



# The family in flux

**Household Decision-Making  
in Latin America**

**T**his book breaks away from the exclusively macroeconomic focus of development studies to bring the spotlight to the place where decisions are made: households. After all, aren't aggregate indicators such as consumption levels, employment growth, and savings rates driven by a multitude of one-off decisions—decisions made in a family context? To unlock the mysteries of plummeting school attendance or widespread child labor, for example, households hold the key.

Complementing this microeconomic view with an aggregate approach, this volume uncovers clues to declining fertility, skyrocketing female labor force participation and many other phenomena that are changing the face of economic activity in Latin America. Insights gleaned from the five in-depth case studies and the policy implication chapters should prove invaluable to scholars, development practitioners and policy-makers alike.



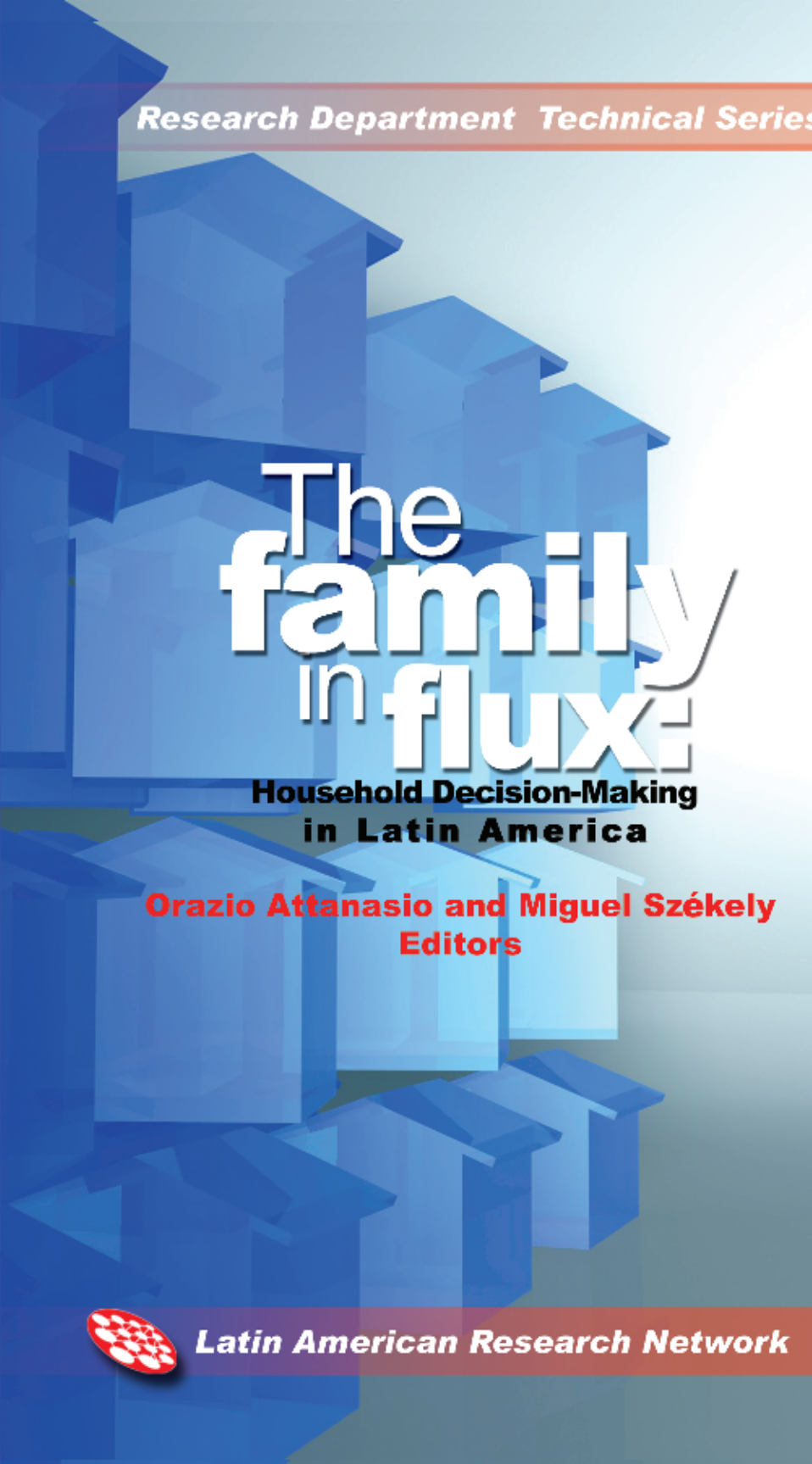
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The family in flux



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**Household Decision-Making  
in Latin America**

**Orazio Attanasio and Miguel Székely**  
Editors

2008



Latin American Research Network

**The Family in Flux**  
**HOUSEHOLD DECISION-MAKING**  
**IN LATIN AMERICA**

*Orazio Attanasio*  
*and Miguel Székely*  
*Editors*

*Washington, DC*  
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**Latin American Research Network**  
**Inter-American Development Bank**

The Inter-American Development Bank created the Latin American Research Network in 1991 in order to strengthen policy formulation and contribute to the development policy agenda in Latin America.

Through a competitive bidding process, the network provides grant funding to leading Latin American research centers to conduct studies on economic and social issues selected by the Bank in consultation with the region's development community.

Most of the studies are comparative, which allows the Bank to build its knowledge base and draw on lessons from experiences in macroeconomic and financial policy, modernization of the State, regulation poverty and income distribution, social services, and employment.

Individual country studies are available as working papers and are also available in PDF format on the Internet at <http://www.iadb.org/res>.

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This book is dedicated to the memory of  
Juan Luis Londoño

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## INTRODUCTION

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This book is part of a larger Inter-American Development Bank Research Department study of household decision-making in Latin America, conducted through the Latin American Research Network. The entire project, intended to be read as a set, comprises five country cases: Brazil, Colombia, Mexico, Peru, and Uruguay. Each of the cases examines the interplay of variables such as changes in household structure, female labor force participation, human capital, and its returns.

The research presented in this book constitutes one of the first attempts to present systematic evidence based on household surveys and using a consistent methodology for five countries in Latin America. The findings illustrated herein are both unique and timely for a number of reasons. During the last few decades, Latin America has been going through an intensive transformation process related to changes in demographics and in the use of human capital. Among the most significant transformations in the region are changes in family structure and fertility, a transition from a relatively young to a relatively older population, an increase in the labor force participation of women, and growth in levels of educational attainment.

These changes have important implications for household decisions since they tend to affect how much income is earned and how it is divided between consumption and savings. To cite one example, an aging population creates new pressures on savings and pension systems, which several Latin American countries have already started to reform. These reforms may, in turn, affect household structure as the extended family is relied upon less as a source of financial security. It is hoped that the research contained herein will shed light on these types of complex feedback loops that affect households, and guide reform and other policy efforts. This research effort is also well-timed as it was able to employ large datasets that have only recently become available.

Given the inherent complexity and intricacy of household structure and behavior, this book does not seek to construct a complete model of household formation and dissolution, fertility and labor supply decisions, and so forth. However, a useful theoretical framework in which to organize the empirical analysis can be constructed by combining the life cycle model and the theory of family formation and structure by Becker (1993). The former explicitly considers household decisions over time, while the latter makes

explicit the links between family structure, labor supply choices, and incentives to accumulate human capital.

As far as the data analysis is concerned, the authors employ cohort analysis techniques, which basically consist of following across time a sample of individuals born in a given year or time span. By using such a technique it is possible to capture the earnings profile and other variables for a group of people throughout the life cycle. It also allows comparing different generations at the same age and observing changes in patterns of income, relative income, savings, expenditures, number of children, participation rates, etc. This method attempts to distinguish the changes that respond to the trend in conduct during the lifecycle from the changes that stem from intergenerational differences.

Finally, the novelty of this book also lies in the two chapters on policy implications that follow the case studies. While the microdata of the country studies provides an in-depth look at household dynamics, the third chapter applies the same methodology to analyze aggregate demographic data. This dual approach allows for a unique perspective that encompasses both the “forest” and the “trees.” While the individual country studies argue that fertility declines are a variable that sets other favorable changes in motion, the third chapter examines the existence of this demographic window of opportunity and explores how policymakers should best capitalize on it to spur growth. The fourth and final chapter continues in the same policy vein by analyzing the determinants of fertility and addresses the question: Is improved health more important than women’s schooling?

The region faces important challenges in the years ahead. How it will be able to meet these challenges will hinge upon boosting the accumulation of human capital, which has been painfully slow in many Latin American countries. The evidence presented herein on how households interact in that process should be of use both to policymakers and to future research efforts. Directly linked to this issue is the relationship between fertility choices and education choices: To what extent will the decline in family size imply a shift in Latin America from a model based on the quantity of children to a model based on the quality of care devoted to each child? To what extent are these issues linked to female labor force participation?

While this publication cannot aspire to uncover all of the mysteries of household dynamics in Latin America, it is hoped that the data and the methodological approach will both encourage further research efforts and guide policymakers in formulating sound and well-directed policies.

# **An Introduction to Household Decision-Making: How to Interpret the Data**

*Orazio Attanasio and Miguel Székely<sup>1</sup>*

The bulk of mainstream development studies tend to view the world of economic activity through the lens of broad measures such as consumption levels, employment growth, and savings rates. While these aggregate indicators are valuable in their own right for providing a panoramic view of the economic scene, close-up snapshots are needed as well. Behind the economy-wide measures are a multitude of one-off decisions—decisions typically arrived at within an individual family context. For example, overall population growth obviously hinges on how many children a woman has—a decision that may be guided by the marketplace but is ultimately made in the bedroom. In making basic choices, households adapt to changing economic environments, and their decisions in turn affect economic variables in a complex and subtle feedback loop. The determination of which sons and daughters will go to school and which will go to work, for instance, determines labor participation rates and is in turn influenced by variables such as returns to human capital. Therefore, to truly uncover what is behind phenomena such as plummeting attendance levels in secondary school or widespread child labor, it is important to include household level data.

This book incorporates the best of both worlds through its dual approach that encompasses both the “trees” of household-level data and the “forest” of aggregate data. The case studies, which include Brazil, Colombia, Mexico, Peru, and Uruguay, paint a picture of the dynamics of household

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decisions at the microeconomic level. Of the several complications involved in the study of the dynamics of household decisions, perhaps the most fundamental is that family decisions can vary substantially across income groups, across generations going through the demographic transition at different points of their life cycle, and even over the life cycle of the same household. Given the changing nature of the structure of households, and the focus on the life cycle of households, the research can only be effectively performed with a thorough analysis of microeconomic data. The country studies, therefore, focus on the analysis of longitudinal data or on the analysis of time series of cross-sections for five countries. The rest of this chapter further explores the rationale behind this research project and the methodology used.

The case studies stress that substantially declining fertility rates represent a major transformation in Latin American households. More specifically, they unanimously argue that these fertility declines have triggered changes in female labor force participation, household structures, increased investment in the human capital of children, and even in household savings decisions. However, due to the nature of the country studies, it is difficult to explore the underlying causes of such fertility declines. This is a crucial issue. The third and fourth chapters of this book are therefore dedicated to drawing the policy implications of this project through the use of a more aggregate approach. Chapter Three discusses the relevance for policymakers of the demographic changes that are triggered by household fertility decisions. For the first time, the same methodology used in the country studies is applied to aggregate data. Do declining fertility rates provide a window of economic opportunity in which countries can take advantage of demographic structures to enhance their development prospects? Which policies are best in order to capitalize on the opportunity? The fourth and final chapter of this publication keeps the spotlight on fertility rates while exploring their possible determinants. Specifically it addresses the policy question: Is improved health more important than women's schooling?

### **How Are Households Relevant for Economic Development?**

The household is the fundamental decision-making entity of a society. How the time of each of the members will be allocated, how income will be earned, and how much of it will be saved—all of these decisions are made within the

household context. Decisions on how much to invest now, especially in the education of the youngest members, have obvious ramifications for the future.

In order to achieve an enhanced understanding of economic processes, therefore, one must first have a solid grasp of household dynamics. How are households structured? Which members are educated, and to what degree? These and many other questions will be addressed in this volume, in the context of the five Latin American case studies.

As also explored in these case studies, the past two decades in particular have proven to be a dynamic time for household structure and behavior in Latin America. The region is undergoing a demographic transition that has tilted the balance from a relatively young population to an older one. In about half the countries, the proportion of the population of working age will increase over the next two decades. In the other half, however, the proportion of elderly individuals is already rising significantly and will reach more than 15 percent of the total population in the next 20 years. While in this sense, Latin America is a few steps behind the most developed parts of the world, it is also becoming more integrated. The past decade has been characterized by a process of trade liberalization and opening up that has been critical for many countries in Latin America. This process is likely to have important consequences for the returns to human and physical capital.

These types of pervasive changes in demographics and variables such as the returns to education impact the amount of resources available to individual households, as well as those households' needs. At the same time, changes in the economic environment provide incentives to the formation of certain types of households as well as to the accumulation of education and training, or "human capital." The central mechanisms through which these changes are observed include changes in family structure and fertility, availability and accumulation of education, participation in the labor market, and savings behavior.

Understanding how these main variables have evolved and how their values are interrelated is relevant for a wide variety of issues, ranging from the evolution of inequality and poverty, to the dynamics of growth, to the design of social security systems and safety nets. Analysis of aggregate trends, however, is of limited use for this purpose. Most questions require that analysis be complemented by detailed analysis of household-level data that make it possible to gauge the micro trends and disentangle them from the macro ones. Fortunately, good-quality data sets are becoming available for many

Latin American countries, including sets containing consistent time series of cross-sections covering, in some cases, several years.

In order to quantify and explain the changes in the essential variables for understanding where the region is going and how the standards of living of Latin American households are evolving, each of the five different countries analyzes household-level data sources using a similar methodology and standardized techniques. While each study has a slightly different focus depending on the individual country context and the nature of the data available, all of the studies present a similar set of basic facts on the evolution of family size and composition, fertility choices and labor force participation, the accumulation of human capital, and returns to human capital. While this does not necessarily present a complete story explaining the joint evolution of these variables, the set of descriptive results presented for each country constitutes an important first step towards such a story. It is hoped that the material presented in this volume can contribute to development efforts that are increasingly responsive to household needs.

The country studies are introduced, placed in context, and discussed below along the main thematic lines: family structure and fertility, participation in the labor market, human capital accumulation and returns, saving and pension provision, interrelated household decisions, and dynamic household decisions. The findings of these case studies are summarized in Chapter Two by country.

## **Household Dynamics: The Key Variables**

### ***Family Structure and Fertility***

Family structure has undergone fundamental changes in Latin America in the last 20 years, particularly in terms of the number of children per household. While in the developed world there has been a large increase in single-adult households (both with and without children), that phenomenon has yet to occur in Latin America. This is particularly noteworthy as the family, especially the extended family and families in rural areas, has been a vital institution for coping with shocks to individual income. The process of urbanization, the decline in fertility, and the changes in the economic environment (in terms of volatility, returns to human capital, etc.) constitute potentially strong incentives for generating further changes in the family structure. All the

case studies start with an analysis that characterizes the proportion of each type of household (“headship rates”) among individuals according to gender and age, followed by an analysis of family size and structure.

Fertility changes are obviously a key determinant of family size and structure and, ultimately, of household needs. Characterizing such changes and how they have unfolded over time and across generations is therefore highly instrumental in gaining insight into family structures and the likely evolution of needs. The case studies quantify the extent of the decline in fertility in the five countries. Not only do the studies document the overall decline in the number of children of younger cohorts relative to older ones, but they also analyze how this decline has varied for different groups of the population: Better educated people account for a large fraction of the decline, while at low income levels fertility is still considerably higher, which imposes pressure on the standard of living of the poorest households. The patterns illustrated in the country studies are fairly representative of what has happened in Latin America at large. While fertility has been declining, it still remains high. The third chapter, on policy implications, explores some of the broader implications of changes in the fertility rate, while the fourth chapter explores more narrow topics such as the impact of health on fertility and whether declining fertility is likely to be related directly to education choices. Among other questions, it asks: Does having fewer children translate into better quality care for each child?

### ***Participation in the Labor Market***

In the 1980s, the rates at which women joined the labor force increased dramatically. However, they seem to have stabilized in most countries in the 1990s and remain well below the rates observed in developed countries. Therefore, one problem might be that households are not using all the resources at their disposal to generate income. In the case of poor families, the decision to participate is normally linked with education since the opportunity cost of not participating in the labor market is small when the individual has a low level of schooling. However, it is not entirely clear why females in better-off Latin American households participate less than in other regions in the world.

The country studies document the main changes in female entry into the labor force over time and across generations and try to relate these changes to the other variables, in particular to fertility behavior and human capital

accumulation. These changes are examined not only at the aggregate level but also for different education and income levels. Why are these female labor supply choices so important? First, they directly change the amount of resources available to a household. Second, increasing the number of jobs held by family members is an effective hedge against income risk, so female participation enhances financial security. Third, female labor force participation boosts economic activity since, as women enter the labor force, some of their household duties have to be outsourced. Fourth, labor market participation by the female is likely to change the distribution of resources within the household.

### *Accumulation of Human Capital and Its Returns*

The painfully slow pace of human capital accumulation in Latin America has played a prominent role in the policy debate in the region. Even though the average years of schooling have increased in the past decades, the actual educational attainment of generations leaving school-age is still around 6 years less than what would be expected at that juncture. Although with limitations, most of the countries in the region provide their populations with access to at least primary and secondary education. Therefore, the problem seems to be that for some reason most families are not able to invest in the education of their members. The lack of proper education and skills seems particularly important when countries open to international trade and competition and when the relative demand for skilled jobs is high. Recent evidence suggests that the returns to skills, and more generally to education, have changed and have contributed to changes in inequality as well as to incentives to accumulate human capital in Latin America. As most of the accumulation of human capital occurs at an early stage of the life cycle, the effects of changes in the returns to education can vary dramatically for different generations.

The five case studies document how the accumulation of human capital has progressed for different generations. They analyze different dimensions, in that they consider both the average years of education of each of several generations, the dispersion of the years of education, and the percentage of individuals with different qualifications. This detailed quantitative analysis is crucial for understanding where the region stands and where its principal problems lie.

Analyzing changes in the returns to education is considerably more complicated because of the inherent difficulty of measuring the price of skills

as they change over time, which is calculated only for employed people. At the same time, such analysis is crucial for a variety of reasons. First, quantifying changes in the returns to skills can shed light on the nature of the changes in inequality and their relationship to the process of economic liberalization in the region. In this respect, the country studies can provide extremely valuable inputs to a variety of studies. Second, the returns to education are likely to provide incentives to human capital accumulation. It is crucial to the understanding of the (slow) process of accumulation to quantify how the returns to various skills and qualifications have evolved.

The evidence on this fundamental aspect is still very limited. In particular, most of the existing studies either consider an average return to education, or define the return to education as the return to college education. While both components are obviously important, they give a limited picture of what has happened. First, the returns to education exhibit some strong nonlinearities. The most obvious is the high value of the last year of study in completing a given degree. Second, the percentage of college graduates in Latin America is still very small. In addition to the return to college education, it is therefore also important to look at the return to secondary over primary education.

Ultimately, understanding the process of human capital accumulation will be crucial to the formulation of well-targeted development policies. The importance of liquidity constraints, the functioning of the mechanisms within households that determine schooling decisions, and so on are fundamental to the design of sound policy interventions that could stimulate the accumulation of skills in the region. In this respect the studies presented in this book provide a useful first step.

### ***Saving and Pension Provision***

Many Latin American countries have gone or are going through substantial reforms of their social security and pension systems. These reforms, together with the demographic trends that have partly motivated them, imply important changes in incentives to save to provide for old age. Savings behavior is obviously related to household needs and resources and is therefore linked to the issues described above. Furthermore, if individuals are forward-looking, consumption and saving choices should reflect individual expectations about future variables and trends and can therefore be particularly informative.

The analysis of savings and consumption will help to identify the kinds of households that are not benefiting from the new pension systems. Additionally, the analysis could help to assess other economic consequences of pension systems. For instance, improved systems could have an enormous impact on household structure since the Latin American household would probably be less relied upon as a substitute for resources for retirement for the elderly. If this were so, improved systems would “free” household resources that could be invested in new generations. Unfortunately, the lack of high-quality surveys with information on consumption and saving has limited this kind of analysis to some of the country studies.

### *Interrelated Household Decisions*

Incentives, resources, and needs differ substantially across generations, over the life cycle, and across income levels. For instance, the structure and decision-making of the average household are likely to change significantly as time passes. In developed countries, a typical traditional nuclear family, soon after its formation, goes through an “investment” stage during which the proportion of members that are not of working age expands. Children are not typically income earners, and a large share of household resources goes to them in the form of investments in education. The “investors” do not expect to receive the full returns to investments in education since the resources are used for the accumulation of other members’ human capital.

In a second stage, households achieve the maximum income-earning capacity of the life cycle, and they tend to start saving for retirement while still supporting some of their members. Finally, the typical household changes structure again when the head ages. At this stage, the household becomes smaller, labor market participation rates decline, and individuals normally retire and support themselves through pensions and social security.

In the case of Latin America, the life cycle of many households differs from this pattern. In this region, significant amounts of interhousehold transfers to older family members are observed, and rather than shifting toward smaller nuclear or single-person units, the family structure has slightly shifted toward extended families that include several generations. For instance, when the household head reaches prime age, it is common for the household to support older generations. Similarly, the poorest female-headed households tend to shift from nuclear to extended households as a

survival strategy. In this case, the shift gives these vulnerable households access to more resources. It is therefore interesting to establish the extent to which the persistent or even increasing role of extended families might be linked to changes in return to human capital and increases in inequality.

There are also differences at the third stage, at which the household head reaches retirement age. Latin American households have a tendency to shift their structures toward extended households, composed of several generations, and in which the main breadwinner is not the oldest person in the unit. This might be due to the absence of adequate social insurance mechanisms. This pattern is particularly important now, given the aging Latin American population. Combined with substantial reforms in the provision of public pensions, this trend might induce pervasive shifts in household structure and savings behavior, which might in turn impact on female participation decisions and investments in human capital. These phenomena might be particularly significant in the short run and in those countries where the process of aging is more advanced and where social security provision is less adequate.

### **Methodology: Measuring Dynamic Household Decisions**

There are several complications involved in the study of the dynamics of household decisions. Perhaps the most fundamental is that family decisions can vary substantially across income groups, across generations going through the demographic transition at different points of their life cycle, and even over the life cycle of the same household. Given the changing nature of the structure of households, and the focus on the life cycle of households, the research can only be effectively performed with a thorough analysis of microeconomic data. The projects, therefore, focus on the analysis of longitudinal data or time series of cross-sections for five countries. Moreover, they use a uniform methodology that, while requiring a number of strong assumptions, allows the analysis of life-cycle patterns with time series of cross-sections.

This book does not aim to construct a complete model of household formation and dissolution, fertility and labor supply choices, and so on. The reality is simply too complex, and there are too many holes in the data. For example, there is not much information about how families adjust to the aging process in the absence of adequate social security and pension systems, or make their decisions on who participates in the labor market. However, together the life-cycle model and the theory of family formation and structure



by Becker (1993) can provide a useful theoretical framework for organizing the empirical analysis. The former explicitly considers household decisions over time, while the latter makes explicit the links between family structure, labor supply choices, and incentives to accumulate human capital.

As the studies in this book focus on examining *changes* in the economic environment faced by households and in their behavior, it is necessary to use a methodology that is suitable for studying intrinsically dynamic phenomena. The choice of a particular methodology ultimately depends on the phenomena one is interested in studying. In what follows, the focus is mainly on households' economic welfare and decisions in a dynamic context. The life-cycle model provides a useful and unifying framework for studying household behavior. It is therefore of interest to characterize the evolution of several key variables over the household life cycle. At the same time, however, it is important to study how life-cycle profiles differ across generations. The subsections below briefly illustrate the methodology used in all five country studies, taking as the example variable the average number of children of a group of households.

In a static situation one could use the age variation in a single cross-section to characterize the life-cycle behavior of this variable. In a situation in which large structural changes are under way, however, it is important to distinguish between the life-cycle patterns and differences across generations and over time. In particular, if cohort effects are likely to be significant, the estimates of life-cycle patterns obtained from an individual cross-section would be problematic. In a famous paper, Shorrocks (1975) stressed that in the presence of cohort effects, the age profile observed in a given cross-section does not correspond to the life-cycle profile of any living cohort and can be completely meaningless and misleading.

### *Synthetic Panels*

Ideally, to follow the behavior of individual households over time, one would use longitudinal individual data. However, as longitudinal data are rarely available over a long time period, what is needed is a methodology based on repeated cross-sections. By considering repeated cross-sections with information on each household's number of children, one can control for cohort effects and estimate the life-cycle profile of different cohorts. The idea, which was first used to study a life-cycle problem by Browning, Deaton, and Irish

(1985), is to form groups of fixed membership over time. One obvious possibility, within the life-cycle framework, is to divide the sample according to the year of birth of the household head. Even though the same household is not followed over time, one can follow the average behavior of a generation as it ages. If several years are available one observes the number of children in each cohort at different ages. If the time period covered by the survey were long enough, one would observe different cohorts at the same age (obviously at different points in time).

Obviously, this methodology is not without problems. The implicit assumption that is made in forming group averages of the variables of interest and following them over time is that the sample for each group considered is drawn from a population in which group membership is constant or varies in a completely random fashion in terms of the variable under study. There are several reasons why such an assumption might be questioned. First, if mortality affects different subgroups differently, it is likely that the composition of the groups changes over time. For instance, if the poor die younger, the cohort becomes progressively "richer" as it ages and a larger proportion of wealthy individuals survives. Furthermore, if family formation is related to some of the variables under study, one can get biases both at the beginning of the life cycle (as the household heads that form a household first are not a representative sample of all the individuals in the population) and at its end (as some individuals will stay on their own as household heads while others might join their children's families). These problems are potentially serious. Their influence, however, can be diminished in a variety of ways. Controlling for additional variables that might explain differential mortality (such as education) might be a solution to the first problem. Characterizing the evolution of household headship might give insights on the practical importance of the second.

The use of synthetic panels or average cohort techniques allows a very useful graphical representation of the life cycle evolution of the variables of interest. As this type of graph will be extensively used in this book, it is worth spending some time describing the way it is constructed and interpreted. This will be illustrated with the help of a simple example, using the number of children in the household as the variable of interest.

Four Mexican surveys covering the years 1984, 1989, 1992, and 1994 are considered below. The sample is divided according to the year of birth of the household head. In order not to reduce too much the number of

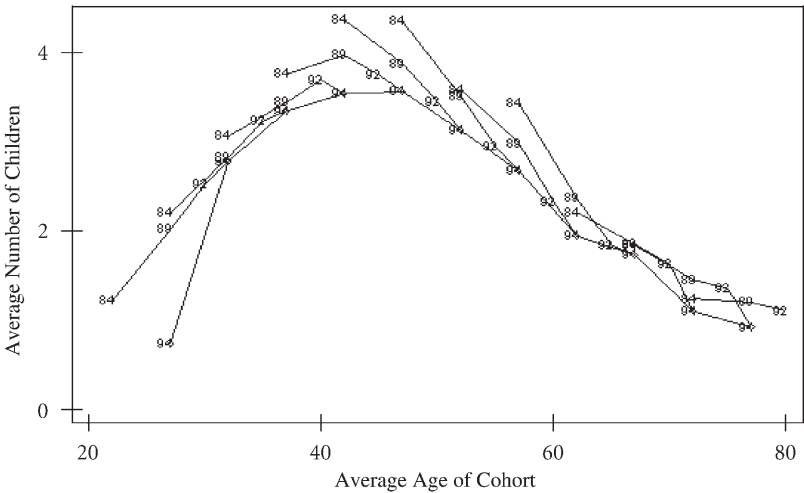
households in each group, cohorts are formed using five-year intervals. A total of 12 cohorts are formed, the first formed by household heads born between 1965 and 1969, the second formed by those heads born between 1960 and 1964, the third formed by those born between 1955 and 1959, and so on. The first cohort is only observed in 1994 at an average age of 23. The second cohort is aged, on average, 22 in 1984, 27 in 1989, and so on.

By using the average number of children of households whose head belongs to the cohorts defined above, one can plot such a variable against age and follow the behavior of each of the cohorts considered, as is done in Figure 1.1. Each connected segment refers to a cohort. Notice that as the period covered by the surveys is 11 years (albeit only four observations are available over that period) and cohorts are defined by five-year intervals, each cohort will overlap with adjacent cohorts.

As can be seen from the graph, each cohort is observed over a different interval of its life cycle. By tracking these different pieces one can try to estimate an entire life-cycle profile. The average number of children increases with age and declines in the last part of the life cycle, as children leave the original household.

Notice the large differences across cohorts: Younger cohorts seem to have considerably fewer children, reflecting the decline in fertility rates in Mexico over this period. It might be tempting to interpret the vertical dif-

Figure 1.1. Average Number of Children by Cohort



ference between overlapping cohorts as pure “cohort effects.” While for a variable such as children, this interpretation is a reasonable one, formally and for other variables, it is not given, as one should remember that overlapping observations refer to different time periods. Differences might be due, therefore, to time effects.

The figure also plots the cross-sectional age profile for 1994. The difference between the cohort and the cross-sectional profile makes it clear how misleading the former can be if used to infer life-cycle profiles.

As is clear from the graph, the methodology proposed can be used with at least two surveys. However, the larger the number of surveys and the longer the time period covered, the larger is the degree of freedom a researcher has to model life-cycle behavior. When few surveys are available, it is usually better to have them spaced over a long time interval rather than in adjacent years.

For the purposes of illustration, the entire sample has been divided into cohorts. Finer partitions are also possible. It is possible, for instance, to divide the sample by the level of education, as well as the year of birth. Figure 1.2, for instance, considers three levels of education: low, medium, and high. Notice that the cohort effects visible in Figure 1.1 are mainly due to the behavior of the highly educated households.

### *Cohort, Age, and Time Effects*

While tempting, one cannot in general interpret the vertical difference between the estimated cohort profiles at the same age as a “cohort” effect as such a difference could be explained by time effects. In general, without additional restrictions/information, one cannot disentangle age, time, and cohort effects. As a cohort is defined by the year of birth, it is obvious that there is a linear relationship among the three variables. In other words, it will always be possible to express a cohort effect as a combination of time and age effects.

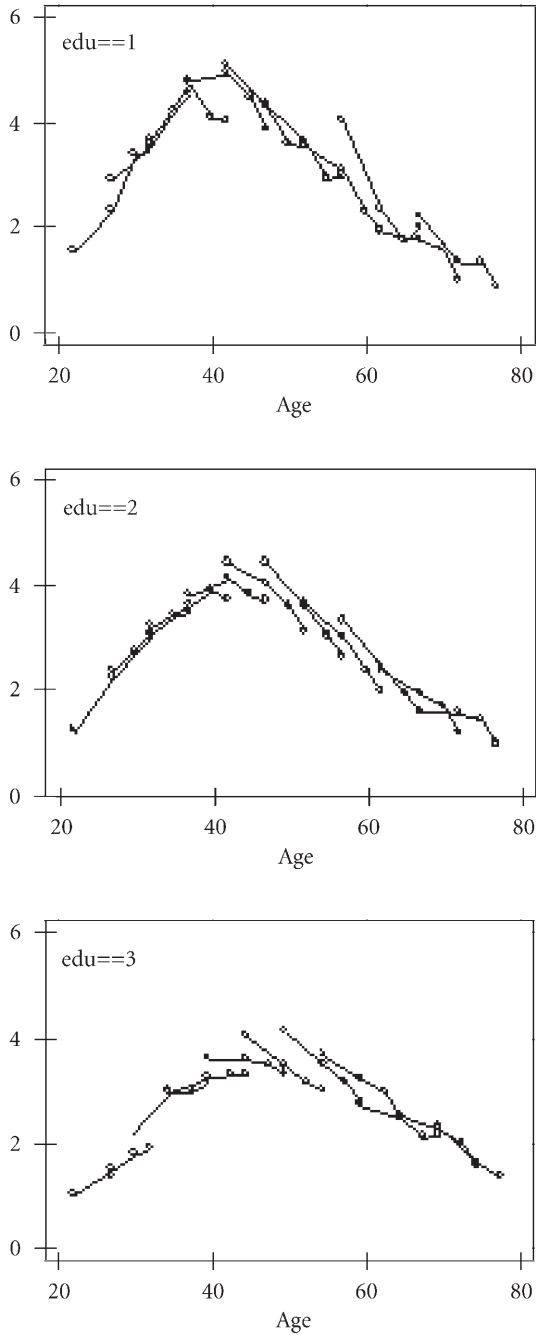
The problem is immediately seen when considering a simple empirical specification that one might want to fit to average cohort data:<sup>2</sup>

$$y(a, c, t) = \alpha_c D^c + \alpha_a D^a + \alpha_t D^t \quad (1)$$

---

<sup>2</sup> See the discussion in Heckman and Robb (1986). The equation above does not consider interactions among cohort, time, and age effects, but this would not change the substance of the problem.

**Figure 1.2. Average Number of Children by Cohort and Education**



where  $D^a$  and  $D^c$  are vectors of dummies identifying the age group and cohort, respectively, to which the individual or household head belongs, and  $D^t$  is a vector of dummies identifying the year in which the household was interviewed. The identification problem is associated with the fact that the three effects are linearly dependent; that is, once one knows the cohort to which the individual (household head) belongs and the year in which the subject was interviewed, one also knows exactly his or her age ( $a = t - c$ ).

Of course one can “solve” the identification problem by arbitrarily normalizing a coefficient (or a set of dummies) to zero. In a way, this would be simply a way of labeling the different effects. There are situations in which such a normalization is reasonable. In the example given above, for instance, of the average number of children, it is reasonable to assume that time effects are negligible and, therefore, interpret the data as being affected only by age and cohort effects. In other situations, such simple restrictions are not as plausible. It is sometimes possible to appeal to economic models to impose some additional restrictions, but this is not always the case.

Some of the papers on which this book is based occasionally use the restrictions suggested by Deaton and Paxson (1994) to identify some of these effects. In particular, one can assume that the year effects sum to zero and are orthogonal to all linear trends in the data. This implies that all deterministic linear trends in the data are interpreted as a combination of age and cohort effects. Under these assumptions, one can regress the data points plotted in Figure 1.1 on a polynomial in age, a set of cohort dummies and a set of year dummies constrained to have a zero mean and to be orthogonal to a time trend.<sup>3</sup>

The age and cohort profiles estimated with the latter procedure depend on the arbitrary normalization that year effects sum to zero and are orthogonal to a linear trend. An alternative restriction, which allows the identification of age profiles, is the assumption that there are no cohort effects in the variable under study. This would be the case if cohort effects in income and consumption would exactly cancel out. Deaton and Paxson (1994) suggest that some versions of the life-cycle model do imply such a restriction, and imposing such a restriction makes it possible to identify unrestricted year effects.

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<sup>3</sup> On this issue see the discussions in Heckman and Robb (1986), MaCurdy and Mroz (1995), Attanasio (1998), Deaton and Paxson (1994), and Paxson (1996).

### **Avenues for Further Research: A Roadmap**

The research presented in this volume constitutes one of the first attempts to present systematic evidence based on household surveys and using a consistent methodology for five countries in Latin America. While obviously critical for a large number of issues, quantitative and systematic evidence on these phenomena is hard to come by. This book hopes to fill an important gap and to support the development of informed and responsive policies.

The region faces important challenges in the coming years. One of the main issues is the accumulation of human capital and its determinants. It is clear that in many Latin American countries the process has been remarkably sluggish, or at least more so than in other regions, despite the increase in the price of skills observed in most countries. The evidence presented on the evolution of skill premia and the accumulation of human capital is fundamental to an understanding of the process whereby households make education choices. Without such an understanding, it would be impossible to effectively design policies to stimulate the accumulation of skills.

A first important research direction that emerges from the evidence presented in this volume is to identify the factors that have prevented faster growth in human capital in the region. Are liquidity constraints responsible for this, as some have argued? To what extent is income variability (even the variability of transitory shocks) reflected in shocks to the process of human capital accumulation? And to what extent does the process of liberalization, or increasing income volatility, make the process more difficult?

Directly linked to this set of issues is the relationship between fertility choices and education choices: To what extent will the decline in family size imply a shift in Latin America from a model based on the quantity of children to a model based on the quality of care devoted to each child? To what extent are these issues linked to female labor force participation?

The evidence presented is also relevant for the debate on the relationship between trade and inequality. While trade liberalization was proposed at some point as a possible explanation for the increase in inequality in the United States, such an explanation was later largely dismissed because it would imply a decrease in the skill premium in regions with relatively abundant unskilled labor. However, the evidence on the evolution of skill premia in Latin America has been limited so far. Of course, the issues involved are more complex. Complicating factors include the nature of trade liberaliza-

tion,<sup>4</sup> whether skills have more than one dimension so that one should consider the evolution of different “skill premia,” whether skill premia are measured without taking into account changes in the rate of unemployment, if the process of technology adoption is endogenous, and so on.

While the studies in this book do not provide answers to all of these questions, they constitute an important first step in that direction. A message that emerges clearly from the case studies presented is that there is now good quality evidence from large household surveys from many countries in Latin America. This wealth of information should be used systematically to keep the policy debate firmly grounded in reality.

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<sup>4</sup> Attanasio, Goldberg, and Pavnick (2002) present evidence that in Colombia in the early 1990s, trade liberalization implied larger reduction of tariffs in sectors where unskilled labor was used more heavily.





## CHAPTER TWO

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# The Country Studies

*Orazio Attanasio and Miguel Székely*<sup>1</sup>

This chapter summarizes and contains edited excerpts of the five case studies that formed part of a Latin American Research Network project. The five working papers on which the chapter is based are:

- *A Dynamic Analysis of Household Decision-Making: The Brazilian Case* by Ricardo Paes de Barros
- *A Dynamic Analysis of Household Decision-Making in Urban Colombia, 1976–1998: Changes in Household Structure, Human Capital and its Returns, and Female Labor Force Participation* by Fabio Sánchez Torres and Jairo Núñez Méndez
- *A Dynamic Analysis of Household Decision-Making: The Mexican Case* by F. Alejandro Villagómez and Andrés Zamudio
- *Household and Individual Decision-Making Over the Life Cycle: A First Look at Evidence from Peruvian Cohorts* by Jaime Saavedra-Chanduví and Martin Valdivia
- *A Dynamic Analysis of Household Decision-Making in Latin America: The Uruguayan Case* by Marisa Bucheli, Andrea Vigorito, and Daniel Miles.

These studies describe the dynamics of household decision-making in their respective countries over the past two decades or so. Each country study has two main objectives. The first is to provide a detailed account of household structure and behavior, and the second is to investigate the main socioeconomic factors behind changes in that structure and behavior over the past

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few decades. Each country study begins by describing the data. While all countries used time series of cross-sectional household surveys, the details of the data differ from country to country. In particular, the time series length, the frequency of the surveys, the coverage (urban vs. rural), and the type of variables on which information is available vary across countries. For example, only two of the five studies analyze data on consumption and savings.

Each case study uses microeconomic analysis to identify how recent demographic trends and changes in the economic environment have been reflected in changes in family structure. These changes have important implications for the subsequent steps of the project, in which human capital accumulation and labor market decisions are analyzed.

The focus of all the studies is human capital accumulation and use. Why do many children drop out of school before achieving the higher education levels that yield the largest returns? What is the evolution of returns to education across generations and over time? Why do different types of households use more or less of the human capital they own (the participation decision), and what drives their savings decisions? These questions are explored in the case studies.

## **Brazil**

The case study on Brazil by Ricardo Paes de Barros (2001) presents an in-depth exploration into many facets of household decision-making. He uses a set of 16 household surveys (Pesquisas Nacionais por Amostra de Domicílios, or PNAD) spanning 19 years between 1979 and 1997, each survey including more than 100,000 households. The age of the head of the household is used to identify the household's position in the life cycle.

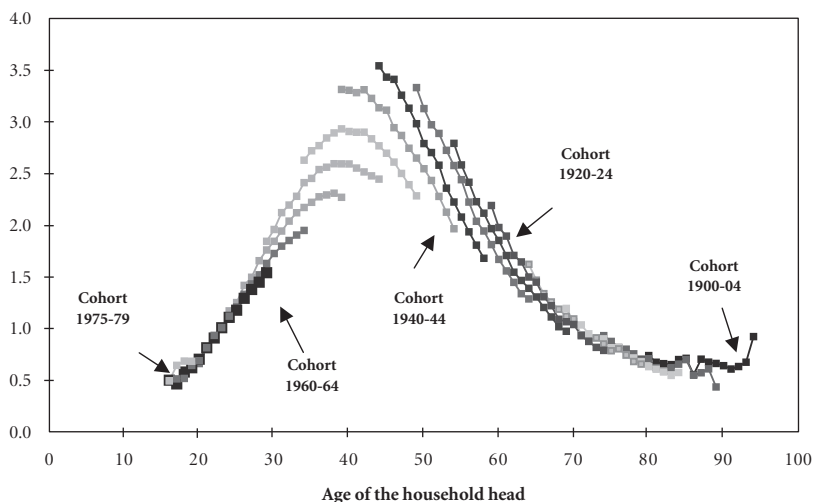
The study paints a portrait of the typical development of the Brazilian household structure over time. This account includes data for household size, its composition by age and gender, and kin relationship between its members and the head. It then looks at how these patterns and characteristics have changed over time, highlighting differences between generations, as well as how each household tends to evolve over the course of its existence (the "life-cycle pattern").

As in the average Latin American country, the main transformation that has affected Brazilian households over the past few decades is the sharp drop

in the number of children, as well as a slight increase in the proportion of individuals over 65 years of age. There is strong evidence that household size is declining. For instance, while those born in 1950 have families with a maximum size of 4.6, the family size was 5.4 for those born 10 years earlier. There is evidence, however, that the rate of decrease is slowing. As shown in Figure 2.1, family size peaks when the household head reaches around 40 years old, although this peak has been occurring earlier in the life cycle over the years. What accounts for this change? Over time, people have been waiting longer to get married, pushing the peak to a later point in the household's life cycle. On the other hand, the number of children has diminished, falling from 3.3 in the cohort born in 1940 to 2.6 in the cohort born in 1950, showing a drop of approximately 0.7 every 10 years. Having fewer offspring pushes the peak to an earlier point in the household's life cycle. Generally speaking, the second effect prevails, leading the peak in household size to occur earlier in its life cycle. In terms of the number of elderly, the number of 65-year-olds or over per household is very small, at less than 0.1 per household. This figure has risen only slightly in the period of study.

Another key finding is that the proportion of families headed by women in Brazil has increased by approximately 4 percent every decade during the

**Figure 2.1. Number of Children per Household by the Age of the Household Head**



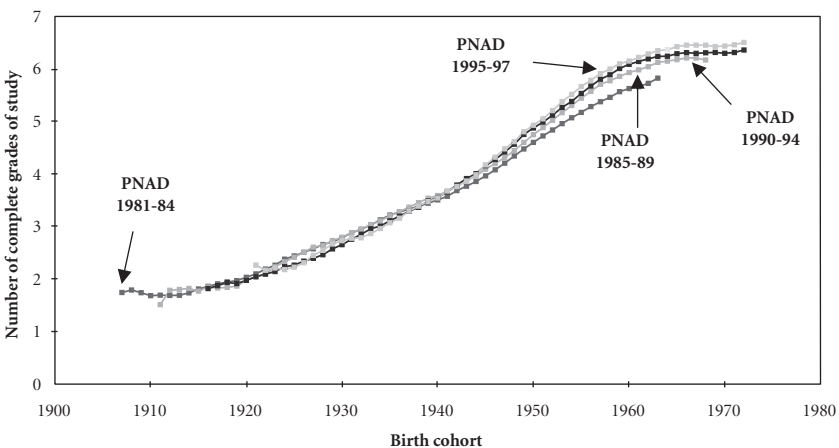
Source: Based on the Pesquisa Nacional por Amostra de Domicílios (PNAD).

sample period, with younger cohorts presenting a larger proportion of female heads of household than older cohorts. This rise is the result of the cumulative effects of both marital separations and the tendency of women to live longer than men. Hence, the percentage of female heads in the cohort born in 1940 is close to 12 percent, while this percentage is 16 percent in the cohort born in 1950.

In terms of the stock of human capital, how has the evolution of educational performance in Brazil evolved since the start of the century, and how is education distributed within the household? Paes de Barros looks at data for the average level of education, inequality in education distribution, education density, and dropout rates for each cohort. One particularly noteworthy finding is the low rate at which education levels have increased over the past 20 years, as illustrated below in Figure 2.2.

Illiteracy rates are a case in point. At the beginning of the century the illiteracy rate was over 50 percent. Illiteracy is still high even among those born in 1970; in fact, almost 10 percent of the cohort born in 1970 cannot read and write effectively. The illiteracy rate, however, dropped somewhat over the century, at a rate close to 7.5 percent every 10 years. At this downward rate of 7.5 percent per decade, illiteracy would be eradicated in Brazil by the next decade, yet there is also evidence of a recent slowdown in the decline of the illiteracy rate. In fact, comparing the illiteracy rate between the cohort born in 1950 with that born in 1970 reveals that the illiteracy rate is now dropping at a rate of only 5 percent per decade.

**Figure 2.2. Average Education**



Additionally, the average rate of human capital accumulation is still strikingly low, reaching only 6.5 years of education for the cohort born in 1970. Moreover, there is a clear slowdown in the growth rate of average education for the cohorts born after 1960. In fact, comparing the average education of the cohort born in 1960 with that of the cohort born in 1970 shows an improvement in average education of only one quarter of a year's education. This gain is modest from a historical viewpoint and in terms of the experience of other Latin American countries. Educational inequality, however, has declined for cohorts born after 1950. The proportion of the adult population that obtained at least four years of primary schooling has increased since the beginning of the century, but it is still low for the younger cohorts (75 percent). The proportion of those with more than eight full years of education has also grown, but again it remains low (30 percent), especially for the younger cohorts. Finally, although it has also increased, the proportion with at least complete high school education has not yet reached 10 percent (with the younger cohorts barely reaching that figure).

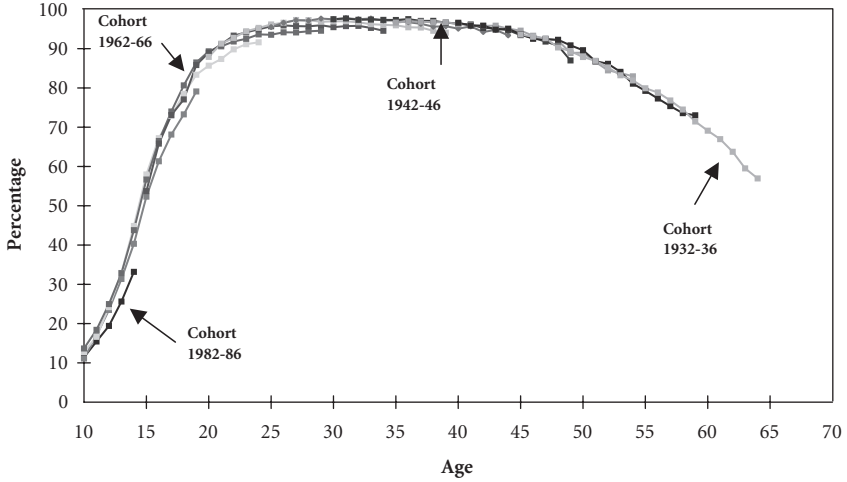
All of these findings are explained to a large extent by the decrease in the dropout rate<sup>2</sup> up to fourth grade, a phenomenon that is not encountered in the second cycle (from fifth to eighth grades). The dropout rate for high school education has been decreasing over time, but the probability that a young adult who has completed this cycle goes on to university does not even reach 45 percent. This is surprising since the returns to education are quite high (10–17 percent on average, per extra year of schooling) compared to international standards.

With regard to labor force participation, male participation tends to resemble the expected inverted U trend over the life cycle, with negligible differences across ages. The life-cycle pattern for female participation is also an inverted U, but with a significantly lower and earlier peak than that of men (a 60 percent participation rate for women compared to a rate of almost 100 percent for men). Women also begin to leave the work force at 45 years old, while men begin to leave when they are about 50. Also, women in the younger cohorts have higher participation rates. Estimates show that the increase in the proportion of families headed by women has been an important factor in raising women's participation rate over the past few decades.

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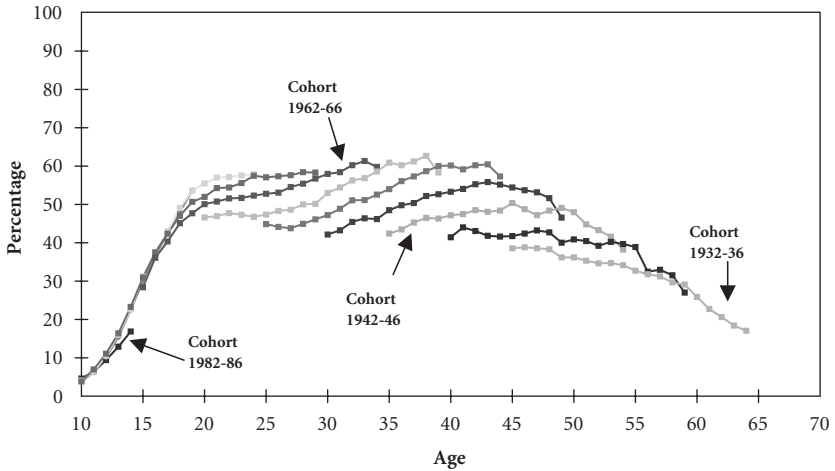
<sup>2</sup> The percentage of the adult population that has a certain level of education as a proportion of the population that has reached at least that level of education.

**Figure 2.3. Male Labor Force Participation Rate by Age**



Source: Based on Pesquisa Nacional por Amostra de Domicílios (PNAD).

**Figure 2.4. Female Labor Force Participation Rate by Age**



Source: Based on Pesquisa Nacional por Amostra de Domicílios (PNAD).

Differences in participation are also apparent across education groups. There is very little difference in the case of males, but in the case of female participation, it is found that the rate tends to be significantly higher for those with a more advanced educational level. For instance, for women born in the 1960s, the participation in the work force of groups, aged 30 to 40, varies from 50 percent for women with the first stage of incomplete primary schooling to 75 percent among women who have completed high school. Women are also more likely than men to have part-time jobs. Among 15-year-olds the percentage of part-time jobs increased from 25 percent to 70 percent for men, similar to the variation for women. The same holds for older people, where the percentage of part-time jobs is also higher. Among 65-year-olds, 50 percent of women and 15 percent of men perform part-time work. With regard to employment categories, evidence has shown a steady upward trend in self-employment over time for both genders. Informal employment is higher at the start of both men's and women's life cycles until they are 15 years old, when it decreases until reaching a plateau at around 20 percent.

Finally, Paes de Barros studies the determining factors of family structure and behavior. Three main conclusions emerge from this approach. The first, concerning the impact of education on fertility, is that on average an extra year of education reduces fertility by 0.32 children (that is, for every three years of additional education, a woman tends to have one fewer child). The impact of education, however, is not linear. Fertility is more sensitive to the first years of education (elementary through middle school) than for variations in education above this level. In fact, while an extra year of education in elementary through middle school reduces fertility by around 0.33, an extra year in high school reduces fertility by around 0.15, and an extra year at university reduces fertility by around 0.10. In other words, basic education has, on average, an effect on fertility twice as great as an extra year at high school, and three times as great as an additional year at college. When this same analysis is performed for different female cohorts, it is apparent that the impact of education is stronger for the older than for the younger cohorts. In regional terms, the average impact of education on fertility is greater in the less-developed regions, such as the Northeast.

The second conclusion, concerning the economic determinants of female participation, is that the main factor driving the changes in female labor force participation in recent decades is that the average Brazilian woman is going through the stage in her life cycle where participation peaks.



The only factor that is statistically significant in explaining the increase in the female participation rate is the increase in the proportion of families headed by women. The effects associated with women's wages and household income are shown to be statistically insignificant.

The third conclusion relates to the low educational attainment of recent generations. As is common in the literature, it is found that parental education—namely that of the mother—has a strong impact on children's education, but additionally, Paes de Barros characterizes some other factors that turn out to be equally important in explaining the lag in education. For example, regional differences play a role determining schooling outcomes, highlighting the relevance of the availability and quality of schools. Child labor was also found to be considerably significant in explaining sluggish progress in young adults' education. More specifically, the high prevalence of child labor in Brazil can be explained by what are called demand (market wage) and supply (household size, education of parents, and available schools) factors.

The main policy implication of the Brazilian study is that access to education is a major factor affecting other household decisions and welfare. A system with high dropout rates for large sectors of the population can constitute a bottleneck for improvement in living conditions since it triggers a set of household decisions that end up translating into low per capita incomes and low investments in human capital for future generations. Policy instruments that provide incentives for families to keep their children in school could be an effective way of breaking this vicious circle.

## **Colombia**

In the last quarter of the twentieth century, Colombia experienced profound changes in its economic and social structure. These changes include the acceleration of the urbanization process, large-scale incorporation of women into the labor force, growth in the stock of human capital, and a sharp decrease in fertility rates. At the same time, there have been important changes both in the structure and composition of families, such as an increase in both the percentage of single-parent families and in children's accumulation of human capital.

How quickly have these changes occurred? What has been the evolution of returns to education? What have the main determinants of the degree

of women's participation been? Has the wage gap between men and women diminished? Has the accumulation of human capital been similar among children of parents belonging to different socioeconomic backgrounds?

Fabio Sánchez Torres (2002) and Jairo Núñez Méndez (2002) shed light on these interrelated questions of household decision-making with the help of 23 urban household surveys spanning the 1976–98 period.<sup>3</sup> With this information, they constructed a database of more than 6 million observations involving workers, parents, and children.

Higher stocks of human capital and more-advanced educational attainment by women are associated with greater labor participation by women and a higher opportunity cost of children, which lead to a lower number of children and smaller families. In addition, more-educated mothers raise fewer children and invest more resources in them. Given these circumstances, they are increasingly able to run and maintain a household without the assistance—or sometimes without the presence—of a husband.

Examining each piece of this story in detail, beginning with household size and composition, it is apparent that for the new generations, the main change in urban family structure has been the decreasing share of nuclear families (husband, wife, and children younger than 30 years of age) in total households. This shift has occurred largely in favor of extended families (defined as families whose members are 30 years of age or more, or have additional adults) and, to a lesser extent, childless couples.

The data show that 30 percent of households with heads of around age 20 are nuclear families. This percentage increases with the age of the head until age 38, when the percentage of nuclear families reaches its peak. For instance, 68 percent of 38-year-old household heads lead nuclear families, while for household heads over 38, the percentage of nuclear families decreases and the percentage of extended families increases. Also, single-parent families are more common in the younger generations.

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<sup>3</sup> One possible concern with this type of data is that migration might change the composition of urban samples, which in turn changes the type of households belonging to each cohort. This blurs the picture of changes in behavior for each of the cohorts under analysis. Nevertheless, the authors argue that changes in sample composition do not influence their conclusions. They present a series of statistics that suggest that the characteristics of household heads that migrate from rural areas are not particularly different from samples already living in urban areas. Thus, the credibility of the results depends on whether the tests proposed to evaluate changes in sample composition are seen as convincing.

Other patterns in family formation have varied significantly among cohorts, particularly between older and younger cohorts. There have been quite significant changes in family size for cohorts born after 1965. The average family size of household heads born in the 1920s and 1930s was around seven people. In contrast, the family size of recent generations of household heads is close to four. The family sizes of the older generations of household heads are quite similar regardless of the household head's educational level. However, in younger cohorts the reduction in family size seems to be stronger among the families of the most educated household heads. This may reflect the higher opportunity cost of raising a child for the most educated women. In fact, the percentage of women born before 1930 with 11 years of education or more was about 8 percent (and about 15 percent for men) and the percentage with college education was less than 1.5 percent (and about 7 percent for men). However, the percentage of women born between 1950 and 1970 with 11 years of education or more is about 40 percent (and about 36 percent for men) and the percentage with college around 10 percent (and less than 9 percent for men). Clearly, the younger generations of women have, on average, higher school attainment, which may explain both the reductions in family size and in the number of children that have occurred over time. In fact, the number of children fell almost by 50 percent in a 20-year span. Thus, the cohorts born in 1935–39 had about four children compared with the two children of the cohorts born in 1955–59. Changes in the size of urban families have been accompanied by a moderate increase in schooling of both men and women, especially the latter.

Household heads belonging to older cohorts were also much younger than today's household heads at comparable stages of household life cycle. These changes may also be related to significant increases in school attainment among younger generations of men and women that have delayed their mating decisions.

As for the accumulation of human capital, average years of schooling have increased across generations, as expected, and the gender gap in this variable has been eliminated. The proportion of men born between 1930 and 1960 with primary education or less decreased from 60 percent to 30 percent, while the proportion with complete and incomplete secondary school increased from 27 percent to 55 percent, and the share with college education only reached 10 percent. In contrast, the proportion of women born between 1930 and 1960 with only primary education decreased from 65 percent to 27 per-



8.8 to 9.3 (1910 parents' cohort versus 1940 parents' cohort). The educational attainment may be even slightly higher for children of the 1960 parents' cohort. These figures also show, however, that the pace of increase in the educational attainment of the children of the least educated has been very slow. Thus, at 20 years of age, the children of the younger cohort (among the least educated parents) attained only 0.15 more years of schooling than did children (10 years older) with parents 10 years older.

The differences in children's educational attainment (at age 25) among cohorts with parents of similar schooling are positive although not very significant. In fact, the educational attainment of children with parents having 6 to 11 years of education belonging to the 1942 cohort is only 0.4 years higher than the educational attainment of children with parents belonging to the 1912 cohort. The educational attainment of the different groups of children (at every age) with parents having 12 or more years of education has also increased. Thus, the younger the parents' cohort, the higher the children's educational attainment.

Differences in children's attainment are thus clearly related to parents' schooling. In fact, at 25 the difference in years of education between the children of the most and the least educated parents of the same cohort has always totaled around 5.5 years. However, the average years of schooling of children at age 24 is higher than the parents' average years of schooling. This result might indicate (a) the existence of some degree of social mobility in urban Colombia, and (b) the fact that the children of the poor are more educated than their parents.

In terms of enrollment rates, at age 10, almost 90 percent of the children of the least educated parents in younger cohorts go to school, compared to almost 100 percent of the children of the most educated parents. However, after age 13, the enrollment rate gap among children with parents with different levels of education starts to widen. Thus, at 18, the school attendance rate of children of the least educated parents is around 35 percent (though a bit higher for the new generations), around 55 percent for children with parents with 6 to 11 years of education, and about 80 percent for the children of the most educated parents. In addition, the attendance rate among the children of the least educated differs just slightly across cohorts. On the other hand, the attendance rate of the children of the most educated parents has increased substantially for recent generations. Thus, at age 18, the attendance rate of the children with educated parents born in the

1910s has been about 75 percent, while the rate of those with parents born in the 1950s has risen to 85 percent.

The percentage of men and women with only primary education or less has decreased in every cohort, which indicates that each new generation has had more educated parents and has attained higher levels of schooling. These results indicate that the enhanced educational opportunities accompanying the expansion of education programs and the public school system have clearly reached the urban poor, but not quite enough to close the education gap (Sarmiento and Caro, 1997). Most of the children who drop out of the school system belong to households with low-educated parents and are probably poor. (An analysis of mating decisions at three points of time indicates that men and women tend to marry people of the same educational level.) Raising the enrollment rates of the poor, mainly of teenagers, is one of the most important challenges of Colombian social policy, and it is, in addition, the surest way to close the income gap and help people escape from poverty.

What are the main determinants of how many years a child stays in school? The following general patterns are found:

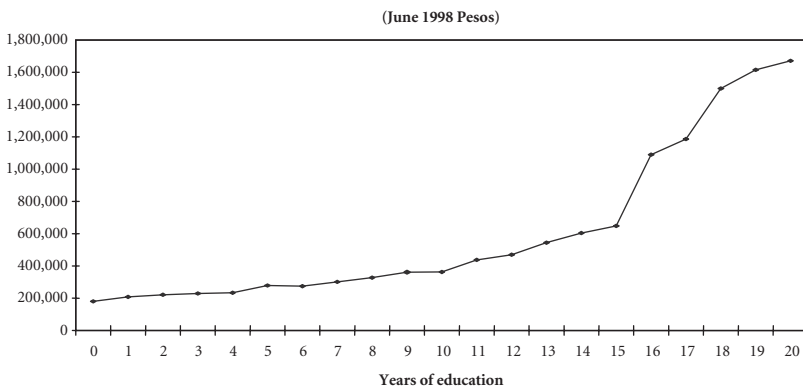
- The higher the number of children, the lower is each child's schooling and enrollment probability.
- The child's years of schooling and enrollment probability are lower in single-parent households.
- The impact of both spouse labor participation and labor income on the child's schooling or enrollment, after controlling for education and number of children, is negligible. It seems that such variables captured the mother's opportunity cost.
- The child's schooling or enrollment probability is lower if either the household head or his (her) spouse is unemployed.
- The child's years of schooling are higher, *ceteris paribus*, if the parents belong to cohorts born in the 1930s and 1940s and are lower if the parents belong to the 1910 or 1960 cohorts. In contrast, the child's enrollment probability is higher, *ceteris paribus*, the older the parents' cohort.
- College versus high school relative labor earnings have a strong positive impact on the child's enrollment probability but are insignificant for children's schooling.

It can thus be concluded that, as in the Brazilian case, children's educational attainment and school attendance are strongly associated with parents' education and household characteristics. Nevertheless, there have been some positive cohort effects. For any parent cohort, the children of more educated parents have greater enrollment rates and, consequently, greater schooling attainment. Moreover, for the younger parents' cohorts, the school attainment gap between the children of the more educated and the children of the less educated seems to have increased. Thus, the children of younger cohorts have both higher educational attainment and greater enrollment rates, although parental background seems to be the most important determinant of the children's accumulation of human capital. Labor market shocks, in particular unemployment, seem to affect human capital accumulation as well. The effect on education of the shocks affecting the household is captured by the unemployment variables. Thus, macroeconomic conditions that are transmitted to families via labor market conditions also affect the accumulation of human capital (Behrman, 1999).

With respect to returns to education, it is also found that, although returns to education are lower for younger cohorts than their older counterparts, there is a significant premium in returns to education for college-educated workers. The estimates show that substantial increases occur in average income once a school degree is achieved (primary, secondary, and college). An enormous jump in income occurs once a college degree is obtained (almost 100 percent for men and 71 percent for women).

College graduates have the highest returns to education (more than 0.20), 80 percent more than the returns to complete primary and secondary

**Figure 2.6. Average Income by Years of Education**



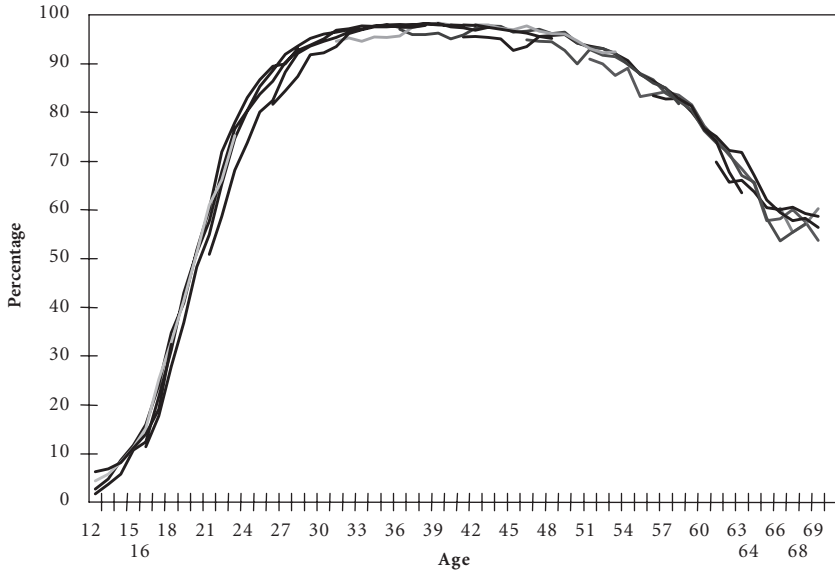
school and three times the returns of incomplete secondary school. It is also found that the labor income gap between workers with college degrees and workers with primary education has decreased across cohorts. In contrast, the income gap across cohorts between workers with complete college and workers with complete and incomplete secondary school has increased. Thus, a recent surge in labor income inequality (Núñez and Sánchez, 1998) may be due to the widening income differential between skilled and unskilled workers that belong to younger cohorts. The gender income gap has been closing for the younger cohorts. The evidence examined shows that gender income differences have narrowed at every level of education but especially between men and women with completed college degrees. It seems that returns to college education for women have increased over time despite the fact that the relative supply of female college graduates has also increased.

In fact, returns to education and expected earnings of women have increased for most education levels, which may have contributed, along with more educated parents in each successive generation, to raising the level of education among women. At the same time, higher levels of women's education in urban Colombia have prompted an increase in their labor participation rates. In terms of labor force participation, the younger cohorts of women have experienced a remarkable increase during the past years. At age 25 more than 90 percent of men participate in the labor market regardless of the cohort, and this percentage remains around 95 percent until age 50, when male participation begins to decrease smoothly. However, in the case of women, at age 40 about 35 percent of women belonging to the cohort born around 1937 participated in the labor market, but this percentage reaches 65 percent for the generation born around 1957. The largest jump in women's participation rate occurred in 1982, thanks to legislation that set the minimum wage for women as well as men. The estimates reveal that the most important determinant of the changes in female labor participation is women's income or expected income.

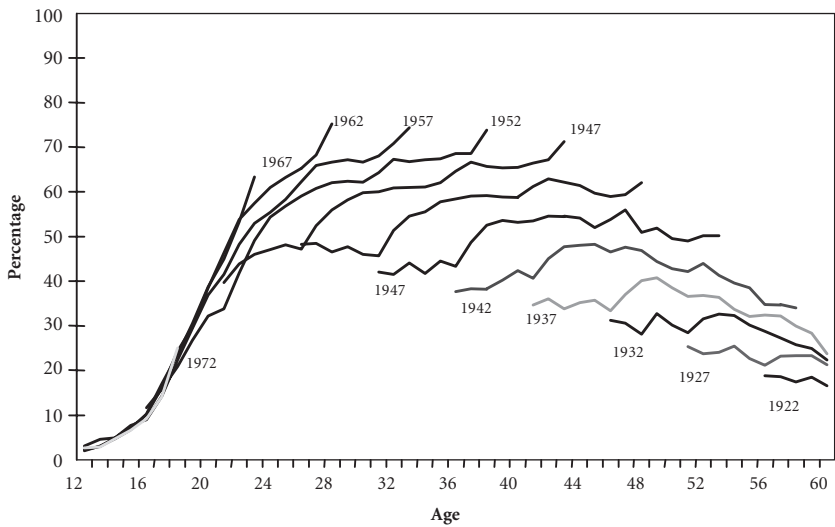
After the descriptive cohort analysis of changes in household size and structure, fertility, human capital accumulation, returns to education, income profiles, and labor supply, Núñez and Sánchez interpret the relationship between all variables by using regression analysis in which a wide set of explanatory variables is included. Finally, they argue that the main explanatory variable that triggers the other household decisions is change in the returns to education. Greater returns lead to higher female labor force participation,



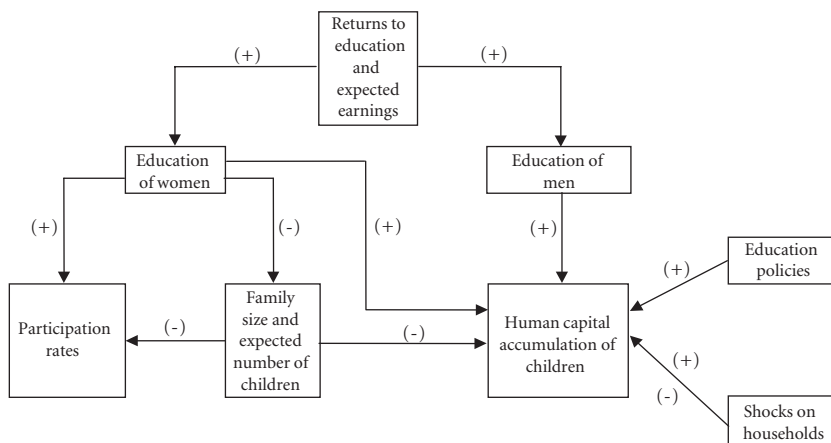
**Figure 2.7. Labor Participation Rate of Men by Cohort**



**Figure 2.8. Labor Participation Rate of Women by Cohort**



**Diagram 2.1. A Diagram of Returns to Education, Participation, and Human Capital**



which in turn reduces fertility rates and induces greater incentives to invest in human capital. Since investment in education for newer generations is to a large extent a function of parental education, improvements in parents' background and fewer children per family result in better educated new generations. The dynamics and interrelation of these changes are depicted in Diagram 2.1.

From a policy perspective, the negative side of the coin is that human capital accumulation has been very unequal for different income groups. The children of poorly educated parents achieve low levels of education both in old and new generations. Thus, escaping from the poverty trap is as difficult today as in the past since educational opportunities are concentrated in the middle- and high-income groups. On the other hand, any social policy that increases the education of women will have an impact on their potential earnings and on the probability of their joining the labor market. At the same time, a more educated woman will have greater incentives to limit her number of children and will dedicate more resources to each of them. In the long run, a greater level of children's education would reduce income inequality.

## Mexico

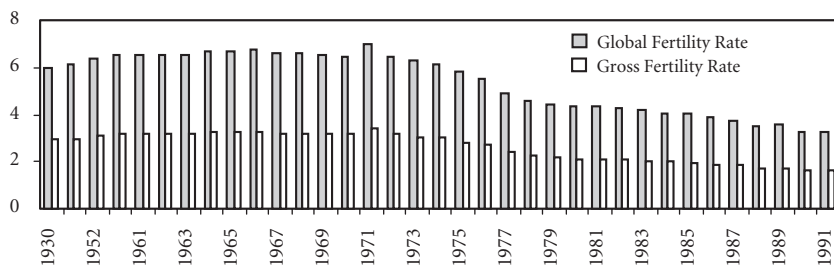
Mexico has not been left behind in the intensive demographic transformation that has taken place in most of Latin America. As has been shown,

among the most significant changes in the region are shifts in family structure and fertility, a transition from a relatively young to a relatively older population, an increase in the labor force participation of women, and growth in levels of educational attainment. These changes have important implications for household economics since they tend to systematically alter consumption decisions. This has certainly been the case in Mexico, where these transformations have been concentrated in the past two decades, intensifying the pressures on institutions.

The main objective of the study on Mexico by F. Alejandro Villagómez and Andrés Zamudio (2000) is to contribute to the understanding of some of these issues through an explicit analysis of the evolution of family structure, human capital accumulation and returns, labor force participation, and household savings. In particular, the analysis emphasizes the observed correlations among the reduction in fertility after the spread of birth control programs, the increase in the schooling of women, and the increase in women's labor force participation during the last two decades. Essentially, Villagómez and Zamudio maintain that these trends might have been reinforced by the spread of public social security and the improvement in the functioning of the financial system that have reduced the security motive for having children. The study covers the 1984–96 period and is based on household survey income and expenditure data drawn from the Encuesta Nacional de Ingreso y Gasto de los Hogares (ENIGH).

Most noteworthy in the Mexican story are the dramatic changes in family size related to the demographic transition. The total fertility rate fell from 6.4 in 1950, to 3.2 in 1990, and finally to 2.8 in 1995, one of the largest absolute and relative declines over the period of any country in Latin America. Figure 2.9 shows the fertility rate for selected years between 1930 and 1991. The rates presented are the gross fertility rate (GRFR), defined as the number of births per year with respect to the average population in the same year, and the global fertility rate (GLFR), which relates these births to the number of women between 15 and 49. After the GLFR reached a maximum of 7 in 1971, this trend bends down at an accelerated speed until 1979, with a much slower decrease during the 1980s.

Additional information about specific fertility rates by age groups suggests that the main impact of the reduction in the fertility rate took place in the 25 to 29 year age group. In only six years, the rate for this group decreased by more than one third. In 1971 there were 336 births for each one thousand

**Figure 2.9. Fertility Rate, 1930–1991**

Source: Consejo Nacional de Población.

women of that age group, while in 1977 this number decreased to 218 births. It is important to emphasize that this age bracket is the most fertile for Mexican women. Clearly these changes have important implications for family size and structure.

According to Villagómez and Zamudio, an aggressive public birth control program contributed to the most precipitous decline in fertility rates shown during the second part of the 1970s. In 1973, the Health Law was modified to allow the advertising and commercialization of contraceptive products. In January of the following year a new General Population Law was published, obliging the State to offer free birth control services, and in December of 1974 the Constitution was amended to establish the right of parents to freely decide the number of children they have. Mexico was the first Latin American country to include such a statement in its constitution, and only the second in the world. However, it should be noted that the decline in Latin America's fertility was already following a secular trend, and public policy was trying to accelerate this momentum further.

Table 2.1 reports the percentage of married women aged 15 to 49 who claimed the use of any kind of contraceptive method, by age group and by educational level for the period 1976–97. Villagómez and Zamudio maintain that this information, obtained from the National Population Council, offers compelling evidence of the impact of these public programs on the behavior of women of child-bearing age. This effect is particularly strong during the first 10 years covered by the information, during which the percentage of women between 25 and 39 years old using contraceptives almost doubled. Another possible explanation for this behavior is the increase in the general level of education during these years, as discussed below. Although the data is not

**Table 2.1. Use of Contraceptives by Age and Education**

	Use of Contraceptives: Nonsingle Women in Fertility Age (percent)						
	1976	1979	1982	1987	1992	1995	1997
<b>By Age</b>							
15–19	14.2	19.2	20.8	30.2	36.4	36.1	45.0
20–24	26.7	37.4	45.7	46.9	55.4	57.1	59.3
25–29	38.6	44.5	56.5	54.0	65.7	67.7	67.8
30–34	38.0	49.6	59.8	62.3	70.1	75.2	75.4
35–39	37.9	42.8	57.6	61.3	72.6	78.8	76.1
40–44	25.1	33.3	42.9	60.2	67.4	70.8	74.5
45–49	11.8	16.3	22.1	34.2	50.5	53.1	61.4
<b>By Educational Level</b>							
Without school	12.8	20.3	32.6	23.7	38.2	48.4	48.0
Incomplete elementary	25.5	32.0	42.9	44.8	56.4	58.2	61.3
Complete elementary	40.3	49.6	51.2	62.0	66.7	67.8	69.8
Secondary school and more	55.8	59.0	61.7	69.9	73.6	73.6	74.8

Source: Consejo Nacional de Población.

available to test this issue formally, Villagómez and Zamudio contend that education was not a crucial factor since the most important increase in the use of contraceptive methods was among women without schooling and those who had not completed elementary school. Many women with higher levels of education were already using these methods.

The evolution of family structure has also undergone important although somewhat less dramatic changes than the changes in fertility. In general, compared with other Latin American countries, a large percentage of Mexican households are composed of nuclear families. In fact, nuclear families are the most common type in Mexico, representing around 65 percent of the sample. Their predominance, however, is not constant across ages. They are relatively dominant when individuals are young but are replaced by extended and single-person families as individuals age. The increasing importance of other types of families can be explained by the fact that some households become single-person entities as a result of the dissolution of the family, via marriage of the children and death of the spouse. Although the proportion of female-headed households has increased, such households continue to be somewhat less common in Mexico than in other countries of the region.

The data confirm that as individuals become older their role as head of household decreases, particularly for males with a lower educational level. In the case of heads with higher education, not only is the decrease less accentuated, but the profile is also noisier. A significant number of older individuals with higher education are heads. This is important because the households observed at either extreme of the age distribution are households with special characteristics. In this case, these households correspond in a greater proportion to heads with higher education, which generally means that they are richer.

The increasingly prevalent tendency to keep families small, according to Villagómez and Zamudio, generated an intensive transformation of household decisions. It allowed women to devote more time to labor market activities rather than concentrating on childbearing and household chores, which, due to cultural patterns, are normally the responsibilities of women. The possibility of devoting more time to activities rewarded in the labor market and the existence of fewer children in each family imply, in turn, that more resources can be devoted for investment in the human capital of each child. This is, according to Villagómez and Zamudio, one of the factors behind the increase in the number of years of education of each cohort. Although plausible, they do not test this hypothesis.

Another finding is that household size is related to the educational level of the head. Households with a more educated head are smaller. Cohorts with lower educational levels tend to have larger families (reaching a maximum of 6.5 members) than cohorts with more education. For the latter the maximum number of members is around 5.

In terms of educational attainment, Mexico has shown substantial advances over past decades as a result of a complex interaction between supply and demand factors. During the 1970s, school enrollment rates increased from 41.6 percent to 57.7 percent among males aged 12 to 19, while for females the rate increased from 32 percent to 52.2 percent. As a result of the education initiative launched by the Mexican government in the 1970s, there was a substantial increase in resources devoted to public education, along with the strong expansion of the educational system. Essentially, the government instituted a robust public education program with the main objective of substantially increasing the supply of education and reducing the illiteracy rate. One component of this initiative was the founding of the Metropolitan University in Mexico City in 1974. These efforts also included the creation of new institutes for technological studies, the establishment of high schools

associated with the National University, the implementation of an Adult Education Program and the expansion of educational infrastructure to rural areas. Expanded opportunities for education had a particularly strong effect on women.

The stock of human capital has continued to grow, increasing from an average of 5.6 years in 1984 to 7.0 in 1996. Since the level of education typically does not change very much over the life cycle, except during the first years when individuals invest in their formal education, the increase in the stock of human capital is explained by the educational effort of the younger cohorts. On the other hand, the schooling average is higher for males than for females, though differences in educational attainment between males and females for younger cohorts are fairly small.

While the gender gap in educational attainment may be narrowing, large differences are found in educational attainment among cohorts. For example, the oldest cohorts have, on average, less than three years of schooling, while for the youngest cohorts this number tops eight years. The most important changes in this trend can be attributed to cohorts born after 1960, which were probably the most affected by the public policy measures implemented during the 1970s. Education inequality, measured by the coefficient of variation, is slightly higher for females and for older cohorts.

It is important to reinforce that the increase in the level of education of women is correlated with a decrease in fertility. It is possible that higher education among women reduced fertility, that the demographic transition allowed women to remain in school longer, or that both of these trends were consequences of changes in households. These changes affected family structure, human capital investment, and labor force participation, particularly among women.

**Table 2.2. Schooling Average**

Survey	Overall		Males		Females	
	Average (years)	Std. Dev. (%)	Average (years)	Std. Dev. (%)	Average (years)	Std. Dev. (%)
1984	5.6	4.19	6.0	4.33	5.2	4.01
1989	6.3	4.50	6.7	4.60	6.0	4.38
1992	6.5	4.48	6.8	4.54	6.3	4.41
1994	6.7	4.54	6.9	4.57	6.4	4.50
1996	7.0	4.52	7.3	4.54	6.7	4.49

How does this increased educational attainment pay off? Not surprisingly the returns are an increasing function of the level of education. It is interesting to see that over the whole period under analysis the differences in these returns have grown, in particular the returns to higher education. The returns to education have risen from 1984 to 1996 for secondary and higher education, and these returns increased at an especially rapid rate for women during the 1990s. This is a key development as higher educational levels for females and higher premiums for investment in education can only produce higher labor participation due to the increased opportunity cost of not working.

Between 1970 and 1990, the participation of Mexican women did in fact grow by an astounding 90 percent, as compared to 30 percent for men. From 1970 to 1980 alone, the economically active female population increased rapidly from 15.2 percent to 26.3 percent, surpassing the regional average of 23.5 percent for Latin America. Women continue to enter the labor force in substantial numbers, showing particularly dramatic increases between 1994 and 1996. In taking a closer look, the study finds that there are important differences between age groups of women. There has been a clear tendency for younger women to increase their participation in labor markets. For instance

**Table 2.3. Returns to Schooling by Gender**

	Rates of return to schooling by gender*					
	Overall	1984	1989	1992	1994	1996
<b>Primary</b>						
<b>Overall</b>	10.7	14.6	9.5	10.8	9.8	9.0
<b>Women</b>	11.2	11.9	10.4	10.1	12.5	10.8
<b>Men</b>	10.2	13.6	10.1	11.3	10.7	8.7
<b>Secondary</b>						
<b>Overall</b>	13.9	14.5	11.1	13.3	14.7	14.3
<b>Women</b>	15.6	16.8	12.2	15.5	17.8	16.1
<b>Men</b>	12.1	12.4	10.4	12.4	12.2	13.9
<b>Superior</b>						
<b>Overall</b>	17.5	9.6	14.3	17.0	21.0	20.0
<b>Women</b>	17.1	8.6	14.3	15.9	20.3	19.7
<b>Men</b>	19.0	13.3	16.2	19.3	21.7	19.5

\*For all types of workers and all types of income.

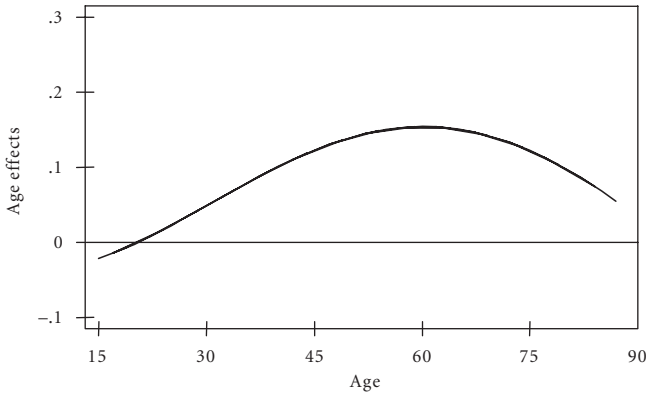


for women between 20 and 40 years of age, there was a pronounced increase in hours worked during the 1990s. As in the other cases, labor force participation is particularly strongly correlated with education for females. Highly educated women participate more than their less educated counterparts. Less educated women, however, show very important cohort effects, and younger cohorts tend to participate more.

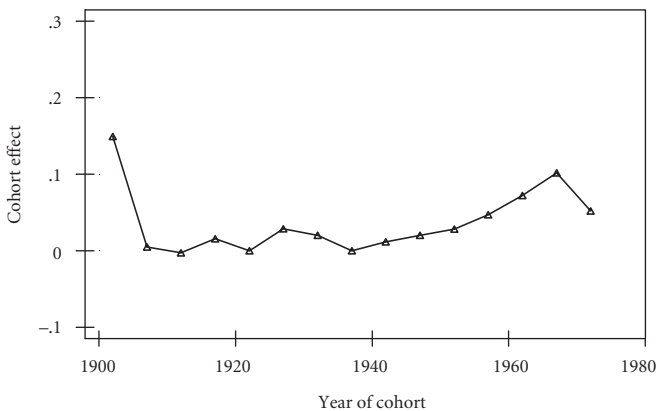
Villagómez and Zamudio believe that the change in the participation rates of women is one of the most significant changes observed during the last few decades in the labor market in Mexico, as in other Latin American countries. This could be explained by the decrease in fertility, the increase in women's education, and the higher rate of returns on their education. Increased labor participation of both men and women can also be explained in part by the structural changes that have occurred in the Mexican economy, in particular the move to a more open and competitive economy, with the consequence of a possible increase in the demand for better educated and more qualified workers (Villagómez, 1998). Importantly, the returns did not decrease during the years of economic crisis in 1995–96.

All of these household-level changes in fertility, structure, education, and labor market participation tend to have important effects on household decisions such as saving and consumption. With respect to saving, two issues have been particularly relevant for the Mexican case. The first relates to the recent decline in the rate of domestic saving. Aggregate household saving increased at a faster rate during the 1980s. Between 1989 and 1992 this rate slowed. After a recovery in 1994, there is a sharp drop in 1996, most likely as a time effect due to the deep economic crisis faced by the Mexican economy in 1995 and 1996. Nevertheless, it still seems that aggregate household saving in Mexico remains high compared to other countries.

Figure 2.10 shows clearly the saving profile of Mexican households by age of household head, bringing out a hump-shaped pattern. For younger cohorts up to 30 years of age, the savings rate increases rapidly, then increases at a slower rate until reaching a maximum at around 60. The rate of savings declines thereafter at an accelerated rate. Turning to the cohort effects presented in Figure 2.11, it is apparent that younger cohorts are systematically saving more than their older counterparts. This result is entirely driven by those individuals with high and average education levels as cohorts of individuals with low education are actually saving less than older cohorts with low education.

**Figure 2.10. Household Saving Rates by Age Effects**

This can be explained by a combination of factors affecting younger cohorts' behavior, among them the aggressive public policies implemented during the 1970s that affected fertility trends and educational opportunities, the tendency for younger cohorts to have fewer children, and the increase in women's labor force participation. Villagómez and Zamudio do not imply any kind of causality between the decrease in children and the increase in women's labor participation since both are endogenous decisions for a household. What they do consider important is that, if the public birth programs and responsible parenthood program implemented during the 1970s had an

**Figure 2.11. Saving Rates by Cohort Effects**

important effect on family behavior, this effect must have been translated into a reduction of the number of children, most of whom would be planned. In that case, parents may save more in anticipation of higher future consumption needs. Therefore, younger cohorts show a greater contribution to the saving rate than older cohorts, a behavior reinforced by the education factor. More educational opportunities and higher returns thus mean that younger cohorts with more years of education are in a better position in the labor market than older cohorts. Since this effect is particularly important for women, it may be that the incorporation of younger educated women into the labor market translated into higher financial savings for younger cohorts. This is especially relevant for households in which this event constitutes a second source of income, as has been shown for the Mexican case.

The second issue is related to retirement saving. One of the most important reform initiatives of the current political administration has been the change to the Mexican Social Security Institute (IMSS). Mexico recently substituted the state-run, pay-as-you-go pension system with a fully funded defined contribution scheme with individual accounts. Although the main reasons for this reform were the increasing financial problems being faced by the old system and changes in demographic trends, this reform will also foster domestic saving. The effect, however, is ambiguous. These types of changes can reduce household savings since the “forced savings” generated through individual accounts in a fully funded pension system reduce the need for saving through traditional financial instruments. On the other hand, if these types of measures are introduced during periods of economic expansion, which imply higher incomes, and thus, higher savings capacity, the final outcome in terms of savings will be more difficult to determine. That is the case in Mexico during the years under study. Nevertheless, little is known about the way pensions affect individuals’ consumption and saving decisions, or how family structure interacts with the pension system and consumer behavior in Mexico. In the short run, cyclical effects are relevant and can explain some of the movements in the observed saving rates, but from a longer-run perspective savings behavior is sensitive to changes in family structure, population structure, fertility rates, and life expectancy. Therefore, it is important to consider both kinds of effects in order to improve our understanding of this variable.

Thus, to help poor households escape from the low-income/low-savings trap, it may be more effective to create income-earning opportunities,

which could trigger their savings capacity, rather than concentrating on maintaining expensive pension systems that actually substitute for one's own savings for retirement.

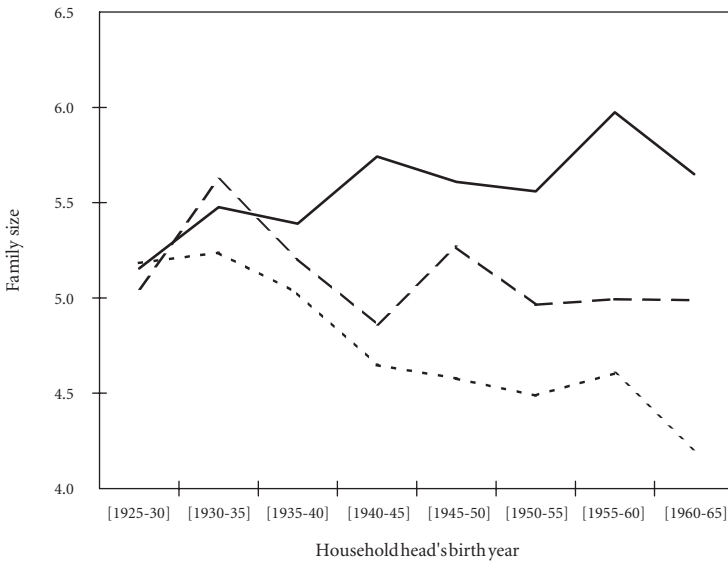
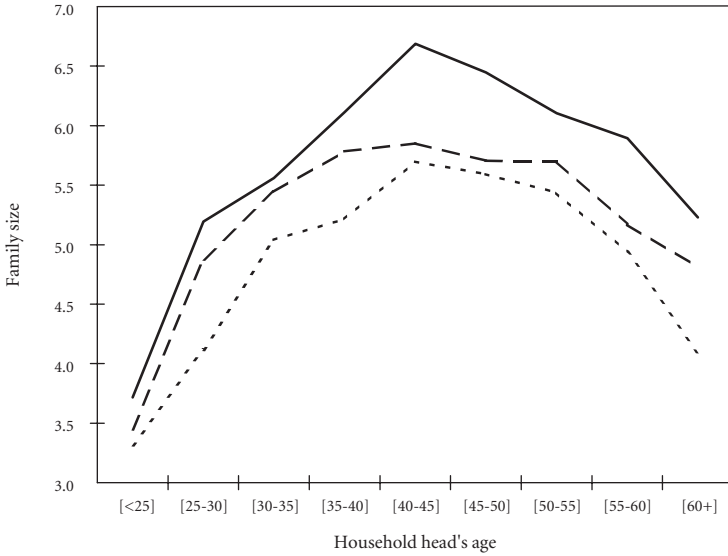
## Peru

Demographic changes in Peru have occurred at a slightly faster pace than the Latin American average. The Peruvian population is already aging, with young dependency ratios falling and old dependency ratios increasing slightly. These changes are very promising in the sense that they improve the ability of the Peruvian economy to cover the needs of both children and the elderly. Nevertheless, the differences in these achievements by level of education, reported in the Peruvian country study by Jaime Saavedra-Chanduví and Martín Valdivia (2002), raise important policy concerns related to future income distribution trends in Peru. Like the Mexican study, its Peruvian counterpart also sheds light on the savings behavior of households. Using a series of four nationwide household surveys (Living Standards Measurement Surveys—LSMS) from 1985, 1991, 1994, and 1997, Saavedra-Chanduví and Valdivia are able to extract income and expenditure data to examine savings behavior.

As in other countries under study, there has been a decline in the number of children per Peruvian household. The data show that family size grows sharply until the household head is around 42 years old, and then starts to fall. Also in line with the experience of other countries in the region, education plays a significant role in explaining family size patterns. Heads with primary education have larger families than heads with secondary education, which in turn have larger families than college-educated workers. Less-educated heads have relatively more children and have them earlier in their lives when compared with more-educated heads. Family size for the former reaches a peak of about seven members at age 43. For the more educated, the peak is reached slightly later, at only six members.

The cohort effects are shown in the bottom panel of Figure 2.12. They indicate a clear decreasing trend in household size among the households with more educated heads; that is, younger cohorts tend to live in smaller households. This result is consistent with the important reductions observed in the aggregate fertility rate. Nevertheless, it is rather surprising to find that households whose heads have at most primary education present an increasing

**Figure 2.12. Age and Cohort Effect on Family Size by Educational Level**



— Primary    - - - Secondary    ····· Higher

Source: 1985, 1991, 1994, and 1997 Peruvian LSMS Household Surveys.

pattern. Since the LSMS does not include the history of pregnancy and births by women, it is impossible to identify to what extent this pattern corresponds to changes in fertility, or the lack thereof. Alternatively, younger cohorts may live in larger households because they tend to live more with extended families.

According to the LSMS data, the average number of children per household is the largest if the head has only primary education (1.0) and lowest if he or she has a university education (0.7). The number of children peaks when the age of the household head is between 25 and 30 and falls monotonically. Differences across levels of education are observed at young ages, with primary- and secondary-educated workers having more young children in their 20s. After their 30s, all education groups have roughly the same average number of young children. Regarding cohorts, there are important differences among younger cohorts. While for secondary- and primary-educated workers the number of young children is stable or increases the younger the cohort is, for university-educated workers there is a clear downward trend.

Regarding children aged six to 15, the life-cycle peak is in the early 40s. The life-cycle pattern for families with college-educated heads is clearly below the other groups and peaks at a later age. The cohort analysis reveals a clear reduction in the number of teenagers in educated families and a stable pattern among the less educated, consistent with the findings regarding household size.

These results would still be consistent with the idea that the slight increase in family size among the less educated would at least be partially explained by differences in the number of children per household, a variable closely connected to fertility trends. This would suggest an important role for family planning programs among the poor.

Turning to types of households, Table 2.4 shows that more than half of Peruvian households are made up of couples with children (nuclear households), while extended households represent around 35 percent of Peruvian households.<sup>4</sup> Slightly over a third of those households do not have children.

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<sup>4</sup> Extended families are those in which, in addition to the parent or parents and children younger than 24, there is an additional family member. Note that a son that is older than 24 and lives with his/her parents is considered to belong to an extended family.

Table 2.4. Household-Level and Individual-Level Structure by Household Type

	Household-Level Structure			Individual-Level Structure			
	1985	1991	1994	1985	1991	1994	1997
Couple with children	55.8	56.5	52.9	56.0	56.0	52.7	53.5
Single father with children	1.3	0.9	1.0	1.1	0.5	0.7	0.5
Single mother with children	4.8	4.7	3.7	3.5	3.7	2.7	2.6
Couple without children	2.1	2.1	2.0	0.7	0.8	0.7	0.7
Extended families	34.1	35.3	39.0	36.4	38.4	41.6	41.5
Couple or single parent with children plus other relatives	23.9	24.8	25.4	28.6	30.4	30.6	31.8
Head or couple without children plus other relatives	10.2	10.5	13.6	7.8	8.0	11.0	9.7
Other	1.9	0.6	1.3	2.4	0.06	1.5	1.1

Source: 1985, 1991, 1994, and 1997 Peruvian LSMS Household Surveys.

In terms of the proportion of nuclear and extended households along the life cycle, the data suggest that people increase their probability of living in an extended household from their early 20s through their mid-30s, when it is more likely that older children stay with their parents and bring their own offspring to their parents' home. The likelihood of living with relatives increases again as heads approach their 50s and start to live with their children's families. If the head's children merely left the household to form a new family, there would be no obvious reason for a clear increase in the proportion of extended families as the head grows older. The observed pattern reveals that, in many cases, as the head ages, his/her children bring their own families to the household instead of leaving their parents. Additionally, older parents stay with their children as a way of surviving.

The cohort effect shows a clear decreasing pattern for those born after the mid-1940s, with no important differences among education groups. This similarity indicates that these types of adjustments in household structure cannot be behind the constancy of family size among the less-educated younger cohorts, as reported above. It supports the notion that such constancy is related to the fact that the number of children is stable across these cohorts. Introducing demographic and other controls does not affect the shape of the age or cohort profiles.

In summary, household size has decreased significantly for younger Peruvian cohorts with relatively more-educated heads, but this is not true for households with less-educated heads. The slight increase in family size among the less educated seems to be related to differences in the number of children in the household—a variable related to fertility. It is not related to differences in household living arrangements because the proportion of extended families has been decreasing for the younger cohorts regardless of educational level. Still, extended families remain an important feature of family arrangements in Peru over the life cycle, in particular when the individual is in his early 20s and later as he approaches retirement.

This analysis relies on the self-identification of the head of the household, considering that he/she is the one leading the decision process within the household. This assumption would be particularly harmless if the self-reported head were at the same time the main income earner. This need not be the case here, considering that a large portion of Peruvian households consists of extended families, which tend to host adults other than the head and the head's spouse. The data clearly show an increasing pattern of this type



of membership over the life cycle. The question is whether the older male or female remains as the self-reported head, or whether this changes when another adult becomes the main income earner.

The surveys reveal that the proportion of individuals of each age group who are identified as household heads increases steadily over the life cycle for both genders, but the likelihood of a male being identified as a household head is substantially greater. About 90 percent of males above 50 years old are identified as such, while the corresponding figure for females is only 25–30 percent. The issue is that these older members are not always the main income earners in the household, especially for heads older than 40 years old. The proportion of adult males (females) who are main income earners reaches a peak at about 75 percent (25 percent) when they are about 40. At about age 70, though, this proportion falls to only 45 percent for males (about 15 percent for females). Generally speaking, the pattern that emerges from the data is that self-reported household heads are also the main income earners until the head is around 55 years of age. From then on, other family members become the main income earners. This pattern suggests that as individuals age they tend to merge into other households in which younger members can contribute to supporting their consumption requirements. This change in household structure impacts savings decisions. Peruvian households, then, tend to identify the older male adult as the head of the household, even long after he stops being the main income earner.

This can also be analyzed by looking at the proportion of self-reported heads who are not the main household earners. The data indicate that the proportion seems to be flat at around 15 percent until age 40 and then increases steadily. One possible explanation for this phenomenon is that the probability of change in headship increases when the self-reported head—one of the parents—is less educated than at least one of their children. Even if differences in labor market experience give an earnings advantage to the parent, eventually the more educated son or daughter may catch up. A somewhat surprising finding, however, is that there do not seem to be major differences by level of education.

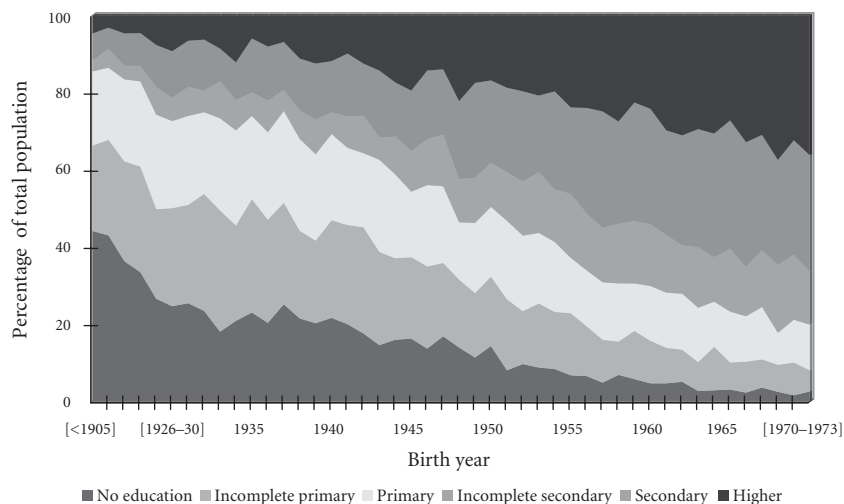
The next question is what determines when a former head of household is “no longer the boss,” or what are the characteristics prevalent when the family head stops being the main supporter of the household and that position is presumably occupied by one of his or her adult children. In fact,

the member who becomes the main income earner is always younger than the self-reported head. Moreover, it is clear that after the self-reported head reaches about 45, the age difference between the head and the main income earner grows farther apart, in particular among male household heads. In more than half of the cases in which the head does not have the highest income, the main earner is one of his or her children. In around 30 percent of the cases it is the spouse who has the household's highest income.

Turning to educational attainment, there are almost no uneducated individuals in the most recent generations, revealing that a "big push" took place in Peru during the past three decades. Figures 2.13 and 2.14 show the steady progress the country has made, with educational attainment improving substantially for younger cohorts.

Only 25 percent of those born in the 1930s had secondary or higher education, while half of that cohort had no education or incomplete primary schooling. The cohort born in the early 1970s, four decades later, is clearly more educated: Only 20 percent have primary education or less, while a quarter of that cohort has secondary education and another quarter has

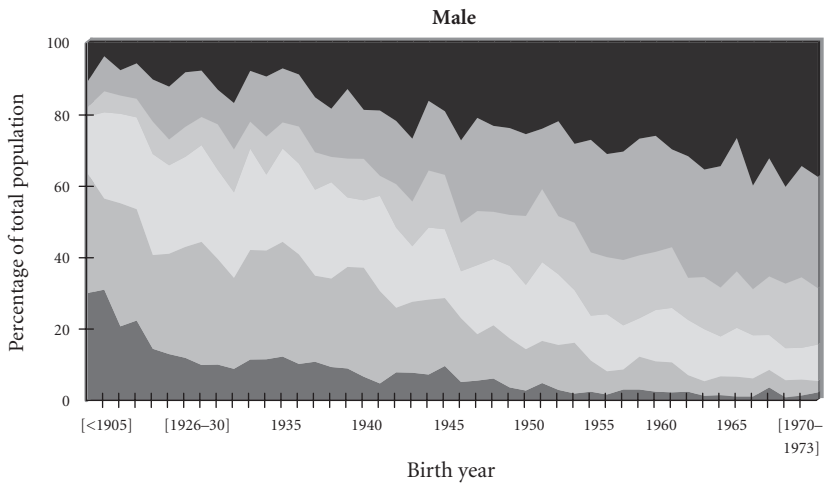
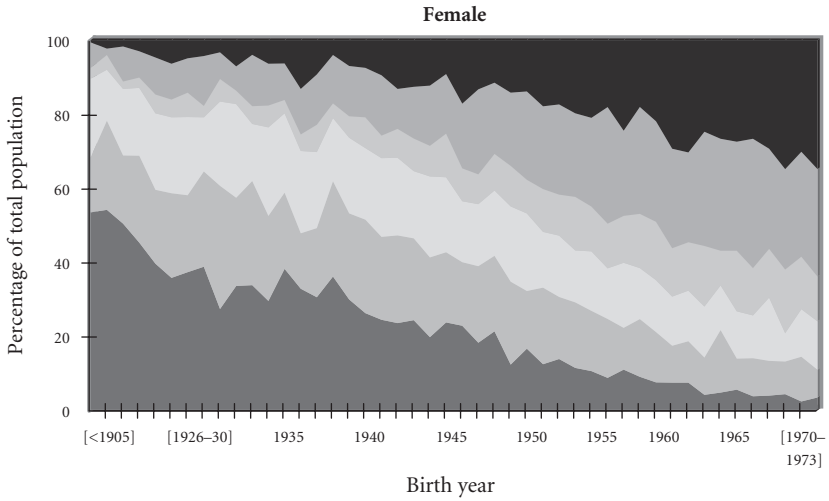
**Figure 2.13.\* Population Structure by Level of Education and Birth Year**



Source: 1985, 1991, 1994, and 1997 Peruvian LSMS Household Surveys.

\*The jungle and rural coast regions are not included because they were not surveyed in the 1991 LSMS.

**Figure 2.14.\* Population Structure by Level of Education, Birth Year, and Gender**



■ No education ■ Incomplete primary ■ Primary ■ Incomplete secondary ■ Secondary ■ Higher

Source: 1985, 1991, 1994, and 1997 Peruvian LSMS Household Surveys.

\*The jungle and rural coast regions are not included because they were not surveyed in the 1991 LSMS.

some higher education. Nevertheless, it should be noted that 20 percent of the youngest adult cohort still has only six or fewer years of schooling. These improvements might be strongly associated with improvements in education-related public infrastructure and the important rural-urban migration flows that began in the 1950s.

One interesting feature of this trend towards a population with higher schooling is that the gap between the education levels of males and females has practically vanished in the country over the past two decades. The average level of schooling has risen faster for females, and they have indeed almost caught up with their male counterparts. For the cohort born in the 1970s, the gender gap is less than 0.5 years.

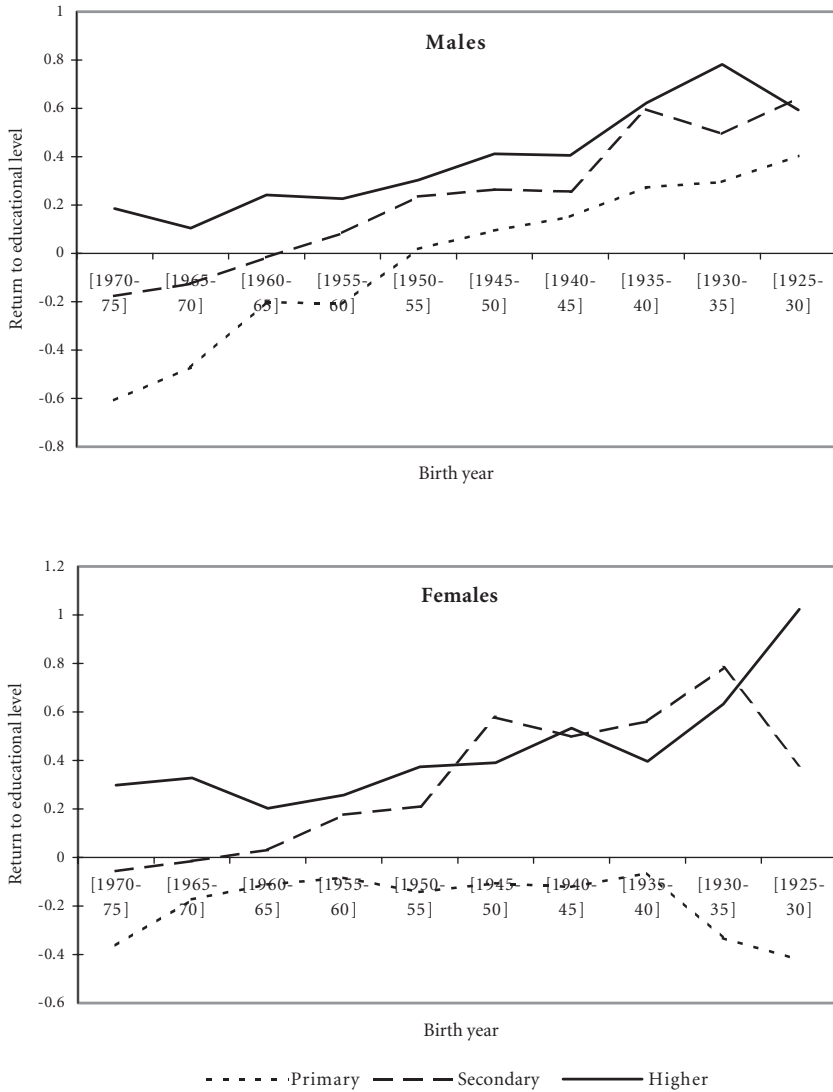
How has the market valued this increasing educational attainment? By gender, returns to higher education among males increase up to 45 years of age and then start decreasing. Returns to primary and secondary education show a downward trend throughout the life cycle. Among females, the pattern of returns to higher education is similar but somewhat more pronounced. The life-cycle pattern of returns to primary education is increasing, while that of secondary education is decreasing.

As shown in Figure 2.15, older cohorts have much higher returns than the younger ones for all educational levels. Among females, the same decreasing pattern is observed, except for primary-educated workers, whose returns are constant across cohorts. The reduction in educational premia for younger cohorts may be related to changes in the quality of the educational system as well as to significant increases in educational attainment. The smaller decreasing trend in the cohort effect for the returns to college is consistent with the fact that the supply of college-educated individuals has grown less over the past four decades.

The much lower returns to all levels of education for younger cohorts may be related to changes in the quality of the educational system, and/or to the significant increases in educational attainment achieved in the past decades. Normally, the increase in the relative supply of educated workers effect is partially offset by economic growth, as that generates an increase in relative demand. In that sense, the observed decreasing trend would indicate that supply pressures have predominated over the past 50 years.

In terms of the labor market, as in other Latin American countries the main change is that female participation has increased dramatically, and this change is closely associated with the fertility declines and improved education

**Figure 2.15. Cohort Effects on Returns to Educational Level by Gender**



of recent decades. The study shows that during the past three decades, female labor force participation increased from 30.5 percent in 1970 to 34.3 percent in 1980 and 38.2 percent in 1990, while for males the share has been stable at 81.5 percent, 80 percent, and 79.2 percent, respectively.

A look at aggregate trends shows that in the last 12 years, labor force participation has moved in a procyclical fashion.<sup>5</sup> According to the LSMS data, it fell between 1985 and 1994 and then increased by 1997. Among males the trough was in the early 1990s, coinciding with the lowest point of economic activity, immediately after the period of hyperinflation and the beginning of the Fujimori macroeconomic stabilization program. Using annual surveys from metropolitan Lima, these trends are confirmed, as it is possible to show that labor force participation fell from the mid-1980s until 1991 in the case of males and until 1993 in the case of females, increasing thereafter (Saavedra, 1998).

Figure 2.16 shows the life-cycle pattern of labor force participation for males and females. As expected, labor force participation reaches almost 100 percent for men between 35 and 50, and falls steadily thereafter. Consistent with human capital investment patterns, labor force participation rises faster along the life cycle for less educated males, but reaches higher levels for more educated ones. Among females, the data reveal a smooth increase until the early 40s, after which their labor force participation falls faster than for men. In the case of college-educated females, although they start participating later, participation reaches higher rates than for the other educational levels.

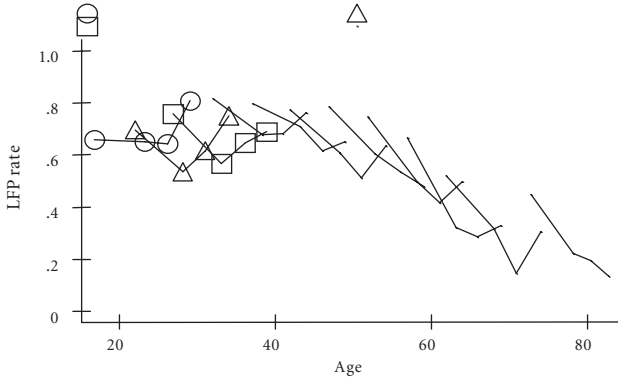
With regard to employment relationship, the proportion of self-employed is very low at early stages of the life cycle but increases as cohorts age. By contrast, salaried work decreases from the early stages of the cycle. At higher levels of education the proportion of young people who are self-employed is lower. For primary- and secondary-educated workers, the increase in this rate follows a slightly increasing trend throughout the life cycle, while among workers with higher education there is a slight decrease until their 40s. An inverse trend can be seen for the proportion of salaried workers by educational level, that is, a steady downward trend in salaried work over time.

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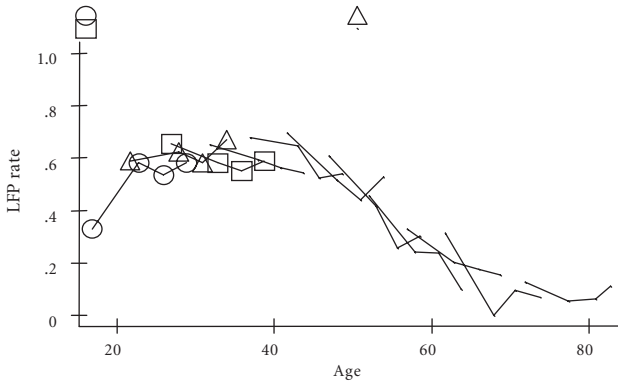
<sup>5</sup> See Saavedra (1998) for an extensive analysis of the procyclicality of labor force participation.

**Figure 2.16. Labor Force Participation by Gender and Education over the Life Cycle**

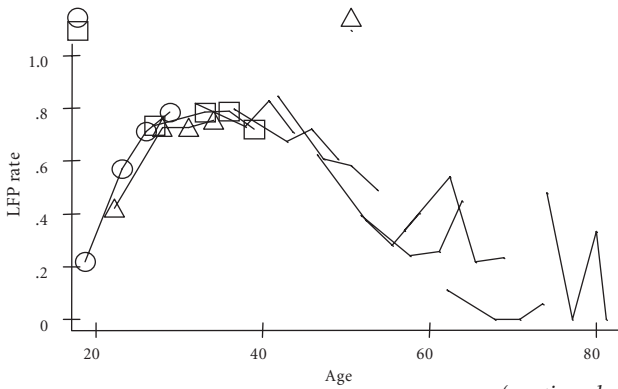
LFP Rate of Women with Primary Education



LFP Rate of Women with Secondary Education

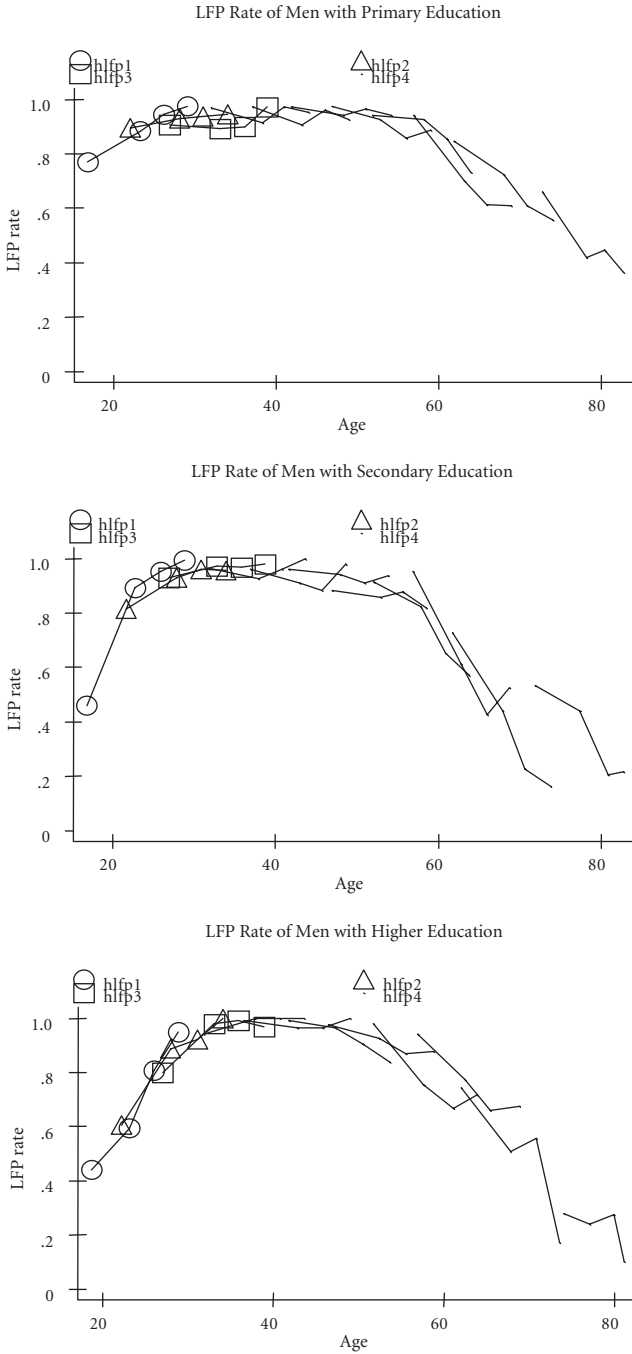


LFP Rate of Women with Higher Education



(continued on next page)

Figure 2.16. Continued





Finally, the study analyzes household saving under three different variations: a standard saving rate, saving computed by excluding net transfers from the estimation of household income, and estimated savings after controlling for household demographic factors. In terms of methodology, the novelty of this study is that it uses a slightly different identification strategy than the one discussed in Chapter One. Saavedra-Chanduví and Valdivia argue that business cycle fluctuations are the most common source of the year effects associated with the variables of interest, and since year effects are associated with gross domestic product (GDP) per capita fluctuations, they include information on GDP in their regression analysis. This allows for identifying age and cohort effects, after controlling for “year effects” as proxied by a GDP per capita measure.

After controlling for some of the mechanisms through which intergenerational transfers take place, for households with more-educated individuals a hump-shaped pattern of savings is observed. This is consistent with the life-cycle hypothesis of savings, which states that individuals tend to dissave at younger and older ages but increase their savings during the middle phases of their life cycle, which are characterized by greater income-earning capacity. This pattern was not present in households whose heads are less educated. The reason might be that for households with lower incomes, family arrangements, and especially the tendency to merge into extended households at older ages, blur the picture of individual saving behavior. In these households with lower education levels, the family substitutes for the lack of past savings or pensions, and it is therefore the main available instrument for smoothing consumption over the life cycle.

The analysis of household savings patterns across the life cycle therefore shows that family arrangements by Peruvian households affect income patterns. Saavedra-Chanduví and Valdivia argue that Peruvian households—both with more-educated heads and less-educated heads—do smooth consumption over the life cycle, not only by the typical saving-dissaving mechanism but also by smoothing household income. Under these circumstances, it is not easy to predict the implications of the demographic transition on aggregate savings in Peru. If anything, these initial findings on the savings age and cohort profiles stress the importance of additional research on the decisions on household structure over the life cycle in Peru. Another important issue is that the optimality of this income smoothing by Peruvian households over the life cycle may be related to the lack of develop-

ment in Peruvian long-run capital markets. Again, enhanced understanding of this connection is needed in order to discern the potential effects of reforms in the pension system.

## Uruguay

The case of Uruguay, presented by Marisa Bucheli, Andrea Vigorito, and Daniel Miles (2000), is unique in the Latin American context since Uruguay led the pack in the region in terms of its demographic transition. It also enjoys one of the highest education levels in Latin America. Constructing pseudopanel data from the individual data of the Continuous Household Surveys (ECHs) taken in the 1986–97 period, the study uses cohort analysis to describe these patterns, while drawing implications for present policies.

Uruguay experienced a sharp decline in fertility levels decades ago, long before its neighbors. Mortality and fertility rates actually began to fall as early as the end of the 19th century. This was due to the high proportion of European immigrants who arrived in the country between 1850 and the early decades of the 20th century. These immigrants, who hailed mainly from Italy and Spain, exhibited fertility rates that were substantially lower than those of their Uruguayan contemporaries (Pellegrino and Polleri, 1999). Since a decline in fertility rates took place simultaneously in Italy and Spain, it seems plausible that these immigrants brought those new reproductive patterns with them to Uruguay. Because of Uruguay's head start in lowering fertility rates, its demographic changes over the past 50 years have been less pronounced than in the rest of Latin America. While fertility rates in the region have fallen sharply from an average of 5.9 children per woman in 1950–55 to 2.9 in 1990–95 (CELADE, 1996), in Uruguay, the decline was appreciably less: from an average of 2.7 in 1950–55 to 2.3 in 1990–95. The persistence of low fertility rates has not only affected Uruguayan family size and structure, but also brought about changes in the age pattern of marriages, divorce rates, and the role of women in society.

Lower fertility has also given the elderly an important weight in the age structure of the present population. According to the 1996 population census, the over-65s represent 13 percent of the total population of the country. This proportion is higher among women, given that their life expectancy is 77.6 years vs. 69.6 for men. This relatively old population stands out with

respect to other Latin American countries, even those with similar demographics such as Argentina and Chile, where the proportion of elderly is 9 percent and 7 percent, respectively.

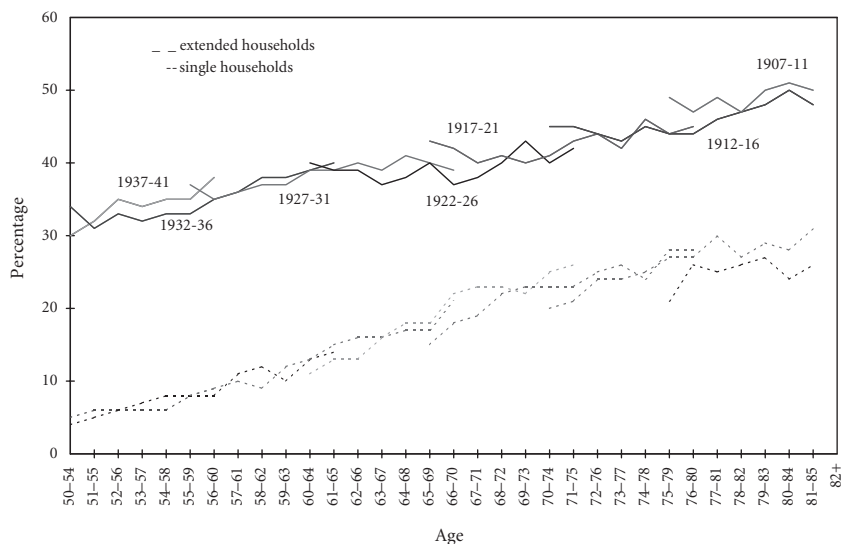
Another important development under way in Uruguay is that the formation of nuclear households by younger generations is taking place later in the life cycle. This is related both to lower fertility levels and a longer stay in the educational system. The only exception to this general trend is found in the 15- to 19-year-old group, whose fertility rate slightly increased during a 10-year span (from 6.6 to 7 percent between 1985 and 1995).

Nuclear and extended families were found to be the most predominant types of household in Uruguay, with a prevalence of male-headed households. In contrast, female-headed families are restricted to single parents and single-parent families, which result mainly from divorce or widowhood. The creation of extended families is associated with the educational level of the household head. For instance, in the 50–65 age group, around 67 percent of the male heads of nuclear families born between 1932–36 achieved six years or less of schooling, while for extended households this participation hovers around 72 percent. Due to the positive correlation of income and education, it is probable that the formation of extended households is the result of a strategy of merging incomes to take advantage of economies of scale.

Although children live mainly in nuclear households, the proportion that live in extended ones is not insignificant and has increased since 1993. The percentage of children under four in nuclear households declined from about 66 percent before 1993 to 58 percent in the 1993–97 generation. Their participation in extended households, which is 27–31 percent before 1993, also grows gradually but continuously from then on to reach 36 percent for those born 1993–97 (Figure 2.17).

There are a number of factors that could contribute to the growing number of children in extended households. On one hand, the trend may be related to the increase in adolescent pregnancy in the last decade since the proportion of children under age four declared as “relative not children” of the head grew from 17–20 percent before 1993 to 27 percent in 1997, while the proportion of adult relatives in these households did not show such abrupt short-term changes. It is also possible that young couples from low-income strata are tending to form extended households, as suggested by the differences in the educational level of heads. This strategy may have been

**Figure 2.17. Percentage of Women over 50 in Single Person and Extended Households by Cohort**



encouraged by the increase in the pension/wage relationship found in the 1990s (Bucheli and Rossi, 1994; Machado and Reggio, 1999). As an additional inducement, the family subsidy program is very limited: It is estimated that 40 percent of children in households in the first decile of income distribution are left out (Bucheli, 1997a).<sup>6</sup>

Lastly, the growing number of children in extended households could be a result of the increase in marriage breakdowns among low-income couples and the resulting return of women and their children to the woman's home of origin. Historically, divorce legislation appears early in Uruguay (1869 with

<sup>6</sup> Entitlement to the family allowance requires that children under age 18 attend the educational system and that the responsible adult contribute to the welfare system, which is more difficult for the low strata than for the middle strata. In 1995, a change was approved in the design in order to redistribute the benefits toward the poorest strata, subjecting the coverage and amount of the allowance to the income of the couple responsible for the child. The entitlement for children in the care of couples with income over 10 national minimum wages (SMN) was eliminated. For the rest, the benefit was set at 16 percent or 8 percent, based on whether the income of the adults responsible for the child was lower or higher than six SMN, respectively. Although this favored the lower income strata, the fall in the SMN in real terms has been gradually decreasing the amount of the benefit.

changes in 1907, 1913, and 1978) in relation to other countries, particularly in the Latin American region. Marriage breakdown began to intensify in the 1980s (Cabella, 1999). The reasons for the increasing prevalence of this phenomenon in Uruguay have not been studied. However, it is frequently argued that it is difficult to find the causes of the spread of marriage breakdowns since they may be a response to the assimilation of a new model of conjugal union (Roussel, 1993). In other words, societal expectations surrounding the institution of marriage are changing.

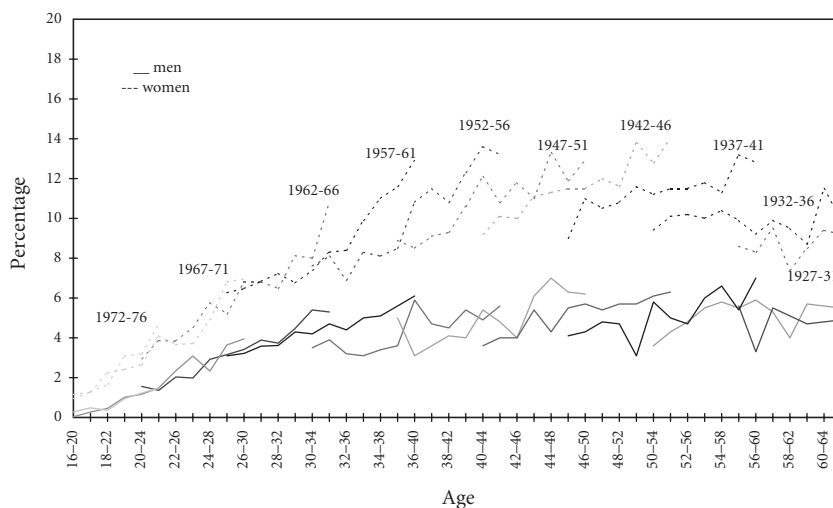
The effect of the divorce rate on household size, however, is not the same for all income levels. As mentioned above, for lower income levels the tendency is to return to the extended family for income-pooling purposes. Because judicial practice is to grant custody of the children to the mother, higher numbers of failed marriages also lead to the increased presence of children in households with female heads if the mother chooses not to join an extended family. In fact, for the most recent generations, households are commonly split into smaller entities since the breakdown of couples without reconstitution of marriage is not only greater in the youngest generations but also occurs at earlier ages (see Figure 2.18). For example, in the 1952–56 generation, 12 percent of women aged 37–41 are divorced; for the 1963–67 generation, 12 percent are already divorced by age 30–34.<sup>7</sup>

The incidence of single-parent households grows during childhood and adolescence: Approximately 3 percent of children born in 1982–86 live in this type of household by age five; at age 10–14, their participation increases to 11 percent. In addition, their weight increases in the period of study, particularly among adolescents: 8 percent of children aged 10–14 of the 1972–76 generation versus 11 percent in the 1982–86.

With regard to schooling, the process of accumulation of educational capital began early in Uruguay. Over the course of the 20th century, each

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<sup>7</sup> The ECH only reveals the present conjugal situation. Since more women define themselves as “divorced/separated,” it is inferred that men repeat cohabitation more intensively, as is the case in developed countries (Kiernan and Mueller, 1998). For example, 13–14 percent of women born between 1926 and 1952 stated they were divorced or separated in 1997, versus only 6–7 percent of men in this group. In addition, the low rate of compound households among children—less than 3 percent—reinforces the idea that women with children repeat cohabitation with second partners more slowly. These considerations lead to the conclusion that attention is centered on women.

**Figure 2.18. Incidence of Divorce by Gender and Cohort**

generation overtook the level of investment made by the previous one. On average, people born in the late 1960s and early 1970s have four more years of education than people born in the mid-1930s. In recent generations, the average number of years of education of females has exceeded that of males. By region, educational levels are higher in the capital, although they are growing in all the urban areas.

In the second half of the last century, a free system of public education was established, with a compulsory primary cycle of six years. A subsequent policy change in 1973 that made secondary education compulsory is one of the main factors explaining the high rates of human capital accumulation. In the 1980s there was also an appreciable growth in tertiary enrollment. Smaller family sizes, changes in the cultural pattern of women's role in society, and an active role of the state in expanding the educational system resulted in universal coverage of primary education and about 80 percent completion rates for high school students. Today, virtually all households send children in the 6–12 age group to primary school. Later, at age 13–17, about one-quarter of adolescents drops out, while at age 18–22 only one-third continues to attend school. Attendance from age 22—which exceeds 10 percent until age 30—is largely the result of the high rate of late completion of the third level.

This investment in education translates into a variety of household characteristics. For example, as the other side of the coin in terms of the extensive coverage of the primary cycle of education, the Uruguayan child labor rate is very low for Latin America, and school dropout rates only become significant for those 14 and above, the minimum legal age for work.

The picture is not entirely rosy, however, as human capital accumulation starts declining at around age 18/19, and by age 24, only a minority continue in the education system. Furthermore, although ideally tertiary enrollment begins at 18, many of the 18-year-olds in the educational system are still attending secondary school. In addition, although most students in the tertiary cycle are expected to graduate at age 24, the incidence of falling behind at this level is very high. Consequently, enrollment in tertiary studies among the new generations is growing through an increase in the weight of attendance in the younger cohorts at higher ages than those established in the education plans. It is mainly the participation of women in recent years that has accounted for the slight increase in tertiary enrollment.

Furthermore, what drives the 20 percent dropout rate among adolescents in recent years? Bucheli et al. maintain that it is related to the educational level of the household head, school performance, and gender. First, household decisions on the allocation of time of their younger members depends to a large extent on the educational level of the head, which suggests the importance of income, despite the abundant supply of free education. Specifically, in the households whose head reached tertiary education, over 95 percent of adolescents in the 13–17 age group attend learning institutions. In contrast, in households whose head studied only to primary level, the dropout rate is 30 percent. The differing results of decisions of households from different income strata can be explained by their different opportunity costs, which result in higher intertemporal discount rates and thus in a higher valuation of present income.

Secondly, the indicators of students who fall behind in their studies reveal, not surprisingly, that adolescent dropout is more intense among students with poor school performance. These probably belong to the low-income strata for two basic reasons: first, parents with higher qualifications—indicative of higher income—have better contacts that facilitate labor integration and create a more favorable environment for good school performance. A second reason, for which there is no evidence, could have to do with differences

in the quality of the teaching available to young people in the various income strata.

Thirdly, households seem to prefer to allocate more time to the education of young women and put more emphasis on work for young men, a trend that may have begun several generations ago. There are various possible explanations, although more detailed analysis is required. One reason is that women perform better in school. Furthermore, if the intertemporal discount rate is very high, it could be influencing the wage differential between genders because present income increases more if the household decides that a male child will join the work force.

Ultimately, the decisions on investment in education for the under-22s are strongly influenced by the age of the younger members and the context variables of the household. In particular, school dropout among young people affects their long-term income and, in so far as dropping out is more prevalent in the low strata, reduces the possibilities of mobility.

Attendance in tertiary education is also related to conjugal status, with the percentage of students being higher among single people. Thus, the late formation of couples, the setting up of a new home, and the postponement of the reproduction decision can be associated with the pattern of growth in human capital accumulation.

The analysis of returns to education reveals that, as expected, returns increase with higher levels of education. Cohort effects are positive in particular for women: Younger cohorts receive higher returns than older ones. These effects are especially pronounced for individuals with 13 years of education or more. In general, income grows at decreasing rates throughout the life cycle, except for the most qualified individuals for whom, after the age of 48, predicted income grows at increasing rates. For each educational level, the return on education and the predicted income values are higher for men throughout the life cycle.

Uruguay also displays interesting features in female participation in the labor market. Participation rates are high by Latin American standards, influenced by higher education levels and also by the delay in marriages. As in other countries, each subsequent generation of women is characterized by a higher participation rate. For example, 74 percent of women born in 1953–67 are active at age 35–44, which is 14 percentage points higher than in the 1942–45 cohorts at that age. Interestingly, the age pattern of participation differs considerably from the pattern presented in the average country, where women



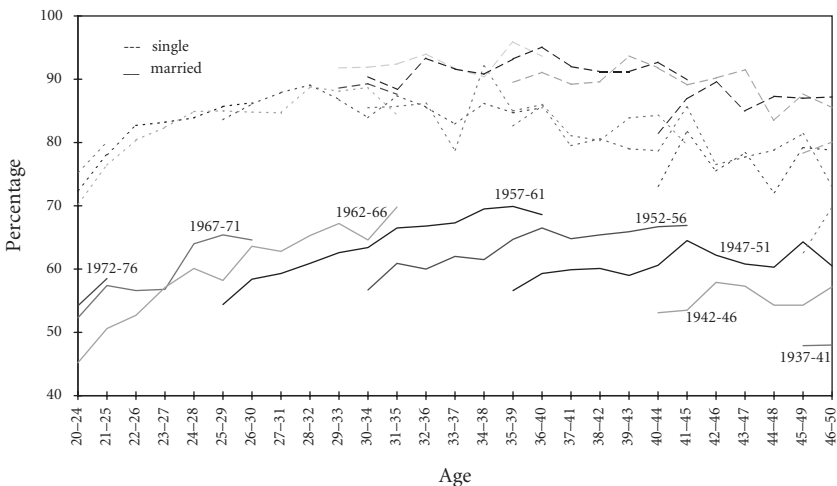
display lower participation rates at the middle of the age range because of childbearing. In Uruguay, participation rates remain at high levels until the latter stages of the life cycle.

However, as in other countries, it is also true that participation rates are higher for women with more education than for those with less schooling. Women from different generations with over 12 years of education have activity rates of around 90 percent, 20 points higher than among women who completed at least one year of secondary education and did not go on to tertiary level. Finer levels of analysis reveal that the upward trend over time in female participation is in part dependent upon the growing stock of educational capital.

With respect to participation according to marital status, the activity rate of married women aged 30–40 is around 60–70 percent, while for single and divorced women the rate rises to over 80 percent and 90 percent, respectively. Part of the growth in the female activity rate could thus be due to the higher divorce rate. Another contributing factor stems from the behavior of married women, whose integration into the labor market has intensified among younger generations.

In sum, all of the household decisions identified above are inter-related. The triggering factor is that fertility rates decline as a result of cul-

**Figure 2.19. Activity Rate of Women Aged 20 to 50 by Marital Status and Cohort**



tural patterns that delay marriage and therefore allow for fewer years of childbearing. Older mothers and fathers, who have children during periods of high productivity and wages, are able to invest more in the human capital of their children, which in the longer term improves labor market prospects. This completes the cycle, creating incentives for their offspring to postpone marriage. Two forces therefore work to bring about lower fertility. Not only does delaying marriage tend to leave fewer years for childbearing, but as the growth in educational level raises the expected income from work, the opportunity cost of devoting time to the care of children increases, creating incentives to have fewer children.

These changes are reflected in the activity rate of married women who, after a longer period of investment in educational capital, devote more time to work outside the home. Thus, the decisions on activity, the number of children, and education can be considered endogenous variables of a single decision-making system whose results are reflected in a more intense allocation of time in the labor market by wives in the new generations. In other words, there is a less marked division of labor by gender, traditionally characterized by dedication to production of household goods by women and to integration in the labor market by men. A particular characteristic of Uruguay is the apparent low sensitivity—in comparison with the evidence available for developed countries—of female activity to the presence of small children, who are probably cared for in preschool and by domestic or family help from outside the home.

Finally, the high divorce rates prevalent in the country and the resultant increase in single-parent households can also be interpreted as endogenous in the family decision models. For example, the change in the allocation of time, that is, a less specialized division of labor between men and women, reduces the expected gains from marriage, creating conditions that facilitate the dissolution of the nuclear household. Moreover, factoring in the possibility of marriage breakdown could constitute a cause of the changes mentioned earlier, for example by creating incentives for investment in human capital to increase lifelong income in the event of divorce. Setting up single-parent households may also have negative effects on educational attainment through their effect on household resources. All in all, it seems that the first of these two patterns dominates since Uruguay continues to present a virtuous circle of high incomes, high education that is apparently not broken by family dissolution.



# **Aging and Economic Opportunities: What Can Latin America Learn from the Rest of the World?**

*Jere Behrman, Suzanne Duryea, and Miguel Székely<sup>1</sup>*

The country studies described in the previous chapter have all argued that fertility is the key variable in household decision-making in terms of household structures, schooling investments, labor force participation, and savings behavior. If one pulls the camera back from the close-up view of households, it is apparent that individual fertility decisions—through their impact on the overall age structure of a country—are also a main determinant of the pace of that country's demographic transition. The nature and speed of the demographic transition, in turn, shape the socioeconomic opportunities and challenges faced by a country. This chapter explores the links between demographic transitions, as measured by the country average age, and various economic and social indicators. Analysis based on panel data for 164 countries for 1950–95 looks at how Latin America is performing with respect to the rest of the world, what is on the region's horizon, and what policies might best take advantage of the current demographics. The analysis contained in this chapter therefore offers an aggregate perspective of fertility changes and their implications that complements the micro approach of the five country studies. The micro country studies analyze the average behavior of cohorts of individuals that are followed in the absence of data that tracks the same individual as he or she ages over time. Similarly, this chapter follows the average behavior of a set of variables as a worldwide sample of countries goes from a stage at which large proportions of their population are young to later

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stages at which the relative shares of older groups increase. The main difference between this macro approach and the micro life-cycle analysis is that when individuals are followed, there is a natural, inevitable, and steady aging process. But an older country can become younger or age at a reduced rate due to a surge in fertility. Therefore, countries do not necessarily follow a natural, steady linear progression from young to old. In fact in the initial stages of the demographic transition the average age of a population tends to fall and only subsequently does it tend to rise. The advantage of taking this broader approach is that it allows for the drawing of some general conclusions based on a more wide-ranging set of demographic experiences that can then be applied to an individual country to develop more-customized policies.

Despite the policy relevance of demographic changes, the importance that the economic development literature has given to changes in population structures that are triggered by fertility choices has varied considerably over time. At times those who believe that Malthusian factors severely constrain opportunities have considered population growth to be a major—perhaps the major—determinant of economic options. At other times, including most of the 1970s, 1980s, and early 1990s, mainstream economic literature has treated demographic considerations as merely one of many factors that might shape aggregate options. The studies saw the relationship between population characteristics and economic development as a two-way street. A number of empirical studies on the links between demographics and economic aggregates from the 1950s through the early 1990s revealed very little that supported those that thought demographic factors played major roles in the development process.

In the last decade, however, there has been a rebirth of emphasis on the importance of demographic factors conditioning economic development. This emphasis has not been on traditional Malthusian population pressures, but instead on how the shifting age structure during the demographic transition may offer medium-term economic opportunities. This new aggregate evidence, supported by some very recent micro analysis of life-cycle savings, raises again the question of whether there is an inverse relation between population growth and per capita income growth, particularly through transitory effects on the age structure of population (which, although temporary, may last for decades). Thus, there has been a recent shift from emphasis on the negative long-run effects of population growth on economic outcomes to a focus on medium-run effects of changes in the age structure on economic outcomes, with increasing emphasis on the opportunities that transitory

reductions in dependency ratios may afford. To date, however, the empirical explorations related to age structures and growth have been limited and have not considered many of the channels through which these effects might be manifested. This chapter presents some new empirical evidence on associations between the age structures that are caused by fertility decisions taken at the household level, and selected economic outcomes.

### **A Window of Opportunity?**

Why have economists experienced this renewed interest in changing age structures, and why should policymakers pay attention? Perhaps the loudest wake-up call came from East Asia. That region, particularly the Four Tigers, has registered the highest rates of economic growth in the world in the past three decades, precisely the period in which large demographic transitions from young to working-age populations were taking place. Fertility decreased very rapidly in East Asia between 1950 and 1990 (particularly in the 1970s), and the economic rewards were likewise delivered quickly. Bloom and Williamson (1999) estimate that demographics, in particular age structure shifts, provided this region with a boost that accounted for about a third of its skyrocketing economic growth during this period. The Asian Development Bank (ADB, 1997; 158) concurs, claiming that Asia's recent "demographic gift" has accounted for 0.5 to 1.3 percentage points of the annual GDP per capita growth rate, or from 15 to 40 percent of the average annual growth rate of 3.3 percent between 1965 and 1990.

Because of the East Asian and other studies, conventional wisdom increasingly asserts that the age structure changes that occur as part of the demographic transition may impact economic options in the medium term. The role of demographic conditions in shaping current and subsequent economic opportunities for increased economic growth is particularly relevant at this time since the majority of countries in the world are, or soon are likely to be, experiencing important fertility declines. This is certainly the case in Latin America and the Caribbean, which over the next two to three decades on average will be experiencing the fastest demographic transition in the world.<sup>2</sup> A central question for policymakers therefore is whether there is a

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<sup>2</sup> See Behrman, Duryea, and Székely (1999a) for details.

“window of demographic opportunity” through which East and Southeast Asia have passed and Latin America is passing. This demographic moment occurs when transitory low overall dependency ratios combine with more-slowly increasing old dependency ratios. As evidenced by the case studies, Latin America and the Caribbean include a wide range of country age structures, from some that are similar to countries with the youngest populations in the world to others that are more like the developed economies with older populations. Deriving lessons from worldwide data therefore allows for more-customized policy recommendations.

### Methodological Considerations

In the context of the literature on individual decision-making, a change in any aggregate variable can be traced back to three factors. First, individuals may behave differently at each stage of their life cycles, and therefore a change in the age composition of the population shifts the value of aggregate variables even though for any individual there is no change in behavior. Second, there can be factors that are common to all cohorts and stages of the life cycle within a country, or country effects, such as a common culture. Third, factors that are common to all cohorts and stages of the life cycle across countries at a point of time, such as a shock in international markets or period (year) effects, may be at play. The interest here is in the first of these three factors—i.e., how life-cycle effects are revealed as the population shares of different birth cohorts change due to the demographic transition.

In order to estimate these effects, information from a panel of countries for the period 1950 to 1995 is related with the average age of the population of each country in each time period, country-fixed effects, and year-fixed effects:

$$X_{i,t} = \alpha AD_{i,t} + \beta \text{year}_t + \gamma \text{country}_i + \varepsilon_{i,t} \quad (1)$$

where  $X$  is one of a set of aggregate variables for country ( $i$ ) and year ( $t$ );  $AD$  is a vector of 19 dummy variables indicating the average age of the country in that particular year (the dummy for average age 19 is always the excluded category). The variable  $\text{year}$  indicates the year of each observation; the variable  $\text{country}$  indicates the country of each observation; and  $\varepsilon$  is the error term. The coefficient estimates for the elements in the  $AD$  vector reveal whether, after

controlling for country-fixed characteristics and time effects, the  $X$  variable shifts as the average age of the country changes. Most of the graphs shown in the following sections plot the coefficient estimates for the average country-age dummy variables after controlling for country- and year-fixed effects. The graphs represent the pattern of an aggregate variable as the average age of a country changes, net of country and year effects.

This procedure is analogous to the smoothing technique used and discussed by Deaton and Paxson (1994), Attanasio (1998), and Jappelli (1999) on household survey data, which are used in the country studies summarized in Chapter 2 of this volume. In the case of micro data, a dependent variable is regressed on a series of age and cohort dummies, while time effects are normalized and assumed to be zero. Here, the dependent variable is regressed on country average-age dummy variables and controlled for year- and country-fixed effects. Including time effects also helps to de-trend the dependent variables. For most of the dependent variables, statistical tests indicate that the country-fixed effects and year-fixed effects are statistically significant.

It is appropriate here to include a note on causality. The correlation estimates derived from equation (1) and presented below are generally described as “associations” between age structures and economic outcomes. These associations, however, basically reflect causality. Such an interpretation may be somewhat controversial, especially for variables such as per capita GDP, for which it could be argued that if fertility falls and life expectancy rises with income, higher per capita incomes would produce higher average ages. Reverse causality could also be important with variables such as education and health expenditures because improved schooling and health conditions can lead to reductions in fertility that affect the future age structure. It is important to stress, however, that the age structure is determined by fertility decisions taken considerably earlier than the outcome variables on which this chapter focuses. The reverse causality that might concern some analysts, thus, does not seem plausible in light of the necessary chronological sequence.

Even if reverse causality is not a main concern, the age structure still may not be independent of the disturbance term if there are unobserved preferences or price expectations that affect both fertility decisions and decisions that are made later, often decades later, for the dependent variables. Arguably, such possibilities are unlikely to affect the interpretation that the results basically reflect causality because the country-fixed effects control for such unobserved



characteristics that persist for many years (as they must do to cause problems given the time lag between the fertility changes and subsequent outcomes studied here). Therefore, though understanding what the associations are in itself is of interest, an interpretation of causality is plausible—and much more interesting—for the results.

Finally, before launching into the data, a word of explanation should be given about the mechanisms by which the demographic transition unfolds. Leading up to the onset of the stereotypical demographic transition, crude birth rates and death rates are both relatively high and young and old dependency ratios<sup>3</sup> are stable. In the first phase of the transition mortality falls, particularly infant and child mortality, as a result of improvements in clean water, nutrition, and sanitation methods, so that the young dependency ratio increases. In the second phase of the transition, fertility typically falls after infant mortality has declined, perhaps because couples can achieve a desired family size with lower fertility. With a lag the young dependency ratio falls due to the lowered fertility rates. With a much greater lag (perhaps after fertility and mortality rates have stabilized in the third stage), as the population bulge due to the first phase of the transition ages, the old dependency ratio eventually increases. In the third phase of the transition fertility rates and mortality rates are moderate. So, the demographic transition leads to changes in the age structure of the population that may be rapid if the demographic transition is rapid. In reality, differences in age structures and dependency ratios across countries today are due mainly to differences in fertility rates and to the pace at which fertility has declined over time.

### **Exploring the Links between Country Average Ages and Socioeconomic Outcomes**

The data will focus on the country average age patterns for 11 different variables, classified into three groups: (1) four macro variables—domestic saving, GDP per capita, capital per worker, and tax revenue; (2) three indicators of governmental expenditures on education and health; and (3) four

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<sup>3</sup> “Young” refers to the 0–14 age group, “working-age” to the 15–64 age group, and “old” to the 65-and-older age group. Similarly “young dependency ratio” refers to the ratio of the population in the 0–14 age group to that in the 15–64 age group, and “old dependency ratio” refers to the ratio of the population in the 65-and-older age group to that in the 15–64 age group.

indicators of social conditions—the Gini index of inequality, unemployment rates, homicides per 1,000 individuals, and schooling progression rates.

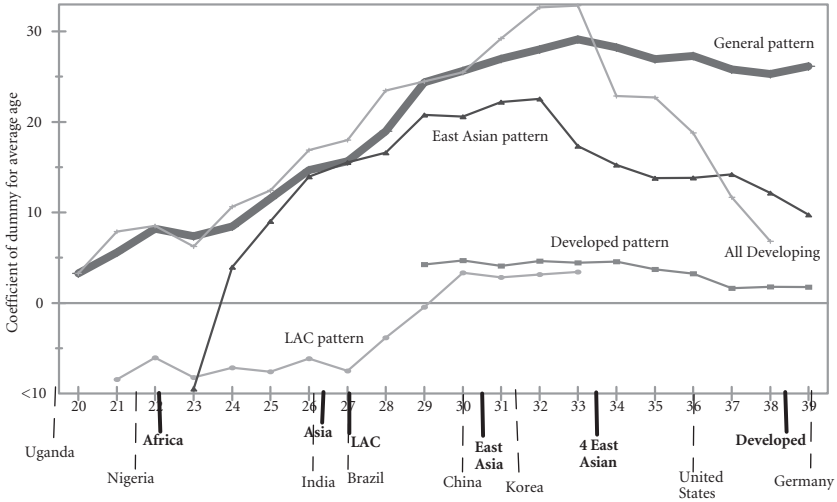
### *Macro Variables*

*Domestic savings as a share of GNP:* Simple versions of life-cycle savings theories predict that individuals save little or dissave at young ages when their income-generating capacities are lower than their desired consumption. The same individuals then save at high rates when they are in their prime working ages because their annual income flows exceed their average annual permanent income, and then, when the same individuals reach old age and are no longer generating as much income as when they were in their prime working ages, they use past savings for maintaining consumption above their current income. One would expect aggregate domestic savings to follow a similar pattern. Countries with high young dependency ratios are therefore expected to have relatively low savings shares in GNP. Countries that have reached a stage of the demographic transition in which their working-age populations are relatively large so that overall dependency ratios are low are expected to save relatively more in order to shift resources for their anticipated desired consumption greater than current income when they become older. Countries with high old dependency ratios are expected to save relatively less because the old are using resources accumulated in the past through individual savings, pension schemes, or other social benefits to maintain their consumption above their current income levels.

Figure 3.1 plots domestic savings as a share of GNP on the vertical axis for the whole sample of countries (the solid line labeled “general pattern”) and average age on the horizontal axis. The figure shows the expected inverted-“U” shape for savings along the average-age pattern, which is consistent with the life-cycle savings theory. As the country average ages increase from the low 20s, the savings rate increases sharply, reaches a peak at around an average of 33 years of age, and declines somewhat for higher country average ages.

Figure 3.1 also indicates on the horizontal axis regional and country average ages for 1995. Countries with young populations, such as Uganda, Nigeria, India, and most other countries in the African and South Asian regions, have mean ages associated with relatively low savings rates. Latin America has populations that are five years older on average than Africa, which implies a larger proportion of the population in the prime working ages and

Figure 3.1. Average-Age Pattern of Domestic Saving for 1995



higher savings rates, as indicated for Brazil. Latin America and the Caribbean (labeled LAC) has a slightly older population on average than all of Asia, but a much younger population on average than the four East Asian countries that have undergone the fastest recent demographic transition. It is well-known that the East Asian economies have much larger domestic savings rates than the average Latin American country. An important part of the difference may be that the average individual in East Asia is at a later stage of his or her life cycle, one that is characterized by higher savings rates. Indeed at the averages for the two regions in the figure, the savings rate is twice as high for the average age of the four fast-growing East Asian economies (about 28 percent) as for the average age for Latin America (about 14 percent). Developed countries such as the United States and Germany are the oldest group. They have somewhat lower average savings rates than the four fast-growing East Asian economies, perhaps in part because of the increase in the relative weight of older population subgroups that are approaching or have reached retirement ages.

The general pattern, however, may be an oversimplification if the nature of the relation varies by region. Figure 3.1 also plots the country average age dummies for four different groups of countries. Perhaps surprisingly, developing countries have a much more pronounced inverted-“U” country average age pattern (with a statistically significant decline after age 33) than does the whole sample. Thus the general pattern is not driven only by the

experience of developed countries, as might be expected given the slowdown and decline in savings that occur at the country average ages for which developed countries have more observations. Actually, the pattern for developed countries is quite flat, with small declines at the highest country average ages.

The pattern for East Asia is much more pronounced and closer to the life-cycle hypothesis prediction than is the pattern for Latin America. The increase for East Asia is sharper than average between ages 23 and 29. There is also a sharper (and significant) decline between ages 32 and 35. In contrast, the country average-age pattern of domestic savings in Latin America is flat between ages 21 and 27, increases (although much less than in East Asia) between ages 27 and 30, and is flat thereafter. For Latin America, only the country average-age pattern between ages 24 and 27 is significantly different from the patterns for other regions. For East Asia the portion between ages 22 and 28 (where the sharp increase is observed) is significantly different from the rest, but the pattern from age 29 on is not.

If one considers the worldwide pattern as the generalized relation between age structure and savings, the steeper pattern for East Asia suggests that the region took great advantage of the early part of the demographic transition to boost savings but that aging at the end of the transition is associated with greater rates of dissavings in this region. In contrast, the early stage of the demographic transition in Latin America is associated with no increase in savings. While the expansion of savings between the mean ages of 27 and 30 is as steep as the world average, savings again flatten out after the age of 30. One possibility is that right when the region was provided with the demographic boost, it was hit by the negative shock of the debt crisis. This possibility was explored in another specification.<sup>4</sup> The results suggest that although Latin America seems to have been saving less in the 1990s than in the 1960s, the difference is not statistically significant. Therefore, the slowdown in the country average-age pattern should not be attributed to a shock in any specific decade but must be reflecting structural differences between this and other regions.

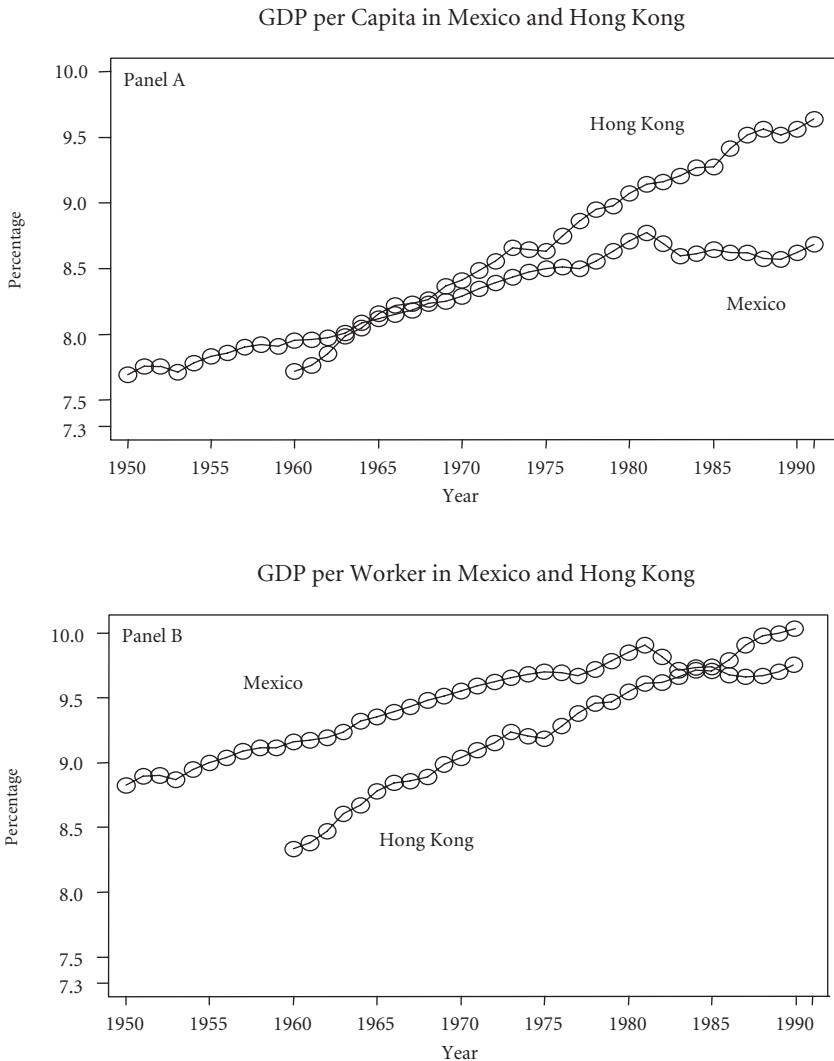
*GDP per capita:* When the country average age increases from low levels there is an initial shift in the age structure of the population toward people in working ages. If the rate of employment generation were sufficiently large one would expect this process to be associated with an increase in GDP per

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<sup>4</sup> The results can be found in Behrman, Duryea, and Székely (1999).

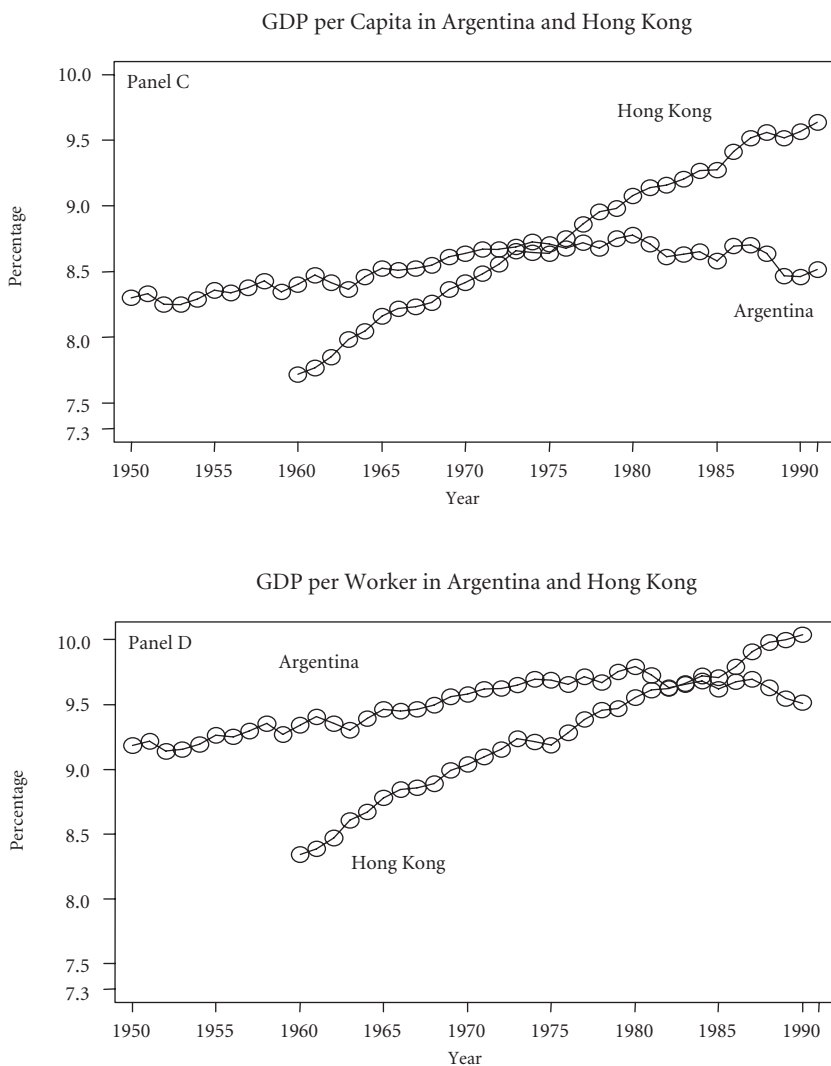
capita. One way of illustrating this point is to compare the GDP per capita to the GDP per worker for countries with different age structures. If there were no differences in average worker productivity between two countries, their GDPs per capita would differ if one had a larger share of its population in the working ages than did the other. In Figure 3.2 Hong Kong (one of the fastest growing economies with one of the oldest populations) is compared

**Figure 3.2. GDP per Capita and GDP per Worker**



with Mexico (which has a relatively young population) and Argentina (which has one of the oldest populations in Latin America, but still a young population in comparison with developed countries). The first panel in the figure plots GDP per capita for Mexico and Hong Kong. This panel indicates that GDP per capita in Hong Kong has been greater than that in Mexico since the mid-1960s. However, in Hong Kong a larger proportion of the popula-

**Figure 3.2. Continued**

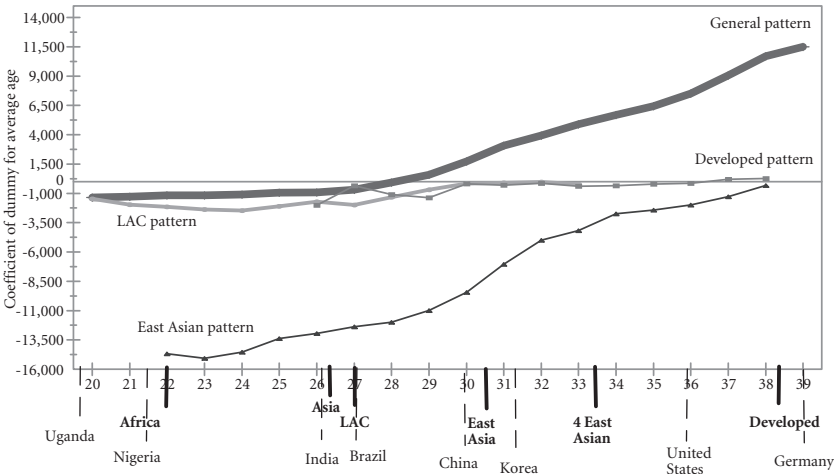


tion has been of working age. Therefore if one plots the GDP per worker, the differences narrow considerably. Panel B still indicates that Hong Kong has grown at a much faster pace, but it only seems to have surpassed Mexico in terms of GDP per worker in about 1985. So, the ranking of these two countries for the period 1960–90 after “adjusting” for differences in population structure would be modified. A similar story applies for the difference between Argentina and Hong Kong in Panels C and D.

Figure 3.3 plots PPP-adjusted GDP per capita as the dependent variable. When the whole sample of countries is used, GDP per capita is quite flat and stable at young ages and starts increasing as the population ages (with statistically significant increases after age 27). When comparing the position of specific regions and countries on the horizontal axis, it seems that East Asia (especially the Four Tigers) is already benefiting from the demographic effect of reducing young dependency rates, while Latin America on average is still at the initial stages of this process.

Looking at each region individually, East Asia has a much steeper slope with respect to age than do Latin America, all developing countries as a group (the pattern for all developing countries overlaps considerably with the Latin American pattern and therefore is not included in Figure 3.3), or all developed countries. In East Asia, the demographic transition was accompanied by a sharp and significant increase in GDP per capita, while for the other

**Figure 3.3. Average Age Pattern of GDP per Capita**

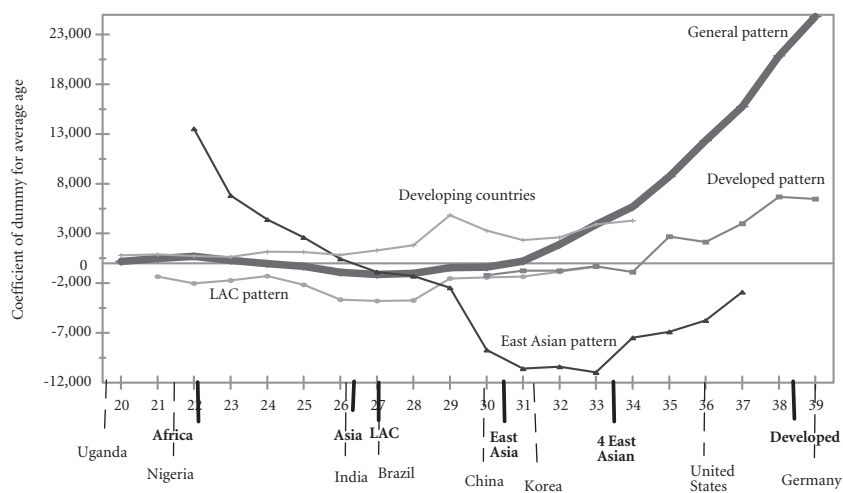


regions GDP per capita does not seem to follow a distinguishable average-age pattern. The East Asian pattern is significantly different from the rest of the world up to age 31 and from 37 on. The specification with decade-region interactions suggests that Latin America experienced a severe negative shock right at the moment when demographics might start “paying off,” with significantly negative effects for the 1980s and 1990s.

*Capital per worker:* When a country has a relatively young population, the rate at which its working-age population is expanding tends to outpace the rate of capital accumulation. After some point, however, when the size of the cohorts entering working ages declines, capital per worker tends to increase. Thus, one would expect that capital per worker would follow a similar pattern as GDP per capita, but with country average age associated with increases commencing at higher ages. Figure 3.4 presents the country average-age pattern that emerges using capital per worker as the dependent variable. As anticipated, the curve is flat at young ages and has a strong positive slope at older ones, with statistically significant increases after age 31.

Regional differences are also apparent in Figure 3.4. Surprisingly, for East Asia, there is a negative (and significant) decline between ages 22 and 31, but then there is an increase that is statistically significant between ages 33 and 37. The patterns for all developing countries and for Latin America and

Figure 3.4. Age Pattern of Capital per Worker





the Caribbean are quite flat, and significantly less than the average pattern at the oldest ages for Latin America. Part of the reason why Latin America has a flatter pattern at older ages is that the 1990s were characterized by a negative effect on capital per worker for this region. Developed countries have a significant increase at older ages. Therefore, East Asian and developed countries mainly determine the general pattern for this variable.

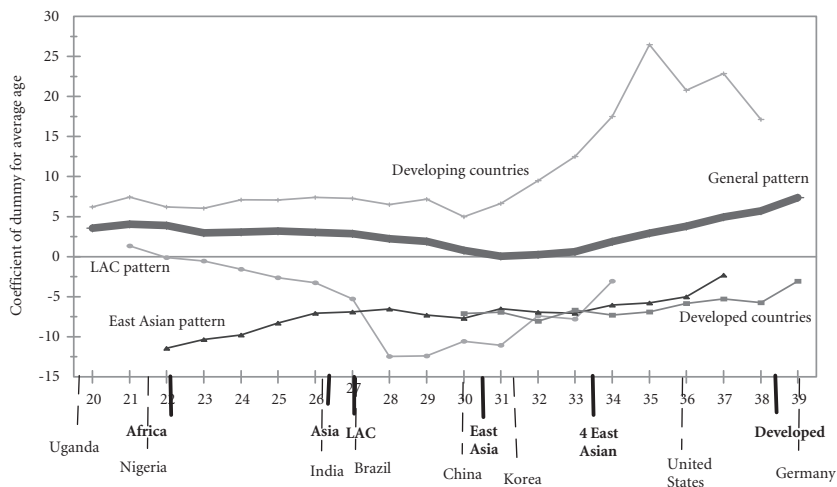
*Tax revenue as a share of GDP:* Tax revenue as a proportion of GDP declines somewhat with an increasing average age of populations until the country average age reaches about 31, but increases as the average age of the population increases from then on. This means that as the population ages, the relative weight of the potential tax base increases. One would expect that at some point, with the increase in the relative size of the population that is retired, the rate of increase of the tax share will decline as the average age of the population increases further. Eventually, a turning point in the average-age pattern of tax revenues due to the increased old-age dependency rate will be observed. Yet apparently, further data analysis shows the associations between country average ages and tax revenue shares in GDP are not all that strong (certainly much weaker than for savings shares). The only changes that are actually statistically significant are those between ages 30 and 32 and between ages 34 and 39.

The shape of the country average-age pattern for tax revenues as a share of GDP, however, differs markedly by region, as shown in Figure 3.5. The increase after age 30 that is observed in the general pattern seems to be determined exclusively by developing countries, where the rise at the second half of the age spectrum is statistically significant. The pattern for developed countries, on the other hand, is quite flat. The pattern for East Asia is significantly flatter than the general one. The Latin American pattern is similar to the general one, but from age 27 on is significantly different from those for other regions. For the 1980s and 1990s, moreover, Latin America has significantly greater tax revenue as a share of GDP even after controlling for the demographic effect of changing age structures and country- and year-fixed effects.

### **Governmental Expenditure on Education and Health**

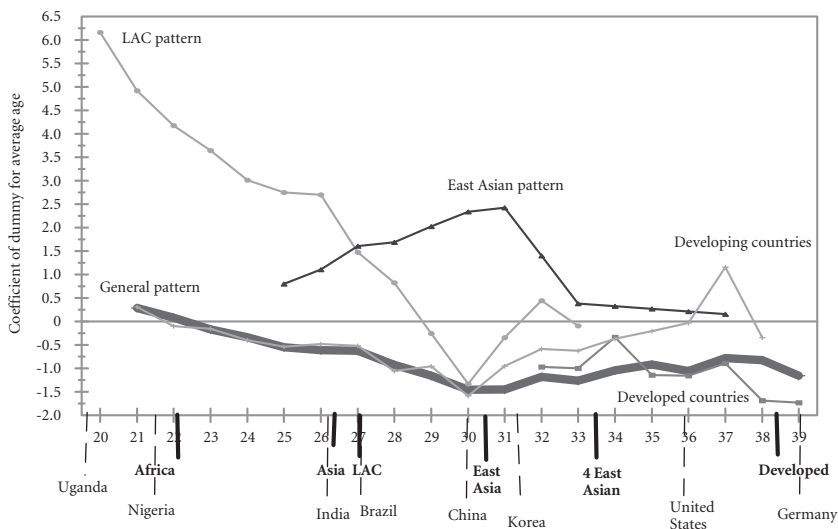
*Public expenditure on education as a share of GDP:* It is expected that countries with young populations, in which the proportion of children is large, face greater demand for educational expenditures, which may be reflected

**Figure 3.5. Age Pattern of Tax Revenue as Percent of GDP**



in a larger share of these in GDP. Figure 3.6 presents the age coefficient patterns for public expenditure on education as a share of GDP. Perhaps surprisingly, the average-age pattern for public expenditure on education is basically flat, with a slight reduction as country average ages increase up to the early 30s and then a subsequent slight increase.

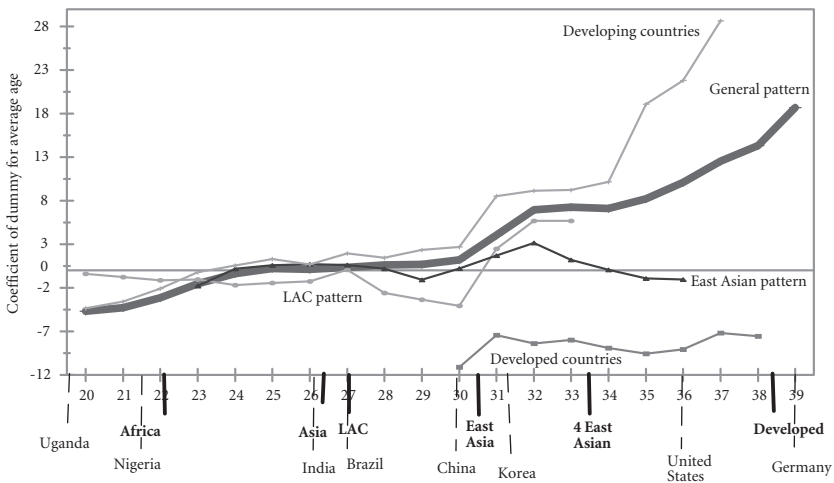
**Figure 3.6. Age Pattern of Public Education Expenditures**



The relation, however, seems to vary considerably by region. While the patterns from developed countries and all developing countries taken together do not seem to be very different from the general one, East Asia and Latin America present stark contrasts. East Asia presents a pattern that is not in line with the general one, but the differences are not statistically significant. In Latin America, public expenditure on education as a share of GDP falls significantly between ages 20 and 30 and increases between ages 30 and 33 (the pattern between ages 20 and 26 is significantly different from other regions). The decline observed in Latin America cannot be attributed to “decade” effects.

*Public expenditure on primary education per primary-school-age child as a proportion of GNP:* Figure 3.7 plots public expenditure on primary education per primary-school-age child as a proportion of GNP. This curve indicates that as the country average age increases, public expenditure on primary education per school-age child as a proportion of GNP increases—with fairly large slopes both for country average ages in the 20-to-25-year range and above 30 years that generally are statistically significant. This pattern is consistent with the fact that if the share of education expenditures for primary education in GDP remains constant as the country average age changes, as suggested by Figure 3.6, the expenditure per child is relatively small in countries with young populations but public expenditure per primary-age

**Figure 3.7. Age Pattern of Education Expenditures per Child**



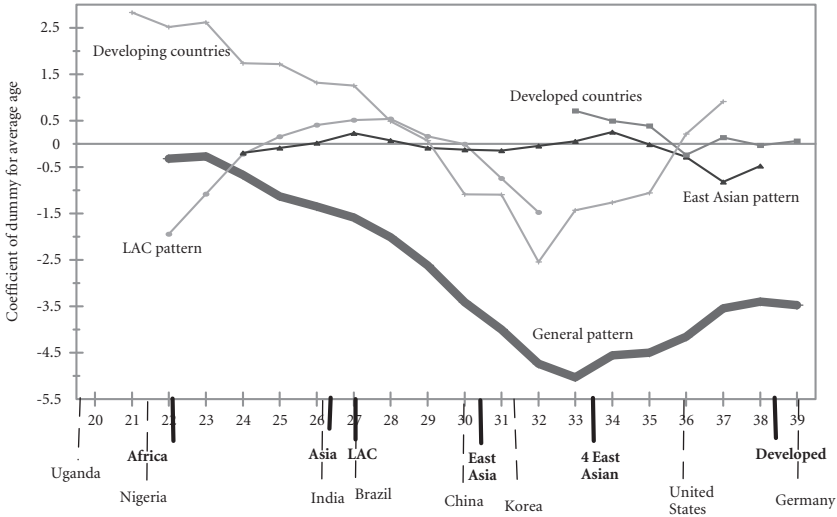
child tends to increase as the relative size of this group falls with the demographic transition. If more public expenditure per primary-school-age child increases the quality of basic public schooling (about which there is some controversy; see Hanushek, 1995, and Kremer, 1995), then this pattern may have an important impact on productivity and other outcomes for these children in their post-schooling years.

Figure 3.7, which plots the age pattern of education expenditure per child, suggests that East Asia on average has benefited from the average-age-related increases in expenditure per school-age child for some time already, though with considerable potential for further benefits as the country average age approaches that of current developed countries. On average, Latin American countries are just entering the stage of the average-age profile in which this variable increases, with the overall Asian average slightly behind the Latin American region. Developed countries as a group have been on the positive-sloping section of the curve for quite some time, while on average, African countries are still far away from being at the stage in which constant public expenditure GDP shares in education imply greater resources per school-age child.

For developing countries, the country average-age pattern is steeper than the pattern observed for the whole sample, while the pattern for developed countries is much flatter. This may seem surprising because educational expenditures tend to be higher in developed countries. However, the graph is not inconsistent with that possibility because it shows that, after controlling for country characteristics such as preferences to spend more on education in general and year effects, there is no evidence that developed countries have spent more per primary-school-age child as their populations have been aging.

It may also be surprising that the pattern for East Asia in Figure 3.7 is flatter than the pattern for developing countries and does not show an increase after age 30. This suggests that if East Asian countries spend on average more in education than countries in other developing country regions, as the available evidence seems to indicate, they do so regardless of their age structure. The Latin American pattern is much more in line with the one for the whole sample (and is not significantly different from the general pattern), indicating that expenditure on primary education per child increases with country average age, although the increase starts at a later age than the world average.

**Figure 3.8. Age Pattern of Public Health Expenditures**



*Health expenditure as a share of GDP:* One expects that in very young and very old countries the demands for health services are larger than if most of the population is of working age. Figure 3.8 presents health expenditure as a share of GDP. As expected, the average-age profile for health expenditure is “U” shaped. If countries have low average age (and high young dependency ratios), health expenditure as a share of GDP tends to be high, reflecting the demand for public health services that is typical of the initial stages of the demographic transition that are characterized by high fertility and high infant mortality.<sup>5</sup> As the average age (and the population share of the working-age population) increases, the shares of health expenditure in GDP decline. They reach a minimum at age 33 and then start rising for higher average ages, apparently in response to increased demand by older individuals, who are increasing their population share. The decline up to age 33 is statistically significant.

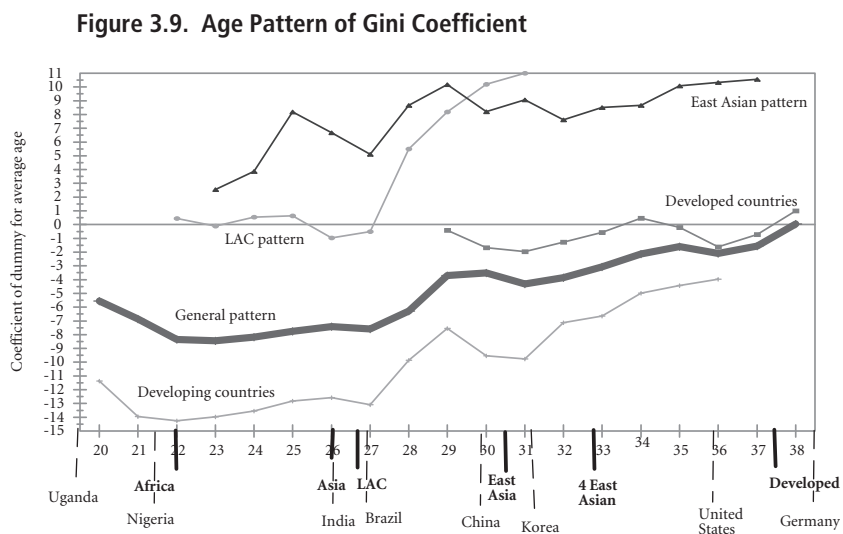
<sup>5</sup> As shown by Savedoff and Piras (1999), data from Latin America and the Caribbean reveal that at young country average ages, the proportion of deaths by communicable diseases (which tend to affect infants and small children more severely) is about 90 percent, but the proportion decreases to about 30 percent at older ages. At the other end of the life cycle the proportion of deaths due to circulatory diseases and external causes increases substantially at older country average ages.

The average age in Africa is associated with a high share of health expenditure, while the typical Asian and Latin American countries are at the stage of the demographic transition in which the aging process is associated with declining health expenditure as a share of GDP. East Asia is close to the turning point of the health expenditure–age relationship (with the four fast-growing East Asian countries past it), while developed countries have an average age at which expenditure in health tends to increase.

The pattern for all developing countries mirrors the general pattern, while developed countries taken alone suggest a slight reduction in health expenditure shares as countries age. The East Asian pattern is quite flat but not significantly different from the average. In contrast, Latin America follows an inverted “U” pattern, with health expenditures increasing as countries age, and then declining between ages 28 and 32 in line with the whole sample.

## Social Indicators

*Gini coefficient of inequality:* Figure 3.9 presents the estimated average-age pattern for inequality, using the Gini coefficient (which measures inequality on a scale from 0 to a high of 1) as the dependent variable. The results show an upward-sloping curve, and the increases observed after age 27 are



statistically significant. *Prima facie* the result may seem surprising because it is well-known that the oldest and most developed countries tend to have more equal distributions than do the younger and less-developed ones, and developed countries are well represented at older ages. The results, however, in Figure 3.9 are not inconsistent with this established notion.

The data suggest that as a population ages there is an age structure effect that generates pressures toward increasing inequality. This evidence is in line with results from several studies using micro data that have found that inequality within cohorts tends to increase with age in part because of the persistent effects of good and bad shocks experienced early in the life cycle (e.g., good or bad luck in the initial job match, bad luck in experiencing chronic illnesses or disabilities).<sup>6</sup> The regression results suggest that these effects are reflected in the Gini inequality index for the whole distribution of income. When the population weight of older (and more unequal) age groups increases, inequality tends to rise. This does not imply that a country will necessarily become more unequal as it ages, but simply that there are unequalizing age-structure factors that will predominate unless there are other stronger effects in the opposite direction.

On average, Africa, Asia, and Latin America are close to the lowest part of the curve for the whole sample. In contrast East Asia and even more so the developed countries on average have larger current unequalizing effects due to their age structures. This is striking because Latin America has been the most unequal region in the world in recent decades. If inequality within cohorts continues to increase with country average age in Latin America, there will be intensified age-structure inequality—increasing pressures in much of the region in the initial decades of the 21st century. In fact, according to Figure 3.9, the country average-age pattern for the Gini coefficient is steeper in Latin America than in any other region in the 27–31 age range, although the difference is only statistically significant for the change observed by age 28. East Asia has the steepest pattern for average ages 27 and under, a pattern that is significantly at odds with those for other regions. The pattern for all developing countries mirrors the general pattern. The pattern for the developed countries does not deviate from the general pattern in contrast to

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<sup>6</sup> See, for instance Attanasio and Székely (1998), Deaton (1997), Deaton and Paxson (1994), Duryea and Székely (2000), and Lam (1997).

what might have been expected by some because of the relatively low inequality enjoyed by the developed countries.

*Unemployment rates:* Changes in the age structure are also expected to strongly impact unemployment rates because different age groups tend to have very different probabilities of becoming unemployed. Unemployment rates tend to be higher among younger workers because when individuals enter the labor market for the first time they spend more time searching for the best match for their skills, they are less costly to release, they tend to have less information about labor markets, and potential employers tend to have less knowledge about their comparative advantages and preferences.<sup>7</sup> Thus, one would expect that when the working age population of a country is relatively young, unemployment rates will be higher but unemployment will be lessened as the age structure shifts toward older ages. Figure 3.10 presents estimates that are consistent with these expectations. Unemployment rates are relatively high and even increasing when the country average age is very young, and decline continuously between the ages of 22 and 33. For ages higher than 33, unemployment rates resume their upward climb. One interpretation of the increase at older country average ages is that there may be increasing difficulty in finding employment at older ages due to the specificity of human capital and experience. The increase between ages 20 and 21 and the decline between ages 26 and 33 both are statistically significant, as is the difference between the coefficient estimate for age 31 and the coefficient estimates for most higher country average ages.

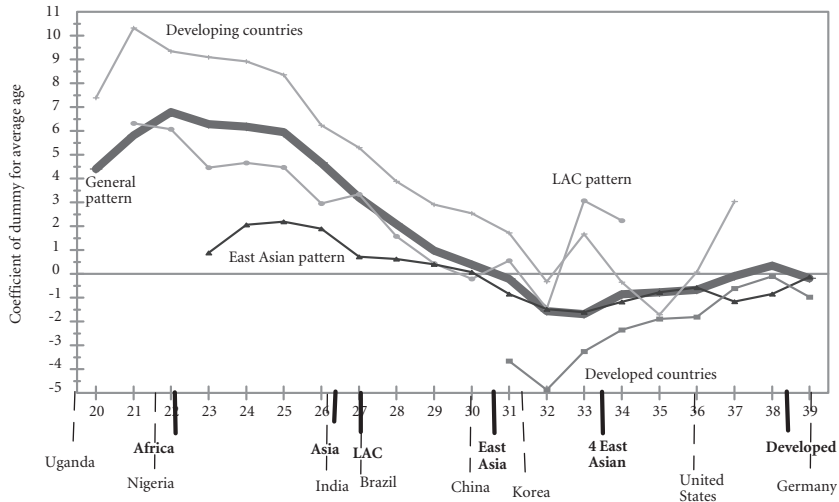
Figure 3.10 also allows comparisons across regions on the horizontal axis. Africa, Asia, and Latin America are on average in the downward-sloping section of the average-age pattern, implying that as the country average age increases there may be further declines in unemployment rates *ceteris paribus*. East Asia, in contrast, is already near the lowest point of the average-age-related unemployment pattern, and the developed countries are on the upward-sloping segment.

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<sup>7</sup> Duryea and Székely (2000) discuss these arguments and explore some of their implications for several Latin American and Caribbean countries. Another argument, developed in Pagés and Montenegro (1999) is that severance payments that increase with tenure provide disincentives to hire young workers and create incentives for their displacement if there are negative shocks.



Figure 3.10. Age Pattern of Unemployment Rates



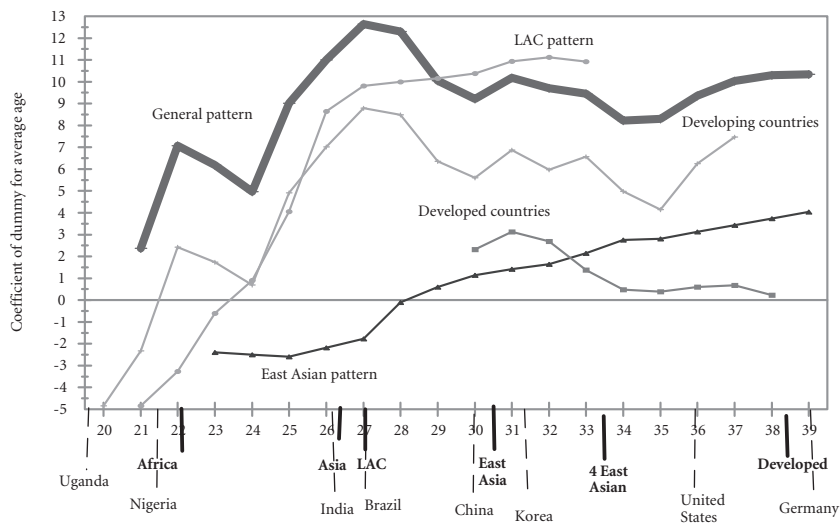
The unemployment rate is the only variable considered so far for which the general pattern is very similar to the patterns observed in the smaller samples of developing, developed, East Asian, and Latin American countries. In all of these regions there is a declining trend at relatively younger ages, and an increase at older ages. In statistical terms, the Latin American pattern is different from the rest of the regions only for ages 25 to 28 and for age 32, and there do not seem to be any decade effects for this region. The East Asian pattern is only significantly different at some of the youngest ages and at age 36.

*Homicide rates:* There is evidence that crime rates tend to be higher among juveniles, leading one to expect that with a surge in the relative importance of the crime-prone age groups, total crime rates would rise and then fall as the population shifts to older ages.<sup>8,9</sup> As noted by Morrison, Pagés, and Fuentes (1999), information on crime rates is usually plagued by problems of under-reporting, but generally homicide rates tend to be subject to less measurement

<sup>8</sup> Some of the best evidence comes from the United States. See Levitt (1998).

<sup>9</sup> Easterlin (1978, 1987) argues that this effect is reinforced in the case of individuals born in relatively large cohorts. Morrison, Pagés, and Fuentes (1999) present some empirical evidence for Latin America and the Caribbean that supports this argument. Levitt (1998) argues that the demographic effect is observed but not very large in the United States.

Figure 3.11. Age Pattern of Homicide Rates



error than other crime indicators. Thus, Figure 3.11 uses homicide rates.<sup>10</sup> The form of the curve for the whole sample supports the argument that there is an inverted “U” relation between homicide rates and age structure with a peak at country average age of 26, although there is a slight increase at the oldest ages. However, the only cases where the coefficient estimates are statistically significantly different from each other are in the increase observed between ages 22–24 and age 28, close to the peak. So, there is evidence of a positive relationship between shifts of population from young to juvenile and increases in homicide rates, but the expected reduction from shifts to older ages is not statistically significant.

On average Asia and Latin America are close to the country average age at which homicide rates peak, while Africa is on the verge of entering the age range with the positive relation between homicide rates and age structure shifts from young to juvenile ages. East Asia is on the downward slope of the general curve, where age structure shifts are expected to result in reductions in homicides.

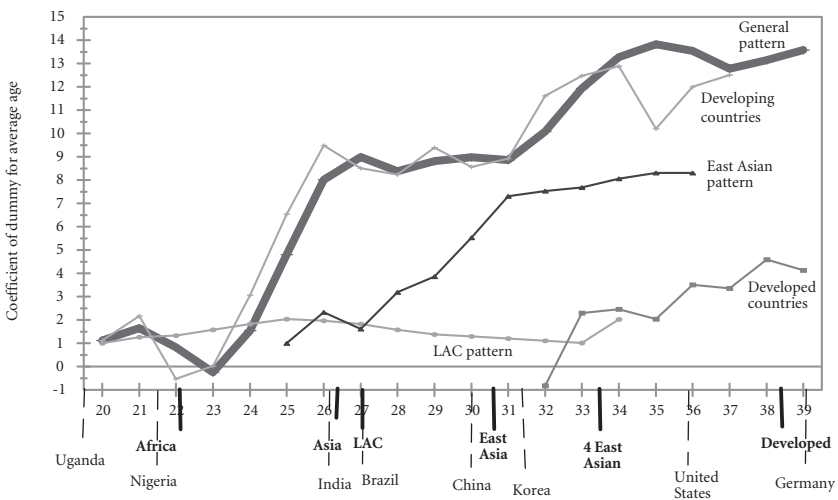
The pattern observed in developing countries mirrors the general pattern for the whole sample, while in developed countries there seems to be a

<sup>10</sup> The data on homicides includes killings associated with political violence, but not deaths due to civil wars or other wars.

reduction at older ages rather than a slight increase. In Latin America, the country average-age pattern of homicide rates is significantly different at ages 24 to 28, where rather than registering a turning point, homicide rates increase. In fact, from age 26 on, homicide rates remain much more stable. There is also a significant and negative decade effect in the 1990s in Latin America. For East Asia the pattern also differs from the one that emerges for the whole sample. In the case of this region, homicide rates increase consistently with country average age, and the differences from the overall pattern are statistically significant

*Schooling progression:* Figure 3.12 plots schooling progression—the probability that a student belonging to the cohort that is of school age in the year of reference progresses to fourth-grade. This variable was chosen because it captures the crowding-out effect that would be expected to occur when large proportions of a population demand a service. The probability of progression to fourth-grade is low at young country average ages, and then increases as country average age increases, with relatively steep slopes for the country average-age ranges of 23–27 and 31–35. The difference between the data for ages 20 to 34 and those for ages 36–39 are significant in most cases. This pattern is consistent with the crowding-out argument and is also consistent with the results in Figure 3.7 that suggest that public education expenditures

**Figure 3.12. Age Pattern of Progression to Fourth-Grade**



per child (which presumably have an effect on the quality of education) are initially low, and start increasing when a country ages.

It would appear that on average the Latin American region has already benefited from this positive effect for the 23–27 age range, though with potential in the future for the gains from the 31–35 age range. East Asia on average is poised to benefit from the gains for the latter range. The four fast-growing East Asian economies on average apparently already have benefited from most of that age range.

The nature of the relationship seems to be different in Latin America than in other regions. While the pattern for developing countries, East Asia and developed countries is in line with the general pattern, the relation between country average age and the probability of progressing to fourth-grade in Latin America is much flatter (although the differences are only statistically significant in few cases). This suggests that on average, the region has not been able to benefit from the demographic opportunity to improve its education prospects.

### **Age Patterns and Policy Variables**

The evidence presented so far indicates that a number of key variables for the development process have clear average-age-related patterns. Latin America is entering the stage in which some of the strongest (mostly positive) age structure effects will begin to show, while East Asia has already been for a while at a stage in which population age structures have provided favorable conditions for development. Africa has much younger populations, which means that most of its potential gains are further in the future.

For some regions the average-age pattern significantly differs from the general pattern. One reason might be that some regions have been more able to translate the demographic opportunity into better economic performance by implementing specific complementary policies. Consider Figure 3.3 for instance, which clearly shows that East Asia has followed a country average-age pattern for GDP per capita that is very different from the Latin American experience, even after controlling for country specific effects and year effects.

This leads to the question of which policies are associated with more-desirable age patterns for the aggregate economic variables of interest. If in fact, demography provides a boost for GDP per capita, as Figure 3.3 suggests, why have the Latin American and East Asian experiences been so different? In order to shed light on this question some policy variables are included in the analysis. Are the demographic opportunities for increasing GDP per capita, increasing savings, and improving educational attainment associated with trade policy, financial market development, macroeconomic stability, and governmental expenditures on education?

The four variables analyzed relate to major policy areas: (i) exports plus imports over GDP as a proxy for trade openness;<sup>11</sup> (ii) the value of credit to the private sector as a share of GDP as a measure of financial market development; (iii) the absolute value of the coefficient of variation of the GDP per capita growth rate for 't,' 't-1,' 't-2,' and 't-3' as a proxy for macroeconomic volatility; and (iv) in the case of the probability of progressing to fourth-grade, the proportion of governmental expenditures on education relative to GDP.

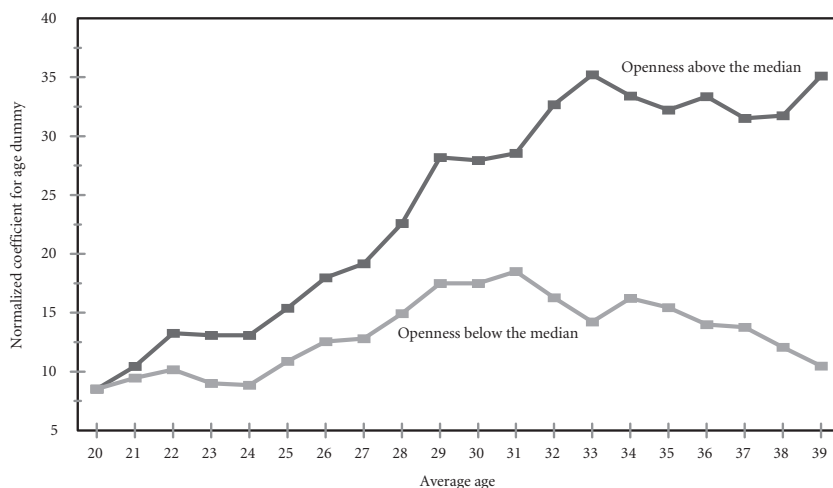
The methodology and results are discussed in detail in Behrman et al. (1999), but the relevance of the findings for policymakers are summarized here.

*Domestic savings rates:* One of the most emphasized aspects of changing age structures, as noted above, is the change in savings. The extent to which the tendencies to change savings patterns as age structure changes, however, may depend importantly on aspects of the economy that are related to major policy choices. When examining domestic savings as a proportion of GDP and trade openness, the findings suggest that across countries there is evidence of a somewhat inverted "U" pattern between country average age and domestic

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<sup>11</sup> One drawback of this particular indicator of trade openness is that small economies may be inherently more open than large ones due to scale economies, and that countries with certain mixes of factor endowments also tend to trade more. Spilimbergo, Londoño, and Székely (1999) construct a measure of trade openness that controls for country size (in terms of both geographic size and GDP), geographic location (in terms of distance to the major world markets), and factor endowments. This measure of trade openness is used here as an alternative to exports plus imports over GDP in the regressions described below, but in all cases, the coefficients of interest were insignificant in statistical terms. Therefore, the conclusions derived from the use of the proxy for trade openness described in the text should be taken with caution because they are not robust to other indicators of openness.

**Figure 3.13. Average Age Pattern of Domestic Saving for High and Low Levels of Openness**

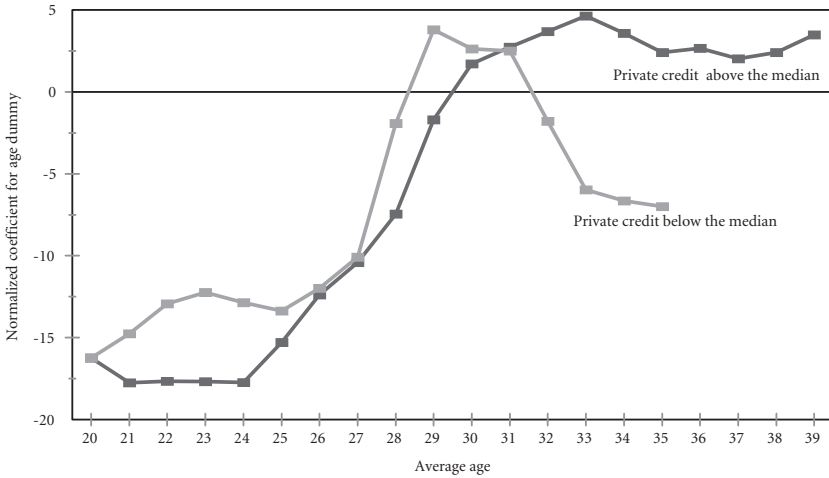


savings, as shown in Figure 3.1. This holds when looking specifically at countries with openness above the median, as shown in Figure 3.13. It increases fairly sharply with country average age until age 33, and then declines somewhat thereafter. In contrast, for countries in which trade openness is below the median, savings have a much flatter pattern with a peak at a country average age of 31. This difference suggests that in the countries that are relatively more open to trade, the shift in age structure toward older ages is more likely to be translated into higher saving.

The extent to which age structure changes due to the demographic transition can provide an opportunity for savings also *a priori* depends on the development of financial markets. If individuals are credit constrained and are subject to uncertainty, people will be more likely to save. On the other hand, individuals will be less able to save for long-term objectives such as accumulating assets for retirement and will find it more difficult to shift between current and future consumption.<sup>12</sup> Figure 3.14 explores if in fact the country average age pattern of domestic savings differs at higher or lower levels of financial market development. The findings do show that countries with relatively developed financial markets tend to follow the

<sup>12</sup> Deaton (1991) discusses this argument in detail.

**Figure 3.14. Average Age Pattern of Domestic Saving for High and Low Private Credit as a Share of GDP**



standard savings pattern. In those countries with underdeveloped financial markets, there is a sharp decline in domestic savings after age 28 rather than a further increase and a leveling off at older ages. This result is consistent with the idea that if financial markets are more developed, individuals have more opportunities to save and the financial system is more efficient in allocating credit. Therefore, individuals are more able to behave as the life-cycle theory predicts would be the case with perfect capital markets.

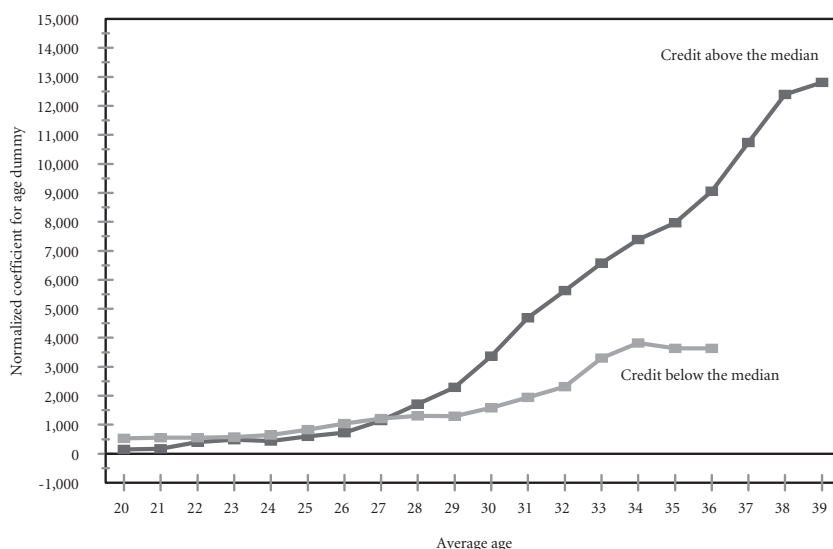
*GDP per capita:* Although the demographic transition from a young to an older population can initially boost the prospects for economic growth due to the reduction in the young dependency ratio, the shift to larger proportions of the population in working ages can also constitute a potential threat if the right policies are not in place. Figure 3.3 suggests that in East Asia this shift was accompanied by substantial increases in GDP per capita, but this would not have been the case if the population moving to working age had not had employment opportunities.

If a country is open to trade and the size of the working age population is increasing quickly, it would seem to be more able to exploit the comparative advantage of having more labor. However, when the sample is split according to levels of exports plus imports as a share of GDP above and below the median, no significant differences are found.

Better financial markets improve the allocation of financial resources, which would be expected to be associated with more employment generation. In fact, as shown in Figure 3.15, for the cases in which financial markets are relatively more developed, the country average-age pattern of GDP has a positive slope from age 27 on, and is much steeper. For those with relatively low financial development, the country average-age pattern is practically flat. This suggests that financial markets may play an important role in assuring that the expansion of the working-age population is translated into greater economic activity.

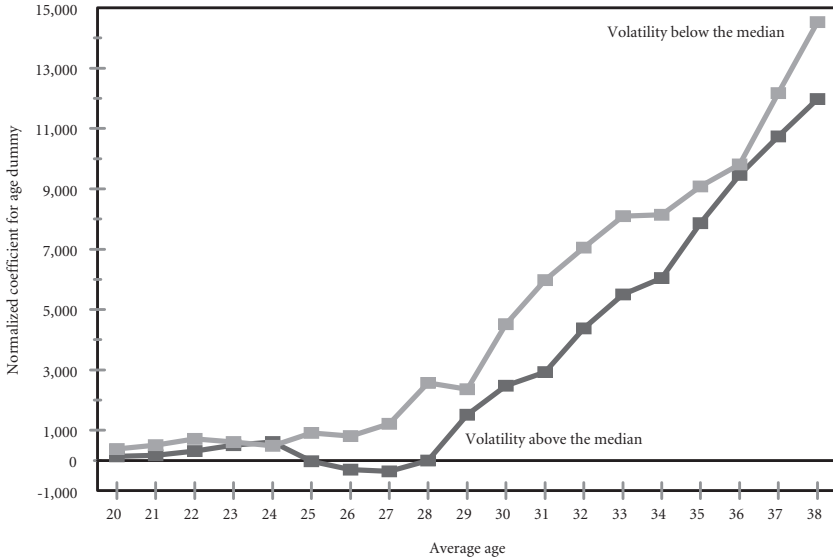
One would also expect that countries subject to lower macroeconomic volatility would benefit from lower uncertainty. A more stable environment during the period of expansion of the working-age population will make it easier to attract investment, which is needed to create enough jobs for the new entrants into the labor market. Figure 3.16 plots GDP per capita as the dependent variable for the two groups of countries in which, respectively, the measure of macro volatility is above and below the median. Although the curves do not seem to differ markedly at very young and old ages, for several cases between ages 25 and 34 the observations with relatively low volatility present significantly sharper increases in GDP per capita than the

**Figure 3.15. Average Age Pattern of GDP per capita for High and Low Private Credit**





**Figure 3.16. Average Age Pattern of GDP per capita for High and Low Volatility**



cases below the median. This provides some support for the argument that a more stable macroeconomic environment provides more favorable conditions in which to take advantage of the demographic opportunity presented by the enlarged working-age population.

*Unemployment rates:* How unemployment rates are associated with trade openness is a subject with significant and controversial policy implications. Since changes in unemployment rates tend to impact age groups differently, this connection merits exploring. Across countries, unemployment rates appear to be relatively high at young ages and relatively low at older ones. If countries are again divided into two groups of high and low trade openness, the decline in unemployment along the country average age profile is much steeper in the cases where openness is above the median. This suggests that, in fact, trade policy might help to release some pressure from the labor markets at the time when large shares of the population are entering working-age even if such effects are not reflected in GDP per capita. In terms of financial market development and macroeconomic volatility, no significant differences were found.

*Probability of progressing to fourth-grade:* Finally, four sets of regressions are estimated using the probability of progressing to fourth-grade as the dependent variable. The three indicators that were examined for the other dependent variables in this section were used—trade openness, financial market development, and macroeconomic volatility—as well as the proportion of governmental expenditure on education as a share of GDP. One might expect that each of these policy-related indicators would affect schooling success both through changing the expected rates of return from investing in schooling and through changing the costs of schooling directly and altering the opportunity costs of time spent in school. Yet such evidence was not found. This is a surprising result (or nonresult). Perhaps schooling is affected through other channels such as changing the quality of education, but—if so—micro estimates suggest that even in that case there should be induced changes in the quantity of schooling as well (e.g., Birdsall, 1985).

## Conclusions

The results suggest that the variables considered follow clear age-related patterns, that the patterns differ by regions and by different policy regimes related to trade openness, deepening domestic financial markets and macroeconomic volatility. The evidence is consistent with the possibility that some age structure shifts can provide favorable conditions for development. East and Southeast Asia in recent decades have been able to benefit from this demographic opportunity. However in other regions such as Latin America, which is poised to experience the largest age structure shifts in the coming decades, creating an adequate economic environment to translate the opportunity into higher living standards for its population is a major challenge. Why have the Latin American and East Asian experiences been so different? From a policy perspective, the results suggest Latin American development could be greatly enhanced through fostering the creation of broader and deeper capital markets. This would spur increased saving and improved allocation of credit, thereby ultimately creating more employment opportunities. Two other areas for improvement in terms of job creation are ensuring macroeconomic stability to attract more investment, and trade openness.



## **Which Matters More for Fertility Changes: Improved Health or Women's Schooling?**

*Jere R. Behrman, Suzanne Duryea, and Miguel Székely<sup>1</sup>*

In the quest for economic development, fertility reductions play a key role in generating a virtuous circle involving greater investment in human capital per child, higher labor force participation rates, elevated levels of and returns to education, and increased savings. By increasing temporarily—yet possibly for decades—the share of the working-age population, lower fertility rates bring about changes that present a demographic “window of opportunity” for economic growth.<sup>2</sup> Although many developed countries and even some developing ones have reached a stage at which future fertility reductions are unlikely, the topic is still very much of interest because the majority of countries in the world are—or soon are likely to be—experiencing important fertility declines. In particular, the Latin American region as a whole is poised to undergo the fastest demographic transition in the world in the next two or three decades. When looking at the performance of individual countries in the region, however, the existence of “stragglers,” or countries with the highest fertility rates and the lowest development levels, is apparent. There is therefore a pressing need in policy circles to enhance the understanding of what types of economic factors might trigger lower fertility, not only to take advantage of current opportunities, but also to bring about new ones.

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<sup>2</sup> See for instance Bloom and Williamson (1999); Behrman, Duryea, and Székely (1999); ADB (1997); and IDB (1998).

The mystery of what induces people to have fewer children, however, is not an easy one to solve. The role of fertility in the feedback loop of household decision-making and economic growth is complex, and the diversity of country contexts is broad. A wide range of analytical perspectives is therefore called for. The previous chapter took a macro view of the demographic changes brought about by fertility decisions and offered several policy insights based on the research findings. In other words, it asked, “Given a certain age structure, what policies are most effective?” It showed that in East Asia, an age structure with reduced dependency ratios created a window of opportunity for economic growth. This chapter essentially turns the same question around to ask, “What policies might be most effective in reducing fertility rates to move countries along the path of economic growth and development?” Rather than asking how to capitalize on a window of opportunity, it explores how to create one.

In order to shed light on the factors that are associated with differences in fertility across regions, and differences in the rate at which fertility has declined, data is gathered from various regions and time periods. First, aggregate international data for the last half of the 20th century is used to characterize differences in fertility and mortality and in related dependency ratios<sup>3</sup> across regions and over time. The evolution of demographic transitions across regions of the world and within Latin America are compared and contrasted. Econometric estimates are used to decompose the differences in fertility rates between developed and developing countries, as well as the differences in fertility between 1960 and 1995 for several developing regions. The spotlight is then placed solely on Latin America and the Caribbean, and data from 22 countries are used to draw a more detailed picture of the regional demographic experience.

The main lessons from the vast body of literature on the subject of fertility are then drawn out, with particular attention to the specific factors that are associated with declining fertility rates. To explore whether the real-world data supports the conclusions of the literature, several international data sources covering most of the countries in the world for 1950–95 are

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<sup>3</sup> Throughout this chapter “young” is used to refer to the 0–14 age group, “working-age” to refer to the 15–64 age group, and “old” to the 65-and-older age group. Similarly “young dependency ratio” refers to the ratio of the population in the 0–14 age group to that in the 15–64 age group, and “old dependency ratio” refers to the ratio of the population in the 65-and-older age group to that in the 15–64 age group.

combined and analyzed econometrically. Key findings underscore the importance of women's schooling and health.

### **Regional Trends in Dependency Ratios, Fertility, Mortality, and Population Growth: How Does Latin America Compare?**

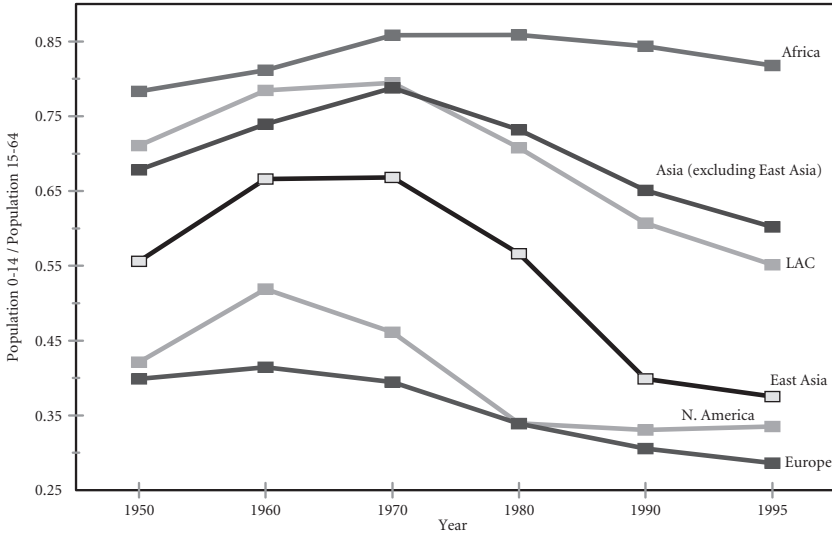
How do fertility and mortality changes come together to create a stereotypical demographic transition? In the first stage, mortality drops quickly while fertility declines more slowly, with the result being high population growth and an increase in the young dependency ratio. In the next stage continuously falling fertility in tandem with more slowly declining mortality reduces population growth so that the young dependency ratio starts decreasing. The faster is the decrease in the young dependency ratio the greater is the "demographic opportunity" presented by a high working-age population share and low dependency ratios. As the population continues to age, however, the old dependency ratio increases with a concomitant reduction in the working-age share despite the continuing decline in the young dependency ratio.

When looking at the paths that young and old dependency ratios have taken over time in various regions over the past half-century, however, it is apparent that they do not fit neatly into a general pattern. Figure 4.1 plots the young dependency ratios for 1950–95 of Africa, Latin America and the Caribbean, North America, Europe, East Asia and the rest of Asia, calculated from the United Nations Population Statistics (see United Nations, 1998).

Africa has the highest young dependency ratio throughout this period—in 1995 about 3.4 times larger than that observed for Europe, the region with the lowest ratio. The African young dependency ratio has also remained relatively static in comparison with the other developing regions, increasingly only slightly until about 1980. It is currently still quite high and declining sluggishly due to sustained high fertility rates.

Asia and Latin America have had young dependency ratios throughout this half-century that have been below those for Africa, but considerably higher than those for North America and Europe. They show the inverted "U"-shaped trend in young dependency ratios that is characteristic of the demographic transition, with the peak in young dependency ratios around 1970. East Asian young dependency ratios have been lower than have been those for the rest of Asia and Latin America throughout this period, though

Figure 4.1. Young Dependency Ratios in the World



they increased considerably between 1950 and 1960. They then topped out a little earlier in the 1960s and declined more sharply after the peak than in the rest of Asia and in Latin America so that by 1995 they were much closer to those in North America and Europe than to those in the rest of Asia and Latin America. The young dependency ratios for North America have been below those for developing countries throughout the past half-century, generally considerably below with the sole recent exception of East Asia. They decline after 1960 (though with a slight baby-boom “echo” in North America in the 1990s), but with lesser rates of decline than the somewhat later declines in Asia (particularly East Asia) and Latin America.

Over this past half-century, the sharpest decline in young dependency ratios was for East Asia between 1970 and 1990. During this period, therefore, this region had the greatest “demographic opportunity” among all of the world regions. The next sharpest decline was in North America between about 1960 and about 1980 due to the earlier “baby boom.” Latin America has experienced a substantial decline, starting around 1970, that is ongoing but not at as rapid a clip as East Asia in 1970–90 or North America in 1960–80. Therefore, though Latin America has an ongoing “demographic opportunity” and currently the fastest decline in the young dependency ratios among all of the regions, this “opportunity” is not as large as that experienced

earlier by East Asia. Asia (excluding East Asia) has a pattern of youth dependency ratios similar to Latin America, with somewhat slower growth rates before the peak around 1970 and somewhat slower declines after that peak. Thus the rest of Asia has a somewhat smaller current “demographic opportunity” than Latin America and much less than East Asia had earlier. Finally, Africa is in the midst of a slow decline in young dependency ratios that promises a very modest “demographic opportunity”; later in this century this region is slated to have the fastest decline (though nowhere near as fast as that in East Asia in 1970–90 or even in Latin America and the rest of Asia currently).

Young dependency ratios are not the only demographic variable of interest. Another major reason for the piqued interest in demography lately is that some of the most developed economies and some of the recently more quickly developing countries have rapidly increasing shares of “old” populations, triggering important consequences, such as imposing pressures on pension systems, saving rates, public health, and other key economic services and variables. The continuation of this age structure shift is expected to have even larger effects in the future, with substantial policy implications. Figure 4.2 presents the old dependency ratios by region.

**Figure 4.2. Old Dependency Ratios in the World**

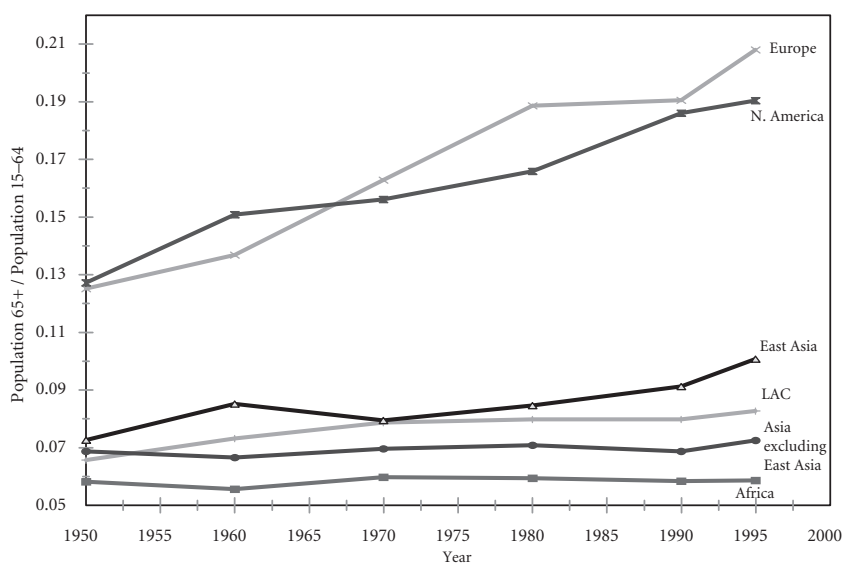
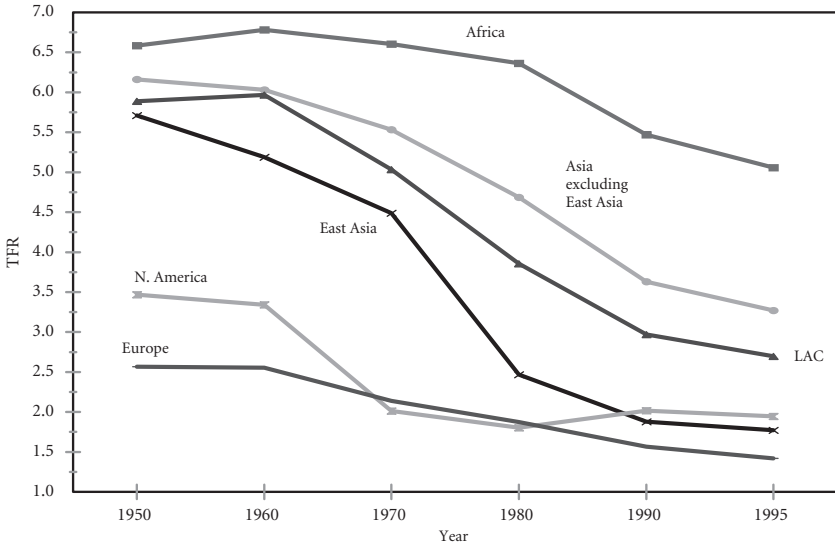




Figure 4.3. Total Fertility Rate (TFR) by Region, 1950–1995



The main feature of this figure is that Europe and North America have old dependency ratios way above those of the other regions. The old dependency ratios in these two developed regions, moreover, have been increasing at more rapid rates than in the other regions for most of the 45-year period covered. The differences among the developing country regions are very small in comparison with the differences between the developing and the developed regions. Among the developing regions, over the entire period the old dependency ratios are positively associated with most indicators of recent development levels, with East Asia highest, Latin America next, then the rest of Asia, and finally Africa. East Asia has had somewhat more variance over time than the other developing regions, and in recent years the East Asian ratio has been increasing at an accelerated rate. Thus, what primarily differentiates the age structure and dependency ratios in East Asia from the other developing regions is the relative size of its working-age population.

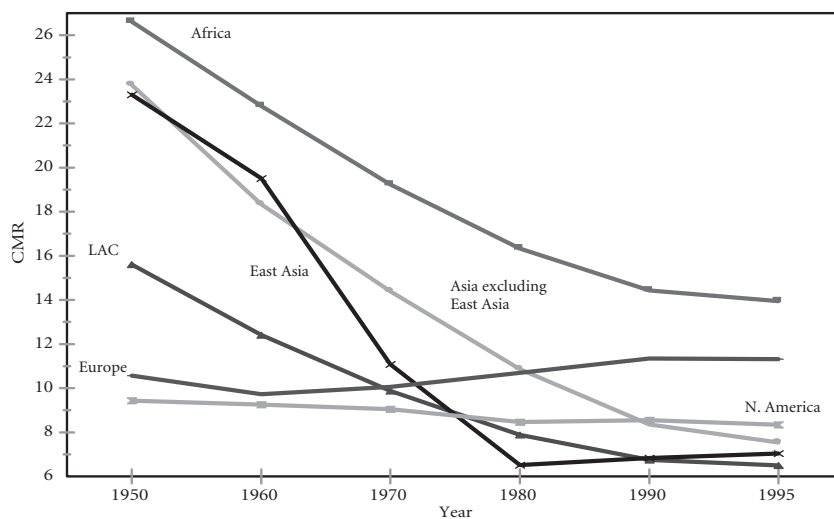
Figure 4.3 presents the regional total fertility rates (TFR), defined as the number of children that would be born to a woman exposed to the age-specific birth rates of the period for the age range 15–49.<sup>4</sup> Africa is the devel-

<sup>4</sup> The correlation of the TFR with the crude birth rate, which is not age standardized, is .98.

oping country region with the highest fertility and where fertility has declined most slowly. Europe has also had a slow fertility decline in this period, but in this case the reason is that it already had the lowest levels in the 1950s. The second- and third-highest fertility rates are found in Asia (excluding East Asia) and Latin America, respectively. In these two regions, fertility rates were somewhat lower than in Africa in 1950, but they subsequently declined much faster, with the result that in 1995 their fertility rates were about half of those observed in Africa. The declines were somewhat greater in Latin America than in Asia (excluding East Asia). In 1950 fertility rates in East Asia were also very similar to those in Latin America, but during the 1950s fertility in this region started to decline more sharply than in any other region in the world. By 1995, fertility in East Asia was between North American and European levels. Yet in Latin America, the region with the second-fastest reduction, fertility in 1995 was still at levels well above those for North America, East Asia, and Europe. The difference between Latin America and East Asia was 0.2 in 1950, but had increased by a factor of over four to almost 1.0 in 1995.

The differences in mortality across regions between 1950 and 1995, presented in Figure 4.4, have been much smaller than have been those for fertility. While fertility rates diverged significantly between East Asia and

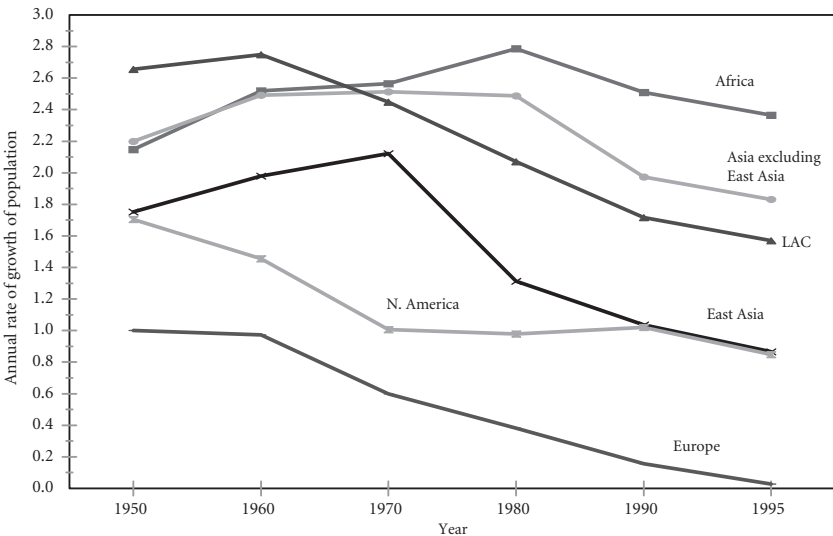
**Figure 4.4. Crude Mortality Rate (CMR) by Region**



Latin America since 1950, crude mortality rates converged from 1960 on. These two regions had very similar rates in 1995 (although mortality in East Asia remains somewhat higher). Differences in mortality rates between these two regions and the rest of Asia are also relatively small. Likewise the differences between East Asia and Latin America on one hand and Europe and North America on the other in recent years are quite minor, with the former having lower crude mortality rates because mortality rates increase substantially as old age dependency ratios increase. Therefore, the cross-country differences in age structures, dependency ratios, and average ages of the population are due basically to differential fertility not mortality.

The combination of rather high fertility and low mortality rates places Asia and Latin America close to the world average in terms of annual rates of population growth. Figure 4.5 shows that Latin America still has a population growth rate over 1 percent, which is normally considered the threshold to enter the fourth stage of demographic transition in which the population growth falls to replacement levels. Given the reduction in fertility experienced by East Asia since 1955, population growth rates in that region are now about half those observed in Latin America, and are very similar to the rates observed in some of the most developed regions in the world.

Figure 4.5. Population Growth Rate by Region



According to the UN population projections, it will take Latin America until 2030 to reach the same population growth rates currently observed in East Asia (0.6 per cent per year), even though these regions had similar age structures in 1950.

### **Differences within Latin America and the Caribbean**

Not only will Latin America on average host the most dynamic demographic changes for the next few decades to come, but it also includes a wide range of country age structures, from some that are similar to countries with the youngest populations in the world to others that are more like the developed economies with older populations. Therefore, it can be determined whether the conclusions from the aggregate regional analysis can be extended to particular countries with widely varying age structures.

The age structure changes that are likely to occur in Latin America in the next 30 years are fairly predictable because they are consequences of fertility declines observed in the past or currently taking place. However, within the region there are a number of countries where the transition has been relatively slow and where there is still scope for major reductions in fertility that could trigger more rapid demographic transitions later in this century.

Differences in age structures within Latin America are quite apparent when looking at the young dependency ratios in Table 4.1. For the countries with the youngest populations such as Honduras, Nicaragua, and Guatemala, the young dependency ratios in 1995 were twice as large as in the countries with the oldest populations, including Barbados, Argentina, and Uruguay.<sup>5</sup> One interesting aspect of the table is that by 1950 about half of the countries had young dependency ratios between 0.7 and 0.8, suggesting that some decline in these ratios already had occurred. By 1995, however, the ranking among this group of countries had changed significantly due to differences in the paces at which fertility had fallen.

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<sup>5</sup> There are only marginal differences in old dependency ratios among countries in Latin America. The only two countries where old dependency ratios are relatively high are Barbados and Uruguay, which are almost at East Asian levels.

Table 4.1. Young Dependency, Fertility, Mortality, and Population Growth in Latin America

Country	Young Dependency			Total Fertility Rate			Crude Death Rate			Population Growth Rate		
	1950	1995	Change	1950	1995	Change	1950	1995	Change	1950	1995	Change
Honduras	0.86	0.82	-0.03	7.5	4.3	-3.2	22.8	5.4	-17.4	3.1	2.7	-0.3
Dominican Republic	0.85	0.58	-0.28	7.4	2.8	-4.6	20.3	5.3	-15.0	3.0	1.6	-1.4
Nicaragua	0.84	0.87	0.02	7.3	4.4	-2.9	22.7	5.8	-16.9	3.0	2.7	-0.3
Guatemala	0.83	0.87	0.05	7.1	4.9	-2.2	22.4	7.4	-15.0	2.9	2.6	-0.2
Costa Rica	0.82	0.57	-0.25	6.7	2.8	-3.9	12.6	3.8	-8.8	3.5	2.5	-1.0
El Salvador	0.80	0.64	-0.15	6.5	3.2	-3.3	19.9	6.1	-13.8	2.6	2.0	-0.6
Venezuela	0.80	0.61	-0.19	6.5	3.0	-3.5	12.3	4.7	-7.6	4.0	2.0	-2.0
Colombia	0.79	0.56	-0.22	6.8	2.8	-4.0	16.3	5.8	-10.5	2.9	1.9	-1.0
Mexico	0.78	0.59	-0.19	6.9	2.8	-4.1	17.0	5.1	-12.0	2.7	1.6	-1.1
Peru	0.76	0.60	-0.15	6.9	3.0	-3.9	21.6	6.4	-15.1	2.6	1.7	-0.8
Bolivia	0.75	0.73	-0.02	6.8	4.4	-2.4	24.4	9.1	-15.3	2.0	2.3	0.3
Brazil	0.75	0.50	-0.25	6.2	2.3	-3.9	15.4	7.2	-8.2	3.1	1.3	-1.8
Suriname	0.74	0.57	-0.18	6.6	2.2	-4.4	12.6	6.0	-6.6	3.0	0.4	-2.6
Trinidad & Tobago	0.73	0.48	-0.25	5.3	1.6	-3.6	11.2	5.9	-5.3	2.5	0.5	-2.0
Panama	0.72	0.54	-0.18	5.7	2.6	-3.1	13.3	5.1	-8.2	2.5	1.6	-0.9
Ecuador	0.72	0.61	-0.10	6.7	3.1	-3.6	19.4	6.0	-13.4	2.6	2.0	-0.7
Paraguay	0.70	0.76	0.05	6.5	4.2	-2.3	11.2	5.4	-5.8	2.2	2.6	0.4
Bahamas, The	0.70	0.49	-0.21	4.1	2.6	-1.5	10.7	4.9	-5.8	2.3	1.8	-0.5
Belize	0.67	0.77	0.11	6.7	3.7	-3.0	12.6	4.2	-8.4	3.0	2.4	-0.6
Haiti	0.64	0.81	0.18	6.3	4.4	-1.9	27.5	12.4	-15.1	1.5	1.7	0.2
Chile	0.62	0.46	-0.16	4.9	2.4	-2.5	13.6	5.6	-8.0	2.1	1.4	-0.8
Jamaica	0.60	0.56	-0.04	4.2	2.5	-1.7	11.5	5.9	-5.6	1.9	0.9	-1.0
Barbados	0.54	0.35	-0.19	4.7	1.5	-3.2	13.2	8.2	-5.0	1.5	0.5	-1.0
Argentina	0.47	0.47	0.00	3.2	2.6	-0.5	9.1	7.9	-1.2	2.0	1.3	-0.7
Uruguay	0.44	0.40	-0.04	2.7	2.4	-0.3	10.5	9.4	-1.1	1.2	0.7	-0.4

Source: United Nations Population Statistics (1998).

One might expect the countries with the highest initial fertility to register a larger decline because fertility has a lower bound and fertility rates across countries therefore tend to converge. The data suggest that the countries in Latin America are in fact converging to lower fertility levels. The largest fertility declines in Latin America are observed in the countries with the highest fertility in 1950. Countries such as the Dominican Republic, which had the highest fertility in 1950, had the largest decline; Uruguay, the country with the lowest rate in 1950, underwent the most modest change. Nevertheless, there are some cases such as Haiti, Guatemala, Paraguay, and Bolivia that had some of the highest rates in 1950, but in which the reductions have been slower than expected on the basis of this correlation.

Convergence has been faster in terms of death rates than for fertility. With the exceptions of specific cases such as Haiti, Uruguay, and Argentina, there seem to have been relatively small differences in death rates across the countries in the region by 1995 compared to 1950.<sup>6</sup> Death rates declined more in the countries with higher mortality in 1950. An extreme case is the comparison between Guatemala and Barbados. Guatemala had death rates almost twice as large as Barbados in 1950, but by 1995 death rates were very similar. On the other hand fertility in Guatemala was 1.5 times higher than Barbados in 1950, but almost three times higher in 1995. As in the rest of the world, therefore, age structure differences observed within Latin America today are primarily due to fertility rate differentials rather than mortality rate differentials.

As can be seen in Figures 4.3 and 4.4 and Table 4.1, the countries in Latin America with the highest fertility rates remained substantially above the world average fertility in 1995, which suggests that there is still scope for substantial reduction. However, in terms of mortality, most Latin American countries were below the world average in 1995 already; with few exceptions, major declines are not expected in the future. In fact, death rates tend to increase with the shift of the population toward the older age group, as noted above, so crude mortality rates may well increase in many countries in Latin America. The age structure and dependency ratio shifts expected in the next decades in Latin America will be due mainly to fertility reductions.

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<sup>6</sup> Death rates are high in Haiti because this country has the highest infant mortality rate, and are high in Uruguay and Argentina because relatively large proportions of the populations in these countries are old.

In summary, there are substantial differences in dependency ratios across regions and within Latin America, and these differences are primarily due to the dynamics of fertility. In some countries and regions fertility has declined at much faster paces than in others, triggering subsequent shifts in dependency ratios that have strong implications for various economic outcomes. Because fertility, rather than mortality, changes are expected to be the major determinant of near-term future demographic changes and because there is still scope for significant reductions in fertility, it is of interest to investigate which factors are associated with differential changes in fertility rates across countries and regions.

### **Fertility Differences and Declines for Major World Regions: Comparing the Literature with Empirical Findings**

Why did Latin America and East Asia diverge demographically from fairly similar paths after the 1950s? And why have some countries within Latin America experienced much sharper fertility reductions than others? There is a vast body of literature (much of which is reviewed in Birdsall, 1988; Schultz, 1997; and Behrman, 1999a) that attempts to explain what determines fertility. Some of the factors that are highlighted in this literature are—

- **Culture and religion:** Religious beliefs and cultural patterns usually have strong associations with the roles that women and men play in society. By influencing the way women allocate their time between home and market activities and within the household, and by providing incentives/constraints to the use of contraceptive methods, these beliefs influence decisions of how many children to have. Differences in religious or cultural patterns could therefore have strong associations with fertility.
- **Health and the epidemiological transition:** The more precarious are health conditions, the lower the probability of survival of each child and therefore the larger the number of pregnancies required to ultimately achieve the targeted number of adult children. If health conditions improve and reduce infant mortality rates while increasing life expectancies, people will perceive increased probabilities of survival to adulthood and can expect to achieve their desired family size

with fewer births. Furthermore, with longer expected lifetimes, the returns to human resource investments are greater, thus shifting the incentives towards investing more in each child rather than having more of them.

- **The roles of children:** In societies in which child labor is productive (e.g., communities with predominantly agricultural activities on family farms) the income-generating potential of children can be high relative to the costs of raising them, which provides incentives for having many children. Children also may be sources of old-age security in the absence of good capital markets and public programs for old-age support. Couples may therefore decide to have more children to reduce the risk of not being able to support their standard of living after retirement or if struck by illness or disabilities. Both of these possibilities are likely to be reduced with urbanization and market development.
- **Income/wealth and quality effects:** On one hand, people might be expected to have as many children as they can afford, and therefore the number of children would increase the higher the income level and the lower the economic cost of raising each of them. On the other hand, parents (particularly richer ones) might choose to invest more in each child, thus reducing fertility. The relation between income and fertility therefore is theoretically ambiguous (Becker, 1991; Becker and Lewis, 1973; Willis, 1973). Empirical evidence on the relations among fertility, child quality, and income tends to suggest that people choose more often to invest more resources in each child rather than to have more children as household income increases.
- **Schooling and labor market opportunities:** The schooling of both men and women may influence through various channels the number of children born. Schooling of women may affect the ability to achieve the desired number of births by increasing their awareness and use of contraceptive methods or boosting their bargaining power relative to husbands' higher preferences for children. More-educated women can then have fewer undesired births (Rosenzweig and Schultz, 1985; 1987). If additional schooling increases productivity within the household—for example, by more efficient use of health services—then the resulting reduction in the cost of being able to devote more resources in each child may also lead parents to shift to



fewer children but invest more in each one.<sup>7</sup> If women have better market opportunities because of their education level, the opportunity cost of their time invested in childcare increases with schooling. They therefore tend to have fewer children if the increased opportunity cost is large enough to offset the potential positive income effect (Kremer and Chen, 1999). Similarly, if the reward paid in the labor market for a fixed amount of schooling increases, the opportunity cost of the time invested in raising children increases, and the desired number of children tends to decline (with the net effect again being ambiguous). Conventional wisdom and much of the past empirical literature suggests that women's schooling is the dominant factor associated with fertility declines, though in most studies exactly what causal role women's schooling is playing is not identified.

Several international data sources with information for most of the countries in the world are combined below to explore how the real-world data compares with the above possibilities.

### **Links between Various Aggregate Variables and Differences in Fertility among Regions and over Time**

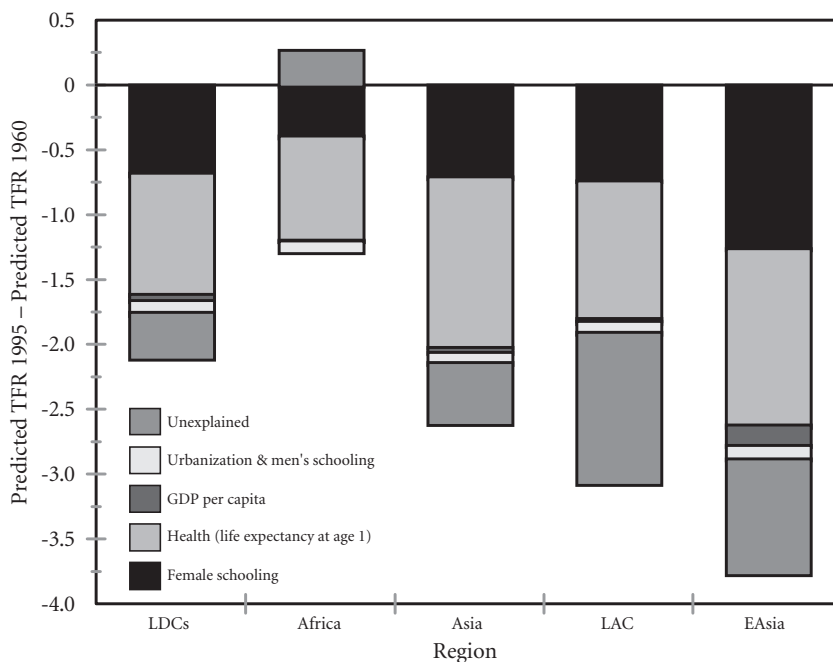
Of the set of variables discussed in the literature, which are the dominant ones in explaining fertility in the developed and the developing countries?<sup>8</sup> According to the estimates summarized in Figure 4.6, the two key variables are the differences in female schooling and in health. Female schooling differentials

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<sup>7</sup> For empirical evidence of increased home productivity related to women's schooling in developing country contexts, see Behrman, Foster, Rosenzweig, and Vashishtha (1999) and Lam and Duryea (1999). Such results, however, depend on the nature of labor markets for women. If the schooling returns are relatively high in labor markets, in contrast to rural India and Brazil (the contexts for the two studies mentioned in the previous sentence), increased schooling for women, once there is control for differential endowments and marriage market outcomes that are associated with women's schooling, may reduce women's time in home production. Therefore, more female schooling may have a negative impact on outcomes such as child schooling, as found for the United States in Behrman and Rosenzweig (1999).

<sup>8</sup> In Behrman, Duryea, and Székely (1999), the total fertility rate was regressed on 17 variables related to the factors identified in the literature. With the exceptions of female schooling and health, none of these turned out to be significant.

**Figure 4.6. Decomposition of the Change in Total Fertility Rates (TFRs), 1960–1995**



are consistent with about three-quarters of the difference (76 percent), with that for secondary school most important (39 percent) followed by that for tertiary school (22 percent). Better health in the developed than in the developing world as represented by the life-expectancy-at-age-one variable is consistent with about half of the difference (51 percent). These two sets of variables alone are therefore associated with more than the observed difference (127 percent), with partial offsets associated somewhat with the total net effect of the other observed variables but primarily with differences in unobserved variables (−24 percent). Among the other observed variables, religious differences have a relatively large association (−17 percent). In particular, developed countries have higher proportions of Protestant populations than the average developing country,<sup>9</sup> which are associated with a negative part of the difference in fertility. Had the developing countries had smaller differences in the distribution of the population by reli-

<sup>9</sup> See Table A2 in the Appendix of Behrman, Duryea, and Székely (1999).

gion with respect to the developed countries, fertility rates would actually be higher.

The other three observed variables are associated on net with 15 percent of the difference between the developing and developed countries' fertilities: 9 percent for Purchasing Power Parity (PPP) GDP per capita, 5 percent for schooling of males, 3 percent for the percentage urban population, and -2 percent for latitude.<sup>10</sup> Once there are controls for female schooling, life expectancy at age one, and religion, none of these other observed variables has a very large association with regional fertility differentials—though they may have causal effects that work through some other variables.

Similar patterns are obtained when comparing Africa, Asia (excluding East Asia), and Latin America with the developed countries. The main differences are that for Africa, where health is relatively precarious, this variable is associated with a somewhat higher proportion of the difference between this region and the developed country average, and female schooling and religion are associated with somewhat smaller proportions of the difference. For Asia (excluding East Asia), the opposite is the case—there are somewhat larger associations for female schooling and religion and smaller ones for health. For Latin America, as for Asia (excluding East Asia), the association with female schooling is larger (80 percent) and that for health is smaller (34 percent) than for all developing countries combined, but—as for Africa—that with religion is relatively small (and positive in sign for Latin America). For female schooling for Latin America, differences in secondary schooling have particularly large associations (61 percent) and those for tertiary schooling also are fairly substantial (27 percent). Because Latin America has a higher proportion of its female population over 25 years of age with completed schooling at the primary level than do the developed countries, differences in this schooling level are associated negatively with the fertility difference (-8 percent).

There is a large difference between the factors explaining the gap between East Asia and the developed countries on the one hand and those explaining the gaps between the other developing countries and the developed countries. In the first case, the difference in TFR is quite small and negative, indicating that on average East Asian countries have a lower fertility rate than the average developed country (though it is in fact higher than for Europe but lower than for North America). The lower levels of female

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<sup>10</sup> The reason for including latitude is to account for the fact that certain geographic areas are more prone to disease and mortality than are others.

schooling and health in East Asia in comparison with those in the developed countries predict a higher fertility rate in this region than in the developed countries. The associations with religious differences, however, which act in the opposite direction, also appear to be very large and more-or-less offset the associations with differences in female schooling and in health.

In sum, these results indicate that the key variables that are associated with differences in fertility rates in the developing and the developed world are differences in female schooling, health, and religion.<sup>11</sup>

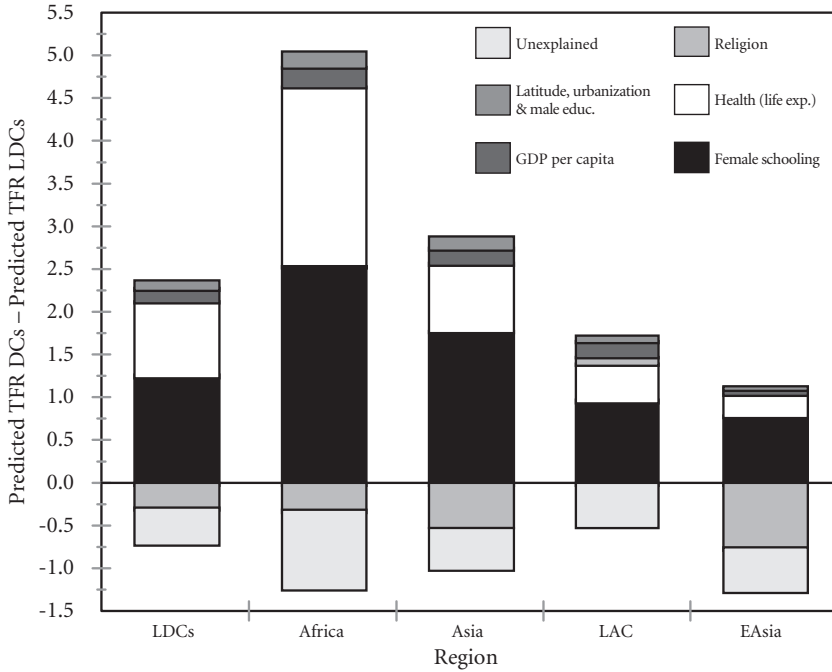
### Explaining Changes over Time

When looking at how TFRs declined in each region from 1960–95, how much of that change is due to the variables that have been highlighted in this chapter? As shown in Figure 4.7, for all developing countries, the TFR declined by 2.09 between 1960 and 1995, the bulk of which is associated with changes in health (45 percent), female secondary schooling (22 percent), and female tertiary schooling (14 percent). This general conclusion applies to the individual developing regions, albeit with some differences in the details. In Africa, the expansion of primary schooling had a larger association with fertility change than did changes in secondary or in tertiary schooling, and changes in health were much more important in proportional terms (79 percent) than in other developing country regions. In Asia (excluding East Asia), Latin America, and East Asia the associations with improvements in health—while less important in proportional terms than in Africa—have had much larger absolute associations with fertility changes and are associated with reductions of 1.31, 1.06, and 1.36, respectively. In East Asia, changes in female secondary schooling impact the results more strongly than in any other developing country region. By 1960, around 12.4 percent of all females over 25 years of age in this region had secondary schooling, but the share increased to 32 percent by 1995, which is the largest absolute increase in schooling registered between 1960 and 1995. After controlling for country differences, the main variables associated with the fertility declines in each region are female schooling and health.

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<sup>11</sup> Decompositions that check the robustness of these conclusions also point to differences in female schooling and health (the religious variables are absorbed into the country fixed effects). See Behrman, Duryea, and Székely (1999).

**Figure 4.7. Differences in TFRs between Developed Countries (DCs) and Less Developed Countries (LDCs) by Region**



In the 1950s, East Asia and Latin America registered similar fertility rates, but since that decade, fertility has declined much faster in East Asia. Therefore it is of interest to examine more closely the difference in the reduction in TFR between these two regions. Differences in changes in female schooling (76 percent) and in health (43 percent) are associated with most of the difference in the speed at which the TFR declined, but differences in changes in GDP per capita (20 percent) also have a fairly substantial association.<sup>12</sup> GDP per capita has a negative association with fertility, and the data suggest that growth in East Asia is one of the reasons why fertility declined faster than in Latin America. Even in this case, however, different changes in female schooling and in health had more predominant associations with the differential changes in fertility.

<sup>12</sup> These three associations total more than 100 percent but are offset primarily by unobserved differences in the changes that are -41 percent of the total.

### A Look within Latin America

Can the conclusions to this point be extended to the case of specific countries? Latin America provides a good testing ground since it includes countries that have characteristics similar to some East Asian countries with the oldest populations, and other countries that have populations as young as in some African countries. In this section simulations similar to those in the previous section are performed, but rather than considering regions, data from 22 individual Latin American countries are used.

Table 4.2 presents the factors behind the change in the total fertility rate between 1960 and 1995 for each individual country. On average, the independent variables are associated with around 68 percent of the decline registered between these years. Female secondary (13 percent) and tertiary schooling (12 percent) and health (38 percent) are associated with most of the fertility decline on average. The largest fertility declines within Latin America are observed in the Dominican Republic and Costa Rica, where the TFR was reduced by more than 4 percentage points. In these two countries female schooling and health are associated with an overwhelming proportion of the shift.

Nevertheless, there are some cases that deviate from the general pattern. For example, in Argentina, Barbados, Costa Rica, the Dominican Republic, Ecuador, Jamaica, Panama, Trinidad and Tobago, and Uruguay, there was a reduction in the proportion of females with primary schooling, and because primary schooling is associated with lower fertility, this variable has a positive association with the TFR. However, this reduction corresponds to a shift toward secondary schooling, which completely compensates for the effect. Two other cases that deviate from the general pattern are Bolivia and Brazil, where the proportion of females with secondary schooling is associated with an increase in fertility rather than a decline. The reason is that the share of females above 25 years of age with secondary schooling decreased in these countries between 1960 and 1995, while the share with primary and higher schooling increased. The increases in the two latter schooling levels fully offset the positive association with changes in female secondary schooling.<sup>13</sup>

In sum, the results suggest that, as in the case of the cross-regional analysis, changes in female schooling and health, but particularly in the

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<sup>13</sup> See Table A7 in the Appendix of Behrman, Duryea, and Székely (1999).

**Table 4.2. Decomposition of the Change in the Total Fertility Rate, 1960–1995**

Country	Change in Total Fertility	Predicted Change	Difference Observed-Predicted	PPP GDP Per Capita	(% Urban Population	Avg. Years of Schooling (Males)	Independent Variable				Life Expectancy at Age 1
							(% Females Primary Schooling	(% Females Secondary Schooling	(% Females Higher Schooling	(% Females Higher Schooling	
Argentina	-0.40	-1.36	0.96	-0.022	-0.039	-0.065	0.456	-0.567	-0.572	-0.548	
Barbados	-2.92	-1.52	-1.40	-0.078	-0.025	-0.076	0.882	-1.044	-0.345	-0.832	
Bolivia	-2.13	-1.66	-0.47	-0.010	-0.043	0.024	-0.727	0.648	-0.164	-1.386	
Brazil	-3.76	-1.76	-2.00	-0.042	-0.079	-0.013	-0.773	0.310	-0.328	-0.836	
Chile	-2.70	-1.88	-0.82	-0.044	-0.045	-0.026	-0.027	-0.204	-0.385	-1.149	
Colombia	-3.85	-1.85	-2.01	-0.035	-0.063	-0.019	-0.033	-0.395	-0.289	-1.012	
Costa Rica	-4.01	-1.60	-2.41	-0.035	-0.029	-0.039	0.333	-0.241	-0.572	-1.019	
Dominican Republic	-4.43	-1.85	-2.57	-0.022	0.000	-0.036	0.423	-0.347	-0.419	-1.455	
Ecuador	-3.39	-2.35	-1.04	-0.028	-0.056	-0.065	0.090	-0.298	-0.719	-1.275	
El Salvador	-3.36	-2.33	-1.03	-0.012	-0.015	-0.048	-0.666	-0.033	-0.204	-1.348	
Guatemala	-1.79	-2.04	0.25	-0.010	-0.016	-0.033	-0.270	-0.139	-0.130	-1.441	

Haiti	-1.72	-1.38	-0.34	0.002	-0.036	-0.054	-0.369	-0.143	-0.017	-0.763
Honduras	-2.86	-2.96	0.10	-0.006	-0.048	-0.047	-0.571	-0.363	-0.181	-1.742
Jamaica	-2.35	-1.67	-0.68	-0.019	-0.049	-0.048	0.410	-1.011	-0.147	-0.810
Mexico	-3.95	-2.67	-1.28	-0.063	-0.057	-0.092	-0.112	-0.775	-0.334	-1.238
Nicaragua	-2.65	-2.20	-0.45	0.002	-0.051	-0.032	-0.158	-0.094	-0.289	-1.578
Panama	-3.07	-2.24	-0.84	-0.034	-0.035	-0.078	0.404	-0.567	-0.883	-1.042
Paraguay	-2.16	-1.14	-1.02	-0.015	-0.034	-0.028	-0.117	-0.338	-0.232	-0.378
Peru	-3.65	-2.86	-0.79	-0.014	-0.064	-0.055	-0.085	-0.554	-0.504	-1.580
Trinidad & Tobago	-3.32	-1.58	-1.75	-0.065	0.000	-0.042	0.158	-0.722	-0.130	-0.776
Uruguay	-0.38	-1.05	0.67	-0.020	-0.023	-0.036	0.251	-0.599	-0.255	-0.367
Venezuela	-3.39	-2.40	-0.98	-0.008	-0.068	-0.051	-0.393	-0.330	-0.611	-0.941
Average	-2.829	-1.924	-0.905	-0.026	-0.040	-0.044	-0.041	-0.355	-0.350	-1.069
(%) of difference	1.0	0.680	0.320	0.009	0.014	0.015	0.014	0.125	0.124	0.378

Source: Authors' calculations.



health indicator, are consistent with most of the reduction in fertility among countries in Latin America in recent decades.

## Conclusions

Regardless of the type of data or analysis performed, the main factors associated with fertility rates and changes through time are differences in female schooling and in health related to life expectancies. The relevant weights of the associations of these two variables tend to differ somewhat depending on whether the focus is on fertility differentials among countries and regions in 1995 or on fertility declines between 1960 and 1995. Female schooling differentials have stronger associations with such fertility differences among regions and countries in 1995, but differential changes in health tend to have larger associations for fertility declines between 1960 and 1995.

Female schooling has long been emphasized as strongly associated with fertility declines—usually based on associations such as those presented here rather than persuasive estimates of causal effects. The consensus in the previous literature, in fact, seems to be that the inverse association between female schooling and fertility is the largest association in most empirical experience.

Some, but less, attention has been paid to the possible importance of health. Yet the findings indicate that the associations between differences in health and in regional/country fertility rates are quite strong in many cases. Moreover, in most cases, the associations between changes in fertility over time have larger associations with changes in health as represented by life expectancies than with changes in female schooling. Because it is the dynamic changes in fertility that are really of interest for most purposes rather than inferences about dynamics that may be misleadingly made from cross-sectional comparisons, this suggests that the importance of associations of increased female schooling relative to those of improved health may be overstated in the literature, which is substantially based on inferring longitudinal relations from cross-sectional data.

Therefore, both for understanding and for considering promising policy alternatives that may have high payoffs in terms of economic growth through enhancing “demographic windows of opportunity” and triggering virtuous circles of household decisions at the micro level, it is necessary to

have careful studies that identify the causal factors underlying the strong associations between health and fertility declines. Focused investments in health may therefore be an important key to development and to improvements in the conditions of households and individuals.

It is precisely this type of question—where to devote resource flows for the greatest positive impact on growth and development—that this book has sought to address. The research project emerged out of a desire to break away from misapplied cross-sectional analysis and other misleading research methods to adopt a strategy that is both uniform (by applying the same methodology in the case studies) and varied (by embodying both an aggregate and a micro approach). Hopefully the trail that has been blazed will mark the way for future explorers as they join the effort to unravel the intricacies of household decision-making and share their newfound insights with relevant policymakers.



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