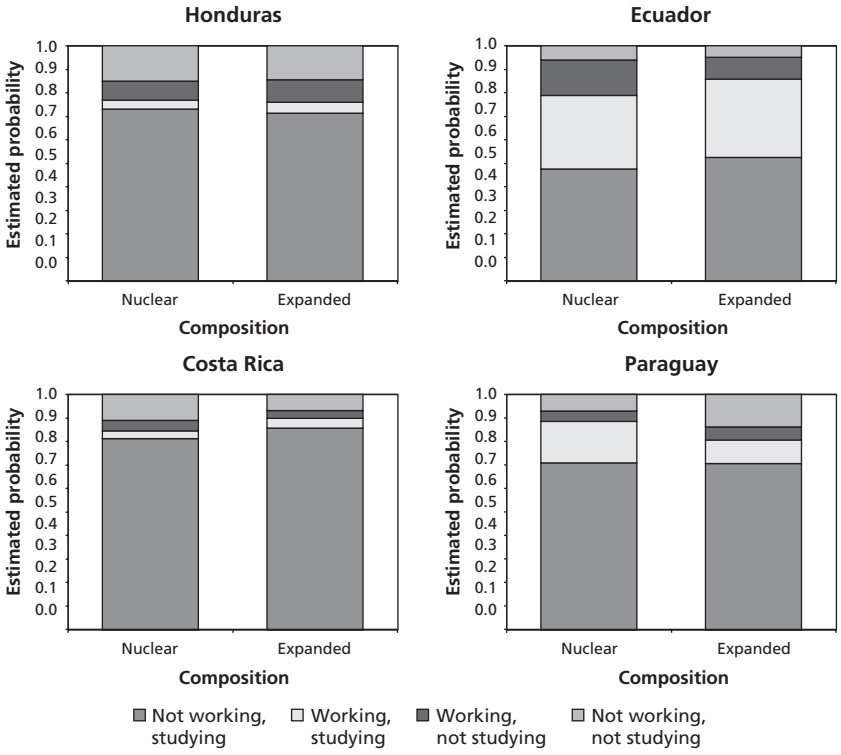
Source: IDB Household Surveys and author's calculations.

Figure 3.12b. Probabilities Related to Number of Children for 16- and 17-Year-Olds



Source: IDB Household Surveys and author's calculations.

Figure 3.13. Probabilities Related to Composition for 12- and 13-Year-Olds



Source: IDB Household Surveys and author's calculations.

Time Series Evidence on Brazil

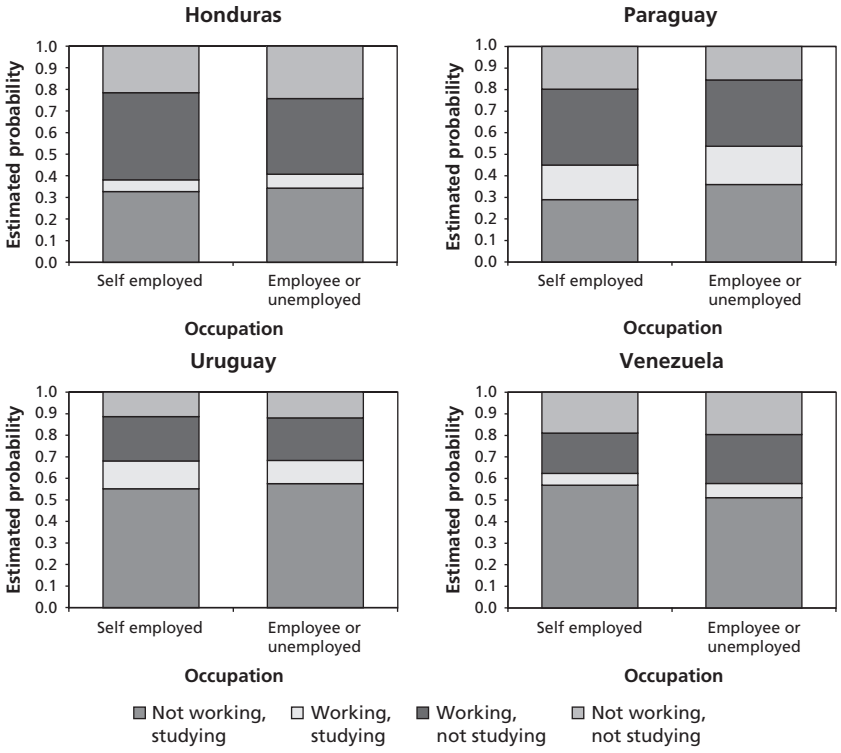
Brazil is the only country for which evidence is available on changing time allocation decisions over an extended period. The data come from the same source utilized above for 1997, that is, PNAD, the main Brazilian household survey conducted by the census bureau.[16]

Descriptive Statistics

Figure 3.15 shows the evolution of time allocation decisions by Brazilian adolescents. About 78 percent of the younger group (12-13) attended school

[16] The survey was not conducted in 1991 or 1994.

Figure 3.14. Probabilities Related to Occupation for 16- and 17-Year-Olds

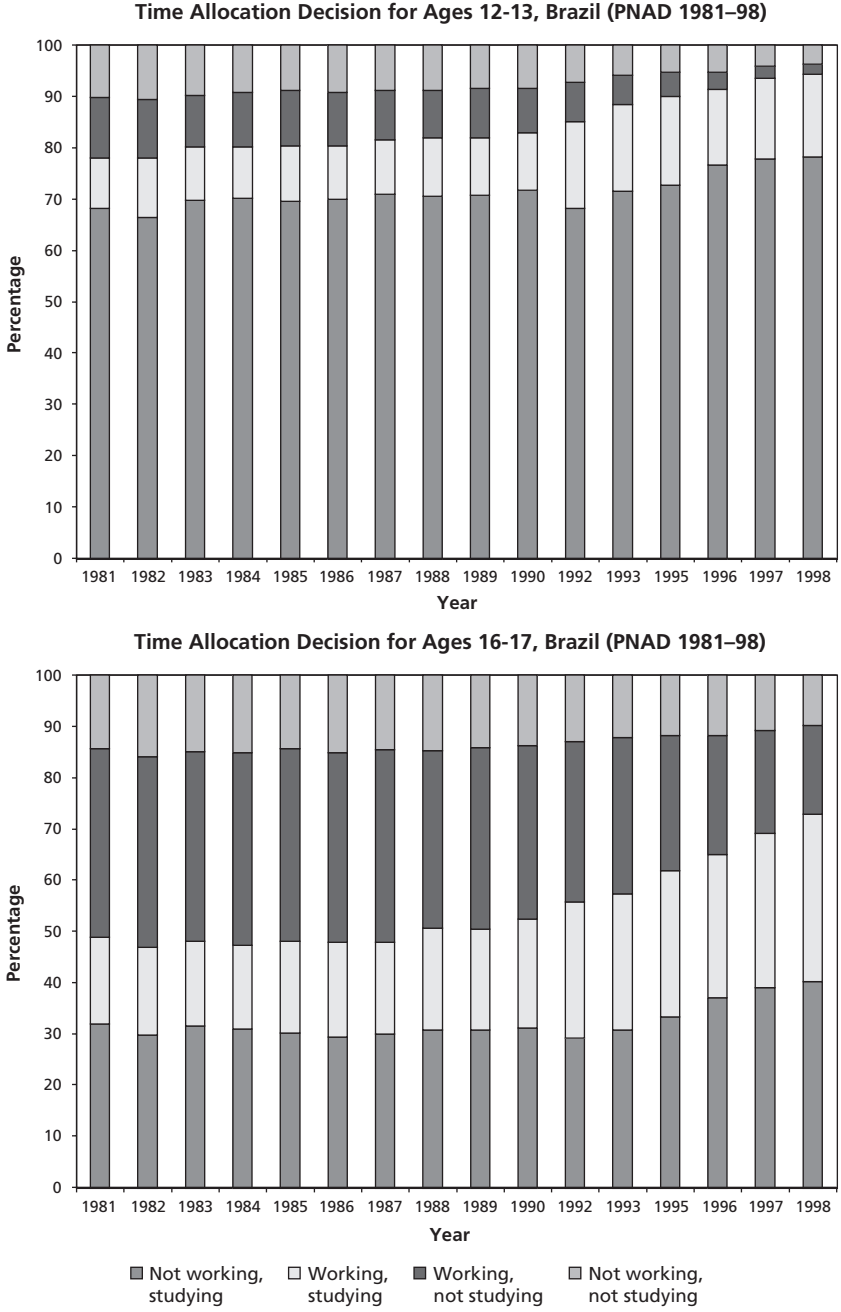


Source: IDB Household Surveys and author's calculations.

in 1981, and this increased to around 95 percent in 1998. Much of this evolution resulted from adolescents' movement from only working to working and studying (9 percent in 1981 to 15 percent in 1998). It is important to note, however, that the evolution of school attendance in Brazil was slower than the Latin American average until the 1970 birth cohort (see Behrman, Duryea and Székely, 1999). The same process is taking place among the older group. The percentage of adolescents studying and working doubled from 16 percent in 1981 to 32 percent in 1998; at the same time, the share of individuals only working has declined. It therefore seems that the pace of education evolution has accelerated in Brazil, a departure from the stabilization of the 1970s and 1980s.

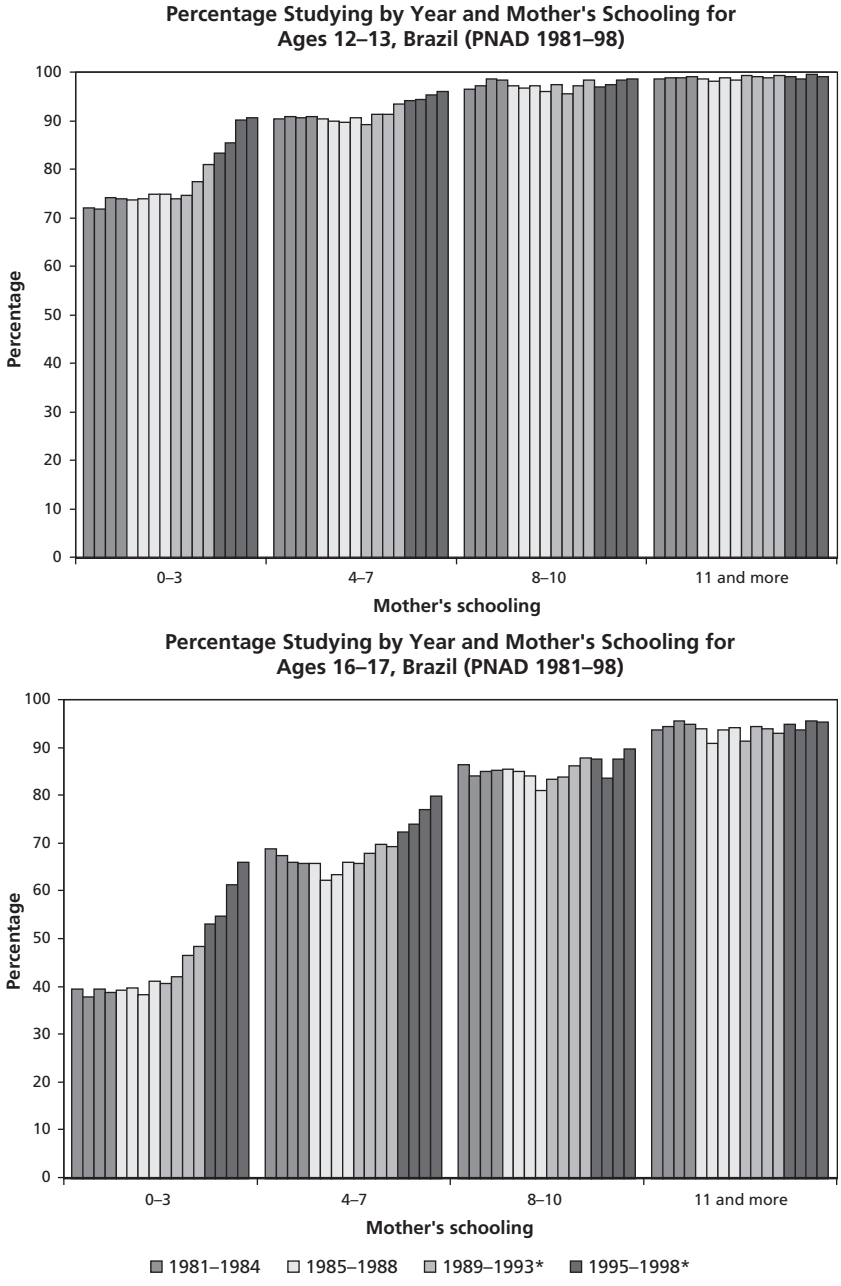
The bottom of Figure 3.15 presents a decomposition of the evolution of school attendance in terms of parental (mother's) education. It is clear

Figure 3.15a. Brazilian Time Series: Descriptions



Source: Pesquisa Nacional por Amostra de Domicílios (PNAD) and author's calculations.

Figure 3.15b. Brazilian Time Series: Descriptions



*No data for 1991 and 1994 census years.

Source: PNAD and author's calculations.

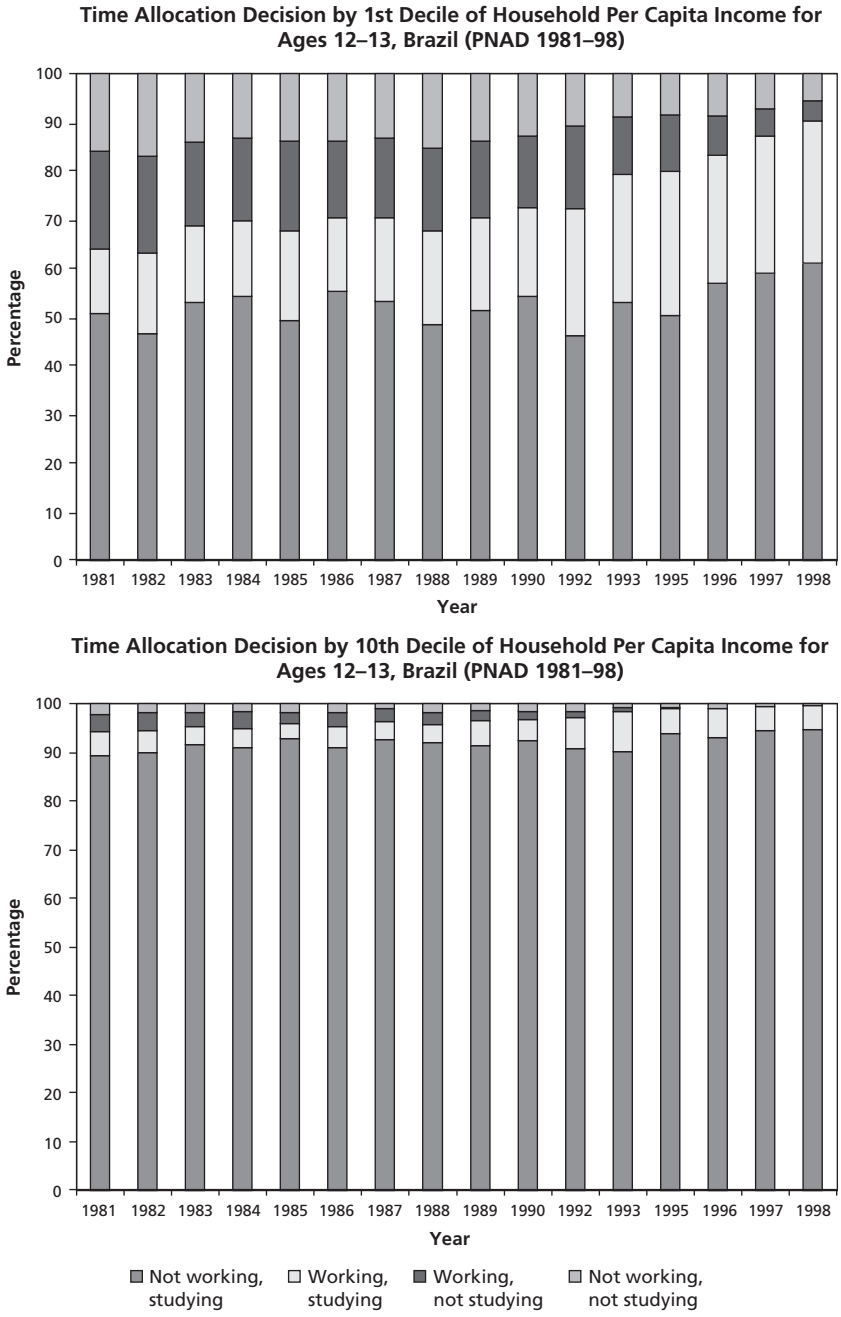
that the change in the share of children attending school has taken place among children with a less educated background, especially those where the mother is illiterate or has only basic writing skills (0 to 3 years of schooling). It is also impressive that the situation hardly changed between 1981 and 1990, with the increase in school attendance taking place almost entirely between 1992 and 1998. The results are similar for both age groups, though the changes are more dramatic for the older group, where the rates of school attendance among adolescents living in poorly educated families has risen from 40 percent to almost 70 percent in only nine years.

As seen above, in Latin American countries time allocation decisions depend quite substantially on relative household income per capita. Figure 3.16 shows that the improvement in school attendance among younger adolescents (12-13) has occurred mainly at the bottom of the household income distribution. The proportion of those attending school jumped in the first decile from 63 percent in 1981 to about 90 percent in 1998, a dramatic improvement that took place mainly between 1992 and 1998. Among older children (16-17), growth in school attendance occurred both at the top and at the bottom of the income distribution. The proportion of individuals studying in the tenth decile rose from 78 percent in 1981 to about 95 percent in 1998, as compared to an increase in the first decile from 30 in 1981 to 52 percent in 1998. There is no doubt that the big hurdle facing Brazil in the near future is to provide even more incentives that will encourage young adults at the bottom of the wage distribution to go to school.

Pooling Across Years

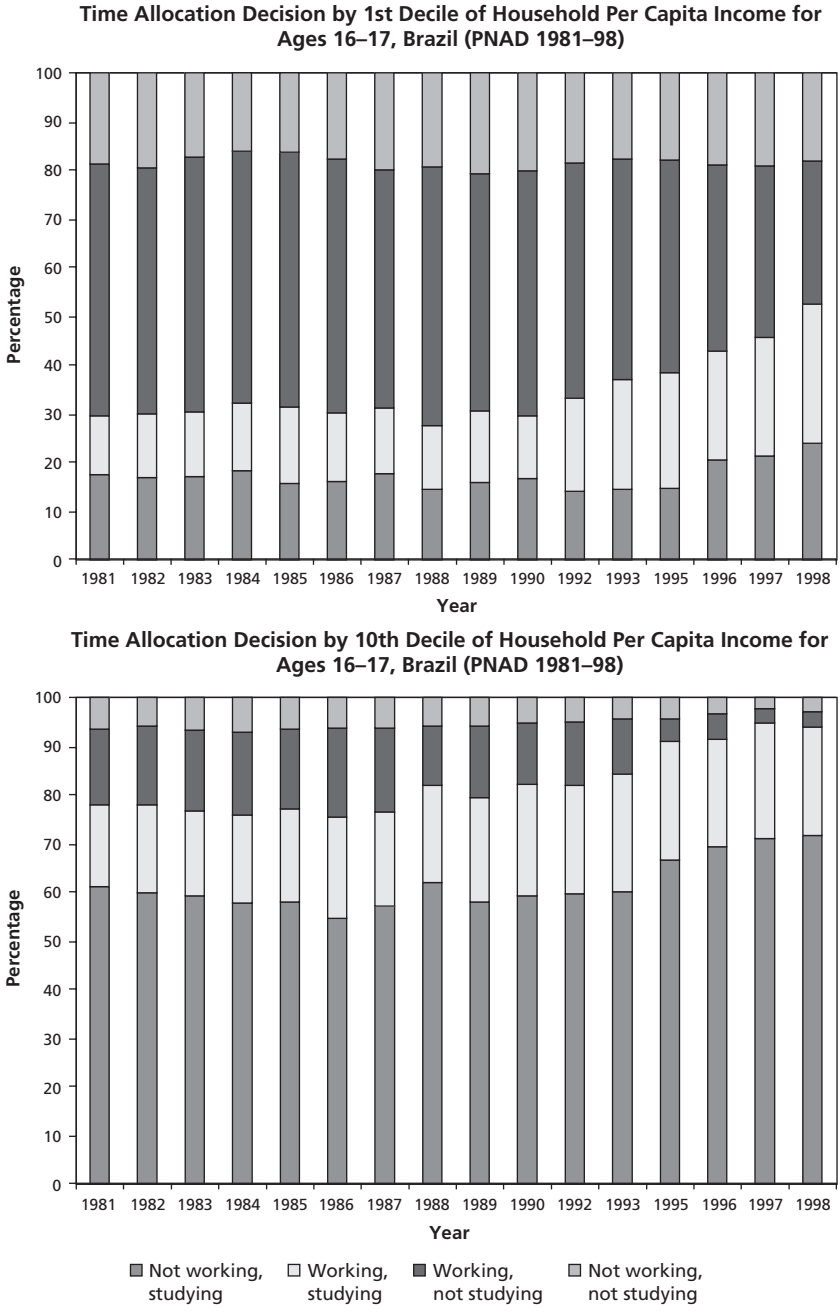
The results of the multinomial regressions with the data pooled from 1981 to 1996 are set out in Figures 3.17 to 3.20. Figure 3.17 shows the effect of the time dummies on the probabilities associated with each outcome; the figure confirms that the increase in the percentage of adolescents attending school was due to an increase in the percentage studying and working at the same time, especially in rural areas. For example, in the 16-17 age group living in rural areas, the percentage of adolescents only working declined from 60 percent in 1981 to about 40 percent in 1998, while the share of those working and studying simultaneously rose from 10 percent to about 40 percent in the same period.

Figure 3.16a. Brazilian Time Series: Inequality and Time Allocation



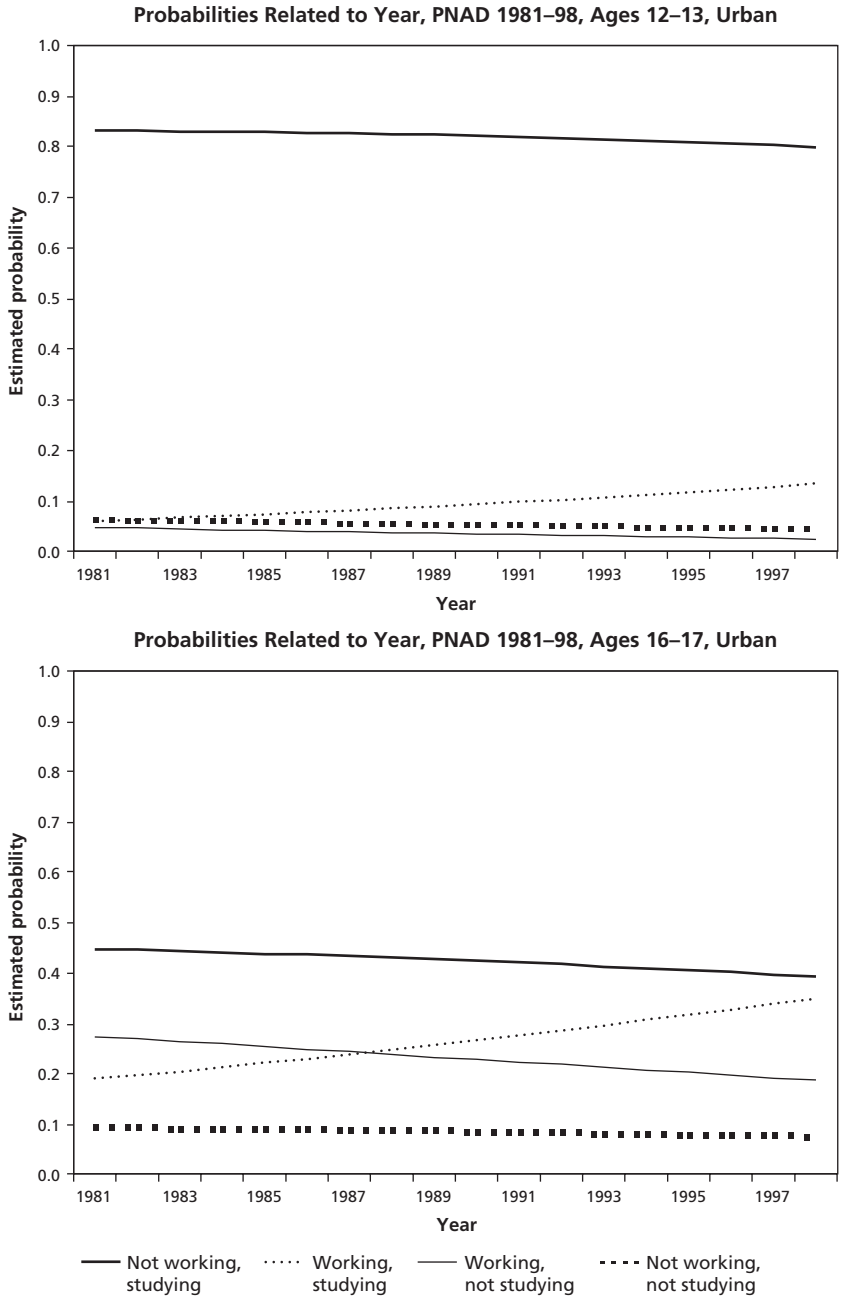
Source: PNAD and author's calculations.

Figure 3.16b. Brazilian Time Series: Inequality and Time Allocation



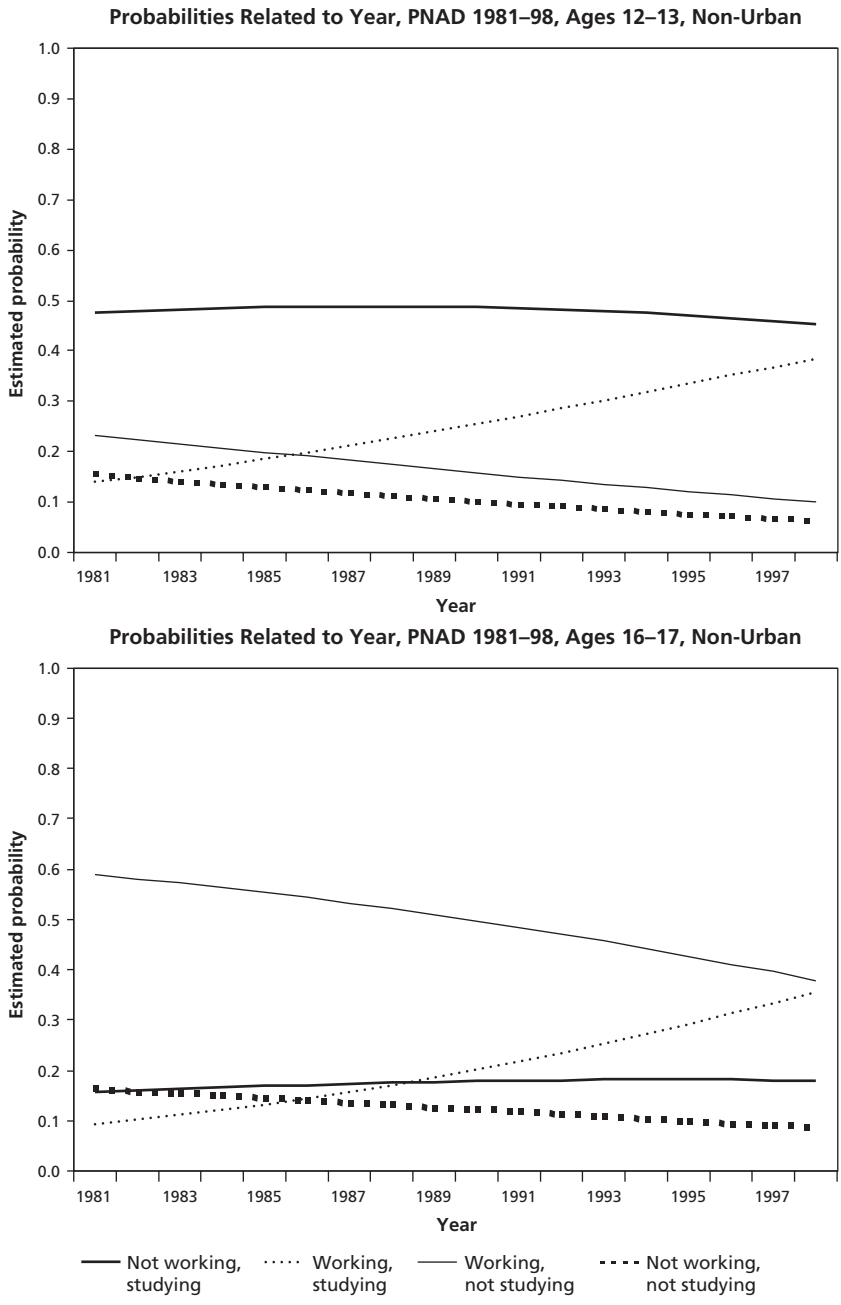
Source: PNAD and author's calculations.

Figure 3.17a. Brazilian Time Series Results: Urban Areas



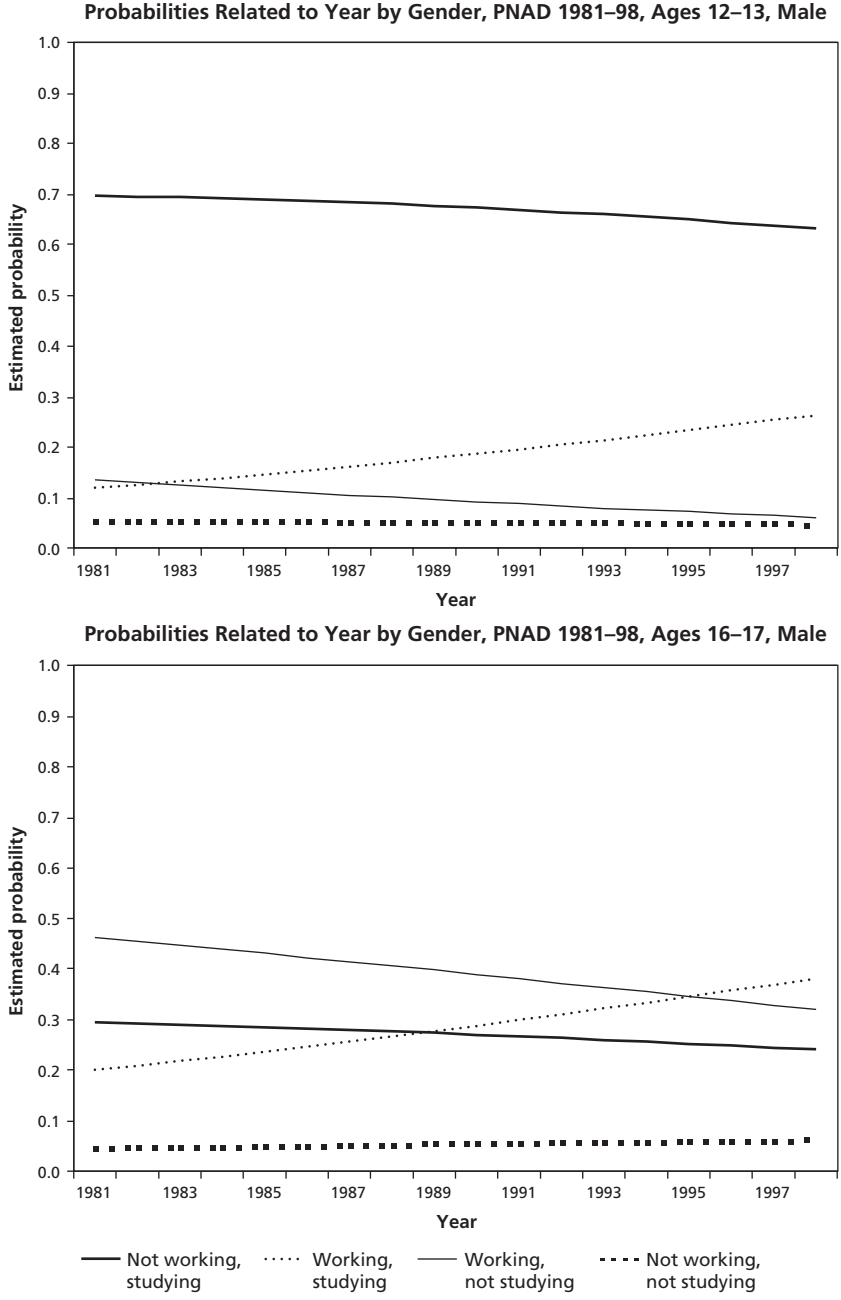
Source: PNAD and author's calculations.

Figure 3.17b. Brazilian Time Series Results: Non-Urban Areas



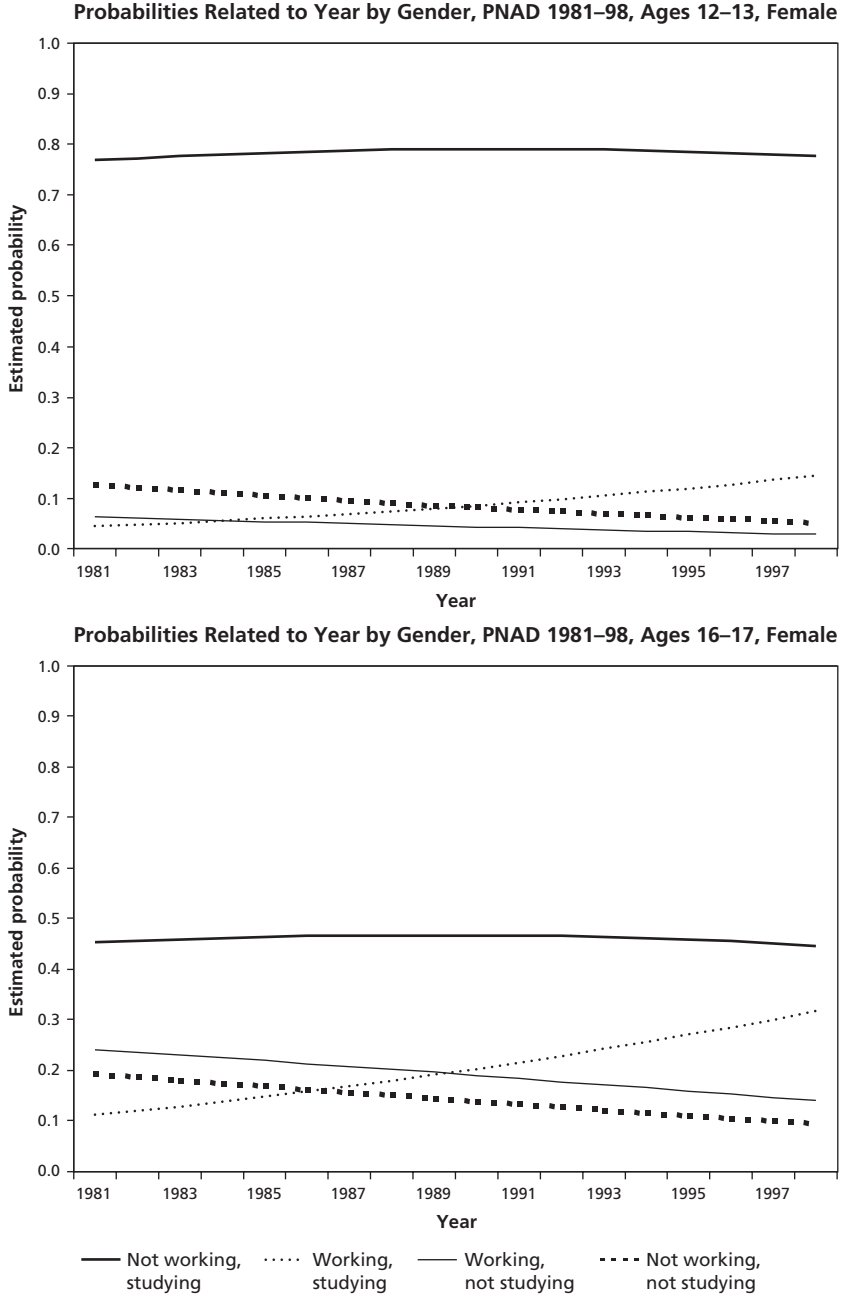
Source: PNAD and author's calculations.

Figure 3.18a. Brazilian Time-Series Results by Gender



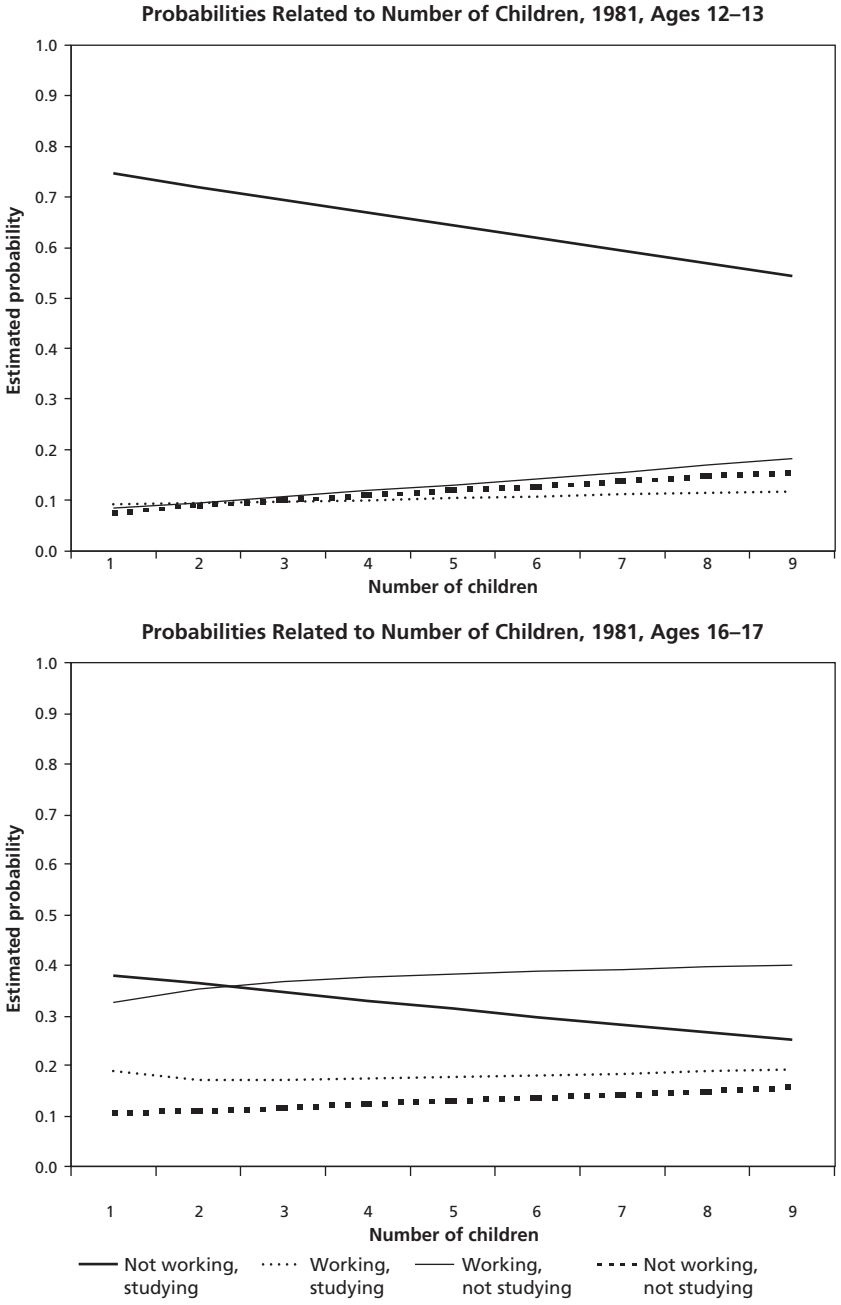
Source: PNAD and author's calculations.

Figure 3.18b. Brazilian Time-Series Results by Gender



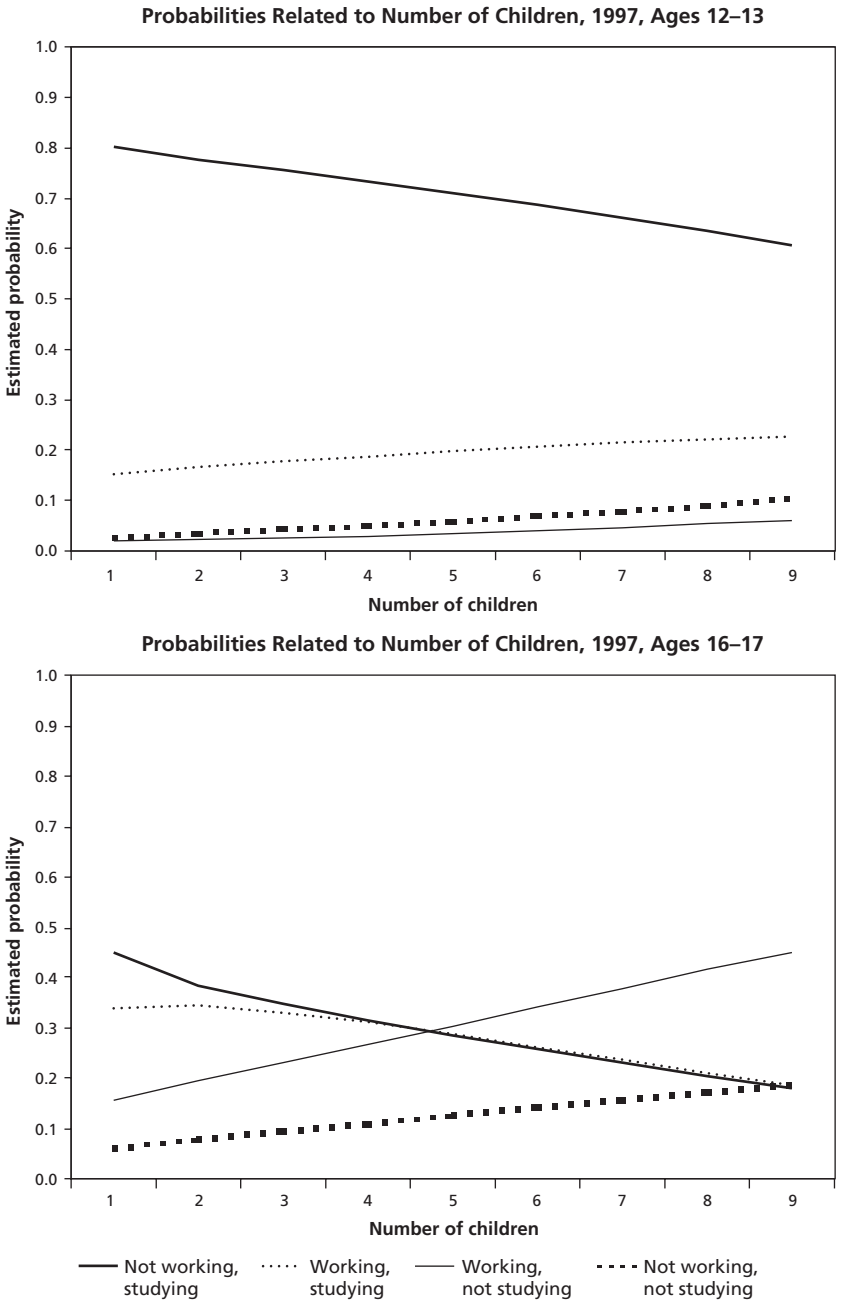
Source: PNAD and author's calculations.

Figure 3.19a. Brazilian Time Series Results, Number of Children: 1981



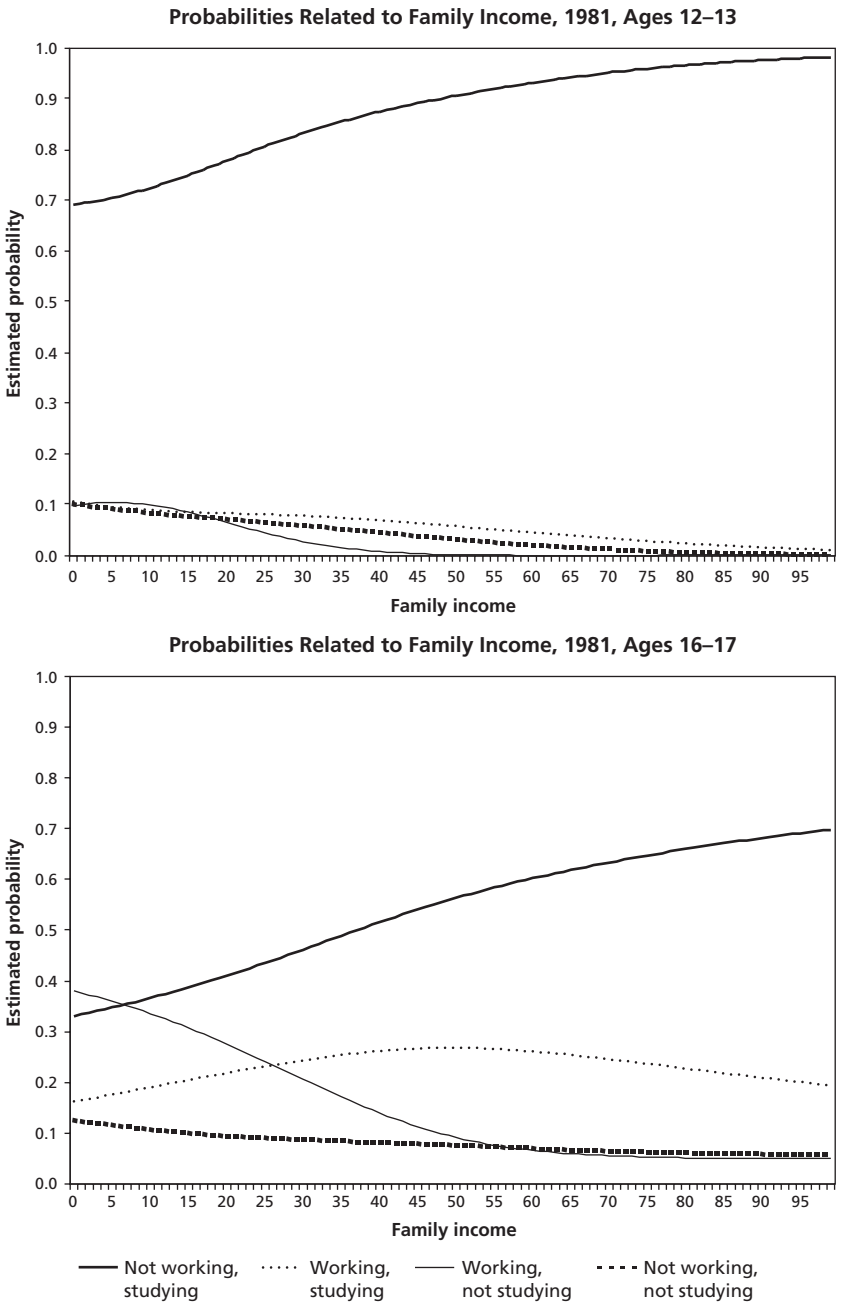
Source: PNAD and author's calculations.

Figure 3.19b. Brazilian Time Series Results, Number of Children: 1997



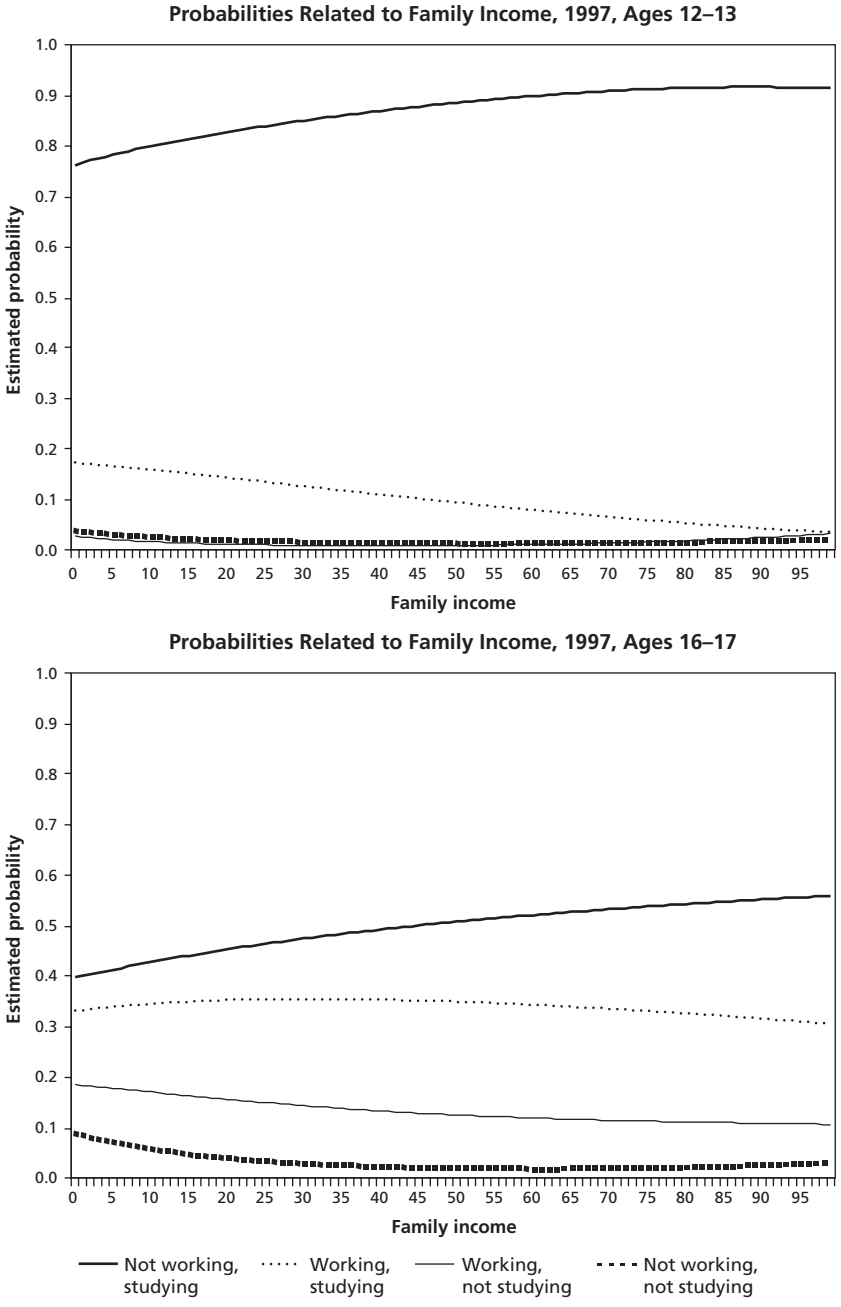
Source: PNAD and author's calculations.

Figure 3.20a. Brazilian Time Series Results, Family Income: 1981



Source: PNAD and author's calculations.

Figure 3.20b. Brazilian Time Series Results, Family Income: 1997



Source: PNAD and author's calculations.

This increase in working and studying at the same time occurred for both age groups and, surprisingly, for both males and females. It is also interesting to note that among older males the share working full time represented the largest group until 1995, when it was surpassed by the share working and studying at the same time. It is further worth noting that the share of female school attendance was about 75 percent in 1997, as compared to 65 percent among males.

Among other determinants of time allocation decisions, Figure 3.19 shows that the effect of the number of younger siblings has remained relatively stable over time—that is, it still reduces substantially the probability of the "studying only" outcome. The main difference is that for the older group in 1997, there is a corresponding increase in the probability of "working only."

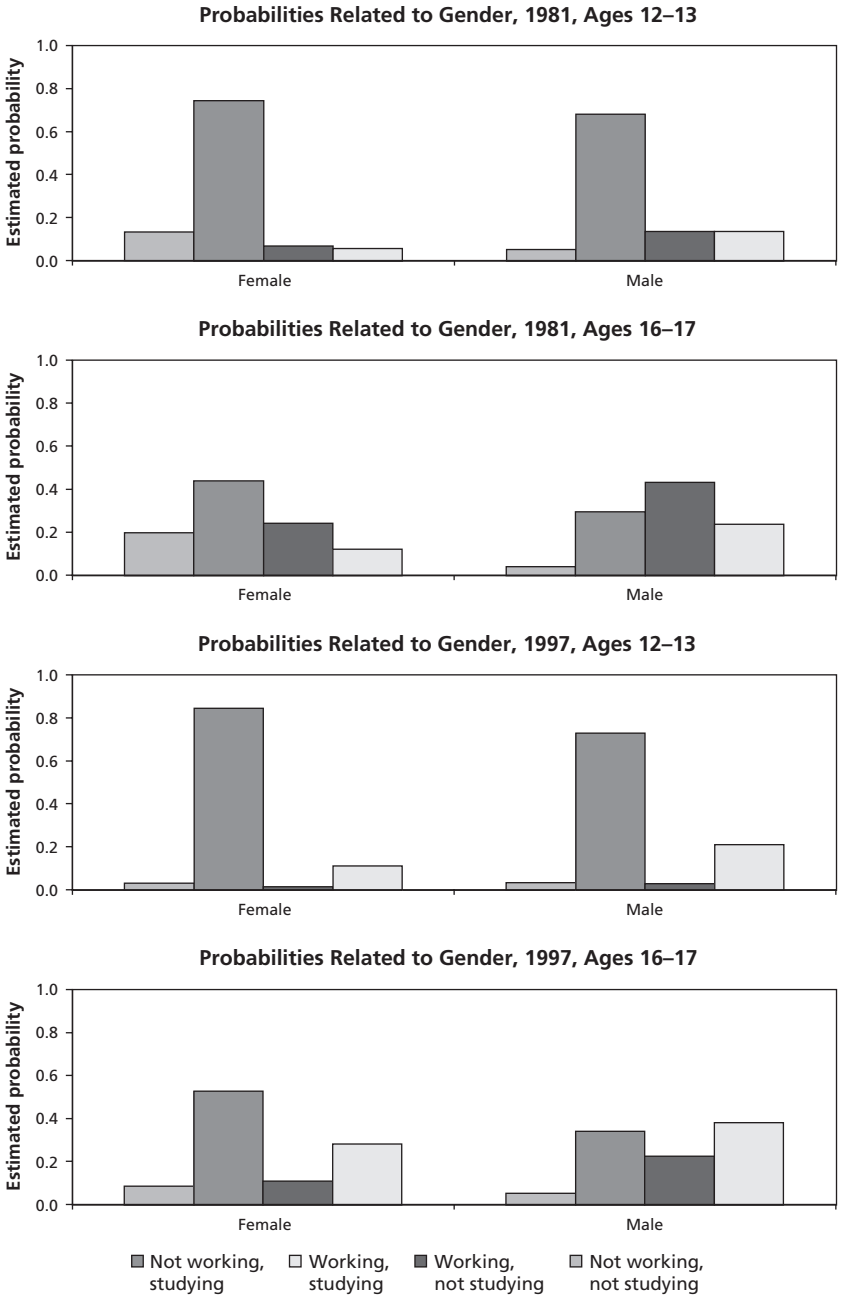
The effect of family income, on the other hand, is weakening over time, as shown in Figure 3.20. This implies that more adolescents have access to education, independently of their family income, which may increase inter-generational mobility. Finally, Figure 3.21 shows that, in comparison to 1981, both males and females have a higher probability of either working and studying or only studying in 1997.

Conclusions

Latin American and Caribbean countries are fairly successful in ensuring school attendance by young adolescents (12-13 years old). As adolescents enter the 16-17 group, though, the situation deteriorates quite rapidly. The best situation overall is found in countries such as Chile and the Dominican Republic, whereas far worse conditions prevail in Ecuador, Nicaragua and Honduras, especially in rural areas. Most countries in the region lie somewhere between these extremes.

As established in the literature, parental education is one of the most important determinants of the time allocation decisions, even after household and country-level characteristics are taken into account. Among adolescents 16 and 17 years old, those with illiterate parents have only a 25 percent likelihood of studying and not working, as compared to about 80 percent for the children of college graduates; this effect is relatively homogenous throughout Latin America and the Caribbean. Finally, the

Figure 3.21. Brazilian Time-Series Results, Gender



Source: PNAD and author's calculations.

number of younger siblings in the family remains an important determinant of school attendance, while gross family income is less important than would have been expected. Factors in the macro environment, especially countries' per capita GDP and youth unemployment rate, are also important determinants of time allocation decisions.

Most school attendance problems, though, can be linked to variables reflecting household structure, particularly parental education and the number of younger children. Thus, in order to increase schooling levels in Latin America, it will be necessary to disseminate information on the economic returns to education, as well as find alternative forms of care for young children so that older siblings do not have to drop out of school.

CHAPTER FOUR

Entry, Participation, Income and Consolidation: Young Adult Labor Market Experience in Latin America

Josefina Bruni Celli and Richard Obuchi[1]

This chapter explores and analyzes the young adult labor market experience in 18 Latin American countries included in the IDB country household survey database.[2] The first area of interest includes the patterns of entry and consolidation of young adults into the labor force, particularly the trajectory of young adults between ages 18 and 25 in terms of labor market participation and labor market status. The principal questions considered are the following: How does the labor market experience of young adults change between ages 18 and 25? Is this period one of final definitions and consolidation, or a segment in a longer transitional period? To what extent do differences in gender and educational level affect the young adult labor market experience? And can any country-specific differences be observed in these experiences, and what accounts for them?

A second focus is to analyze income, exploring the effects of educational attainment, experience and gender. Findings on young adult income are compared and contrasted with those on prime-aged adults, and cross-country differences in young adult income are examined.

[1] Bruni Celli is an Associate Professor of Economics at the Instituto de Estudios Superiores de Administración (IESA) in Caracas, Venezuela. Obuchi is a Researcher at IESA.

[2] The countries are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay and Venezuela.

Patterns of Entry and Consolidation into the Labor Force

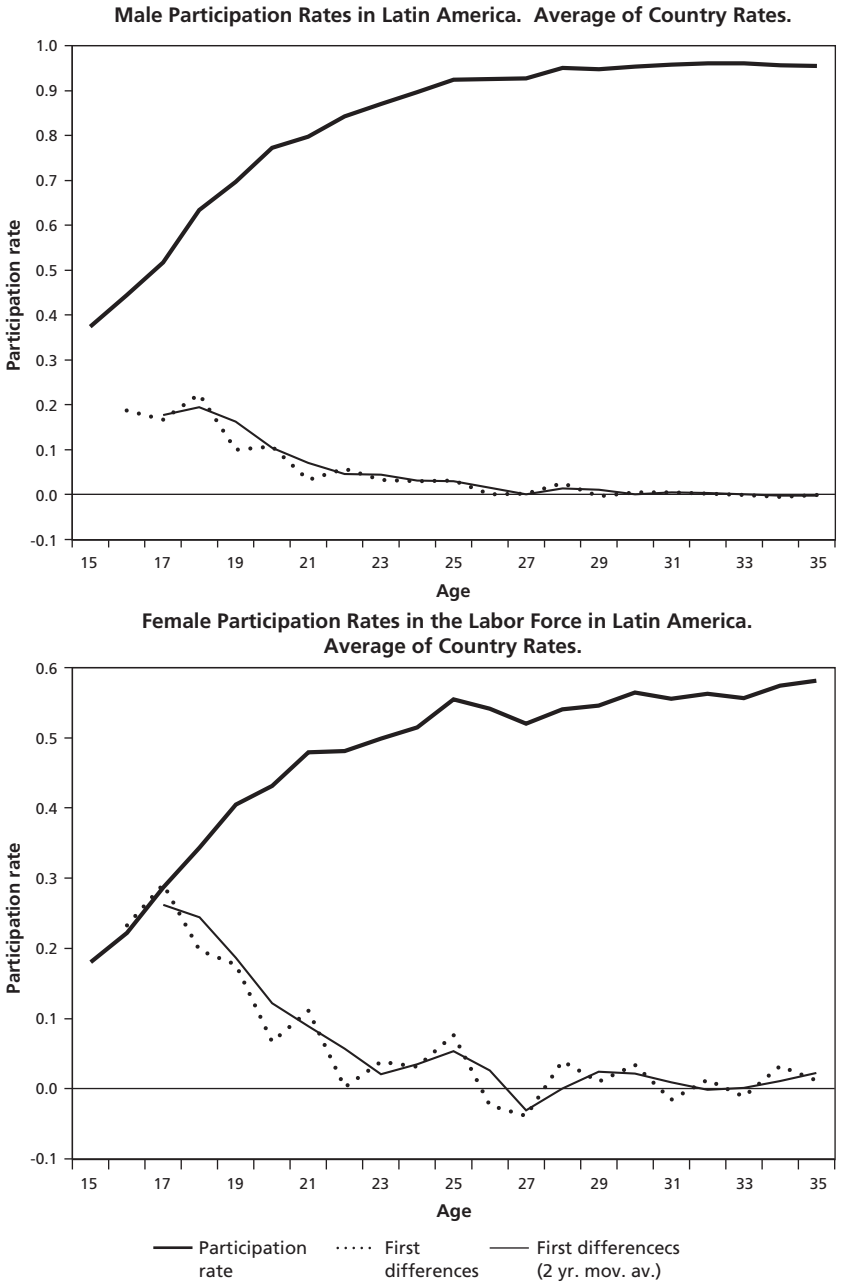
The reported participation rates in the labor force used in this chapter are the simple average of the participation rates of the 18 countries included in the study. Simple country averages were preferred to pooled regional participation rates because the latter measure was found to reflect the patterns of the two largest countries (Brazil and Mexico, which together account for 60 percent of the population under study) rather than overall country patterns.

As shown in Figure 4.1, male entry into the market during young adulthood follows a generally smooth concave trend joining accelerated entry in late adolescence and a steady state reached towards the early thirties. A number of features stand out in the data. First, the first differences curve shows that legal entry into young adulthood at age 18 marks a moment of accelerated entry. Second, first differences decrease steadily over the period of young adulthood from a 0.22 inter-annual increase in participation rates at age 18 to a low of 0.03 at age 25. Third, by age 25, participation rates (92 percent) have almost reached those of prime-aged adults (about 95 percent). Fourth, from age 25 on, participation rates continue to increase at a low rate, converging into the average prime-aged adult rate.

The participation rates of women are lower, grow less, and, in contrast to those of men, do not converge into a steady state associated with full adulthood. As in the case of men, between ages 18 and 21, female participation rates grow steadily at a decreasing rate. One feature that distinguishes female from male participation during this period is a flatter curve tracing the evolution of participation rates combined with higher first differences. The latter reflects the fact that women enter faster in relation to their own base value than men during this period, though it should be noted that women start out at age 18 with a much lower participation rate (34 percent) than men (63 percent). A second finding is that after age 21, the female participation rates curve no longer follows the clean-cut concave pattern that characterizes male entry into the labor market. After age 21, the curve flattens and then accelerates between ages 23 and 25 (small convexity), reaches a peak at age 25, and is followed by a convex U-shape stretching between ages 25 and 30.

Thus, in contrast to men, the peak reached by women at age 25 is not associated with a process of convergence towards an adult steady state.

Figure 4.1. Participation Rates in the Labor Force of Men and Women in Latin America



Source: IDB Household Surveys and authors' calculations.

Rather it marks the peaking end of a comparatively vigorous period of labor market entry, and the beginning of a local trough that reaches its bottom as women reach their late twenties. As will be discussed below, the time at which such convexities occur varies by education level and thus seems to be associated with movements into childrearing; in contrast to men, for many young women participation in the labor market may represent a provisional status.

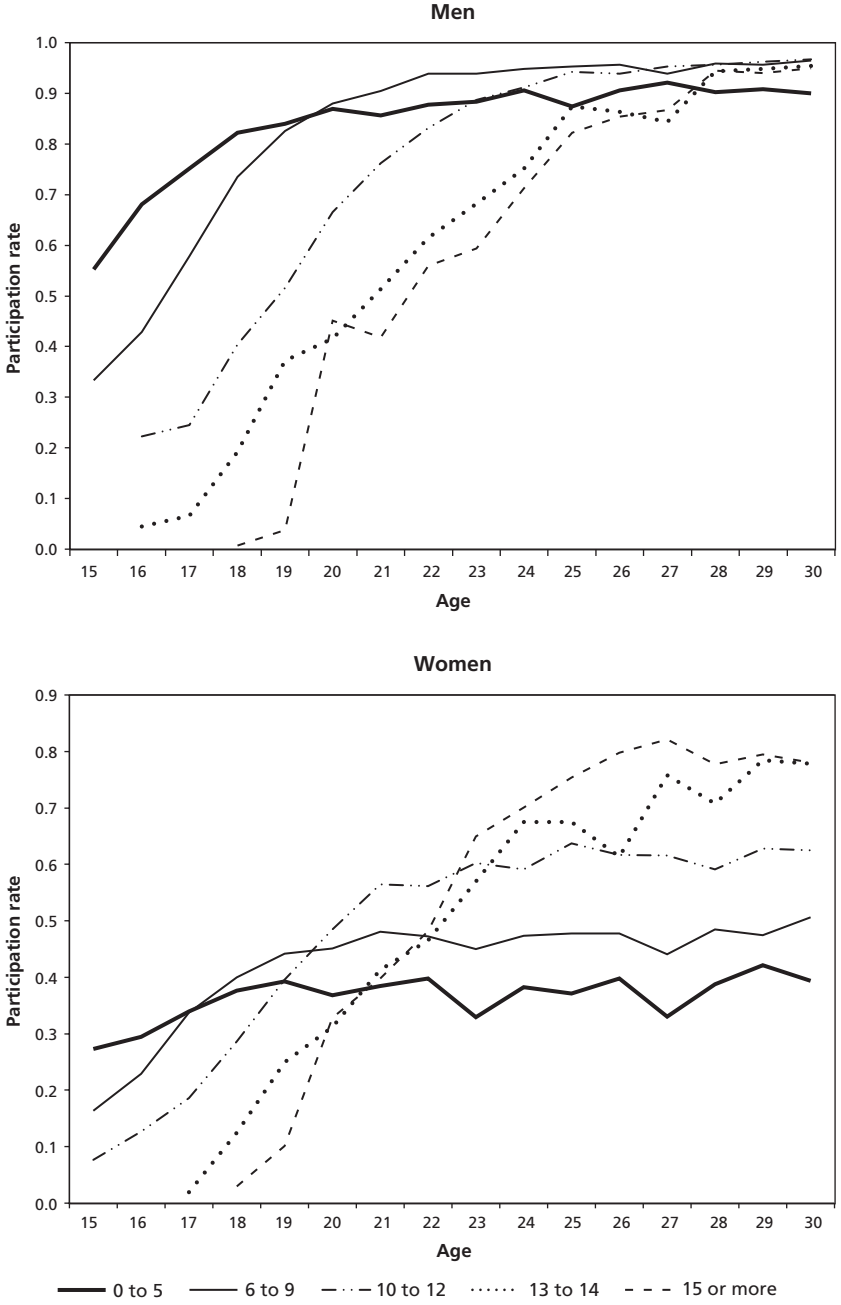
Participation Rates by Education Level: Regional Patterns

Educational attainment determines when young adults enter the labor force. Figure 4.2 shows the age sequence of male and female participation rates in groups featuring different educational attainments.[3] A comparison of the curves in both graphs shows an overall pattern whereby continued schooling postpones entry into the labor market. Both males and females with lower levels of education (0 to 12) reach or almost reach their maximum participation rates during young adulthood. The 0–5 and 6–9 curves are the flattest during young adulthood, while the 10–12 curves have a positive slope but become quite flat by late young adulthood. In contrast, curves belonging to the two groups with the highest educational attainment maintain a positive slope throughout young adulthood, similar to those of the 0–5 and 6–9 groups during late adolescence. Otherwise, though, the patterns of men and women differ sharply.

As seen in Figure 4.2, males enter young adulthood (age 18) with a wide spread in the curves representing different levels of educational attainment: participation rates are higher the lower the level of educational attainment. But, during young adulthood these curves follow a concave trajectory that converges (by age 28) into a very narrow range (0.96–0.90) marking the standard participation rates of all male adults. Convergence over young adulthood among males is as follows: at age 18, the range between the group featuring the highest participation rate and the group featuring the lowest is 0.82–0.007; at age 21 the range is 0.90-0.41, and at age 25, 0.95–0.82.

[3] As in the previous section, results in this figure represent the simple average of the 18 country participation rates. Mexico is excluded from the calculus because in this country the category "13 to 14 years of schooling" lacks sufficient observations.

Figure 4.2. Participation Rates in the Labor Market of Men and Women by Years of Education in Latin America



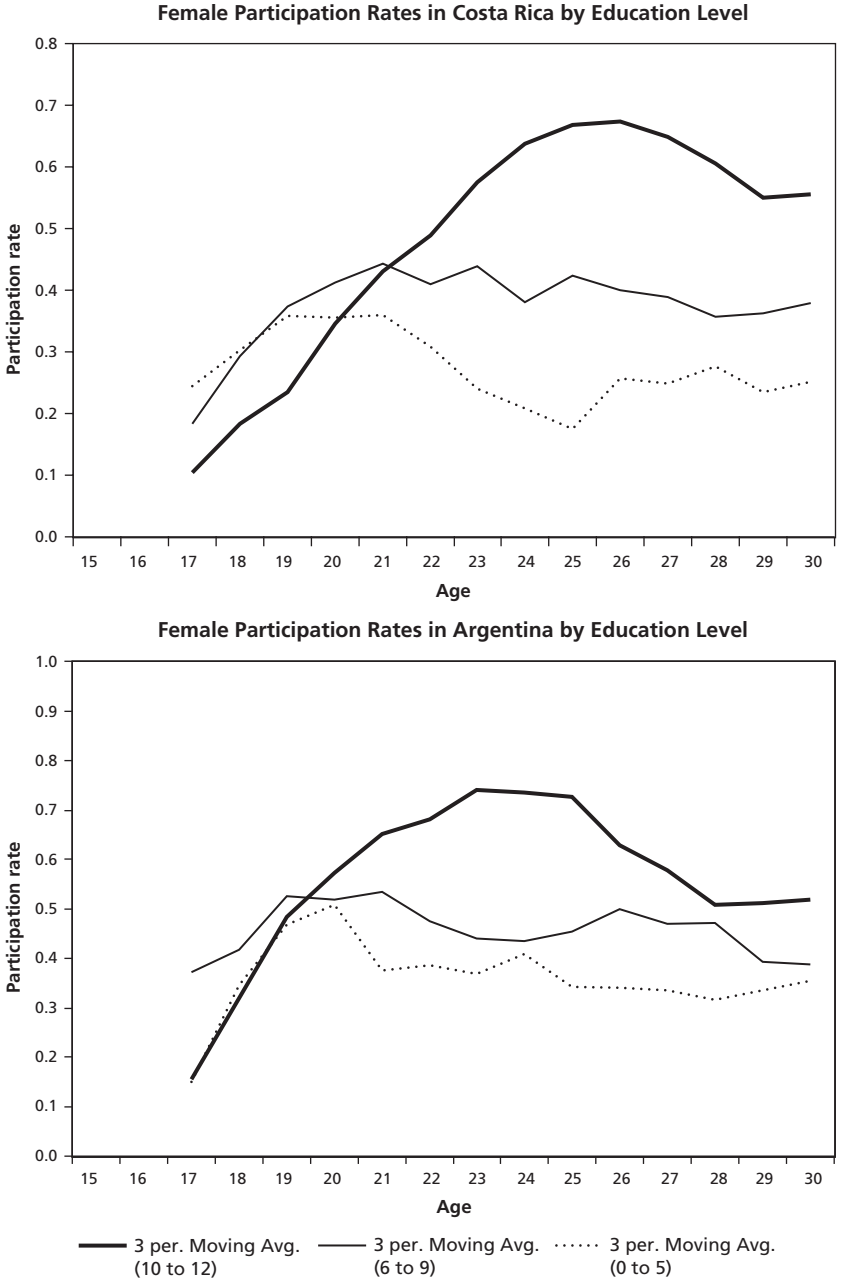
Instead, the curves for females start out with a lower spread between educational attainment groups at late adolescence (0.33–0), then merge into a knot of multiple crossings in the earlier part of young adulthood (ages 18 to 23). By late young adulthood (age 25), these curves are more widely distributed (0.75–0.37) than in mid-adolescence, but in an inverse way, with groups with higher levels of education displaying higher participation rates. The fact that curves for females cross throughout young adulthood accounts for the fact that during early young adulthood (ages 18 to 22), education levels are a stronger determinant of participation rates among men than among women. But such low variation among young adult females should not be confused with the true tendency, which is towards convergence among men and divergence among women as the end of the young adult period is reached. As young adults enter prime age, educational levels become a stronger and stronger determinant of labor market participation among young women, with highly educated women experiencing a much higher participation rate than women with low education. Among men, only those with 0–5 years of education begin to experience a slightly lower participation rate than the rest.

Related to the above is the finding that women with low education levels reach their maximum participation levels at an earlier age (age 18 for 0–5, age 21 for 6–9 and age 25 for 10–12) than their male equivalents, who at age 25 are still located in an increasing trend line with participation rates that are still slightly lower than full adult participation. That is, men with lower levels of education tend to continue entering the labor force as they move through young adulthood, while females stop.

As seen in both Figure 4.1 and Figure 4.2, female plateaus are more erratic than those of men. Underlying these irregular plateaus are processes of exit and entry of women, which vary from country to country. Figure 4.3 shows the cases of Argentina and Costa Rica.

In both of these countries, women with 0–5 years of education reach a peak in participation rate in early young adulthood and then begin to move out of the labor force. Women with 6–9 years of education do the same, with a two to three year lag. Those with 10–12 years of education reach their peak at around 25 years of age and begin to exit after young adulthood. As mentioned in the previous section, this pattern suggests that labor market participation is a temporary state for many women, who then exit the labor market to enter full-time childrearing. The pattern also suggests that

Figure 4.3. Female Participation Rates in the Labor Market in Costa Rica and Argentina by Education Level



Source: IDB Household Surveys and authors' calculations.

as women opt for higher educational attainment they tend to postpone childbearing decisions.

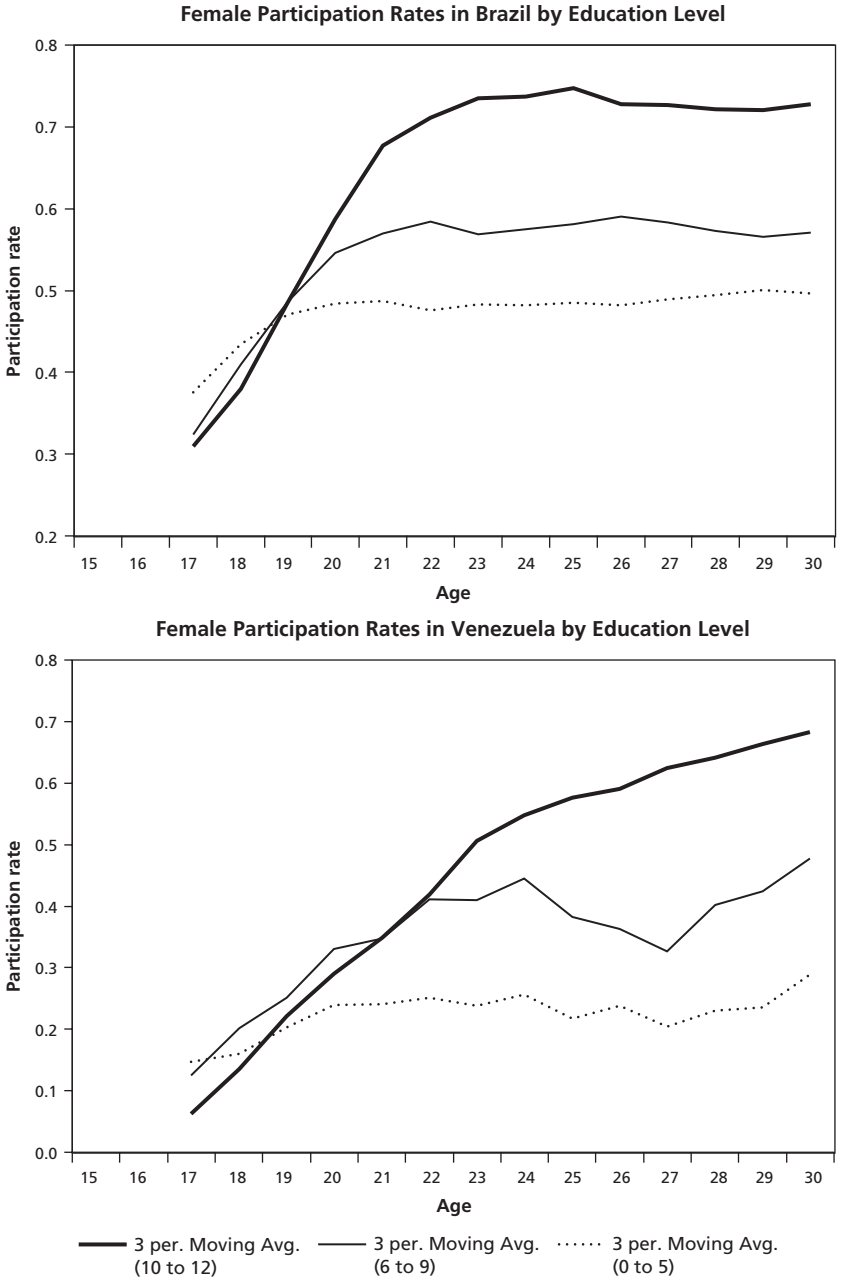
Not all countries show such clear-cut patterns, and the time at which exits occur can vary from country to country. As Figure 4.4 shows, women in Brazil do not feature such exits, and women with lower levels of education in Venezuela exit later than do women in Argentina and Costa Rica. This may explain the erratic movement of the aggregate female plateaus.

Five central findings emerge from the data. First, educational attainment is associated with postponement of entry into the labor market. Second, male labor market participation is negatively related with educational attainment throughout young adulthood; this negative relationship weakens as men move from early young adulthood to late young adulthood, when participation rates merge into a small range where variations by education level are almost null. Third, in the case of women, in early young adulthood, educational attainment is not clearly related with participation; during this period the curve representing different educational attainments features multiple crossings. Differences emerge towards late young adulthood when curves diverge in a pattern featuring high and ever-increasing participation rates among more-educated women, and lower and stagnant participation rates among less-educated women. Fourth, the participation rates of both males and females with 10 or more years of education increase continuously throughout young adulthood. On the other hand, the participation rates of men with nine or fewer years of education grow very slowly; among similarly educated women, participation stagnates and even diminishes slightly after reaching a local peak in the early and mid-twenties. Finally, in some countries young adult women with nine or fewer years of education experience decreases in participation after reaching local participation peaks during early young adulthood. Sequential lags in this phenomenon by educational level suggest that as women opt for higher educational attainment, they tend to postpone childbearing decisions.

Country Differences in Young Adult Participation

Table 4.1 shows country differences in young adult participation. Such differences vary by sex and age during young adulthood. They are highest in the case of early young adult (ages 18–20) males, suggesting significant dif-

Figure 4.4. Female Participation Rates in the Labor Market in Brazil and Venezuela by Education Level



Source: IDB Household Surveys and authors' calculations.

Table 4.1. Country Differences in Female and Male Participation Rates by Age Group of Young Adults (18 observations)

	Female participation rates			Male participation rates		
	18–20	21–22	23–25	18–20	21–22	23–25
Lowest (minimum) country participation rates	0.217	0.325	0.395	0.443	0.698	0.816
Width of range of country participation rates	0.316	0.362	0.318	0.397	0.223	0.132
Standard deviation of participation rates	0.093	0.087	0.084	0.109	0.072	0.044

Source: Authors' calculations based on IDB Household Surveys.

ferences in postponement of entry among countries, but these differences become insignificant when men reach late young adulthood (23–25). In contrast, in the case of females, country differences remain stable over all young adult age groups.

In order to understand observed patterns of country differences, the relationship between participation rates and various country attributes was explored. Variables considered were education of young adult age group, country GDP per capita in dollars according to purchasing-power parity (PPP), percentage of urban population, percentage of labor force working in agriculture, and the ratio of pre-adult (10–17) "working age" population with respect to the size of the prime aged adult population. All were chosen due to their suspected association with postponement of entry into the labor market, and regression analysis was dropped due to severe multicollinearity.

Table 4.2 shows the results of simple correlations between participation rates and attributes with corresponding significance levels. The table shows that the larger country variations found in the 18–20 male group are significantly associated with educational attainment and the relative size of the pre-adult (10–17) population. As expected, educational attainment is negatively correlated with participation rates, indicating postponement of entry due to school attendance. The relative size of the pre-adult population is positively correlated with participation, indicating less postponement in countries featuring larger families and fertility. The education coefficient maintains a reduced significance level in the 21–22 male group. No factor is significant at 23–25, where country differences in male participation rates have converged to a narrow band.

Table 4.2. Correlation between Country Attributes and Participation Rates of Male and Female Young Adults

	Female participation rates			Male participation rates		
	18–20	21–22	23–25	18–20	21–22	23–25
Education of age group	–0.081	0.322*	0.407**	–0.462**	–0.379*	–0.295
10–17 population as proportion of prime-aged population	0.111	–0.272	–0.354*	0.47***	0.304	0.212
GDP per capita $PPP	–0.045	0.227	0.339°	–0.27	–0.068	–0.002
Proportion of labor force in agriculture 1990	0.215	–0.208	–0.290	0.16	–0.019	–0.078
Proportion of population in urban areas 1996	0.102	0.453**	0.524***	–0.18	–0.062	–0.069

Source: Authors' calculations based on IDB Household Surveys.
*Signif. at 0.2 level.
**Signif. at 0.1 level.
***Signif. at 0.05 level.

Among females, country differences do not change much over age groups, but show contrasting sources by age group. In contrast to the male pattern, no correlation coefficient is significant at 18–20, and many correlation coefficients grow and become significant with age. Correlation with education is low and insignificant at 18–20, positive and moderately significant at 21–22, and more intensely positive and highly significant at 23–25. Overall the correlation with education is positive (and increasingly so with age) rather than negative (and diminishing with age), as was the case in males, showing that participation rates of women reaching full adulthood are higher in countries where women have higher education levels. It should also be noted that the correlation with relative size of the population ages 10 to 17 is negative and moderately significant at 23–25; this may indicate an inverse relation between fecundity/family size/motherhood and female participation in adulthood. Finally, the positive and significant correlation with GDP per capita and proportion of urban population with participation in late young adulthood indicates that the participation rates of more highly educated women tend to be higher in more urbanized and richer countries.

Educational Determinants of Labor Market Status of Young Adults

The story of the labor market experience of young adults is in large part a story about the trajectory of their status as workers or potential workers. Consequently, a central question is what determines being in a state of employment or unemployment, or out of the labor force, among young adults in Latin America. Given the large size of informal economies in Latin America, the question also arises of what determines the location of working young adults in the formal and informal sectors of the economy. To answer these questions multinomial logit regressions were run on regional-wide data; Brazil, Colombia and Panama were excluded, however, because these countries' databases did not include marital status, found to be a key determinant of labor market status in all other countries.

Tables 4.3 and 4.4 show predicted total probabilities of location of men and women, respectively, in each of the four following categories according to age and educational attainment: out of the labor force, unemployed, working in the formal sector, or working in the informal sector. Informality was defined as working in a company with five or fewer employees, and unemployment encompasses persons who do not have a job but are actively looking for work. It is important to note that the predicted total unemployment probabilities shown in Tables 4.3 and 4.4 *are not* unemployment rates, because their denominator is total population rather than the labor force. Separate regressions were run for each age group shown in the two tables. Predicted total probabilities corresponding to each age group were calculated at the average group value of all independent variables, except education, which was set at six different values upon calculating total probabilities (thus the six columns in the tables). Given that education is a continuous variable, the columns in the tables do not correspond to nominal categories, but rather to point values that were plugged into the model equation for the purpose of calculating predicted total probabilities.

For men (Table 4.3), the predicted total probabilities of being out of the labor force fit findings based on descriptive data. Between late adolescence (ages 14–17) and mid young adulthood (ages 21–22), higher educational attainment is associated with a lag in labor market entry. Nonetheless, entry rates are faster the higher the educational attainment; thus, by the end of young adulthood (ages 23–25), the following has occurred: 1) the participation rate of males with the lowest educational attainment (3 years of

Table 4.3. Labor Market Status of Men by Age and Schooling in Latin America

Percentage

	3 yrs. educ.	6 yrs. educ.	9 yrs. educ.	12 yrs. educ.	15 yrs. educ.	17 yrs. educ.
14 to 17 year olds						
Out of LF*	41.80	58.10	85.20			
Unempl	4.20	4.00	1.40			
Formal	13.70	10.20	3.70			
Informal	40.20	27.70	9.60			
18 to 20 year olds						
Out of LF	18.65	19.40	27.68	47.23		
Unempl	5.75	6.76	7.97	8.20		
Formal	22.30	26.29	28.37	24.43		
Informal	53.30	47.55	35.98	20.13		
21–22 years old						
Out of LF	13.17	10.06	11.09	17.46	35.47	
Unempl	5.00	6.51	7.45	7.42	5.81	
Formal	24.15	33.01	40.83	45.25	40.61	
Informal	57.68	50.43	40.63	29.87	18.11	
23–25 years old						
Out of LF	10.03	7.90	7.12	7.30	8.39	9.76
Unempl	5.19	5.94	6.34	6.25	5.63	4.96
Formal	25.32	33.24	42.60	52.76	62.42	67.71
Informal	59.46	52.93	43.94	33.69	23.56	17.56
30 years of age						
Out of LF	10.36	8.70	7.00	5.38	3.95	3.14
Unempl	4.87	4.78	4.50	4.04	3.47	3.06
Formal	26.60	35.82	46.19	56.87	66.92	72.88
Informal	58.17	50.69	42.31	33.71	25.67	20.92
35 years of age						
Out of LF	9.24	7.74	6.21	4.75	3.48	2.76
Unempl	4.57	4.47	4.19	3.75	3.21	2.83
Formal	27.21	36.54	46.96	57.63	67.61	73.50
Informal	58.98	51.25	42.63	33.86	25.70	20.91
45 years of age						
Out of LF	10.48	8.90	7.24	5.63	4.17	3.34
Unempl	3.88	3.85	3.66	3.33	2.88	2.56
Formal	24.70	33.61	43.82	54.57	64.88	71.09
Informal	60.93	53.64	45.27	36.48	28.07	23.01

Source: Authors' calculations based on IDB Household Surveys.
Note: Estimations based on multinomial logit regressions whose technical details are shown in Appendix 1 of Bruni Celli and Obuchi (2002).
*LF = Labor force.

Table 4.4. Labor Market Status of Women by Age and Schooling in Latin America

Percentage

	3 yrs. educ.	6 yrs. educ.	9 yrs. educ.	12 yrs. educ.	15 yrs. educ.	17 yrs. educ.
14 to 17 year olds						
Out of LF*	70.10	81.80	94.90			
Unempl	3.00	2.40	0.70			
Formal	5.50	3.50	1.00			
Informal	21.30	12.40	3.40			
18 to 20 year olds						
Out of LF	48.54	49.86	61.29	78.64		
Unempl	5.23	6.08	6.17	4.78		
Formal	11.78	13.71	12.75	8.26		
Informal	34.45	30.35	19.79	8.33		
21–22 years old						
Out of LF	46.36	39.23	42.19	55.66	76.80	
Unempl	3.85	5.55	6.20	5.18	2.76	
Formal	12.89	19.50	23.54	21.86	13.33	
Informal	36.89	35.71	28.07	17.30	7.12	
23–25 years old						
Out of LF	48.08	41.93	39.69	40.85	45.13	49.66
Unempl	3.53	4.48	5.01	4.97	4.30	3.59
Formal	12.51	18.20	24.46	30.44	34.61	35.50
Informal	35.88	35.40	30.83	23.75	15.97	11.25
30 years of age						
Out of LF	46.55	42.50	37.58	31.92	25.86	21.86
Unempl	1.89	2.02	2.09	2.07	1.96	1.84
Formal	12.92	18.90	26.78	36.45	47.34	54.79
Informal	38.64	36.59	33.56	29.56	24.84	21.51
35 years of age						
Out of LF	43.39	39.39	34.59	29.15	23.42	19.68
Unempl	1.85	1.97	2.02	1.99	1.87	1.74
Formal	13.81	20.09	28.27	38.18	49.15	56.57
Informal	40.95	38.55	35.12	30.69	25.57	22.02
45 years of age						
Out of LF	46.61	42.80	38.15	32.71	26.79	22.81
Unempl	1.49	1.60	1.67	1.67	1.60	1.51
Formal	11.86	17.46	24.94	34.27	44.98	52.45
Informal	40.04	38.13	35.25	31.35	26.63	23.23

Source: Authors' calculations based on IDB Household Surveys.
Note: Estimations based on multinomial logit regressions whose technical details are shown in Appendix 1 of Bruni Celli and Obuchi (2002).
*LF = Labor force.

schooling) has been surpassed by all other educational groups; and 2) the participation rate of men with the highest educational attainment (17 years) is only slightly lower than that of men with middle educational attainment. Again, as found in the analysis of descriptive data, as men move into full adulthood, those with higher educational attainment experience slightly higher participation rates than those with lower educational attainment.

Male unemployment probabilities also differ by age and educational attainment during young adulthood. During early and mid young adulthood (ages 18–20), unemployment probability and educational attainment are positively associated among men with three to 12 years of education range. This may occur because groups with higher educational attainment are pressuring more strongly as first-time market entrants than groups with lower educational attainment, which had exerted such pressure at an earlier age. However, this positive relation between unemployment probability and educational attainment does not apply when cells representing post-secondary education (15 and 17 years of education) are included in the analysis. In addition, in mid and late young adulthood (ages 21–25), men with post-secondary education are less likely to be unemployed than men with six to 12 years of education, even though at this age the former are pressuring more strongly for entry than the latter. This suggests that men with college education are more easily absorbed by the market than those with middle levels of educational attainment during mid and late young adulthood.

Among males, the probability of being located in the informal sector decreases, and the probability of being located in the formal sector increases, with the *joint* increase of age and educational attainment (top-left to lower right movement in Table 4.3). In early and mid young adulthood (ages 18–22), higher educational attainment is associated with a lower informality probability, but not necessarily with a higher formality probability. This is because individuals with the highest educational attainment in this age range (ages 18–22) are more likely to be out of the labor force than individuals with lower educational levels. As men move from early to mid and late-young adulthood, the formality probability increases in all educational groups, but more rapidly the higher the educational attainment of the group. To illustrate, between early young adulthood (ages 18–20) and late young adulthood (ages 23–25), formality probability increases from 22.3 percent to 25.32 percent in the case of men with three years of educa-

tion, and from 24.43 percent to 52.75 percent in the case of men with 12 years of education.

Men with post-secondary education never experience a low formality probability, just as they never face a high unemployment probability. In mid young adulthood (ages 21–22) when they begin to enter the labor market, the formality probability (40.61 percent) among these men is already almost as high as that of men with upper secondary education (45.25 percent); in late young adulthood (ages 23–25), when they are massively entering the market, their formality probability (about 65 percent) is far above that of men with 12 years of education (52.76 percent). Again, this suggests that the formal sectors of Latin American economies most easily absorb college and university graduates.

Informality probability generally rises in a slight and steady way with age within each education group, regardless of educational attainment.[4] The model predicts this even for men with college or university education. Although a modeling problem cannot be ruled out, such small continuous increases in informality with age may be picking up the tendency of men to set up their own small businesses as they move into prime age. This may also reflect the definition of informality used, which includes all workers in companies with five or fewer employees.

Table 4.4 shows the total predicted probabilities for women. Note that predicted participation rates of women with 12 or fewer years of education are higher than those found in descriptive statistics. Also, according to the model, age-participation profiles associated with different levels of educational attainment cross in late young adulthood (ages 23–25), rather than in early to mid young adulthood (ages 18–22) as suggested by descriptive statistics. But other than that, model results generally fit the patterns found in descriptive statistics. Throughout, women are less likely to be in the labor force than men. In early young adulthood (ages 18–20), women with higher educational attainment are less likely to be in the labor force than their less-educated equivalents, but as they move into late young adulthood (ages 23–25) the former experience rapid entry into the labor force while the latter fall behind: by the early thirties, the "out of labor force" probability has fallen sharply to 22 percent among women with post-secondary education (similar to descriptive statistics) but remained about the same as in early young

[4] A small slump is observed in the movement from late adulthood into the early thirties.

adulthood (47 percent) among those with three years of education. As in the descriptive statistics, the model predicts the presence of local peaks followed by movements out of the labor force among the less educated; it also shows that educational attainment is associated with lags in local peaks. The model, however, predicts slumps only for women with three and six years of education, failing to do so for women with nine and 12 years of education.

It is interesting to note that unemployment probability is lowest among women with high and low educational attainment, and highest among women with middle levels of educational attainment. The high capacity of formal economies to absorb individuals with college education may explain the low unemployment probability of this group. The low unemployment probability of the least educated women may reflect a tendency to stay out of the labor force and/or a tendency to seek and find work in the more flexible informal sector of the economy. If the above are true, the higher unemployment probability of women with middle levels of education may derive from the pressure they exert on the formal sector combined with the formal sector's limited ability to absorb them.

A closer look at the patterns in Table 4.4 provides some support for this hypothesis. First, the unemployment probability of women with three years of education is highest during early young adulthood (18–20) but decreases sharply at ages 21–22. This seems to be associated with reductions in the pressure exerted on the market: between adolescence and ages 18–20 the participation rate of women with three years of education rises from 30 percent to 52 percent, while the increase between ages 18-20 and ages 21–22 is only from 52 percent to 54 percent. The table further shows how continued reductions in unemployment probabilities of women with three years of education occurring beyond that age are associated with exits from the market or movements into the informal sector. Second, the highest unemployment probability of college graduates (3.59 percent), occurring at ages 23–25 (when they massively enter the market), is much lower than the highest unemployment probability experienced by women of any other educational group; this suggests that the formal sector is highly capable of absorbing them. Finally, women with nine years of education not only show the highest unemployment probability on the table at their peak (6.2 percent at ages 21–22), but also lower reductions in subsequent periods associated with continued entrance into the market and the formal sector of the economy.

As in the case of men, the formality probability of women increases with the joint growth of education and age. It is important to note though that, throughout young adulthood, the proportion of employed women with six to nine years of education located in the informal sector is consistently higher than that of men and that, as women age, this feature tends to become accentuated. This may result from women's lower likelihood of entering the formal sector at mid levels of education and their subsequent turning to the informal sector.

A comparison of Tables 4.3 and 4.4 shows that the unemployment probabilities of women are always lower than those of men. In order to avoid misleading conclusions, it is important to recall that unemployment probabilities are not the same as unemployment rates. In the latter, the labor force is in the denominator; while in the former, the full population is in the denominator. Estimations based on logit regression models in Table 4.5 below show that young adult females experience higher unemployment rates than males at all levels of education. The table also shows that for prime-age females this relationship is reversed. This suggests that during young adulthood, a time when women try to enter the labor force, they are less likely than men to find work. Lower unemployment rates in prime age adulthood may derive from the fact that at this time women have fully entered household occupations and are thus less pressured than men to remain within (or re-enter) the labor force.

In sum, the predicted participation probabilities resulting from multinomial modeling are consistent with descriptive statistics illustrated in Figure 4.2. With regards to other, hitherto unexplored aspects of labor market status, the model offers several findings. First, regardless of sex, formal employment increases with the joint increase of age and educational attainment. Nonetheless, employed women are less likely than men to have formal employment. This gender difference becomes more acute with age, but fainter with educational attainment. Second, within each educational group, unemployment probability is highest when that educational group is entering into the market and then decreases with age. Women display a lower unemployment probability than men during young adulthood, possibly because the former are less likely to press for entry into the market than the latter. Unemployment *probability*, though, must not be confused with unemployment *rates,* which are in fact higher among young women than among young men, suggesting the former face greater difficulties getting

Table 4.5. Unemployment Probabilities of Men and Women in Latin America by Educational Level

	6 years		12 years		17 years		All	
	Male	Female	Male	Female	Male	Female	Male	Female
Young adults (18–25)	4.24	5.83	5.97	8.16	7.91	10.73	4.87	6.68
Prime age (26–55)	2.28	2.07	2.10	1.91	1.96	1.78	2.22	2.01

Source: Estimations based on logit regressions shown in Appendix 1 of Bruni Celli and Obuchi (2002).

jobs when they are actually looking for them. Within each age sub-group, young adult women with middle levels of education have the highest unemployment probability, possibly because they press more than the least educated women for entry into the formal sector but are less successful than the most educated women at finding jobs in that sector. This feature is observed to some extent among men, but the tendency is towards a positive relationship between unemployment probability and educational attainment in early young adulthood and an inverse relationship when late young adulthood is reached. Finally, the labor market, particularly the formal sector, can far more easily absorb both young men and women with college-level education than their less educated counterparts.

Determinants of Young Adult Wages

The following questions must be considered in an analysis of young adult wages in Latin America: How do education, work experience and gender affect the income of young adults in the region? Is the young adult labor market experience different from that of prime-aged adults on the income dimension? What country differences can be observed?

Regional and individual country Mincerian wage equation regressions were run to answer these questions. In order to allow meaningful comparisons among countries and avoid the problems associated with comparisons of wages expressed in different currencies in regional and country-group equations, a wage index was created for each country, based on the median wage (wage/median wage of the country). The resulting variable was called "windex" and its log was used as a dependent variable

in pooled regional regressions. The log of wages was used in single country regressions. In all sets of regressions, regressions were estimated for young adults, prime-age adults and the total labor force.

All wage equations included the following variables:

- *Completed years of schooling,* operationalized as the highest year of formal education completed (educational attainment). Counting begins with the first year of primary education.
- *Experience*, operationalized as age –years of schooling – 6. This definition assumes that the person enters the educational system at age six and begins to work as soon as s/he leaves the educational system.
- *Experience squared*. This variable allows for changes in the returns to experience as experience increases.
- *Gender*, where man = 1 and woman = 0. This variable seeks to capture gender effects on income.
- *Country effects* (only in pooled regressions). These were dummies to control for country-specific effects.

The variables above comprise the basic wage equation used in this chapter. One extension of this model, which added a spline variable for schooling, was also analyzed. Spline variables allow for testing if there were changes in the returns to education at threshold values of years of education, and the splines used in regional and country equations were different. Country splines were set at critical exit points in individual country educational systems.[5] As regional regressions required standardization, however, splines were set identically for all countries at the most common exit points in the region: 0 to 6 years of education, 7 to 12 years of education, and 13 or more years of education.

Table 4.6 shows a summary of the regression models used in the analysis. The basic and spline models were run with both regional and country-by-country data, and regressions were run for the whole labor force, young adults (ages 18–25) and prime-aged adults (ages 26–55). Regressions were also run for a sub-division of prime-aged adults (ages 26–35 and 36–55) for the purpose of comparing the young adult labor market experience with what

[5] See critical points in Appendix 5 of Bruni Celli and Obuchi (2002), the working paper on which this chapter is based.

Table 4.6. Wage Equations: Basic Model and Spline Model

	Pooled regression (all countries)		Individual country regressions	
Sample	All labor force Young adults (ages 18–25) Prime age (ages 26–55) Younger prime age (ages 26–35) Older prime age (ages 36–55)		All labor force Young adults (ages 18–25) Prime age (ages 26–55) Younger prime age (ages 26–35) Older prime age (ages 36–55)	
	Basic	**Spline**	**Basic**	**Spline**
Dependent variable	ln(windex)	ln(windex)	ln(wage)	ln(wage)
Independent variables	Years of education (yedc)	Years of education (yedc)	Years of education (yedc)	Years of education (yedc)
	Experience (exp)	Experience (exp)	Experience (exp)	Experience (exp)
	Experience squared (exp2)	Experience squared (exp2)	Experience squared (exp2)	Experience squared (exp2)
	Gender	Gender	Gender	Gender
	Country dummy	Country dummy Spline (splin#)	Country dummy	Country dummy Spline (splin#)

Source: Authors' compilation.

were found to be two contrasting segments of the prime-aged adult population.

Regional Regression Results

Table 4.7 shows all but the country-dummy coefficients obtained in the basic regional wage equation model regression.[6] Three details stand out. First, returns to education of young adults are positive (13.6 percent) and significant, but no different from those of prime-aged adults. Second, young adult returns to experience (3.2 percent) are lower than returns to education, but they are also positive and significant, and no different from those of prime-aged adults. Nonetheless, the returns to experience squared of the

[6] Detailed results are presented in Appendix 3 of Bruni Celli and Obuchi (2002).

Table 4.7. Simple Wage Equation Results, Young Adults and Prime-Aged Adults

	Constant	Education	Experience	Experience squared	Gender (male = 1)
Young adults	2.85	0.136*	0.032*	0.00097*	0.22*
Prime-aged adults	2.96	0.134*	0.028*	–0.00024*	0.25*
P>ltl of difference test*	0.000	0.111	0.118	0.000	0.000

Source: Authors' calculations based on IDB Household Surveys.
* Coefficient significant at 0.01.

* Test of difference of coefficients was executed through fully interacted wage equation: lnwindex = constant + Primeadult(=1)*education + Primeadult*experience + Primeadult*exp2 + Primeadult*gender + Primeadult*countrydummies. If coefficient of Primeadult interaction is significantly different from zero, then Primeadult coefficient is significantly different from coefficient of (omitted) Young Adult (=0).

two age groups are significantly different, and their opposite signs suggest that the experience-earnings profile of young adults is convex (increasing returns to experience) while that of prime aged adults is concave (decreasing returns to experience). This result may be reflecting two processes. On the one hand, young adults possibly experience higher levels of on-the-job learning than prime-aged adults, and increasing returns may be reflecting the increasing productivity associated with high learning rates. On the other hand, prime-age adults tend to lose value in the market as they approach old age, which is also when they have accumulated the most experience.

Finally, the gender effects shown in Table 4.7 have two features. First, all else being equal, the earnings of men are significantly higher than those of women among both young and prime-aged adults. There are several factors that could contribute to this difference. For instance, women's possibility of maternity implies higher expected costs for the employer because of the time they might spend away from work, as well as a greater risk of absenteeism and potential exit after costly training. In addition, some countries have labor laws that protect women's rights but generate higher costs for employers. Second, male and female differences in income are sharper among prime-aged adults (26 percent) than among young adults (22 percent). As female labor participation increases during young adulthood but becomes erratic after age 25, this could suggest higher intermittence of female participation in the labor market beyond young adulthood. It is possible that such intermittence has a cumulative (and thus increasing) negative effect on female earnings.

Changes in coefficients between young adulthood and prime age were further explored by subdividing the prime-aged population (ages 26 to 55) into two segments: one that is still in the process of consolidating its position in the labor market (ages 26 to 35), here called "younger prime-aged adults," and one that is either established or approaching old age (ages 36–55), here called "older prime-aged adults." The results in Table 4.8 show that the difference between male and female earnings remains lower among young adults than in the two older age groups. The table further shows that such differences increase progressively with age. This finding provides further support to the proposition that women's intermittence in the labor market may have a cumulative negative effect on their income, consequently suggesting that it is during young adulthood that the female experience is closest to that of men.

The experience and experience-squared coefficients in Table 4.8 show that increasing returns to experience do not occur only during young adulthood, but also in the period that immediately follows it. A plot in Figure 4.5 of experience-earnings profiles predicted by the three equations reported in Table 4.8 illustrates how the profile corresponding to younger prime-aged adults (ages 26–35) is in fact *more* convex than that of young adults, as well as how concavity or decreasing returns occur only among the older prime-aged adults (ages 36–55). This suggests that young adults in Latin America have the prospect of engaging in continued high rates of on-the-job learning for at least another decade.

Finally, the returns to education coefficients in Table 4.8 also contrast with those in Table 4.7. Here, returns to education of young adults (0.136) are not significantly different from those of "younger prime-aged adults" but are significantly higher than those of "older prime-aged adults" (0.133). This pattern is analogous to that of the experience coefficients, where both younger groups showed a convex experience-earnings profile, while the older group featured a concave profile, indicating that the labor market experience of the younger prime-aged group differs little from that of young adults. Though the absolute difference between the returns to education of the two younger groups and the older group is small (0.003), its significance raises attention with regards to its possible sources. This is particularly true if it is taken into account that this result is not without its problems; previous findings in the literature suggest that the older population (ages 36–55) should show higher returns to education than the younger population

Table 4.8. Simple Wage Equation Results, Young Adults and Two Age Groups within Prime-Aged Adults

	Constant	Education	Experience	Experience squared	Gender (male = 1)
Young adults (YA:18–25)	2.85	0.136*	0.032*	0.00097*	0.2197*
Younger prime aged (YPA:26–35)	3.22	0.1356*	–0.013*	0.0013*	0.2413*
Older prime aged (OPA:36–55)	3.16	0.133*	0.015*	–0.00005**	0.2648*
P>ltl of difference test[4] YA vs. YPA	0.000	0.647	0.000	0.082	0.005
P>ltl of difference test[4] YA vs. OPA	0.000	0.028	0.000	0.000	0.000

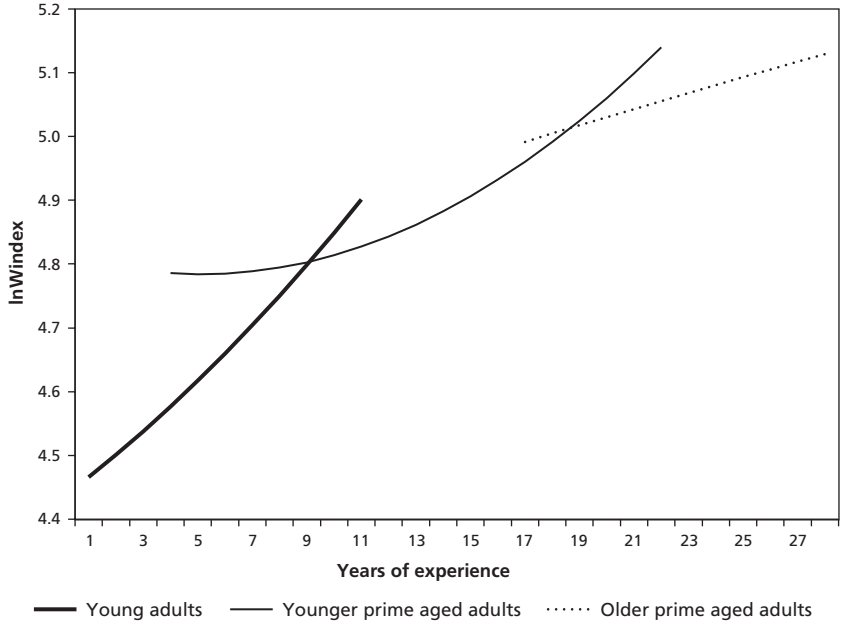
Source: Authors' calculations.
* Coefficient significant at 0.01.
** Coefficient significant at 0.05.

because income continues to rise well into prime adulthood among the better educated, while income stagnates among the least educated. But the literature also mentions that "newer vintage schooling effects" could account for higher returns to education among the young.

In order to disentangle these opposing factors, spline regressions were run at the regional level. The results shown in Table 4.9 tell an interesting story. They show that in the 0 to 6 years of education segment, returns to education of older adults (0.123) are significantly higher than those of young adults (0.113), but once education reaches the level of 13 years or more this relationship is reversed (older adults: 0.172 and young adults: 0.186). Lower returns to education of the younger population at the lower segment may be reflecting higher average education of the young, while higher returns in the upper segment may be associated with the "newer vintage schooling effects" of higher professional education. Younger populations' higher returns in the middle segment corresponding to secondary education may be reflecting the increasing importance of secondary education in obtaining a decent job in the labor market.

The gender effects in Table 4.9 are identical to those in Table 4.8, indicating robustness of the coefficient. But important differences are found in the experience coefficients. Now the simple experience coefficient is higher

Figure 4.5. Experience-Earnings Profiles of Young Adults, Younger Prime-Aged Adults and Older Prime-Aged Adults in Latin America



Source: Authors' calculations.

across all age groups, and all experience-squared coefficients are negative and identical, indicating concavity of the age-experience profiles in all age groups. Taking received research into account, these are "better-behaved" experience curves, and given the greater flexibility of the spline variables, these experience coefficients may be better estimates of the returns to experience. These results are nevertheless consistent with findings in the previous tables to the extent that young people continue to show higher returns to experience.

In sum, young adults in the region experience significant returns to schooling, lower but positive and significant returns to experience, and higher earnings in the male population. Their returns to schooling are similar to those of younger prime-aged adults but differ from those of older prime-aged adults who show higher returns in the lower segment of educational attainment but lower returns in the upper segment of educational attainment. Gender effects increase consistently with age, indicating that female young adults are at their peak in earnings relative to men. Finally, the

Table 4.9. Spline Wage Equation Results, Young Adults and Two Age Groups within Prime-Aged Adults

	Constant	YEDC 0–6	Spline 2 7–12	Spline 3 13+	Experience	Experience squared	Gender (male = 1)
Young adults (YA:18–25)	2.95	0.11*	0.023*	0.079*	0.05*	–0.0004*	0.221*
Younger prime aged (YPA:26–35)	3.09	0.105*	0.022*	0.08*	0.03*	–0.0003*	0.242*
Older prime aged (OPA:36–55)	3.03	0.119*	0.003	0.06*	0.03*	–0.0003*	0.264*
P>ltl of difference test[4] YA vs. YPA	0.001	0.188	0.852	0.895	0.000	0.615	0.008
P>ltl of difference test[4] YA vs. OPA	0.06	0.007	0.000	0.000	0.000	0.699	0.000

Source: Authors' calculations.
* Coefficient significant at 0.01.

returns to experience of young adults are higher than those of prime-aged adults.

Country Results

There are differences in the country wage equation coefficients of both young and prime-aged adults.[7] Figure 4.6 permits a comparison of simple model country returns to education of young and prime-aged adults, respectively. The figure shows returns to education of young and prime-aged adults by country and the confidence interval of such returns, as well as the regional return to schooling and its confidence interval.

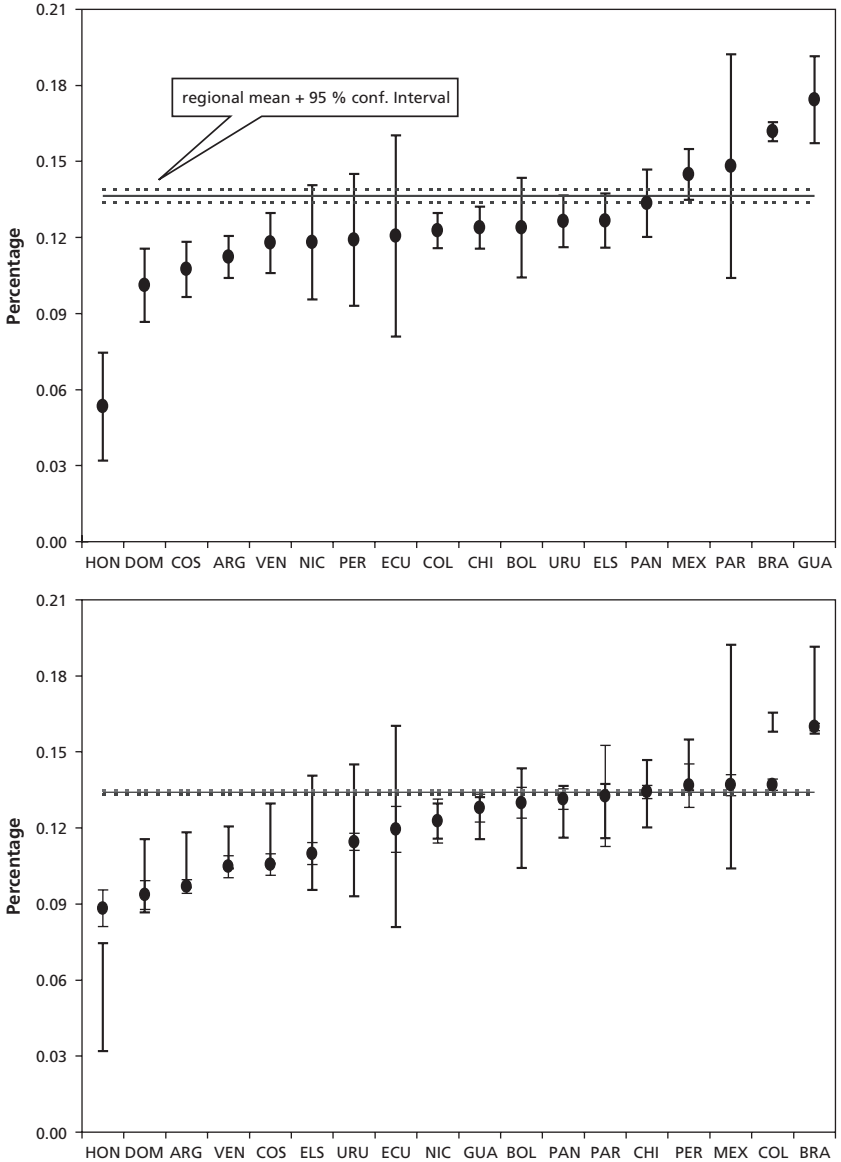
Estimates of returns to education of young adults cover a wide range (5.3 percent to 17.4 percent), though most (15 out of 18 countries) are spread evenly within a much smaller range (10 percent to 15 percent). Prime-aged adults display a smaller range (9 percent to 16 percent) and a smaller number of outliers (only Brazil), but a similarly sized though lower range for the other 17 countries (9 percent to 13 percent). Despite the seemingly bigger inter-country difference among young adults, country differences are in fact sharper and more significant among prime- aged adults. This is because the country confidence intervals of young adult schooling coefficients are much larger than those of prime-aged adults. The larger within-country variability of the returns to education of young adults is consistent with the previous findings, suggesting that young adulthood is a period in which workers have not yet fully consolidated their position in the labor market.

Regardless of the greater variability of young adult coefficients, it was not possible to reject the hypothesis of equal returns to education of young adults and prime-aged adults in all countries except Argentina, Colombia, Guatemala, Honduras and El Salvador. These findings suggest that in most countries the benefits of education tend to be captured early in the life cycle of the worker.

When individual country results are compared with regional results, it is found that half of the country coefficients corresponding to young

[7] Detailed results of the regression analysis by country for young and prime-aged adults are shown in Appendices 4 and 5 of Bruni Celli and Obuchi (2002).

Figure 4.6. Country Return to Education Coefficient and 95% Confidence Interval for Simple Regression Model



Note: ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHI = Chile, COL = Colombia, COS = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GUA = Guatemala, HON = Honduras, MEX = Mexico, NIC = Nicaragua, PAN = Panama, PER = Peru, PAR = Paraguay, ELS = El Salvador, URU = Uruguay, VEN = Venezuela

Source: Authors' calculations.

adults fall within the 95 percent confidence interval of the regional average, but the same is not true for prime-aged adults due to the combination of small regional and individual country confidence intervals. Moreover, the regional return to education is higher than the average of estimated country returns. This result could be a "Brazil effect," given the fact that this country has the second-highest return to education in the region and provides the largest sub-sample of the study.

Spline regressions show tendencies similar to those in the regional analysis: the country average for young adults returning to education is lower than that of prime-aged adults in the lower segment of educational attainment, but higher in the upper segment, which corresponds to higher education. Pair-wise *t*-test for country averages indicate that these differences are significant. Table 4.10 also shows that, as in simple regressions, between-country variations of spline coefficients are higher among young adults than among prime-aged adults, which is again consistent with the previous findings. This suggests that young adulthood is a period in which workers are still in the process of consolidating their position in the labor market.

Returns to experience are consistently lower than the returns for education in all countries and age groups. Simple regression experience coefficients are significant in all but four countries (Bolivia, Honduras, Nicaragua and Paraguay) in the case of young adults, and in all but two countries in the case of prime-aged adults (Honduras and Paraguay). Consistent with patterns found in regional analysis, in the case of young adults these coefficients trace either a linear or a convex curve in all of these countries, while prime-aged adults feature a concave S curve.

Also consistent with patterns found in regional analysis, spline regression models generate a change from convexity to concavity in the experience curves of young adults in all but one country (Colombia). As the introduction of spline variables fits better the changes in returns to education as age increases, these are likely better estimates of returns to experience. As with the education coefficient, inter-country variability is higher among young adults than among prime-aged adults. Furthermore, consistent with regional results, pair-wise country-by-country comparison of young and prime-aged adults indicates that prime-aged adults display lower returns to experience, and these lower returns to experience among prime-aged adults may be associated with decreasing returns to experience over the worker's life cycle.

Table 4.10. Comparison of Average Country Returns to Education Coefficients of Young and Prime-Aged Adults Using Splined Wage Equations

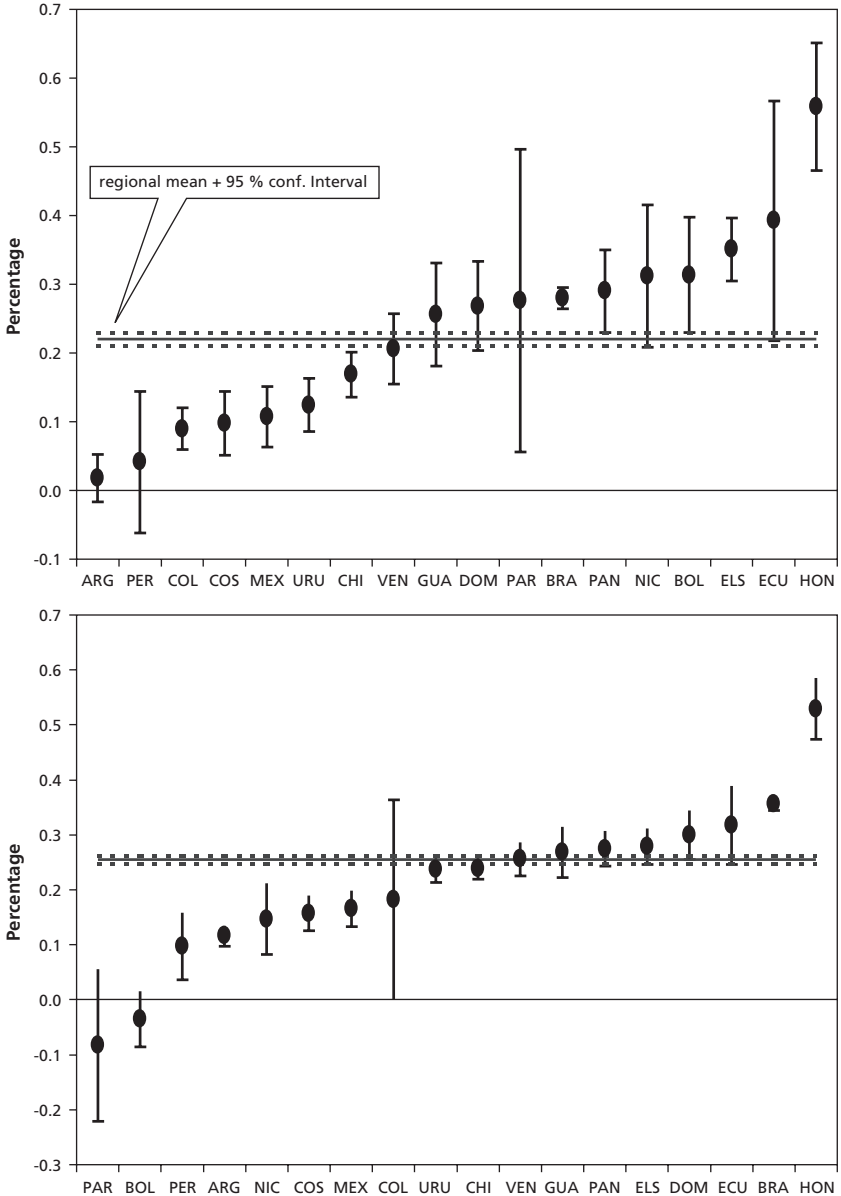
	Age group	Mean of country estimates	Standard deviations	P(T≤t) two-tail pair-wise *t*-test
Spline 1.	Young adults	0.071	0.034	0.079
Elementary	Prime aged	0.085	0.025	
Spline 2.	Young adults	0.036	0.038	0.022
Middle school	Prime aged	0.018	0.031	
Spline 3	Young adults	0.063	0.051	0.081
High school	Prime aged	0.038	0.047	
Spline 4.	Young adults	0.114	0.039	0.011
Higher education	Prime aged	0.087	0.034	

Source: Authors' calculations.

Figure 4.7 shows that young adult country gender regression coefficients vary widely among Latin American countries. Between-country differences are also high among prime-aged adults and, although they display a smaller range, prime-aged adult differences are more significant, as suggested by the narrower country confidence intervals. Pair-wise analysis shows that in most countries the gender effect is lower for young adults than for prime-aged adults; the exceptions were those countries with large gender effects in young adulthood (Bolivia, Ecuador, Honduras, Nicaragua, Panama, Paraguay, El Salvador). Gender coefficients in spline model regressions were similar to those corresponding to the simple model regression in all countries.

In sum, country analysis showed that confidence intervals of education, experience and gender coefficients corresponding to each country were wider in the case of young adults than in the case of prime-aged adults. This result possibly reflects the fact that young adults have not consolidated their position in the job market and may still be engaging in job-changes in a search for better deals. The inter-country range and variance of estimates of young adult coefficients were larger than those of prime aged adults. But as the within-country confidence intervals of the former were wider than those of the latter, inter-country differences were found to be sharper and more significant in the case of prime-aged adults than in the case of young adults.

Figure 4.7. Gender Effects by Age and Country



Note: ARG = Argentina, BOL = Bolivia, BRA = Brazil, CHI = Chile, COL = Colombia, COS = Costa Rica, DOM = Dominican Republic, ECU = Ecuador, GUA = Guatemala, HON = Honduras, MEX = Mexico, NIC = Nicaragua, PAN = Panama, PER = Peru, PAR = Paraguay, ELS = El Salvador, URU = Uruguay, VEN = Venezuela

Source: Authors' calculations.

This suggests that young adult labor market experience on the income dimension tends to converge towards own-country adult patterns, which in turn are clearly distinctive.

Summary of Findings and Conclusions

This chapter has explored and analyzed the labor market experience of young adults in 18 Latin American countries by focusing on two issues: patterns of entry and consolidation into the labor force, and characteristics and determinants of income.

Male and female young adults show contrasting patterns of entry. For men, the period of young adulthood (ages 18–25) was found to be one of smooth convergence towards steady state associated with full adulthood. Females show more complex and less-clear-cut trajectories, which seem to be affected by entrance into motherhood.

Educational attainment shapes certain aspects of the labor market experience of young adults, regardless of gender. First, more educated individuals postpone entry into the market. Also, during young adulthood, the more educated feature higher unemployment rates, possibly because they are newer in the market; at the same time, however, their rate of participation in the informal sector of the economy is also lower. Finally, young Latin American adults with college education were found to experience rapid labor market absorption, featuring swift entry into the formal sector, high participation rates and low and rapidly decreasing unemployment rates.

Educational attainment nonetheless impacts the experience of men and women differently. Though education accounts for postponement of entry among men during early young adulthood, participation rates of men tend to converge by late young adulthood regardless of educational attainment. In contrast, the participation rates of women with different levels of educational attainment tend to diverge as they reach late young adulthood. In particular, while the participation rates of women with higher educational attainment tend to increase during this period, those of women with lower levels of education tend to stagnate and even decrease.

Motherhood was found to affect the labor market experience of women. In many countries peaks in female participation rates are followed by slumps marking exits seemingly induced by motherhood. Educational

attainment seems to affect childbearing decisions as the slumps appear earlier among women with lower educational levels.

The participation rates of young adults vary by country. Such differences tend to disappear among men as they reach late young adulthood, but remain stable in the case of women. Country differences in educational attainment and family size seem to account for country variations in male participation rates during early young adulthood. Educational attainment, GDP and levels of urbanization are positively related with female participation rates.

Earnings equations show significant positive effects of education and experience on earnings, and consistently show that young men obtain better incomes than young women. In simple regression models the returns to schooling of young adults do not differ from those of prime-aged adults, but further analysis incorporating spline variables shows that older prime-aged adults display higher returns to education in the lower segment of educational attainment but lower returns in the upper segment of educational attainment. Gender effects increase consistently with age, indicating the earnings of women relative to men are at their peak during young adulthood. Finally, the returns to experience of young adults are higher than those of prime-aged adults. All of these findings hold for young adults in almost all countries included in the study. Nonetheless, comparison of country results showed differences in all coefficients (education, experience and gender). Such differences were smaller but more significant among prime-aged adults than among young adults. The wider confidence intervals of young adult coefficients in all countries, which accounted for the former, also suggest that young adults have not consolidated their position in the job market and may still be engaging in job-changes in search for better deals.

These widely varying labor market outcomes among young adults hold major implications for their lifetime earnings potential and the prospects of their children. On a larger scale, these outcomes affect the development and the social cohesion of Latin American countries, and they call for policy responses that will encourage participation and retention in the formal economy. Of particular importance is encouraging young women's consolidation in the labor market, as the intermittence associated with motherhood can confine women either to the informal sector or to a working life of entry-level wages in the formal sector. Market incentives for

childcare facilities, for instance, might improve female retention in the labor market, allowing women to maintain stable incomes in the short term and increase their skills and wages over time. Nonetheless, policies aimed at helping women must be carefully designed and monitored to avoid unintended consequences. Regulatory approaches guaranteeing maternity leave, with job security guaranteed during that time, have historically backfired by discouraging the hiring of women.

Of importance for both young men and women is encouraging the human capital formation necessary to participate in the formal sector and stimulating the creation of formal-sector jobs. As education clearly affects formal-sector wages, the quantity of the educational supply must be increased in some countries, and in most instances the quality of the educational supply must be improved to prepare young workers for skilled positions with commensurate earnings. At the same time, macro policies must promote the expansion of the formal sector so that young adults entering the labor market can find suitable employment. Otherwise, the entry of increasingly educated workers into the labor market will create a clash between rising expectations and stagnant job prospects. The possible effects of such a clash cannot be safely ignored: large numbers of unemployed or underemployed workers, especially young men, can represent a source of potential social problems and even instability.

CHAPTER FIVE

School Attainment and Transitions to Adulthood in Latin America

Carlos Filgueira, Fernando Filgueira and Alvaro Fuentes[1]

In the 1980s, studies from the World Bank and the Inter-American Development Bank made a groundbreaking observation in development research. One of the major differences behind the economic and social performances of South East Asia and Latin America could be traced back to distinct efforts and achievements in the accumulation of human capital and the equality of its distribution. This implied a major shift in development discourse, and one that called for an urgent reevaluation of education policies in Latin America. More than 10 years later, it is clear that effecting such changes is more easily said than done. Indeed, while access to education cannot be defined as the major problem in the region, drop-out rates remain a daunting challenge leading to low schooling rates and low overall educational achievements.

Indeed, as compared to other regions in the world, schooling levels in Latin America have grown slowly and remain considerably lower than in developed countries and the Southeast Asian "tigers." In addition, as Londoño and Székely (1997) note, the "growth in the supply of the highest skills has been slow and has not been able to keep pace with demand."

Many Latin American countries have invested considerable economic resources in order to improve their educational supply, particularly in terms of school infrastructure, human and material resources, and innovative strategies to make schools more appealing to students. For the most part, however, politicians, experts and policymakers show frustration with the small returns on the investments made so far, as policies are simply not

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producing the expected outcomes. The key to this failure is not on the supply side but on the demand side: little is known regarding how and why the targeted population behaves as it does.

Thus, the primary focus of diagnosis and policy should go from supply to demand, or from endogenous to exogenous factors to the educational system. Indeed, disappointing school performance has recently motivated international agencies such as the Inter-American Development Bank, the World Bank and the Economic Commission for Latin America and the Caribbean to sponsor studies on how non-academic factors affect educational performance. What these studies clearly show is that most variance in Latin American schooling is not due to access but rather to drop-out rates.[2] Indeed, the "enrollment profiles of the poor differ across countries but fall into distinctive regional patterns: in some regions the poor reach nearly universal enrollment in first grade, but then drop out in droves leading to low attainment (typical of South America), while in other regions the poor never enroll in school (typical of South Asia and Western/Central Africa)."[3] Also, as will be discussed below, drop-out behavior in Latin America shows distinct patterns in modal ages of drop-out, distance between poor and non-poor sectors, and differences between genders.

Overall, a major shift in perspective is proposed in this chapter. The formation of human capital does not result only from educational supply, as important as this may be. Rather, human capital should be seen as the final outcome of a set of interrelated choices made by youth that interact with the availability of services and resources offered by the society at large. When young people get married, when and how they enter work, when they drop out or abandon the educational system and when and how many children they have constitute critical steps and choices that will have a long term impact on their human capital accumulation. In turn, the signs that come from the labor market, the cultural norms and standards regulating gender behavior and the educational system constitute the backdrop against which those options acquire meaning and thus should be interpreted.

Three types of causes can help to explain the interaction of demand for education and human capital formation. First, there are country-specific factors that relate to the stage of the demographic transition, economic

[2] See Filgueira (1998 and 1999), ECLAC (1998), and Londoño and Székely (1996 and 1997).
[3] See Filmer and Pritchett (1998).

development and reach and effort of the educational system itself. Broadly, these characteristics influence the set of options youth have and constitute the major scenario where signals and incentives are presented to young people and limits placed upon their choices. Second, gender and income differences within countries provide an additional set of factors that influence choices among youth. Finally, the choices themselves and how they are sequenced and timed are a third set of efficient causes that help to explain demand for education, human capital formation and eventually the intragenerational and intergenerational reproduction of poverty.

A Structural and Demographic Typology of Latin American Countries

Latin America is neither Southeast Asia nor homogeneous. Lessons cannot be drawn automatically from other regions, nor from single country experiences. Demand changes among countries and within countries, as changes occur among gender and socioeconomic groups. In the context of a heterogeneous reality, the issue of school drop-out is in some countries primarily a combination of "supply" and "demand" issues, while in other countries it is primarily a "demand" problem. This implies that there are no easy solutions, and that simply increasing resources will not do the job, though increasing resources certainly has to be considered. Nonetheless, understanding how demand operates and why it fails to reach adequate levels constitutes the greatest challenge in effective educational policy design. A first step is to consider the heterogeneous structural realities of Latin America. Two factors will be introduced to approach a basic classification of Latin American countries: phase of the demographic transition, and maturity and reach of the educational system.

Demand is driven, among other things, by demographics. In this sense, Latin America is presently undergoing what has been labeled the "golden age" or the "demographic window of opportunity."[4] Indeed, between the 1980s and the year 2050 the region will have the best combination of low dependency rates regarding both children and old age. Yet, this window of opportunity is at very different stages in Latin America. While in

[4] See Duryea and Székely (2000) and Magno de Carvalho (1998).

some countries that window is beginning to close, in others it has not yet fully opened. In any case, the phase at which countries are in their demographic transitions introduce distinct challenges as well as opportunities regarding drop-out and youth choices as they move to adult life. Fertility rates, child dependency rates, and urban/rural population percentages must all be considered in the struggle to increase school attendance. This knowledge must in turn be combined with the accumulated effort that these countries have made in regard to the supply and reach of the educational system. The data for Latin America indicate that three different groups of countries can be broadly identified in terms of demographics: early transition countries, mid-range countries, and countries where the transition is almost complete, which will eventually have to face the challenges of post-transitional societies.

As shown in Table 5.1, Uruguay, Chile, Argentina and Cuba are among the countries that have reached an advanced stage of the demographic transition and in some cases nearly completed it. All four are characterized by low fertility rates, an age distribution that is not heavily weighted toward the young, a predominantly urban population, and an extended schooling system. The persistence of school drop-out problems in these countries, however, indicates that significant difficulties remain on the demand side. As will be discussed, these countries face the challenge of bridging the gap in schooling and educational attainment between different social strata and gender. Here, youth choices regarding adult roles are critical for understanding why there is insufficient demand for education at the secondary level.

Colombia, Costa Rica, Venezuela, Mexico and Brazil, also shown in Table 5.1, present an intermediate situation in terms of their demographic situation as well as educational effort and reach (though this group displays some heterogeneity in the latter regard). Still, almost universal enrollment in the first years of school suggests that demand remains a critical factor in increasing educational attainment; increases in educational supply alone do not appear to be sufficient. In contrast to the previous group considered, however, these countries confront more extended patterns of early adoption of adult roles that diminish the chances of school permanence. Early motherhood, child and adolescent labor, and in some cases earlier marriages are distributed along stratified lines but advance deeper into the middle-income sectors in these countries.

Table 5.1. Demographic Stages and Educational Reach: Selected Variables

	Demographic factors			Past educational effort and basic schooling		
Countries	Child dependency 0–14*	% Urban pop.	Total fertility rates	Adult literacy rate	Net primary enrollment ratio	Net secondary enrollment ratio
Uruguay	41.2	90.7	2.4	97.5	90.3	83.8
Chile	47.2	84.2	2.4	95.2	90.4	80.2
Argentina	50.6	88.6	2.6	96.5	99.9	76.9
Cuba	33.1	76.7	1.9	95.9	99.9	69.9
Costa Rica	61.6	50.3	2.8	95.1	91.8	55.8
Colombia	58.3	73.6	2.9	90.9	89.4	76.4
Venezuela	65.6	86.5	3.0	92.0	82.5	48.9
Brazil	56.5	79.6	2.3	84.0	97.1	65.9
México	67.2	73.8	2.8	90.1	99.9	66.1
Honduras	87.3	45.0	4.3	70.7	87.5	36.0
Guatemala	88.3	39.4	4.9	66.6	73.8	34.9
Nicaragua	97.6	63.2	4.4	63.4	78.6	50.5
Salvador	82.5	45.6	3.2	77.0	89.1	36.4
Haiti	75.5	33.0	4.4	45.8	34.2	19.4
Bolivia	80.2	62.3	4.4	83.6	97.4	40.0

Source: Magno de Carvalho (1998), UNDP (1999).
* Year 1990.

The last countries in the table—Guatemala, Nicaragua, Honduras, Bolivia, El Salvador and the extreme case of Haiti—are in most cases at an early stage in their demographic transition. These educational systems of these countries still need to extend their reach, especially in rural areas, in order to increase enrollment and attendance.

On the demand side, these countries additionally present the most complex scenario. They have large rural populations in which youth enter into work with their family or in rural labor markets early on, and high fertility rates and early motherhood constitute strong and extended deterrents to enrolling or, more typically, remaining in school. Furthermore, the household educational climate that is suggested by high illiteracy rates further inhibits strong educational demand.

These three different types of countries confront distinct challenges and have different opportunities for increasing schooling and educational

attainment. A common feature of all three groups, however, is that demand as well as supply must be understood in order to improve their educational situation. While demographics and educational reach are useful as a first step in understanding how demand is formed, understanding adolescent and youth transitions to adulthood—often referred to in the literature as "emancipation paths"—represents the necessary second and more critical step toward capturing demand formation.

Critical Choices as Path-Dependent and Interrelated Options: The Idea of Emancipation Paths

Behavior behind decisions to drop out of the educational system does not correspond to the typical utility maximization of goods, but instead to choices among options that are to a greater or lesser extent exclusive or compatible. Consequently, the limits of individual educational investment cannot be examined as a derivative from the point where marginal private benefits equal the private marginal cost of the investment, independently of preferences over other goods. Additionally, decisions are not made with perfect information, nor do return benefits take place at a single point in time. Educational investment typically corresponds to benefits that follow a "postponed gratification pattern."

Youth educational behavior should thus be considered as a specific component of the more general process of emancipation. During this stage there are four important transformations in an adolescent's life, which can be sketched in terms of four dichotomies concerning role changes: studies or not; incorporation into the labor market or not; marriage or not; and parenthood or not.

Whenever youth choices regarding marriage, work or education are addressed, it is common to stress the importance of the findings because of the consequences these choices have on young people's future lives. For instance, very thorough studies have considered the impact of years of schooling on future earnings, childbearing on employment opportunities, and labor market participation on savings, culture and integration, to name just a few topics.[5] Fewer studies have concentrated on the interrelationship

[5] See White, Foner and Waring (1988) and Clausen (1986).

among these different choices in the shorter term. Or, in other words, how do childbearing, work, continuation or abandonment of formal educational, and marriage interact as adolescents become adults?

Certainly, it seems both theoretically sound and intuitively obvious not to consider these choices as independent from one another. First, these choices are path-dependent, because a given option in any of these dimensions affects the chances of being able to act upon the other dimensions. Having a child affects the chances of immediate employment, and working limits the possibilities of continuing and adequately performing in the educational system. Even more obviously, marrying or engaging in stable consensual unions increases the chances of childbearing. But choices are not independent from one another in an even more important and individual sense: young people weigh these choices as cost-opportunity issues, and they realize and evaluate the tradeoffs among them. Furthermore, and departing from a rational choice perspective, people attach different symbolic and identity values to these choices as an interrelated set of choices. It is well known that young women in poor and disadvantaged realms have children early, not just due to irrational behavior, incomplete information or lack of family planning tools, but also because among the different adult statuses available to them, motherhood is the easiest to achieve and the least dependent upon other people. This in turn will strongly limit and curtail the achievement of additional adult statuses and the completion of youth roles, such as formal schooling. Here both rational and non-rational behavior operates, and does so as a function of available statuses, the differential value attached to those statuses and control over the means to achieve them. These non-independent critical choices are termed emancipation paths. The advantage of such a perspective is that it incorporates time and interaction in time as a strategy to understand youth choices.

Stylized Facts on Work, Family and Education of Youth

Four countries have been selected for this chapter, and three variables have been considered as the major dimensions of youth emancipation paths.[6] The

[6] While it would be extremely useful to add to these dimensions that of parenthood, the data presently available for the countries considered do not permit the adequate identification of mothers, much less fathers.

patterns of family formation, work and education in Uruguay, Chile, Venezuela and Honduras are analyzed for adolescents and young people between 12 and 29 years. These findings are then combined with factor analyses for each country, in which emancipation variables and household and individual background variables are introduced for four groups within each country: men of high and low income and women of high and low income.

A double purpose guides this exercise. The first is to present some basic curves that show "cohort mortality" along the three emancipatory dimensions. A first simple approach to the question of emancipation paths consists of plotting cohort survival lines between 12 and 29 years for each dimension or group of variables in each country. The graphs represent in each line the percentage of people by yearly cohort that adopt "adult values" or that abandon "youth values." In other words, they represent the percentage of all youth at each age that work, have formed a new family and have left the educational system. This allows for a basic country comparison as to when young people adopt adult values and for a more nuanced comparison as to how these adult roles are sequenced or superimposed in time. As will be seen, countries differ in the modal ages at which young people leave the educational system, marry and enter the labor market. Furthermore, in some countries the curves of these different dimensions converge among older cohorts, while in others they diverge or remain parallel.

Secondly, factor analysis serves another subset of purposes. First and foremost, if choices regarding the adoption of adult roles are an interrelated and interdependent set of choices that covary with time, then that relation should come out in the factor analyses. In other words, age and emancipatory variables should cluster together in one factor or have important weights in one factor. This would not mean that background household and individual variables are not associated with emancipation dimensions, but simply that such association is weaker than that among time and emancipation variables and within emancipation variables.

Some Notes on Factor Analysis

Factor analysis is an analytical model employed in sociology for determining the number and nature of the underlying variables (factors) among large numbers of measures. More succinctly, factor analysis is a method for deter-

mining k underlying variables from n sets of measures, k being less than n. It may also be viewed as a method for extracting common factor variance from sets of measures.[7]

In multivariate analysis, the sources of variance in a variable can be expressed as:

$$V_t = V_{co} + V_{sp} + V_e$$

where V_t = total variance of a variable; V_{co} = common factor variance, or the variance that two or more variables share in common; V_{sp} = specific variance, or the variance of the variable that is not shared with any other variable; and V_e = error variance.

If the common factor variance V_{co} were broken down into two sources of variance, V_A and V_B, where V_A might be drop-out and V_B single-married, then,

$$V_{co} = V_A + V_B$$

This is reasonable if one considers the sums of squares of factor loadings (correlation) of any variable:

$$hi^2 = ai^2 + bi^2 + ci^2 \ldots\ldots\ldots + ki^2$$

where ai^2, bi^2 ..... are the squares of the factor loadings of variable i, and hi^2 is the communality of variable i. But $hi^2 = V_{co}$. Therefore $V(A) = a^2$ and $V(B) = b^2$ and the theoretical equation is tied to real factor analytic operations.

But there may of course be more than two factors. The generalized equation is:

$$V_{co} = V_A + V_B + \ldots\ldots V_K$$

Substituting in the former equation, one obtains:

$$V_t = V_A + V_B + \ldots\ldots V_K + V_{sp} + V_e$$

[7] This description is drawn from Kerlinger (1966).

Dividing by V_t yields a proportional representation:

$$\overbrace{\underbrace{V_t / V_t = 1 = V_A / V_t + V_B / V_t + \ldots\ldots}_{r_{tt}} + V_K / V_t + V_{sp} / V_t + V_e / V_t}^{h^2}$$

where h^2 is the proportion of the total variance that is common factor variance and r_{tt} is the proportion of the total variance that is reliable variance.

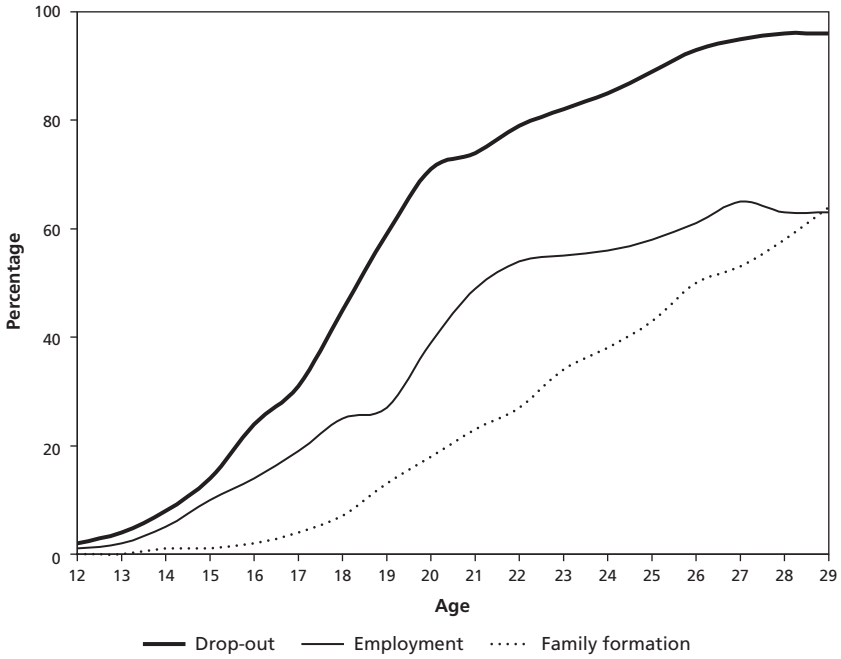
Given a set of variables, factor analysis serves to detect clusters of variables with high correlations among themselves and low correlations with variables of other clusters. The clusters are defined by the structure of factors. Finally, figures in the factorial matrix are the loading or correlations between variables and factors. These correlations indicate the relative weight of the variables in the factors and makes it possible to interpret the meaning of the factors. In the present work, factors were extracted through the Principal Component method and rotation was performed through the Varimax method. As is usual, the factorial matrix in the tables includes only the factors that make the greatest contribution toward explaining the proportion of the total variance of the original correlation matrix.

Cohort Country Emancipation Patterns and Factor Analysis

As can be seen in Figures 5.1 to 5.4, the curves present in percentage terms the expected ranking of changes. The largest area is always defined by school drop-out, followed by work and then by family formation or marriage. This does not mean, of course, that all individuals follow this path, only that it predominates at the aggregate level.

Chile represents a case in which emancipation occurs relatively late in all of the dimensions considered. Broadly 80 percent of youth who are 15 years of age study, 90 percent do not work and almost 100 percent have not married. A sharp increase in non-attendance at school can be seen in the next cohorts, reaching almost 50 percent of the population at 18 years of age and 90 percent by age 24. Employment follows a similar pattern, although the curves between drop-out and work show an increasingly divergent pattern, with employment lagging behind school drop-out. Marriage follows a

Figure 5.1a. Emancipation Paths, Chile



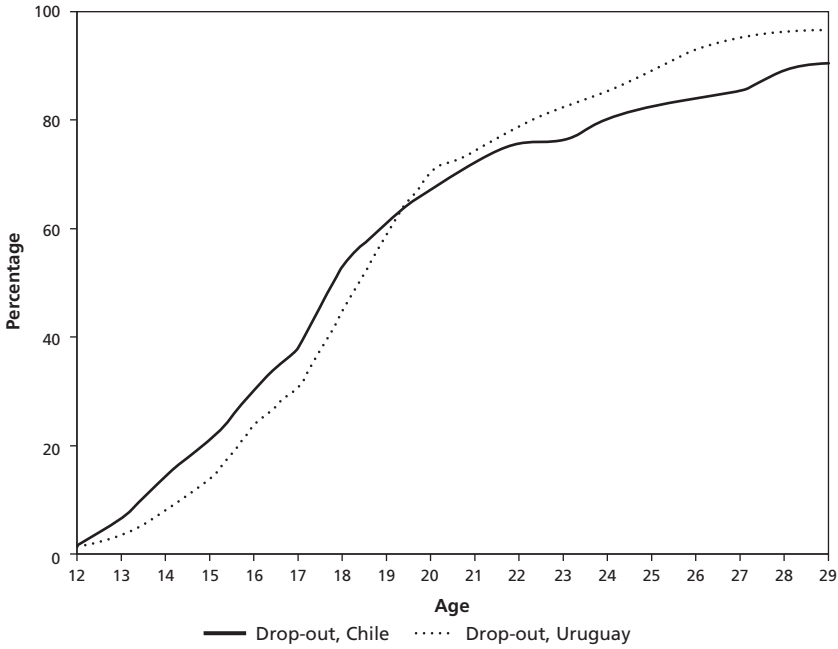
Source: IDB Household Surveys.

linear pattern of increase between the ages of 15 and 29, converging towards employment at the end of the age distribution.

These basic data indicate a pattern that fits the general impression of Chilean society, given its demographics and its pattern of inequality. In short, Chile is a country with strong stratification and differentiation patterns along income and gender, but with basic integrative mechanisms among those different groups. This could explain on the one hand the country's good performance in education up to the age of 18, and the sharp decline in school attendance thereafter. Yet, with the data at hand in this section, it is not possible to move further nor to see how well this hypothesis confronts reality. Survival analysis and hazard analyses, though, will make it possible to test this hypothesis more adequately.

On the other hand, gender differences might underlie the pattern of school drop-out and work. In other words, women who leave school would tend to adopt the "private adult role" of marriage and eventually childbearing, rather than the public role of work. Furthermore, one could expect this pattern of emancipation in women to be formed along stratification lines.

Figure 5.1b. Drop-Out Curves, Chile and Uruguay



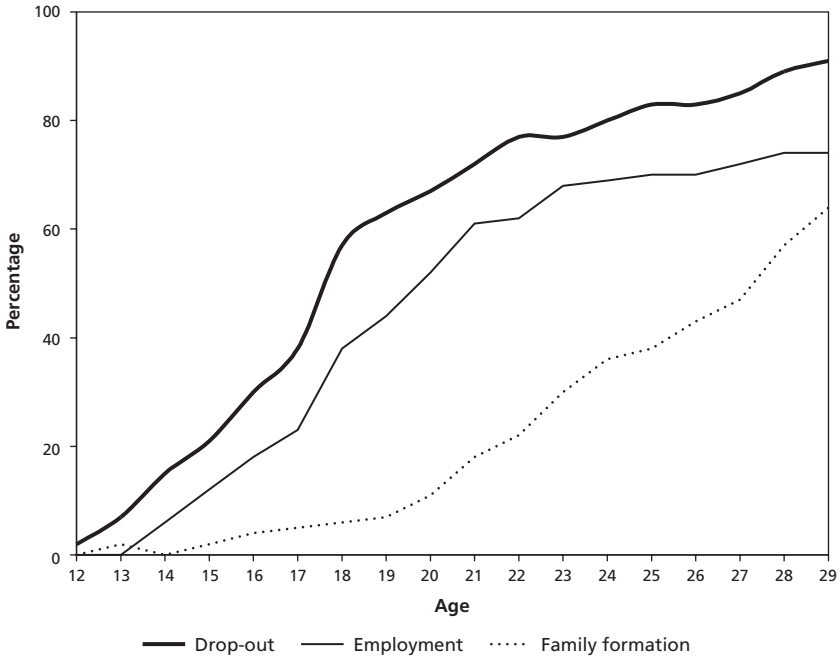
Source: IDB Household Surveys.

Thus, women of higher socioeconomic status would move towards work, while women lower in the stratification system move towards household responsibilities. If this is indeed the case, then emancipation and background variables should cluster together in different ways for men and women. Factor analysis supports this view, but hazard analysis will again be needed to test this finding.

As shown in Table 5.2, a first factor is formed for men that encompasses time (age) and the basic emancipation dimensions (drop-out, marital status and work), while the second factor groups the two socioeconomic and household background variables.[8] Among women, however, in the lower income group, educational attainment, rather than time and other emancipation options, is linked to work. The coefficient signs further indi-

[8] Type of household assumes two values: 1 = single-person and nuclear families, and 2 = extended and composed. According to the conventional definition, a nuclear familiy is composed of a couple, a couple with children or a single-parent family (father or mother only with children). Extended families are nuclear families plus one or more relatives. Composed families are the kind of households where both parental and non-parental relations are present.

Figure 5.2. Emancipation Paths, Uruguay

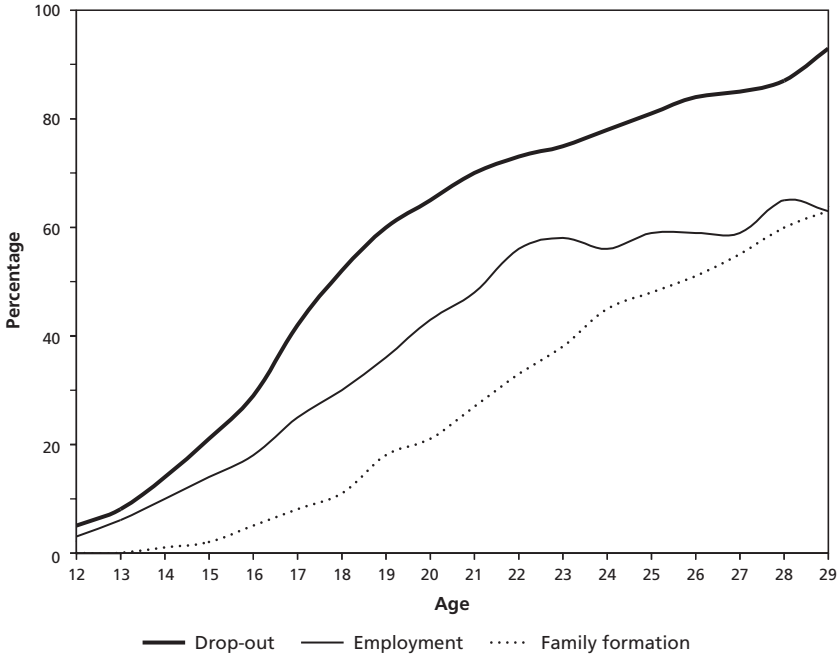


Source: IDB Household Surveys.

cate the higher the socioeconomic status of women, the more likely they are to work.

Uruguay, the other more-developed country that is considered, presents a pattern that is similar in some aspects to Chile's, though with some telling differences. Even though Uruguay shares with Chile a late pattern of emancipation, it presents for both education and work earlier adoption of "adult values." Drop-out at age 15 is 10 percent higher than in Chile, and a similar tendency occurs with work. Among older cohorts, though, drop-out becomes less marked than in the case of Chile, while employment continues to grow at a faster rate than Chile. Two additional distinct patterns are worth mentioning in the case of Uruguay. First, employment does not lag behind drop-out, but evolves throughout the age distribution on a parallel line. Second, while early drop-out and work force entry evolve at a faster rate than Chile, marriage does not. The linear pattern in Uruguay regarding family formation mirrors the Chilean case, and even shows slight differences in favor of Chile (that is, more youth marry by age group).

Figure 5.3. Emancipation Paths, Venezuela



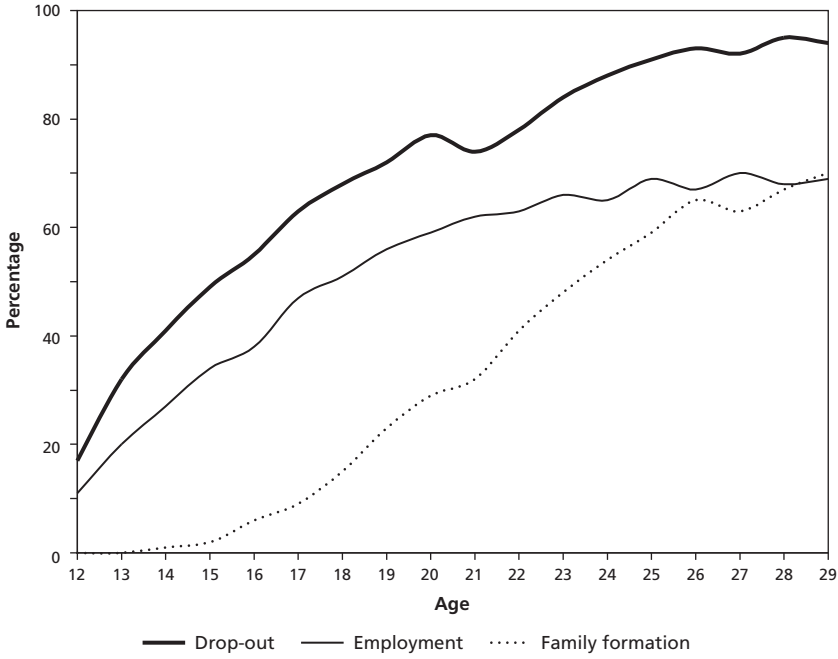
Source: IDB Household Surveys.

Since the precise year of schooling drop-out is known, but not the equivalent points in time involving work and marriage, it is not easy to assume a causal relation. More precisely, it is not known if young people leave school *because* they enter the labor market or form a new couple. It is highly probable that they do so; alternatively, drop-out indicates a predisposition to assume adult roles in the near future. In any case, it is preferable to interpret the relationship among these variables as one of association rather than causation.

Uruguay's pattern of emancipation thus shares with Chile relatively high ages of entry into adulthood, but it differs in regard to gender and income stratification. Demand for the educational system between 12 and 18 years reaches far less adequate levels than in Chile, yet demand among older cohorts reverses that comparison. Figure 5.1, which shows the difference between the drop-out curves in Chile and Uruguay, conveys this message more clearly.

In short, Uruguay represents a generally more egalitarian society (or in other words one with less stratification discontinuity), but one with less

Figure 5.4. Emancipation Paths, Honduras



Source: IDB Household Surveys.

protection for those toward the bottom of the income distribution. Yet the data suggest that, compared to Chile, Uruguay is also lagging behind in high school completion among the middle sectors; an instrumental market-oriented educational investment in a strongly stratified society might explain Chile's good performance. Conversely, a more symbolic and status-oriented educational investment, which works mainly for part of the middle and most of the upper end of the stratification system, might be at work in the case of Uruguay. Beyond these (mostly unwarranted) interpretations it seems clear that in Chile progress has been made, while in Uruguay there are very good reasons to be worried about the type of society that might be developing (see Table 5.3).

The former ideas might still explain both the high retention rates in older cohorts and the low retention rates in younger ones. The different characteristics of Chilean and Uruguayan educational systems at the tertiary level should also be considered. In the case of Uruguay, several features of post-secondary educational system explain high retention rates

Table 5.2. Factor Analysis for Chile

	Men		Women	
Upper income group	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
Education attendance	–0.861		–0.867	
Age	0.786	(–0.457)	0.885	
Work	0.870		0.647	
Marital status	0.632		0.627	
Years of education		–0.608	0.587	(–.410)
Nr. of children in household		0.731		0.727
Type of household		0.611		0.676

	Men		Women		
Lower income group	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**	**Factor 3**
Education attendance	–0.871		–0.869		
Age	0.888		0.851		
Work	0.855			0.600	(0.360)
Marital status	0.704		0.854		
Years of education	(0.308)	(–0.370)		0.800	
Nr. of children in household		0.725		(–0.355)	0.688
Type of household		0.731			0.770

Source: Based on special tabulations from Household Surveys, IDB, 1999.
Rotation Method: Varimax with Kaiser Normalization.
Loadings of less than 0.300 are not shown; brackets indicate shared loadings between factors.

after 18 years of age. In contrast to Chile, Uruguay has a completely free state university that serves most of the country's tertiary-level students, and it allows students to work and study at the same time through means such as flexible hours and by not requiring specified grades or yearly progress in order to remain in a degree program. This also makes for long study careers that very frequently extend to the age of 30 and beyond. In Chile access to higher education is more stratified, working and studying more difficult to combine, and academic careers shorter.

In addition, the data on Uruguay's work/family pattern suggest that the country's emancipation paths are not characterized by large gender differences; in other words, work and education remain the two critical first choices both for women and men, clearly trailed by marriage. Compared to Chile, in Uruguay there is a far larger proportion of unmarried youth who

Table 5.3. Percentage of Youth with Adult Roles at Ages 15 and 18 by Gender and Income

			Emancipation dimensions					
			School drop-out		Work		Married or informal union	
Countries	Age	Income* level	Men	Women	Men	Women	Men	Women
Uruguay	15 years	Low	43.9	35.4	25.1	6.9	1.3	3.7
		Middle	9.2	8.1	11.3	4.6	—	3.1
	18 years	Low	75.5	63.9	46.6	28.2	5.2	16.1
		Middle	55.4	46.8	53.2	26.5	1.1	14.7
Chile	15 years	Low	18.3	17.1	4.2	3.9	—	2.7
		Middle	14.8	7.9	8.6	2.7	0.5	0.8
	18 years	Low	48.9	49.2	25.1	7.5	6.5	14.5
		Middle	42.0	44.2	33.1	15.9	1.3	13.9

Source: Based on special tabulations from Household Surveys, IDB, 1999.
* Household per capita income is coded in three levels.

both work and have left the educational system. This is due mainly to the fact that women of all strata enter the labor force at the same rates as men (and even more than men at lower income levels) rather than marry and withdraw from the labor market. Consistently, and in contrast to Chile, factor analyses for the case of Uruguay show a distinct pattern in how variables cluster for men and women (see Table 5.4). Uruguay is the only case in which women of lower incomes display characteristics similar to those of men. In particular, work is not related to years of education but to time and other emancipation dimensions.

Venezuela presents a less favorable emancipation pattern that combines aspects of both the Uruguayan and the Chilean pattern. On the one hand the relative distance of the three curves mirrors the Chilean case, yet the ages at which drop-out occurs more closely resemble Uruguay both among younger and older cohorts. In effect, drop-out in Venezuela is similar to Uruguay, presenting a continuous albeit slightly higher increase, with low retention at the early stages, but with a less marked increase in drop-out among older cohorts. In contrast to both Chile and Uruguay, marriage increases somewhat more steeply at early ages, though it then follows the classic linear pattern of the other two countries.

Table 5.4. Factor Analysis for Uruguay*

	Men		Women	
Lower income group	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
Educational attendance	–0.812		–0.847	
Work	0.792		0.480	
Marital status	0.688		0.752	(0.359)
Age	0.861		0.851	
Years of education		–0.705		0.745
Nr. of children in household		0.742		–0.718
Type of household		0.467		–0.422
Upper income group				
Educational attendance	–0.833			–0.745
Work	0.750	(0.322)	0.590	(0.467)
Marital status	0.627			0.696
Age	0.735	0.555	0.757	(0.516)
Years of education		0.842	0.782	
Nr. of children in household	(–0.448)	–0.581	–0.700	
Type of household	(0.307)	–0.372	(–0.395)	0.532

Source: Based on special tabulations from Household Surveys, IDB, 1999.
Rotation Method: Varimax with Kaiser Normalization.
* Loadings of less than 0.300 are not shown; brackets indicate shared loadings between factors.

Venezuela seems to combine a more traditional division of roles between women and men and a relatively open education pattern where attendance among older cohorts does not fall off as markedly as in some other countries. Retention in young cohorts is rather low, however, and even slightly worse than in Uruguay. Yet this is not due to worse performance among those at the lowest income levels, but rather to low retention rates in the middle sectors. The data presented in Table 5.5 and subsequent factor analysis permits a better understanding of both gender and stratification effects.

As the table shows, 33.7 percent of 15-year-old males have left the school system in the lower income group. This puts Venezuela in a better position than Uruguay (see Table 5.3). In the middle sectors, however, almost the same percentage of men have left the system in the middle sectors. Women, on the other hand, while more protected from drop-out, rarely enter the labor force (10.7 percent at 18 years in low-income households and 21.7 percent in middle income ones) even though more than half

Table 5.5. Percentage of Youth with Adult Roles at Age 15 and 18 by Gender and Income in Honduras and Venezuela

			Emancipation dimensions					
			School drop-out		Work		Married or informal union	
Countries	Age	Income* level	Men	Women	Men	Women	Men	Women
Honduras	15 years	Low	68.3	51.6	56.4	10.9	—	1.9
		Middle	54.7	49.3	50.2	19.9	0.5	5.7
	18 years	Low	80.8	83.0	75.8	18.8	5.6	37.8
		Middle	73.6	70.4	68.1	32.5	5.1	34.5
Venezuela	15 years	Low	33.7	28.9	29.7	6.4	0.8	7.5
		Middle	25.5	15.2	20.4	5.5	0.6	4.3
	18 years	Low	72.8	62.6	43.3	13.0	8.4	22.2
		Middle	64.5	50.7	53.4	21.7	5.3	23.1

Source: Based on special tabulations from Household Surveys, IDB, 1999, expanded data.
* Household per capita income is coded in three levels.

of women at both income levels have left the educational system. This traditional gender pattern can also be seen in factor analysis (Table 5.6). Among Venezuelan women, in the second factor work and years of education are the most important variables, suggesting again a traditional pattern in gender behavior among less educated women in both upper and lower income groups.

Honduras, the least-developed country considered, presents a pattern that is consistent with the typology presented above in the point covering development and demographic stages of Latin America. Of all the cases, this is the only one where a significant percentage of 12-year-olds are outside of the educational system. Indeed, almost 20 percent of 12-year-olds have dropped out of school, indicating a large proportion of people who do not reach six years of schooling. At 15 years of age, more than 50 percent of the population has left the system. Child labor is also a clear difference between Honduras and the other cases. Thirty percent of those in the age cohort of 15 years work, and at age 18 close to 50 percent of that in that age group are classified as having a job. It is interesting to note that from that age onwards, labor remains almost stagnant as a percentage of age cohorts, rising only 15 percent for the nine years remaining in the age distribution. At the same

Table 5.6. Factor Analysis for Venezuela*

	Men			Women		
Lower income group	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 1**	**Factor 2**	**Factor 3**
Educational attendance	–0.832	(–0.318)		–0.865		
Work	0.795				(0.404)	(0.435)
Marital status	0.697			0.824		
Age	0.837			0.825		(0.336)
Years of education		0.913				0.873
Nr. of children in household		(0.393)	0.866		0.692	(–0.425)
Type of household			0.675		0.793	

	Men		Women	
Upper income group	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
Educational attendance	–0.824	(0.324)	–0.811	
Work	0.831		0.578	(–0.325)
Marital status	0.631		0.713	
Age	0.832		0.812	
Years of education		–0.650		–0.657
Nr. of children in household		0.773		0.769
Type of household		0.580	(0.345)	0.556

Source: Based on special tabulations from Household Surveys, IDB, 1999.
Rotation Method: Varimax with Kaiser Normalization.
* Loadings of less than 0.300 are not shown; brackets indicate shared loadings between factors.

time (around 18 years), marriage, which also shows an earlier start in Honduras, begins to rise more steeply and catch up with employment by age 26.

A brief look at Honduras' cohort evolution reveals a radically different kind of society than in any of the other countries considered. Child and adolescent labor still penetrates deep into Honduras' social structure (see Table 5.7). In addition, while educational demand and the impact of emancipation paths on that demand remain important considerations, Honduras still needs to increase both the quantity and quality of the educational supply.

Factor analysis shows, as in the case of Venezuela and lower-income women in Chile, the importance of years of schooling in the participation of women in the labor market. Instead of clustering with time and emanci-

Table 5.7. Factor Analysis for Honduras*

	Men			Women		
Lower income group	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 1**	**Factor 2**	**Factor 3**
Educational attendance	–0.799	(0.312)		–0.803		
Work	0.779			(0.302)		0.482
Marital Status	0.705	(0.325)		0.852		
Age	0.837			0.859		
Years of education		0.794				0.840
Nr. of children in household		–0.563	0.523		0.744	
Type of household			0.911		0.757	(0.332)
Upper income group						
Educational attendance	–0.806	(0.339)		–0.842		
Work	0.827			(0.376)	0.450	
Marital status	0.641			0.820		
Age	0.785	(0.440)		0.736	(0.474)	
Years of education		0.831			0.879	
Nr. of children in household		–0.662	(0.375)		(–0.451)	0.690
Type of household			0.958			0.866

Source: Based on special tabulations from Household Surveys, IDB, 1999.
Rotation Method: Varimax with Kaiser Normalization
* Loadings of less than 0.300 are not shown; brackets indicate shared loadings between factors.

pation variables, work clusters with education for lower-income women and splits between the two factors for upper-income women.

Some Basic Findings

In all the countries considered, cohorts behave in a manner that broadly resembles a classic emancipation pattern. As noted above, drop-out from the educational system occurs first, followed by work and finally by marriage. All countries also show a marked difference between the public dimensions (work and education) of adult values and the private one (marriage). In effect, a high percentage of young people leave the educational system and start working long before they get married. In contrast to these

common patterns, though, some striking differences can be found among the cases:

- Chile and Honduras represent the two extremes regarding drop-out. While in Chile a majority of young people complete approximately nine years of study (only 12.7 percent of the 15-year-old cohort do not attend school), in Honduras at age 15 already half (50.5 percent) have left the educational system. Between these two countries fall Uruguay and Venezuela, with relatively high drop-out rates for the first years of secondary schooling (at age 15 the drop-out rates reaches 22.2 percent and 23.5 percent, respectively). The case of Uruguay is especially striking given the maturity of its educational system and the overall low levels of inequality present in the society at large. The early drop-out in this country cannot be attributed to problems of educational supply. Thus the deficit in demand for basic secondary schooling suggests that processes of poverty "hardening" might be taking place at the lower end of the stratification system, leading to the creation of intragenerational and intergenerational circles of poverty. Venezuela, on the other hand, resembles the Uruguayan pattern of low retention at early ages, with two important caveats. First, at age 12 Venezuela has already lost more than 4 percent of that cohort, while Uruguay has lost less than 2 percent. These differences become more pronounced toward the end of secondary education. In effect, at age 17 (the end of high school, assuming no repetition or extra age) Venezuela retains only 55 percent of that cohort in the educational system, while Uruguay still retains 65 percent of that cohort.
- Cohort behavior regarding work follows a slightly different ordering among countries than school drop-out at the earliest age. Child labor at age 12 is non-existent in Uruguay and almost nil in Chile (0.9 percent), yet it reaches 2.7 percent in Venezuela and almost 10 percent in Honduras. In Chile 6 percent of 15-year-olds work, while in Honduras 33.8 percent do. Between these extremes lie Uruguay, where 11.1 percent of that cohort is working, and Venezuela, where 14.2 percent have entered the labor market. Employment at older ages shows some interesting differences. In Uruguay almost 70 percent of the cohort is working at the age of 24,

while Venezuela's 57 percent represents the lowest proportion at that age. Chile, at 60 percent, and Honduras, at 64 percent, occupy intermediate positions. Women's labor market participation explains these differences, as shown in Tables 5.3 and 5.5.

- Forming a new family or marrying clearly reinforces the impression that Chile and Uruguay differ markedly from Honduras and Venezuela, which in these dimensions behave quite similarly. At age 18 only 7 percent of Uruguayans and 7.9 percent of Chileans are married, while 12 percent of Venezuelans and 14 percent of Hondurans are married at that age. The differences at age 22 show an even more important delay in marriage in Uruguay (followed by Chile) in comparison to the other countries. At age 22, in Uruguay 23 percent of the cohort is married, and 26 percent in Chile. The figures for Venezuela and Honduras are 33 percent and 39 percent, respectively.
- Factor analyses show that gender and income interact, affecting how work relates to other variables in the countries considered. In Chile, Venezuela, and Honduras, for instance, women of lower socioeconomic status enter the labor market more as a function of their educational attainment than of time and other role changes. This is also true for higher-income women in Venezuela. The only country where the three emancipation dimensions cluster without regard to gender is Uruguay.

Cox Regression and Hazard Analyses: Class, Gender, Emancipation Patterns and Educational Attainment

Survival analysis supposes the existence of a group of individuals, who are followed through time to establish whether a given phenomenon, such as drop-out from the educational system, has taken place. The objective of the analysis is to obtain a time function—the survival function—the values of which establish the probability that an individual has of remaining in the educational system beyond a moment *t* of her life.

The method implies the existence of a sample of *N* individuals for whom it is periodically registered whether the phenomenon under analysis occurs. In this case two variables are registered: *t*, the individual's age, and

δ, a dichotomous variable which indicates whether the individual has dropped out of the educational system at that age. Then a matrix with *N* rows and *t* columns is constructed, computing in each cell the values of δ during the period: 0 if the individual does not drop out and 1 if he does. Once the matrix is constructed, the life tables calculate the survival probabilities at a given age *t*, using the probabilities conditional on the fact that the individual has not dropped out up to moment *t*.[9]

In practice, the form of the probabilities calculus is influenced by the fact that the observation periods are generally not the same for all individuals. In a panel study it is common to find desertions among participants. For these individuals then, it is not possible to know the actual moment when they drop out of the educational system. All that is known is the data available while they were present, which are used to calculate the corresponding probabilities. These observations, called censored observations, receive special treatment in the different modalities of survival analysis.

The life tables, despite permitting the introduction of control factors such as the economic level and the sex of the individual (as shown in Table 5.8), present limitations since they do not allow the introduction of other factors, nor the direct comparison of joint influences. For these purposes, the Cox Regression method is used. This method assumes the existence of a group of independent variables *X*, the values of which influence the current time until the final event occurs. For simplicity, this kind of regression uses the hazard rate to estimate individuals' chances of dropping out. This is a time function $h(t)$ that estimates—determined by certain independent variables—the potential system withdrawal per unit of time in a given moment, conditional on the fact that the individual has survived up to that instant. Greater values of the function indicate a greater mortality rate. Defined in such a way, the hazard rate is not a probability, and its values can therefore lie outside of the unit circle, taking any value between 0 $y + \infty$.

The objective of the regression analysis is to establish the relative influence of certain independent variables on a young person's hazard of dropping out of the educational system. These variables include the following: household type, family economic level and educational climate, gender, and

[9] Instead of using the direct calculus derived from the survivals, the calculus of the survival probability at moment *t* is constructed from a chaining of conditional probabilities, with which a more precise description can be obtained, due to the use of the whole information from the sample, independently of the number of periods in which the individual is measured.

Table 5.8. Definitions of Dummy Variables for Hazards

Variable	0 "Hazard absence"	1 "Hazard presence"
Sex	Female	Male
Household type	Unipersonal and Nuclear	Extended and Composed
Household income level[1]	High	Low
Household income level[2]	High	Medium
Household educational climate	High	Low
Employment	Not employed	Employed
Couple situation	Single	Married or out of wedlock, widowed, divorced or separate
Socioeconomic level* educational climate	High socioeconomic level or high educational climate	Low socioeconomic level and low educational climate
Employment* couple situation	Not employed or single	Employed and not single

Source: Authors' compilation.

the adoption of adult roles through activities such as job-seeking, couple formation or having children.

The following equation is a simple way of specifying the model, making it possible to compare situations using control variables, or evaluating the differences brought about by the presence or absence of a certain characteristic:

$$h(t) = [h_0(t)]e^{(BX)}$$

According to this model, the hazard function may be expressed as the product of a baseline hazard function, which quantifies the hazard of dropping out from the system when none of the factors is present, and an exponential term, which represents the influence of each variable that is assumed to affect that hazard. These variables are introduced into the model as dummies, facilitating the afterwards comparison of the influence of the different factors considered.

Besides, it is possible to transform the model, with the objective of simplifying the interpretation. This one consists in taking the ratio between the hazard function and the baseline function, called the ratio of relative hazard.

$$h(t) / [h_0(t)] = e^{(BX)}$$

In this way it is possible to estimate the impact that a given factor configuration has on the drop out hazard, with respect to the baseline situation where those factors were not present. So if the hazard factor is to belong to a low economic level, the variable X takes value 1 for that stratum and 0 for the high stratum. The baseline hazard function would be the one corresponding to the high stratum[10] and the Exp(B) value, which is presented in the regression output, is the term that multiplies the baseline hazard when individuals belonging to the low economic level are considered.

It is also possible to establish a connection between the hazard and the survival functions, through the following equation:

$$S(t \,/\, X) = \exp\left\{-\int_0^t h(\theta \,/\, X)d\theta\right\}$$

Adaptations and Assumptions of Household Survey Data

The data matrix constructed from the Household Surveys generates several problems. First, the age at which an individual drops out of the educational system is not recorded, which necessitates an estimate based on the individual's educational achievement. Assuming there was no repetition, and that the individual began schooling at the age of six, the drop-out age is calculated as six plus the years an individual attended the educational system, giving variable δ the value of 1 since that moment. In addition, the surveys do not allow a panel study, basically because none of them have this form. Therefore, at the beginning of the analysis period there are important proportions of censored observations, which diminish when drop out rates increase. The treatment of censored observations in life tables leads to an underestimation of mortality at the beginning of the period, which diminishes over time.[11]

The survival function will depend on the validity of the assumptions that schooling begins on time—which seems quite probable, at least for the

[10] When X takes the value 0, the exponential term displays the unit value and $h(t) = h_0(t)$.

[11] The censored observations are incorporated to the denominator in the probabilities' calculus (multiplied by 0.50) but without affecting the numerator, which is given by registered cases of drop-outs.

Uruguayan data—and that repetition does not exist. The latter assumption is more difficult to support, due to the high repetition rates that occur during the first year of primary and of secondary school. These would lead to an underestimation of the age at which an individual adopts an adult role. They might also produce a bias, especially among boys at lower socioeconomic levels, who have the highest repetition rates and schooling lags. This would lead to a function that underestimates the survival probability during the first years.

Regression Analysis Results and Their Interpretation

As outlined above, the survival function expresses the probability that an individual will continue studying depending on his age. Although drop-out from the educational system begins before the ages considered in this chapter, this information is taken into account for the calculus of such function using the life tables. This method can therefore test the introduction of control factors such as sex and socioeconomic level, allowing the observation of different behaviors. The socioeconomic level influence always appears, with the expected effects. For the same age, young people from the highest socioeconomic level have higher survival probabilities than those at the lowest level. The gender influence is also relevant, as life tables generally show that boys are more likely to drop out of the educational system.

Cox Regression analysis allows a wider comprehension of the problem. The variables that are used, and the categories identified as risky, will be presented below. The regression coefficients' magnitude and sign, estimated by maximum likelihood, will make it possible to determine the influence of the factors described on the relative hazard, all else being equal. So, those B that are statistically significant (Sig < 0.05) and have a positive sign will result in values of the hazard multiplier ($Exp\,(BX)$) greater than one. On the contrary, a negative sign will imply a smaller hazard in the presence of this factor. Therefore, the greater the magnitude, the greater the multiplication. Considering two risk factors simultaneously will simply imply the product of the multipliers belonging to each one of them. For the interaction terms between two variables, the total effect will have to consider the coefficients of those terms and the ones of the simple variables. In Table 5.9 the compared situation of the hazard multipliers—the exp (BX)—is presented for the four countries under analysis.

Table 5.9. Multiplier Risk Factor of Drop-Out by Country

Variable	Chile	Honduras	Uruguay	Venezuela
Sex	0.8680	1.0193	1.2034	1.2081
Household type	0.9599	0.8115	—	0.9304
Household income[1]	3.0583	1.4614	2.6191	1.6473
Household income[2]	1.7519	1.1389	1.5924	1.4754
Household educational climate	2.0134	2.2509	1.9441	2.0108
Employment	2.0743	1.7819	1.6272	1.8351
Marriage	2.0685	2.2027	1.9823	2.2200

Source: Based on special tabulations from Household Surveys, IDB, 1999.
Notes: [1]Compares the difference between high and low income.
[2]Compares the difference between high and medium income.

Variables Construction

- *Household income level*. This variable classifies individuals into per capita income quartiles according to the household to which they belong, but without considering the income of individual members, nor that of domestic servants and their relatives. To analyze the information thus obtained, this variable is reclassified into three levels: Low, corresponding to the lowest per capita income quartile; Medium, corresponding to the following two quartiles; and High, including the households with the highest per capita income.
- *Household educational climate* is constructed from the average years of study of the household head and his or her partner, if there is one. Otherwise, only the household head's years of education are considered. Households are classified into two levels, low and high educational climate, depending on whether they are under or over the median. Finally, individuals are classified into these levels according to the educational climate to which they belong.
- *Type of household.* Households and individuals belonging to them are classified into two categories. The first is Extended Households, which include households where at least one member (excluding domestic servants and their relatives) is unrelated to the household head or is a relative other than the head's spouse or child; this encompasses households in the Extended and Composed cate-

gories in the standard terminology. Other households, Single-Person and Nuclear, are included in the Rest category.

- *Drop-out from the educational system* is the first of three variables considered to characterize the transition from adolescent to adult roles. Individuals are classified into those who have dropped out of the educational formal system and those who have not.
- *Employment.* The second variable on transition to adulthood classifies individuals into two categories, according to whether they are employed or not.
- *Couple situation* is the last variable used to illustrate the adoption of adult roles. Individuals are classified into two categories according to their marital status. One that includes only the single ones, and the other accounts for couple formation, which includes married and cohabiting couples, and widowed and divorced individuals.
- *Age at time of drop-out.* This is used as a temporal variable in the application of life tables and Cox's regressions. It is constructed based on the individual's maximum educational achievement in the formal system, on whether he remains in the educational system at the time of being surveyed, on his age, and on two assumptions: that educational attainment has occurred without repetition, and that schooling began at the age of six. Therefore, among those who dropped out, the age at drop-out was estimated by adding six years (the assumed initial age) to the maximum educational achievement, measured in years of education. When the individual is still in the system, this variable value is his biological age.

Cox Regression Analysis

The most relevant findings from Table 5.9 are the following:

- Gender is significant in all cases, even though its effects are relatively modest in comparison with that of other variables. In Uruguay and Venezuela men have on average a 20 percent greater drop-out risk than women, while in Honduras the effect is negligible. Chile represents an interesting departure, as men there are on average 15 percent less likely to drop out than women.

- Extended households generally serve as protection from drop-out, as indicated by coefficients of less than 1. Even though the effects are again modest, large households and those with three or more generations allow members to share household tasks and coordinate private demands and schooling. Furthermore, where extended households are typically large, as in Honduras, the effect is larger, reducing risk by nearly 20 percent. In contrast, where extended households are more "modern" and entail smaller increases in size and number of generations, the effect is neutral, as in Uruguay, or almost nil, as in Chile.
- Low income and low household educational climate significantly increase the risk of dropping out, and they do so with stronger coefficients than the variables previously considered. The extreme comparison of lowest to highest income shows that the risk of school drop-out increases in all cases, tripling in Chile and more than doubling in Uruguay. Counterintuitively, though, these coefficients are clearly lower for Honduras and Venezuela even though they are still important, increasing drop-out risk by approximately 50 percent. There is no convincing interpretation of these figures other than the possibility that in these countries an even more continuous income scale may be needed to capture differential risk. The comparison between medium and high levels of income offers coefficients that are consistent with the extreme comparison: medium income youth have a higher risk than higher income youth, but less than low-income youth. Finally, the findings for low educational household climate confirm previous findings that it is a strong risk factor for educational attainment, in all cases roughly doubling the chance of drop-out.
- Consistent with factor analyses, the coefficients of work and drop-out are in most cases as important or more important than individual and household background variables. Work has a similar influence across countries, doubling the risk in Chile and almost doubling it in Venezuela and Honduras (approximately 1.8 in both countries). Again, the case of Uruguay confirms the notion of a more compatible realm for work and education (1.6 times the risk of its baseline function).

- Forming a new family or marrying increases the coefficients even more than employment. Yet, as marriage or similar relationships occur quite late in all countries when compared to the adoption of other adult roles, a straightforward interpretation of marriage as a hazard to educational attainment is unwarranted. In some cases it is indeed correct to assume that marriage has operated as a deterrent of educational investment given the increasing load of household responsibilities and the need to enter the labor market. Yet in other cases, the coefficients simply indicate that as people grow up they leave the educational system and they also get married; this is radically different than leaving the system *because* one has gotten married. While this problem of causation is essentially true for all dimensions of the emancipation process, both the causal link and the proximity time allow for a less problematic interpretation of work as risk for educational attainment. This methodological issue notwithstanding, the coefficients are significant and of magnitude, as marriage makes people roughly two times as likely to leave the educational system in all four countries considered.

The coefficients presented above hide important differences in how these variables affect chances of dropping out for men and women. As shown in Table 5.10, repeating the analysis for men and women in each country reveals telling differences, and three major findings are worth mentioning:

- While work increases the risk of dropping out for men far more than for women, marriage increases risk in exactly the opposite way. Women who get married are far more likely to leave the educational system than men. This suggests that a gendered approach to school attainment and emancipation is worthwhile, since there appear to exist what could be termed Dual Emancipation Patterns. While for women predominantly private adult roles affect their educational investment, for men public ones do so. It is interesting to note that a country comparison of these Dual Emancipation patterns is consistent with the previous findings and interpretations. As factor analysis showed, Uruguay was the only case in which

Table 5.10. Multiplier Risk Factors of Drop-Out by Country and Gender

	Chile		Honduras		Uruguay		Venezuela	
Variable	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
Household type	0.9595	0.9920	0.9021	0.7276	1.0279	0.9734	0.9720	0.9051
Household income[1]	2.9488	3.1796	1.3975	1.4404	2.5292	2.8389	1.6850	1.6814
Household income[2]	1.6829	1.7797	1.1638	1.1138	1.6039	1.6238	1.4822	1.4719
Household educational climate	1.9854	1.9080	2.0209	2.3306	1.8670	1.9890	1.9964	1.9430
Employment	4.4213	1.5499	3.8526	1.1614	2.1540	1.3714	3.1107	1.2813
Marriage	1.2623	2.7041	1.3605	3.0649	1.4467	2.5316	1.3921	3.1859

Source: Based on special tabulations from Household Surveys, IDB, 1999.

Notes: [1]Compares the difference between high and low income.

[2]Compares the difference between high and medium income.

factors for men and women were formed by roughly the same variables. As seen in Table 5.10, this is also the country with the lowest hazard differentials between genders for marriage and work. This again implies a more homogeneous behavior in Uruguay than in the other countries.

- Table 5.10 further reinforces the previous findings on household type. If extended households protect against drop-out through shared responsibilities and the availability of multiple caretakers, then their impact should be higher precisely for women, who are traditionally assigned domestic roles. The results, though modest, are significant and consistent with this interpretation. This is especially true in Venezuela and Honduras; in these countries, where extended households are larger and more common, the effect clearly favors women and only slightly favors men. In Chile, however, the results contradict this hypothesis. In Uruguay the apparent neutral effect of household type becomes visible with gender, though only to a very modest degree; extended households represent a risk factor for men and a mild protection factor for women.
- Although socioeconomic status has only slightly different effects on men and women, this finding is nevertheless extremely important. As shown in the next hazard analysis, broken out by country in Tables 5.11a.–d., this is because the interaction of income and gender is mediated by the two central emancipation variables of marriage and work. Educational climate also presents generally small differences between men and women, although Honduras shows a 30 percent difference in favor of men. Low educational climate is associated with more traditional gender roles. Where this climate is extremely low, study for women might seem irrelevant, leading to lower demand and larger risks of drop-out.

Again some basic findings should be sketched. As income increases, the hazard effect of marriage on educational attainment decreases in all cases. The effect is dramatic for Chile (from more than 3.5 times the baseline rate to slightly less than 2), moderate in Venezuela and Honduras, and relatively mild in Uruguay (a reduction from 2.5 to 1.9 times the baseline rate). Additionally, as income rises men are increasingly likely to

Table 5.11. Multiplier Risk Factors of Drop-Out by Gender and Income

	Low		Middle		High	
Variable	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
Chile						
Household type	0.9049	0.9923	0.9857	0.9548	1.0360	1.1918
Household educational climate	2.1524	2.2181	1.8573	1.8878	2.0977	1.6876
Employment	2.9917	1.6952	4.4678	1.3760	7.2586	1.9491
Married	1.6368	3.6943	1.1476	2.7075	1.2052	1.8411
Honduras						
Household type	0.9082	0.8055	0.9144	0.6618	0.8750	0.7837
Household educational climate	1.6887	2.1244	2.0141	2.4014	2.2981	2.5239
Employment	3.8897	1.2213	3.7568	1.0917	4.0794	1.2399
Married	1.4657	3.2069	1.2886	3.2153	1.4444	2.5632
Uruguay						
Household type	1.0754	.9711	1.0173	1.0173	—	—
Household educational climate	1.7919	1.9482	1.7866	1.9350	2.1919	2.4346
Employment	1.7930	1.1446	2.4908	1.5256	3.6238	2.2161
Married	1.4258	2.6643	1.4253	2.4275	1.6036	1.9688
Venezuela						
Household type	0.9168	0.9790	0.9970	0.8618	0.9872	1.0137
Household educational climate	2.2812	2.4157	1.8970	1.8791	2.0118	1.5971
Employment	2.4002	1.1207	3.3643	1.2959	3.6815	1.4597
Married	1.6403	3.9296	1.3278	3.1847	1.3642	2.4229

Source: Based on special tabulations from Household Surveys, IDB, 1999.

leave the educational system. As with marriage, though, this can represent an associational relationship rather than a causal relationship. In Chile, for instance, the risk for upper income men who start working is seven times higher than for those who do not work. Given the average ages at which upper-income males leave the educational system in Chile, though, this may reflect the combined effects of actual hazard rates and rates of completion of university studies while working.

The Issue of Proportionality: Breaking Down the Average Results

This chapter is based on a triangulation of methods that includes stylized data for countries on emancipation variables, factor analyses that combine background and emancipation variables, and Cox proportional hazard models to study the determinants of drop-out considering both emancipation and background variables. Overall, the findings are consistent, suggesting both the importance of emancipation variables as an independent factor that affects drop-out and the differential combinations and effects of these variables according to country contexts, as well household and individual background variables. Yet, the former findings derived from Cox analyses require strong specifications. This is due to the fact that Cox requires covariate effects to be proportional, which is something that happens in the present cases only after much relaxation of the proportionality assumption has taken place. This does not mean that the hazard ratios are meaningless. First, they do indicate an effect, and that effect is statistically significant. Second, the specific hazard ratio can be loosely interpreted as the average effect of the different covariates for the full time length of the hazard line. In order to understand the real hazard ratios at different points in time, however, it is necessary to perform the proportionality tests and specify new models. What follows is an in-depth discussion of the test of proportionality for the model, how the assumptions were relaxed and some interpretations of the results.

As is well-known, a crucial assumption in the Cox proportional hazard model is that the hazard ratio is proportional over time. In this kind of model, if the hazard of drop-out is 20 percent higher for married than for unmarried individuals, such an effect should be the same for youth at different ages. In other words, under the assumption of proportionality, the hazard effects of each covariate must be equal for the complete time frame being considered. This is a strong assumption of the model, especially as the effects are being examined of a wide array of variables on youth educational drop-out in an age range that goes from 12 to 29 years (and that includes male and female as well as all the income and educational strata for each country). Two central problems make it extremely hard to sustain the proportionality assumption: one is substantive, and the other is built into the data.

First, it is unlikely that the effects of the covariates will remain constant for all ages. Indeed, it would be rather strange to find that being married or working has the same hazard rate for school drop-out at the ages of both 16 and 24. The stages of the life cycle encompassed in the age range are far too large to expect similar effects from the covariates. Second, while the dependent variable measures the exact age at which individuals abandon the educational system, the other behavioral or emancipatory variables are measured as a given attribute at the age of the individual in the survey. Thus the event (i.e., marriage, work) might have occurred at any point in time (between the age of 12 and the age of the respondent).

As shown in Table 5.12, the first general test rejected the null hypothesis for all the countries considered. The two covariates that showed the largest nonproportional effects were sex and family income. Through stratification, which allows the covariates to have effects over different baseline functions, the test sought to solve the proportionality problems for sex and income level, but the assumptions were still found to be invalid. In other words, when the proportionality test was run again, it still failed to reject the null hypothesis (that the effects are equal). The samples were consequently separated into men and women at different income levels. In the case of Honduras, income level was not a problematic covariate, so the samples were simply separated by sex. Still, and as expected, the proportionality assumption was invalid for many of the covariates, and in all of the countries considered. The covariates were subsequently allowed to have different effects on four segments of the baseline hazard in the four countries. The segments were not the same for each country since the year at which young people finish institutionally defined stages of their educational career varies from country to country. Broadly speaking, the cut-off points were 6–8 years of age, 9–11, 12–17, and 18 and above, and sequential testing produced the simplest specification of the different models that for each sample do not violate the proportionality assumption of the Cox proportional hazard model. In each country and each sample, tests finally failed to reject the null hypothesis both in each covariate and for the global test. The results are shown in Table 5.13.

With respect to the specific hazard rates of the proportional models,[12] the following results emerge:

[12] See the Appendix of Filgueira, Filgueira and Fuentes (2001) for detailed data.

Table 5.12. Test of Proportional Hazards Assumption and Global Test

	Test of proportional hazards assumption			Global test		
	Wald χ^2	df	Prob > χ^2	χ^2	df	Prob > χ^2
Uruguay	2,821.79	6	0.0000	480.75	6	0.0000
Venezuela	4,829.52	6	0.0000	695.86	6	0.0000
Honduras	1,780.92	6	0.0000	97.41	6	0.0000
Chile	6,978.41	6	0.0000	672.38	6	0.0000

Source: Authors' calculations.

- Of the four countries considered, Honduras and Venezuela present the simplest models, followed by Uruguay and Chile; this suggests that constant effects should be expected in countries of lower social and educational development. This is not surprising, since in those countries the bulk of the population has earlier and more condensed emancipation patterns. This fact has two positive effects on the test of proportionality. First, it reduces the "built-in" data problems of large age brackets with no exact date for emancipation variables. Second, it contains the problem of differential effects along the age continuum; in other words, regardless of an individual's age, it is likely that he or she has undergone early emancipation processes.
- Household educational climate presents a consistent and clearly interpretable non-proportional effect. In effect, the earlier the drop-out the more important the educational climate of the household is. In other words, early drop-out is strongly associated with low family education. In the earliest drop-out bracket (between ages 6 and 8–9) the effect of low educational climate is never less than 3.8 (women of low income for Uruguay), while among the oldest drop-outs (ages 17 or 18 and more) the effect of low educational climate never surpasses 1.5.
- Extended households are of particular interest. For men, they have no differential effects over time, and the average effects are usually small. For women they are far more important, protecting women at early ages and increasing the risk of dropping out in older cohorts. For instance, while low-income Venezuelan women in

Table 5.13. Global Test and Drop-Out Hazard

	Global test		
	χ^2	df	Prob > χ^2
Uruguay (by sex and Income)			
Men, low income	7.91	14	0.8940
Women, low income	10.77	14	0.7040
Men, high income	22.94	14	0.0612
Women, high income	9.43	20	0.9774
Venezuela (by sex and income)			
Men, low income	10.25	11	0.5078
Women, low income	18.88	20	0.5293
Men, high income	14.69	14	0.3999
Women, high income	22.33	20	0.3227
Honduras (by sex)			
Men	6.22	12	0.9046
Women	6.56	18	0.9934
Chile (by sex and income)			
Men, low income	17.48	17	0.4222
Women, low income	18.71	21	0.6035
Men, high income	21.83	17	0.1915
Women, high income	22.97	17	0.1502

Source: Authors' calculations.

extended households have a 50 percent lower risk of dropping out at earlier ages, at age 17 or above they have a 70 percent greater risk. This suggests that extended households do indeed operate as a risk pool mechanism that distributes domestic burdens differentially across age groups, especially for women.

- In regard to the emancipation variables (marriage, work, and children) and given the built-in problems in this type of study, the results should be interpreted cautiously. Still, it is absolutely clear that work, marriage and number of children in the family are positively associated with leaving the educational system at all ages. Furthermore, employment and marriage, as expected, become more important risk factors among older age groups. A finding that is consistent with previous claims and that relates to Chile and Uruguay should also be highlighted. Marriage represents a signifi-

cantly larger risk factor for both high and low-income women in Chile than in Uruguay.

Conclusion

Emancipation patterns matter, and not just for educational attainment. These patterns not only affect immediate additional choices, but also define future chances throughout individuals' life spans. As factor analysis and hazard rates have shown, it is necessary to consider the patterns and sequences of adult role adoption. This is not meant to question the robust correlations that a myriad of studies has shown regarding the effects of income, educational climate, and household characteristics on youth educational investment. Still, in order to guide policy appropriately, it is necessary for researchers to open the "black box" where structural and personal factors interact to produce educational outcomes. This interaction involves adolescents' choices and behavior as they move into adult life.

This chapter has only been able to consider three dimensions of this transition: marriage, work and educational attendance. The exercise has nonetheless yielded several interesting results. First, countries differ as to when youth move into adult roles. This difference is quite clearly linked to demographic stages, which are also closely associated with development levels and educational supply. Furthermore, these countries present different distributions of drop-out, labor market incorporation and marriage ages for different classes and genders.

Second, it has been possible to explore how class and gender interact to affect emancipation patterns (factor analysis constitutes a first approach), and how this interaction differs from country to country. From this exercise, the idea of a "Dual Emancipation Pattern" clearly emerges as a useful concept to understand how public and private adult roles affect the educational investment of men and women. The regressions also show the mellowing of these two distinct emancipation patterns as income increases within countries and development increases among countries.

Third, demographic factors are important, especially the share of extended households, which affect hazard rates for educational attainment. Countries at the beginning of their demographic transitions confront huge obstacles in increasing their educational performance, and their only

advantage may lie in extended households and the protective function they provide. As these countries move into subsequent demographic stages, though, they will most likely lose that form of protection. In Chile this movement has not led to decreasing educational attendance, even among lower-income groups; nonetheless, aside from conjectures on the legacies of traditional societies and market signals regarding the value of education, how Chile accomplished that change remains unknown. Uruguay represents the opposite scenario. Among lower-income sectors, the simultaneous adoption of very "modern" roles and family structures, has left a vacuum of basic integrative and protective mechanisms. This has resulted in very weak educational demand among the lower income groups.

Finally, given the strong links between structural factors, emancipation patterns and educational attainment, policies designed to improve the supply side of the equation will do little to improve young people's educational attainment. Innovative reforms will be based on policies addressing the reproductive patterns of young poor women, regulation of youth labor and school attendance, and secondary-level curricula that permit work and study at the same time.

CHAPTER SIX

Social Mobility in Latin America: Links with Adolescent Schooling

Lykke E. Andersen[1]

Latin American countries generally have extremely unequal income distributions compared to most other countries in the world. This inequality often goes hand in hand with high rates of poverty.

However, high inequality combined with high social mobility is not as bad as high inequality combined with low social mobility. Actually, the high inequality-high mobility combination appears to be beneficial for long-run growth prospects. It provides people with better incentives to work hard, be innovative, and take risks, because the expected returns are high. The high inequality-low mobility combination, on the other hand, does not provide such incentives. Two recent papers have theoretically analyzed the relationship between social mobility and economic growth (Raut, 1996, and Hassler and Mora, 1998). They both arrive at the conclusion that high social mobility is associated with higher economic growth, although the transmission mechanisms between mobility and growth differ between the models.

The purpose of this chapter is to investigate empirically the degree of social mobility in Latin American countries. For that purpose a new measure of social mobility is proposed, which has the distinct advantage of being calculated on the basis of standard household survey data, available for most countries. This measure basically gauges the importance of family background in determining the education of teenagers. If family background is very important, it can be said that social mobility is low.

Social mobility in this sense is likely to be correlated with income mobility, given the close connection between education and income. A measure based on education, however, is more desirable than a measure based

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on income, because there are many more problems associated with the reporting of income than the reporting of education.[2]

Methodology

There have been two previous attempts at estimating social mobility in Latin America (Behrman, Birdsall and Székely, 1998; and Dahan and Gaviria, 1999). Both studies use standard household surveys, since there are vary few panel data sets available that follow the same families over time.

The basic idea behind both studies is to measure how important family background is in determining the educational outcomes of young people. If family background is important in determining young people's educational level (and consequently their future income levels), social mobility is considered low. If family background is unimportant, social mobility is high.

Behrman, Birdsall and Székely (1998) measure the influence of family background directly in regressions with schooling gaps as the dependent variable and family background variables as explanatory variables. Dahan and Gaviria (1999) measure the influence of family background indirectly by comparing the correlation in schooling gaps between siblings to the correlation of schooling gaps between random adolescents.

The advantage of Dahan and Gaviria's social mobility index (or rather immobility index) is that it does not require the a priori definition of what family attributes are important (e.g., mother's education, family wealth, parental attitudes, etc.). Their index controls for all influences that are common to children in the same family. The disadvantage is that at least two siblings in the relevant age range are needed for each family. This implies a dramatic reduction in the sample of young people. Worse, the ones that are left out are unlikely to be similar to those that are included in the analysis, since teenagers with many siblings are much more likely to be included.

This chapter basically follows Behrman, Birdsall and Székely (1998) in the estimation of social mobility, but proposes some methodological changes. Following both Behrman, Birdsall and Székely (1998), and Dahan

[2] Székely and Hilgert (1999) have written a very interesting paper on all the problems that arise in trying to compare income measures and GINI coefficients from different Latin American countries.

and Gaviria (1999), this chapter uses the schooling gap as an indicator of opportunities. The schooling gap is defined as the disparity between the years of education that a teenager would have completed had she entered school at normal school starting age and advanced one grade each year, on one hand, and the actual years of education, on the other hand.[3] Thus, the schooling gap measures years of missing education.

For example, an 18-year-old teenager who has completed nine years of schooling will register a schooling gap of (18-9-6) = 3 years, if he lives in a country where children are supposed to start school at age six. If he has actually gone to school all the time between age six and 18 (12 years), but has been retained three times and required to repeat a year, then he will still register a schooling gap of three years, because years of education is calculated on the basis of the level of schooling attained rather than on the actual years of study.

The schooling gap is a simple indicator of future opportunities, but it is well suited for the present purpose, and it has several advantages compared to a measure based on earnings or a measure based on years of education. First, income measures are notoriously inaccurate, highly dependent on season for large groups of the population, and generally difficult to compare across countries.[4] Second, years of education is not a good measure of educational attainment for young people, because many of them are still in school. For example, a 14-year-old teenager with eight years of schooling is making expected progress, while an 18-year-old teenager with eight years of schooling is a dropout. The schooling gap measure solves these problems, because years of missed education is a relatively simple measure that is easily comparable across countries and population groups, it is rarely misreported, and it can be used for teenagers that are still of school age. It does not take into account differences in school quality, however, and that seems to be the main drawback. School quality issues will be discussed below.

The impact of family background variables on schooling outcomes can be measured in a variety of ways. Behrman, Birdsall and Székely (1998) regress the schooling gap on three family background variables (father's

[3] Normal school-starting age is six for most countries, but seven for Brazil, El Salvador, Guatemala, Honduras, and Nicaragua.

[4] See Székely and Hilgert (1999) for an excellent discussion of the differences in income measures in Latin American household surveys.

years of schooling, mother's years of schooling, and household income) and two dummies (urban and female-headed household). Then they calculate the proportion of the variance in the schooling gap that is associated with a weighted average of the family background variables, where the weights are the regression coefficient estimates for these three variables.

In this chapter the importance of family background will be determined in a slightly different way. For each country all the teenagers who live at home (with at least one parent) are selected, and schooling gaps are regressed on two family background variables (adult household income per capita, and the maximum of father's and mother's education) and a group of other variables that might be relevant in explaining schooling gaps. These variables include: age, age of head parent at birth of the child, dummies for the presence of older sisters, older brothers, younger sisters, or younger brothers, a dummy for a non-biological relation to the household head, a dummy for female-headed households, a dummy for single-parent households, a self-employment dummy for the family head, average regional income, and average regional education. A Fields decomposition (Fields, 1996) is then carried out on the regression results to calculate the percentage of the total variance in schooling gaps that can be explained by the two family background variables.

As opposed to the method of Dahan and Gaviria (1999), this method requires specification of family background variables. The goal is to measure the socioeconomic status of the family, and, as in Behrman, Birdsall and Székely (1998), household income and education level were chosen as indicators of socioeconomic status. However, in order not to lose the teenagers who live with only one parent, the maximum of the mother's and father's years of education is used instead of both.

The use of the Fields decomposition method for determining the importance of family background variables has the advantage of being scale-independent, so results do not depend on, for example, the currency in which income is measured. This allows for easy comparison across countries and regions. Second, the method does not require the weighting of different family background variables.

In practice, the Fields decomposition works as follows: For each explanatory variable, a factor inequality weight is calculated, which is the product of the coefficient estimate for that explanatory variable, the standard deviation of that same variable, and the correlation between the

explanatory variable and the dependent variable. All factor inequality weights in the regression are scaled to sum to R^2, and each is intended to measure what percentage of the total variation is explained by the respective variable. The Social Mobility Index is 1 minus the sum of the two factor inequality weights belonging to the two family background variables. When the index is low, family background is an important determinant of the education gap, and consequently, social mobility is low.

The two basic assumptions underlying this methodology are that a smaller schooling gap should imply better future opportunities for young people and that equality of opportunity is a good indicator of social mobility. These assumptions appear to be reasonable, given previous extensive empirical evidence on the positive links between (1) education and earnings, (2) educational inequality and income inequality (Lam, 1999), (3) educational gaps and inequality (Dahan and Gaviria, 1999) and (4) educational gaps and social mobility (Dahan and Gaviria, 1999).

While the schooling gap regressions are mainly used as intermediate inputs in the calculation of a Social Mobility Index, they contain other important information about the differences in opportunities between young people from different types of households and even between young people within the same household. For example, a child's birth order might affect his educational attainment and thereby his future opportunities. First-born children, for example, usually enter the family early in the life cycle of the parents, and as a result, there may not be as many resources available for them as for siblings born later in the life cycle of the parents (Binder and Woodruff, 1999). This argument suggests that younger siblings should have a smaller educational gap than older siblings, and that children with young parents should have a larger schooling gap than children with older parents. There are also likely to be gender differences between educational attainment of siblings, and possibly cross-effects between gender and birth order. An older sister may, for example, receive less education than an older brother because the opportunity costs of her education are greater, while younger siblings may benefit from having older siblings that work and contribute to total household income (see, for example, Jensen, 1999). For these reasons, variables are included describing the teenager's birth order, and the results are discussed in detail below.

Due to clustering at the regional level, cluster correction (the Huber-White sandwich estimator) is used in all estimations (see Moulton, 1986).

Data

The main data used for this project are a collection of 18 standardized household surveys from the Inter-American Development Bank. These are briefly described in Table 6.1.

The surveys vary hugely in sample size, the largest being the Brazilian survey containing 346,106 observations, and the smallest being the Peruvian survey with only 19,745 observations. The precision with which the Social Mobility Indices can be estimated will therefore vary considerably across countries, and it is important to calculate confidence intervals for the SMI estimates in order to make sensible comparisons.

The surveys are representative at the national level, except in two cases. The surveys for Argentina and Uruguay cover only urban areas, but since these are highly urbanized countries, the surveys cover 80 to 90 percent of their populations.

The most important variable used in the analysis is years of education, which should be reasonably reliable and comparable across countries. Table 6.2 provides a summary of schooling gaps for all the teenagers (aged 13–19) who are included in the analysis (i.e., still living at home). The normal school start age, which is used to calculate schooling gaps, is also given in Table 6.2.

The table shows that about 95 percent of all teenagers can be included in the analysis; the remaining 5 percent are excluded because they no longer live at home (i.e., they have formed their own households or they live as live-in maids in another household) or because some crucial information is missing (e.g., parents' education levels or household income). The share of teenagers included is relatively stable, varying from 91 percent in Nicaragua to 98 percent in Peru.

The variable that is most prone to measurement error and least comparable across countries is "total adult household income." For some countries that includes only labor income, while for other countries it also includes non-labor income, capital rents, property rents, and non-monetary income. In some cases, missing observations have been imputed by the national statistical offices, and in other cases by the Research Department of the Inter-American Development Bank. Only in the latter cases was it possible to include a dummy. The Social Mobility estimates will be correlated below with various macro level variables.

Table 6.1. Summary Information on Household Surveys Used

Country	Year	Sample size	Coverage	Name of survey
Argentina	1996	111,235	Urban	Encuesta Permanente de Hogares
Bolivia	1997	36,752	National	Encuesta Nacional de Empleo
Brazil	1997	346,106	National	Pesquisa Nacional por Amostra de Domicilios
Chile	1998	188,360	National	Encuesta de Caracterización Socioeconómica Nacional
Colombia	1997	143,398	National	Encuesta Nacional de Hogares-Fuerza de Trabajo
Costa Rica	1998	43,944	National	Encuesta de Hogares de Propósitos Multiples
The Dominican Republic	1996	24,041	National	Encuesta Nacional de Fuerza de Trabajo
Ecuador	1998	26,134	National	Encuesta de Condiciones de Vida
El Salvador	1995	40,004	National	Encuesta de Hogares de Propósitos Multiples
Guatemala	1998	35,725	National	Encuesta Nacional de Ingresos y Gastos Familiares
Honduras	1998	32,696	National	Encuesta Permanente de Hogares de Propósitos Multiples
Mexico	1996	64,916	National	Encuesta Nacional de Ingreso Gasto de los Hogares
Nicaragua	1998	23,637	National	Enc. Nac. de Hogares sobre Medición de Niveles de Vida
Panama	1997	40,320	National	Encuesta de Hogares
Paraguay	1998	21,910	National	Encuesta de Hogares
Peru	1997	19,745	National	Enc. Nac. de Hogares sobre Medición de Niveles de Vida
Uruguay	1997	64,028	Urban	Encuesta Continua de Hogares
Venezuela	1997	7,965	National	Encuesta de Hogares por Muestreo

Source: Inter-American Development Bank, Research Department.

Table 6.2. Summary Information on Schooling Gaps for Teenagers Included in the Analysis

Country	Year	Official school starting age	Average schooling gap for teenagers	% of teenagers included in analysis
Argentina*	1996	6	0.75	95
Bolivia	1997	6	2.33	94
Brazil	1997	7	3.27	94
Chile	1998	6	1.66	94
Colombia	1997	6	2.88	94
Costa Rica	1998	6	3.00	94
The Dominican Republic	1996	6	2.38	95
Ecuador	1998	6	2.25	95
El Salvador	1995	7	2.71	94
Guatemala	1998	7	2.81	94
Honduras	1998	7	3.82	94
Mexico	1996	6	2.38	98
Nicaragua	1998	7	3.75	91
Panama	1997	6	2.03	93
Paraguay	1998	6	2.80	94
Peru	1997	6	1.92	98
Uruguay*	1997	6	1.39	97
Venezuela	1997	6	2.29	96
Average			2.47	95

Sources: Inter-American Development Bank, Research Department. Official school starting age from UNESCO (http://www.uis.unesco.org/en/stats/stats0.htm).

* The samples for Argentina and Uruguay cover only urban areas.

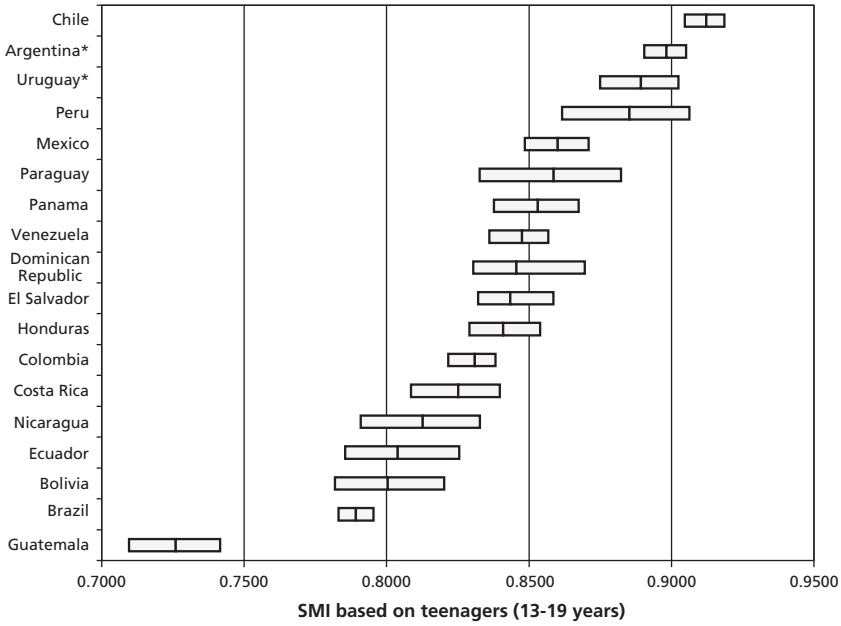
Main Results

Social Mobility across Countries

Figure 6.1 shows the main social mobility index with 95 percent confidence bounds. The index is based on teenagers representing the whole country, but in two cases (Argentina and Uruguay), the samples only included urban citizens. However, these two countries are both highly urbanized (more than 85 percent of the population living in urban areas), so the urban samples provide a reasonable approximation of a global sample.

The confidence bounds have been estimated by bootstrapping (100 repetitions) and the span of the confidence interval reflects the number of

Figure 6.1. Social Mobility Index (SMI) Based on Teenagers (13-19 years)



observations in the sample. The larger the sample, the narrower the confidence interval.

Chile, Argentina, Uruguay, and Peru stand out as having high social mobility, while Guatemala and Brazil show very low social mobility. The picture for those in between is less clear since their confidence intervals tend to overlap. However, Bolivia, Ecuador, Nicaragua, Costa Rica, and Colombia all appear to have rather low social mobility.

Comparison with Other Social Mobility Rankings

The correlation between the main Social Mobility Index (SMI) used in this chapter and the Family Background Immobility Index of Behrman, Birdsall and Székely (1998) is –0.71.[5] The two indices agree that Chile, Argentina and

[5] Bolivia is not included, as Behrman, Birdsall and Székely had data only for urban areas.

Uruguay are the three most socially mobile countries, and Brazil the least mobile.[6] The ranking of those in between differ, but, as shown above, the differences are not statistically significant. The differences are probably mainly due to their larger age group (10–21 year olds), and the fact that some of the surveys in this chapter are more recent than theirs.

The second paper on the subject is by Dahan and Gaviria (1999). They also use the schooling gap to calculate their social mobility index, but in order to gauge the influence of family background, they compare the correlation in gaps between siblings to the correlation in gaps between random adolescents.

The correlation between the main SMI used in this chapter and the Dahan and Gaviria (1999) Immobility Index is –0.52, but with little agreement on the ranking. They find Costa Rica, Peru, and Paraguay to be more socially mobile than Chile; while Bolivia, Ecuador, Nicaragua, Colombia, Mexico, and El Salvador are even less mobile than Brazil. Besides applying a completely different methodology, there is another important difference. Dahan and Gaviria's samples are much smaller than those used in this chapter, since they need households with at least two siblings in the chosen age range (ages 16–20) in order to calculate correlations.

The index presented here is an improvement over the previous ones for the following reasons. First, the schooling gap regressions are more inclusive and better specified than those in Behrman, Birdsall and Székely, and unlike their indices, this index is not sensitive to the scaling of variables. Second, this method includes, on average, 95 percent of all teenagers, while the Dahan and Gaviria index includes only an average of about 37 percent of all adolescents in their selected age group. There is reason to believe that these are not representative of all adolescents in the age group, since adolescents with many siblings are much more likely to be included. Third, the method presented here measures directly what is of interest, namely the influence of family background on education gaps, while Dahan and Gaviria's method measures this only indirectly.

None of the other indices have been reported with confidence intervals or standard errors, so it is not known whether the reported differences between countries are in fact significant. Behrman, Birdsall and Székely divide their samples into 559 sub-samples, many of which may be so small

[6] Behrman, Birdsall and Székely did not have data for Guatemala.

that the results cannot be significantly different from each other. They do not report the number of observations in their regressions, nor any standard errors or confidence intervals.

Discussion

Cross-Country Analysis

Income Inequality

Measures of social mobility are important largely because the conventional GINI coefficient does not capture all, or even the most important part, of the "fairness" of income distributions.

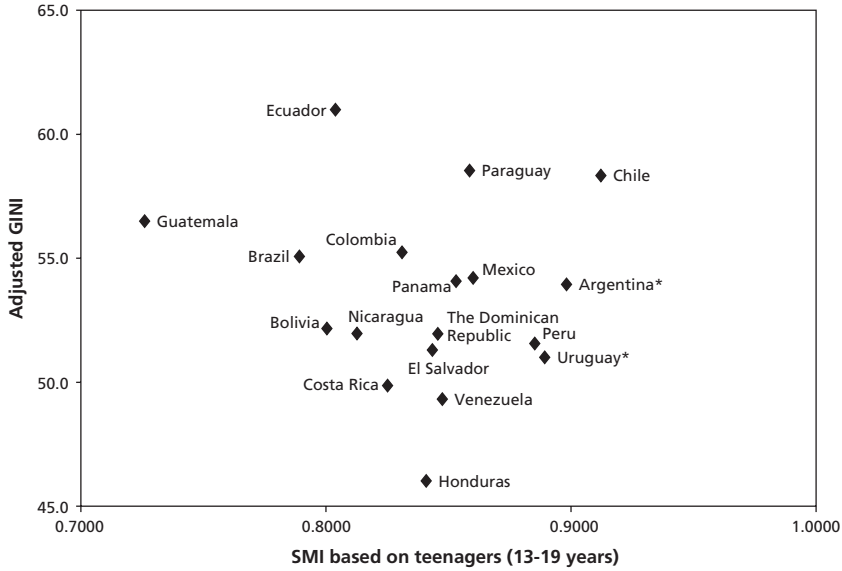
The GINI coefficient is a static measure of inequality, and even if it is measured at several points in time, it does not indicate whether the same people are at the bottom of the distribution every time. A country where income recipients move relatively freely around the income distribution would seem more fair than one where the poor are stuck consistently at the low end. Social Mobility indices are designed to measure that part of "unfairness."

Figure 6.2 compares this chapter's measure of Social Mobility with a GINI coefficient for each country. A GINI measure is used that has been adjusted for differences in household survey characteristics, such as coverage, income measure used, and timing, so they should be reasonably comparable across countries.[7] The figure shows that no clear relationship exists between Social Mobility and Inequality ($\rho = -0.12$). Guatemala, Ecuador, and Brazil are clearly "unfair" countries, since they have both high income inequality and low social mobility. In those countries, large gaps exist between rich and poor and there is little chance of crossing those gaps.

There are no clearly "fair" countries in the sample. Chile and Argenina have high social mobility, but they also have extremely high income inequality. While low mobility and high income inequality is clearly the worst combination, high mobility and low income inequality is not necessarily the best. High income inequality and high mobility (as in the case of Chile) may provide better incentives for people to study hard, work hard, be innovative,

[7] The adjusted Gini is drawn from Székely and Hilgert (1999), Table 5, Column 8.

Figure 6.2. Social Mobility and Income Inequality



Notes: Argentina and Uruguay estimates are based on urban populations only. The GINI coefficients are from Székely and Hilgert (1999), which generally uses the same surveys as are used for the social mobility index. However, in a few cases the SMI is based upon a slightly more recent survey than the GINI.

Source: IDB Household Surveys and author's calculations.

and take risks, because the returns are higher. Better incentives may lead to greater growth in the long run because the work force is better motivated, better educated, more innovative, and less dependent on social safety nets.

Per Capita Income

Several theoretical papers have suggested mechanisms through which social mobility and economic growth might be related. Murphy, Shleifer and Vishny (1991), Raut (1996), and Hassler and Mora (1998) all use the idea that intelligent agents may contribute to higher technological growth if they are assigned appropriate positions in the economy (e.g., entrepreneurs rather than workers or engineers rather than lawyers). If social mobility is low, educational attainment and job allocation will depend more on family background and less on intelligence, implying inefficient education and use of the intelligent people in the society. The authors show (in different

types of models) how this can give rise to multiple equilibria: one with low growth and low social mobility and another with high growth and high social mobility.

The causality between growth and mobility goes in both directions. High social mobility implies a better use of human resources, which implies higher growth. High growth rates, on the other hand, facilitate social mobility because the rate of change in the society is higher. In a highly dynamic society children cannot just follow in their parents' footsteps, as they could in a more static society.

The correlation between the Social Mobility Index used in this chapter and GDP per capita is 0.53, implying that higher per capita GDP is indeed associated with higher social mobility. The correlation is relatively strong, and thus lends evidence to the theoretical arguments stated above.

Figure 6.3 suggests that Argentina, Chile, and Uruguay are located in high growth/high social mobility equilibria, while Guatemala, Bolivia, Nicaragua, and Colombia are stuck in low growth/low social mobility equilibria (assuming that higher GDPs are caused by higher long-term growth rates).

In contrast to the results in this chapter, Dahan and Gaviria (1999) did not find any clear correlation between social mobility and per capita income.

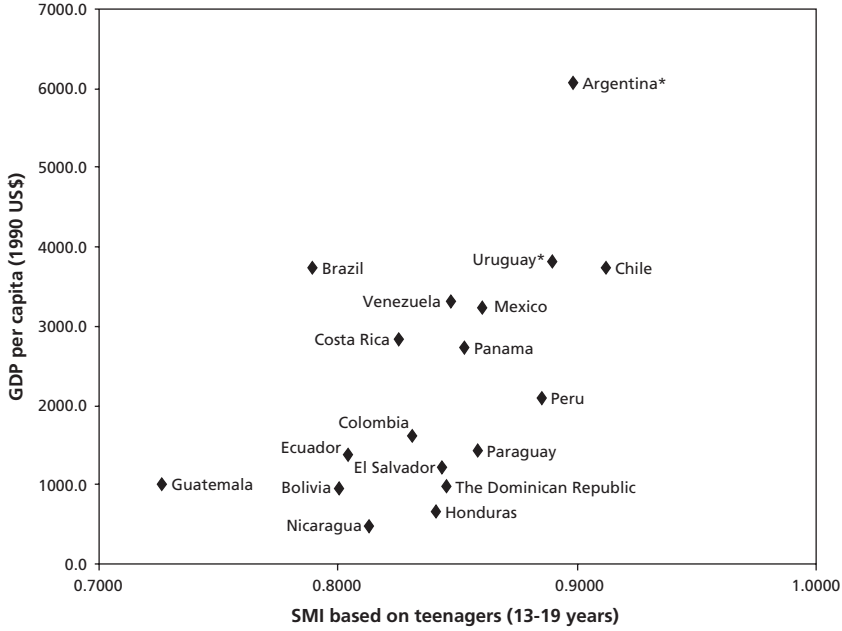
Urbanization Rates

There is a tendency for highly urbanized countries to have higher social mobility than less urbanized countries. The reason for this may be that it is easier for governments to provide decent education for everyone if children are clustered together in urban centers. Figure 6.4 shows the relationship, with Argentina and Uruguay listed as 100 percent urbanized, reflecting the samples used to calculate social mobility.

The social mobility estimates for Argentina and Uruguay could have been adjusted downward to reflect their actual urbanization rates (87.1 and 85.6 percent, respectively), but the adjustment would have been small, and it would not have affected their ranks among the four most mobile countries in the sample.

The positive relationship between urbanization rates and social mobility ($\rho = 0.55$) initially suggests that urban teenagers might be more socially mobile than rural teenagers. However, when the samples are divided by area, there is no evidence of that hypothesis. Rural and urban

Figure 6.3. Social Mobility and GDP Per Capita



Note: Argentina and Uruguay estimates are based on urban populations only.

Source: IDB Household Surveys and author's calculations.

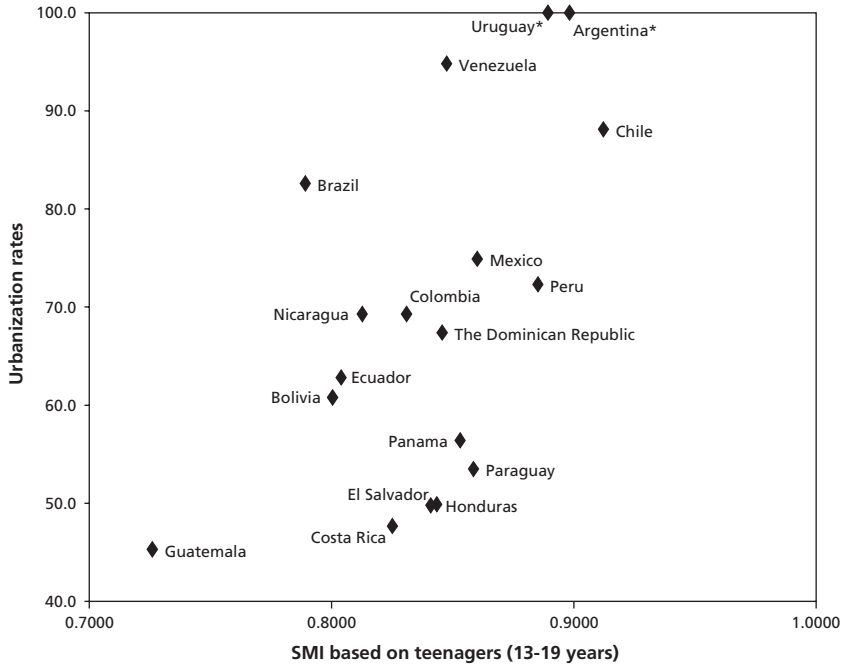
teenagers are affected in approximately the same way by family background. On average, rural teenagers are actually slightly more mobile than urban teenagers, but the difference is not statistically significant. The average SMI for rural teenagers is 0.8725, while it is only 0.8549 for urban teenagers. Bolivia is the only country in the sample where urban teenagers are significantly more mobile than their rural counterparts (SMIs of 0. 8841 and 0.8239, respectively).

The Education System

A free education system of high quality would seem the obvious way to increase social mobility. Theoretically, any teenager could then get the education he wants independent of his family background. His idea of the optimal amount of education may still depend on family background, though, so social mobility need not be perfect.

Figure 6.5 shows that there is a clear negative relationship between social mobility and schooling gaps ($\rho = -0.60$). The lower the average

Figure 6.4. Social Mobility and Urbanization Rates



Source: IDB Household Surveys and author's calculations.

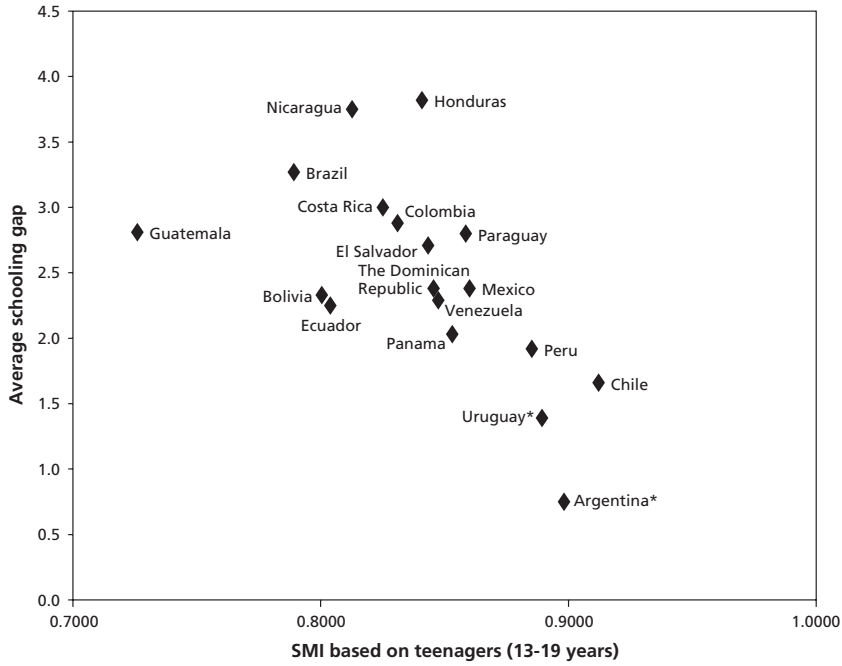
schooling gap, the higher the mobility. This makes it likely that countries could improve their social mobility simply by reducing schooling gaps. It is not inevitable, however. Bolivia and Ecuador have below-average schooling gaps, but they still have very low social mobility.

It is interesting to note that four of the five countries where children start school at age seven instead of age six (i.e., Guatemala, Brazil, Nicaragua, and Honduras) are among the countries with the largest schooling gaps and the lowest social mobility. The correlation between school start age and social mobility is –0.54, and the correlation between school start age and teenage schooling gaps is 0.66, indicating that it might be an advantage to send children to school at age six rather than seven.

One way to reduce schooling gaps is to make sure that the quality of public education is sufficiently high so that students do not drop out simply because the classrooms are so crowded or the teachers so incompetent that the benefit of attending school is small.

If the pupil-teacher ratio in secondary education is chosen as an indicator of the quality of the public education system, Nicaragua is among the

Figure 6.5. Social Mobility and Schooling Gaps

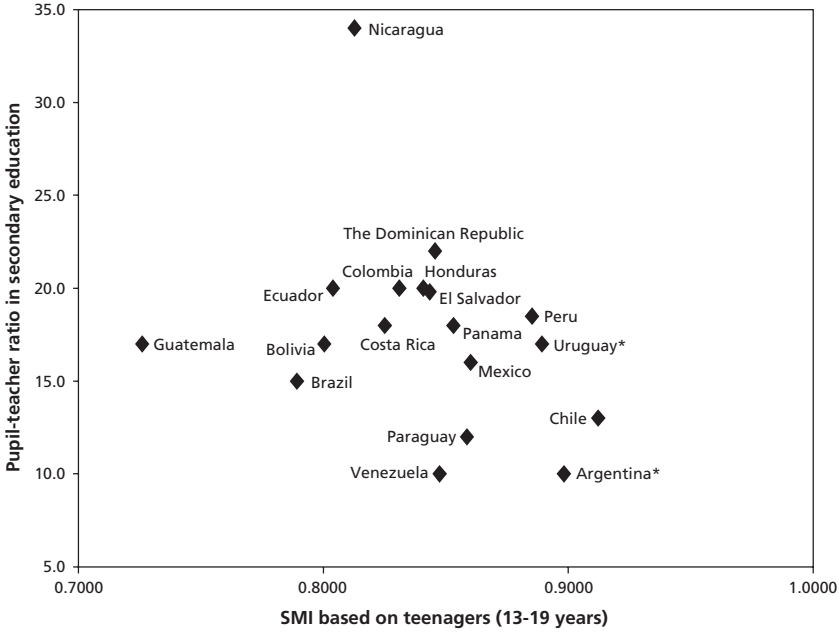


Source: IDB Household Surveys and author's calculations.

worst (34 pupils per teacher) and Venezuela and Argentina among the best (10 pupils per teacher), as shown in Figure 6.6. The pupil-teacher ratio is weakly correlated to the Social Mobility Index ($\rho = -0.31$ across countries), implying that better school quality is associated with higher social mobility, most likely through lower dropout rates and smaller schooling gaps.

The fact that school quality cannot be controlled for at the individual level may lead to a bias in the mobility estimate. Usually rich and well-educated families tend to choose better and more expensive private schools than poorer families. Thus, even if children in poor public schools have a zero schooling gap, they may be far behind children in expensive private schools. If "quality-adjusted" schooling gaps could be constructed and used, it would probably be possible to see that family background is more important than when simple schooling gaps are used. This is so because in the latter case there are many children from poor families who appear to have all the schooling they should, but in fact this schooling may not be worth much. The bias is likely to be larger in countries where the public education system

Figure 6.6. Social Mobility and Pupil-Teacher Ratios in Secondary Education



Source: IDB Household Surveys and author's calculations.

covers the population well but is of very poor quality compared to private schools. Andersen and Muriel (2002), for example, show that even when using very imperfect school quality indicators, school quality turns out to be just as important as school quantity in determining subsequent wage rates in Bolivia.

The Marriage Market

The marriage market can work either to increase or to decrease social mobility. This depends on whether individuals in a country marry primarily within their own social background and status, a pattern referred to in the literature as "assortative mating." If people tend to marry only people from their own class, then social mobility is restrained by marriage customs. If, on the other hand, people often marry outside their class, then social mobility is promoted by the marriage market, and inequality is lower, since resources are spread out more evenly across households.

A simple measure of the degree of assortative mating is the correlation between spouses' education levels, ρ_m. This correlation is generally high in Latin America, ranging from 0.67 in Costa Rica to 0.79 in Bolivia. The corresponding figure for the United States in 1990 is 0.62 (Kremer, 1996).

Figure 6.7 shows that there is only a weak negative relationship between spouses' education levels and the social mobility index ($\rho = -0.36$). In Bolivia and Colombia, the marriage market tends to contribute to low social mobility, as the correlations between spouses' education levels are extremely high. In Uruguay, Honduras and Argentina the less segregated marriage market tends to contribute to higher social mobility. Chile has high social mobility, however, despite the fact that the correlation between spouses' education levels is among the highest in Latin America.

Inter-Family Differences

In addition to other factors, different types of households experience differences in social mobility. The types considered are male-headed versus female-headed households, dual parent versus single-parent households, indigenous versus non-indigenous households, and rural versus urban households.

Female-Headed Households

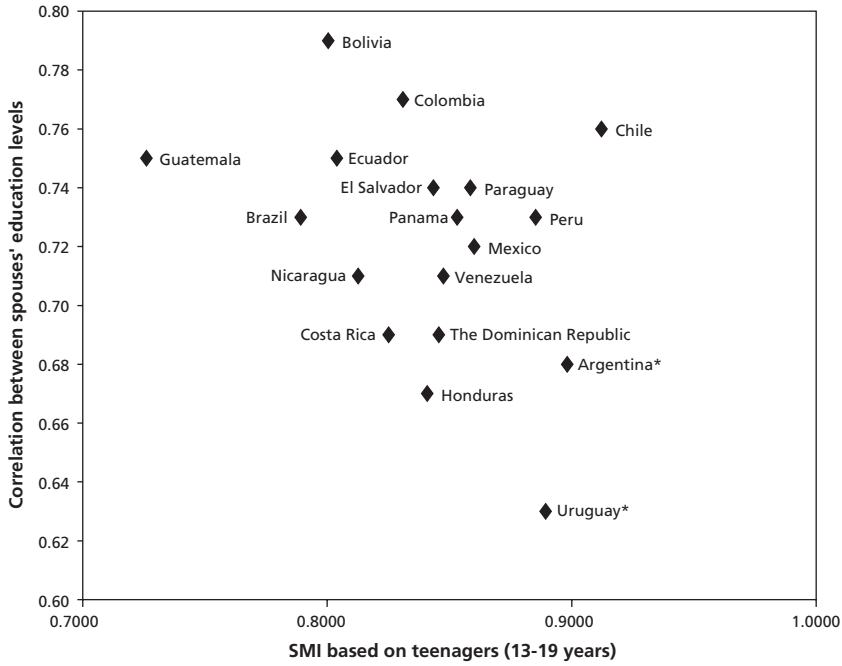
Just as girls seem to be better educated than boys in most Latin American countries, as will be discussed below, it appears that teenagers living in female-headed households are better off than teenagers living in male-headed households.

On average the schooling gaps for teenagers in female-headed households are 0.22 years (or 9 percent) smaller than those in male-headed households, after controlling for other factors. For no country in the sample is it a significant disadvantage to live in a female-headed household, although in about half of the countries there is no significant difference.

Single-Parent Households

Most single-parent households are headed by women, so it is possible that the single-parent dummy rather than the female-headed household

Figure 6.7. Social Mobility and Assortative Mating



Source: IDB Household Surveys and author's calculations.

dummy would pick up the expected disadvantage from living with a single mother.

But contrary to expectations, it is generally not a disadvantage to be a teenager in a single-parent household. Only in Ecuador and Paraguay is the single-parent dummy significantly positive, thus indicating that the gap is a little higher when living in a single-parent household rather than a dual-parent household.

Indigenous Households

Indigenous teenagers generally have larger schooling gaps than non-indigenous teenagers. Ethnicity data are available for six countries in the sample, but only for three countries (Costa Rica, Ecuador, and Guatemala) does the ethnic dummy turn out to be positive. In these three countries, being indigenous adds about half a year to the schooling gap. For Bolivia, Brazil, and Peru there were no significant differences between ethnic groups after controlling for other factors.

Rural-Urban Differences

Both the demand for and the supply of schooling differ dramatically between rural and urban areas in Latin America. Thus, the average gap for teenagers in rural areas is 4.0 years, while it is only 2.2 years in urban areas (see Table 6.3). On average gaps are 82 percent higher in rural areas than in urban areas, but there is wide variation across countries. Bolivia has the highest relative difference, with 121 percent larger gaps in rural areas, while Guatemala has the largest absolute difference (2.8 years). Brazil, Costa Rica, Paraguay, and the Dominican Republic have the smallest relative differences (less than 50 percent larger gaps in rural areas).

Some of the difference is explained by differences in characteristics, such as more siblings and a higher proportion of indigenous people. The pure effect of location is only 0.7 years on average, implying that the schooling gap of urban teenagers is 28 percent smaller than the gap of rural teenagers, all other things being equal.

In Bolivia, rural teenagers are significantly less socially mobile than urban teenagers, while in Guatemala and Nicaragua rural teenagers are significantly more mobile than their urban counterparts. For all other countries the difference is not statistically significant.

Intra-Household Analysis

In addition to differences across households, there are differences in opportunities between children of the same household. The differences considered are gender, birth order, timing of birth, and whether the teenager is a biological child of the head of household.

The Reverse Gender Gap in Education in Latin America

Generally, women in developing countries are less likely than men to attend high school; on average there are only 8 women in high school for every 10 men (World Development Report, 1999). In Latin America, however, there is a *reverse gender gap*. In almost all Latin American countries, women are more likely than men to attend high school, and this anomaly is also reflected in schooling gaps. Only in Bolivia, Mexico, and Guatemala do women have higher schooling gaps than men. In the rest of the countries in the sample, women have smaller gaps.

Table 6.3. Schooling Gaps for Teenagers, by Gender and Zone

Country	Average education gap	Male education gap	Female education gap	Gender gap
Argentina, urban '96	0.71	0.88	0.52	Reversed
Bolivia '97	2.36	2.24	2.49	Normal
Rural	3.73	3.33	4.17	Normal
Urban	1.69	1.66	1.73	Normal
Brazil '97	4.37	4.74	4.01	Reversed
Rural	5.91	6.34	5.43	Reversed
Urban	3.96	4.27	3.65	Reversed
Chile '98	1.55	1.66	1.43	Reversed
Rural	2.24	2.41	2.06	Reversed
Urban	1.42	1.52	1.32	Reversed
Colombia '97	3.04	3.27	2.81	Reversed
Rural	4.23	4.56	3.87	Reversed
Urban	2.25	2.33	2.18	Reversed
Costa Rica '98	2.97	3.15	2.77	Reversed
Rural	3.40	3.54	3.23	Reversed
Urban	2.37	2.57	2.17	Reversed
The Dominican Republic '96	2.56	2.98	2.16	Reversed
Rural	3.14	3.53	2.65	Reversed
Urban	2.12	2.45	1.86	Reversed
Ecuador '98	2.28	2.48	2.08	Reversed
Rural	3.12	3.29	2.94	Reversed
Urban	1.62	1.80	1.43	Reversed
El Salvador '98	3.72	3.90	3.54	Reversed
Rural	4.96	5.10	4.81	Reversed
Urban	2.71	2.88	2.55	Reversed
Guatemala '98	5.25	5.09	5.40	Normal
Rural	6.34	6.03	6.66	Normal
Urban	3.56	3.62	3.50	Reversed
Honduras '98	4.17	4.44	3.89	Reversed
Rural	4.92	5.24	4.57	Reversed
Urban	3.20	3.35	3.06	Reversed
Mexico '96	2.32	2.28	2.36	Normal
Rural	3.16	3.08	3.24	Normal
Urban	1.70	1.68	1.72	Normal
Nicaragua '98	4.48	4.84	4.12	Reversed
Rural	5.91	6.23	5.57	Reversed
Urban	3.30	3.60	3.03	Reversed

(*continued*)

Table 6.3. Schooling Gaps for Teenagers, by Gender and Zone (continued)

Country	Average education gap	Male education gap	Female education gap	Gender gap
Panama '97	1.96	2.23	1.69	Reversed
Rural	2.67	2.92	2.37	Reversed
Urban	1.49	1.71	1.28	Reversed
Paraguay '95	2.90	3.09	2.71	Reversed
Rural	3.53	3.69	3.34	Reversed
Urban	2.37	2.53	2.23	Reversed
Peru '97	1.90	1.94	1.87	Reversed
Rural	2.81	2.71	2.92	Normal
Urban	1.41	1.51	1.31	Reversed
Uruguay, urban '97	1.43	1.64	1.24	Reversed
Venezuela '97	2.33	2.74	1.91	Reversed
Unweighted average	**3.01**	**3.19**	**2.83**	**Reversed**
Rural	**4.00**	**4.13**	**3.83**	**Reversed**
Urban	**2.19**	**2.35**	**2.05**	**Reversed**

Source: Author's calculations using teenagers (13–19 year old).

As the literature does not so far appear to explain the reverse gender gap in Latin America, several tentative suggestions—which remain to be empirically tested—are offered here. First, in Latin America girls have typically contributed greatly to domestic and agricultural work, while boys more often have paid jobs outside the house. With the demographic transition and increases in household amenities, however, the amount of time that girls spend on household chores may have been slowly declining over time. If boys' time has not been freed up in a similar manner, and if girls have not been pushed to work outside the house, this might explain how girls have caught up with and even surpassed boys in education level. Latin American culture may also work in favor of girls' education, since families are much more reluctant to send their daughters out to work than their sons.

If there really is a reverse gender gap, then it will have positive long-term consequences for the region's general education level, since mothers' education is much more significant in determining children's education than fathers' education.[8] In addition, several studies have shown that women's education is important in reducing fertility (see Robbins, 1999),

[8] In an earlier version of this chapter, both father's and mother's education, rather than the greater of the two, were used as family background variables. The results showed that

improving health (see Ranis and Stewart, 2000), promoting economic growth (see Klasen, 2000), reducing poverty (see Dollar and Gatti, 2000), and even reducing corruption (see Dollar, Fisman and Gatti, 2000), so there appear to be many benefits deriving from this reverse gap.

Given that female teenagers have more education than male teenagers, female teenagers would be expected to be more socially mobile. To test that hypothesis, the samples have been split by gender and the calculated Social Mobility Indices calculated for both males and females. The results are shown in Table 6.4.

On average, female teenagers are slightly more mobile than male teenagers, but only in a few countries are they significantly more mobile (Brazil and Venezuela). Bolivia is the only country where boys are significantly more socially mobile than girls, but Bolivia is also one of the few countries where boys are better educated than girls.

Life-Cycle Effects

If a child is born early in the life cycle of the parents, there will usually be fewer resources available for the education of the child. An attempt is made to capture this effect by including in the schooling gap regressions a variable measuring the age of the household head at the time of the birth of the child. The estimated coefficients were negative for all countries, and they were usually highly significant (average t-statistic of –8.0). The average coefficient estimate across countries was –0.018, which implies that a child born to a 30-year-old household head is likely to have a schooling gap that is 0.18 years (or approximately 7 percent) smaller than a child born to a 20-year-old household head.

In addition, the life-cycle effect is larger in urban areas than rural areas. A child born to a head of household 10 years later in life would have a 13 percent smaller gap.

Birth-Order Effects

The number and order of siblings were also found to be important. Generally a higher number of siblings increases a teenager's schooling gap, but the

mother's education was at least twice as important in determining variations in schooling gaps as father's education. Behrman, Birdsall and Székely (1998) found the same result.

Table 6.4. Social Mobility by Gender

	SMI for teenagers		
Country	**Male**	**Female**	**More mobile****
Argentina*	0.8923	0.9035	Equal
Bolivia	0.8282	0.7696	Male
Brazil	0.7727	0.7987	Female
Chile	0.9000	0.9237	Equal
Colombia	0.8245	0.8349	Equal
Costa Rica	0.8195	0.8270	Equal
The Dominican Republic	0.8191	0.8623	Equal
Ecuador	0.7817	0.8273	Equal
El Salvador	0.8318	0.8525	Equal
Guatemala	0.7342	0.7160	Equal
Honduras	0.8405	0.8380	Equal
Mexico	0.8654	0.8558	Equal
Nicaragua	0.8122	0.8083	Equal
Panama	0.8416	0.8642	Equal
Paraguay	0.8504	0.8644	Equal
Peru	0.9088	0.8574	Equal
Uruguay*	0.9017	0.8696	Equal
Venezuela	0.8210	0.8706	Female
Average	**0.8359**	**0.8413**	**Equal**

Source: IDB Household Surveys and author's calculations.
*Argentina and Uruguay include only urban citizens.
** Using a 5% significance level.

characteristics of those siblings are also important. The presence of a younger sister, a younger brother, or an older brother would on average increase the gap by 0.26 years. The presence of an older sister, on the other hand, would not on average have any effect on the schooling gap.

Thus, in a hypothetical family who raised first a girl, then a boy, and then a girl, the oldest sister would have a 0.52-year (or 24 percent) greater schooling gap than the younger sister. And this is not counting the life-cycle effect, which would further tend to increase the older sister's schooling gap compared to the younger sister's gap.

The effects of siblings are larger in urban areas than rural areas. The estimated coefficients are slightly higher, and because the gaps are generally smaller the relative effect is substantially larger. In urban Argentina, for example, an average family who raised first a girl, then a boy, and then a girl,

would see that the oldest sister would have a 0.70-year (or 92 percent) higher schooling gap than the younger sister (again not counting the life-cycle effect).

Generally, then, it is best for educational attainment to be an only child, or to have only older sisters. Younger siblings or older brothers will tend to divert resources away from any child's education. In urban areas, the presence of many siblings presents more of a disadvantage than in rural areas.

Extended Families

Many parents in Latin America raise children other than their own. Only a minority of these non-biological children are formally adopted, in which case they would be counted the same way as biological children. Most of these children are simply accepted as part of the family as a favor to relatives or friends who are unable to take care of their own children. Here the term "adopted" applies to all the teenagers living in the household who are not spouses, sons or daughters of the household head, maids or relatives of maids, tenants or guests.[9] By this definition, "adopted" teenagers account for about 15.7 percent of all teenagers, so it is not an insignificant group.

Adopted children, with this very broad definition, have significantly larger schooling gaps than household heads' own children. On average the schooling gap for adopted children is 0.36 years (or 14 percent) larger than the gap for their own children, all else being equal. This should not be taken as a sign that adoptive parents are unfair in their treatment of adopted children relative to their own children. Serious disruptive events may have taken place in the child's life prior to adoption, and these events may easily have caused the child to miss several months of school. Indeed, the child is likely to benefit from the fact that some relative or friend is willing to take him in, and it may even be his only chance of continuing his education.

Conclusions and Policy Implications

This chapter has proposed a new measure of social mobility, which can be calculated from ordinary household surveys rather than the less-common

[9] For technical reasons, the group of adopted teenagers includes grandchildren of heads of households, even if those teenagers' parents also live in the same household.

longitudinal surveys typically used to measure intergenerational mobility. The Social Mobility Index is based on schooling gap regressions for teenagers (13–19-year-olds) and uses the Fields decomposition to determine the importance of family background in explaining schooling gaps. When family background is important in determining schooling outcomes, social mobility is low. Conversely, if family background is unimportant, social mobility is high.

The method was applied to household surveys from 18 different Latin American countries conducted in the late 1990s. The process yielded results at two levels. First, the schooling gap regressions provided a large amount of information on the differences in opportunities between individuals within any given country and even within any given household. Second, the cross-country analysis of social mobility provided some indication of the factors that are associated with social mobility.

Several possible explanations and policy implications arise from this research. At the micro-level, it was found that the age of the household head at the birth of the child was highly significant and negative in all countries, implying that children who are born early in the life cycle of the parents have higher schooling gaps than children who are born later. A possible explanation for this relationship is that young parents may not have had time to get firmly rooted in the labor market. Consequently, their income is lower and more erratic at the time when they have to make schooling decisions for their child.

Low and erratic income may affect the education decision in several different ways. First, poor parents may decide to postpone the beginning of schooling in order to postpone the costs. Even if the school is free, there are costs in terms of school uniforms and other supplies, transportation costs, loss of work from the child, and loss of work from the parent who has to enroll the child, walk the child to school, help with homework, and engage in other education-related tasks. Second, parents may choose the cheapest school rather than the best school. This will not immediately appear in the schooling gap measure, but being in a poor school seriously reduces the possibilities for continued study at secondary and tertiary levels. Third, poor parents may let their children drop out of school early because they need the income that children can generate in the labor market. Fourth, young parents, who are not yet established in the labor market, may move around a lot to search for opportunities. Such moving may be highly disruptive for a

child's schooling. Fifth, young parents have probably had to terminate their education early in order to take care of their children, and such behavior tends to be transmitted to the next generation.

The strong evidence of the life-cycle effect suggests that policies targeted at preventing early childbearing would be beneficial for both parents and children. If young people can postpone the arrival of their first child until they have finished their desired level of education and have gotten a foothold in the labor market, then they have much more freedom to choose how they want to live their life and how they want to educate their children. If workers have their first child before they have finished their education, they are likely to drop out of school, be unable to find a decent job, and be unable to give everything they really wanted to their child. Chapter 2 of this book shows that teenage fertility has remained high in Latin America, even though fertility levels in general have dropped sharply since the late 1960s. In Bolivia, for example, more than 5 percent of 15-year-old girls are already mothers. This is related to a lack of knowledge about and use of contraceptive methods. Almost two-thirds of uneducated adolescents do not know any family planning method at all in Bolivia and Guatemala. In many Latin American countries, a large proportion of the demand for family planning is unmet, e.g., 70 percent in Guatemala, 52 percent in Bolivia, and 41 percent in the Dominican Republic. This hurts the educational attainments of the resulting children.

Another clear result from the regression is that each younger sibling born in the family will divert resources away from the older siblings. So a girl born to very young parents, who keep having more children, is unlikely to get much schooling at all.

The micro results also show that girls in most Latin American countries receive more education than boys do. This is good news, since mothers' education is the single most important determinant of children's education. In addition, other studies have shown that women's education is important in reducing fertility, improving health, reducing poverty, reducing inequality, and reducing corruption, so there appear to be many benefits from this reverse gender gap.

At the macro level, there is no apparent relationship between social mobility and income inequality. They are really two complementary measures. High income inequality can be good if it is accompanied by high social mobility (as in the case of Chile), or it can be bad if it is accompanied by low

social mobility (as in the case of Guatemala). In the first case the prospects for long-run growth look good, because people have strong incentives to study hard, work hard, take risks, and be innovative. In the second case the prospects for growth look bleak, because people do not have good incentives. Rich people do not have much incentive to work because they were born rich and they are likely to stay rich. Poor people also have less incentive to work hard because, no matter how hard they study or work, they are unlikely to advance to higher social strata.

Given that all Latin American countries have high income inequality, social mobility should be encouraged in order to take advantage of the incentives that high inequality offers. Encouraging social mobility basically requires making high-quality education available for all, which means vastly improving the quality of public education systems.

This chapter has also shown that social mobility is strongly correlated with per capita GDP. High social mobility and high growth seem to reinforce each other, because countries with high social mobility can make better use of human capital. Essentially, high mobility allows people to apply their talents in the best way. Many Latin American countries, however, seem to be stuck in a low growth/low social mobility equilibrium. Low mobility means that children from the most-advantaged backgrounds, rather than children with the highest capacity for learning, progress to high levels of schooling and ultimately occupy the most important positions in society, and there may thus be a great deal of wasted talent in the population. The relatively strong empirical correlation between per capita GDP and social mobility provides another incentive for governments to improve social mobility.

A final point of policy interest is that countries where the official age of starting the first grade of primary schooling is age seven instead of age six seem to perform worse both with respect to schooling gaps and to social mobility. It seems that sending children to school earlier reduces the risk of dropout, especially among the poor.

This chapter has argued that countries benefit from high social mobility. Not only is high social mobility related to high growth rates, both theoretically and empirically, but it also seems more fair if it is not the same families who are stuck at the bottom of the income distribution period after period and generation after generation. High social mobility allows children of poor and uneducated families to escape poverty and illiteracy, since they then have largely the same opportunities for education as richer children.

There is, however, another side to this argument. If family background is unimportant, then the rich and well educated do not have much influence on their children's education outcomes. If personal effort and advancement is not transmitted to one's offspring, this may reduce incentives for hard work, and the average level attained may thus be lower. Just as excessive income equality is not good for the economy, as it tends to stifle the incentives to invest in both physical and human capital, excessive social mobility is not desirable either.

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