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Labor Markets in Latin America: A Supply-Side Story

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Abstract: One of the main concerns of Latin Americans today is the lack of adequate employment opportunities. This concern is based on the widespread perception that not enough employment is being generated, and that few individuals have access to well-remunerated jobs. This work asks whether there is a supply-side story to be told about these outcomes. We present stylized facts about the connection between the demographic transition and changes in education (the size and quality of the labor force), with labor supply, inequality, and unemployment. The main conclusion is that demographics and education significantly improve our understanding on the overall decline in employment, the changing pattern of unemployment, and the rise in wage inequality. By adding them to the demand and institutional factors behind these outcomes, we obtain a clearer picture about labor markets in Latin America. Although demographics and education move slowly through time and have a strong inertial component, there is still a wide scope for policies that move these variables in a direction that produced better labor market outcomes.

Keywords: Latin America, labor markets, demographics, education, inequality.
JEL classification: D3, J10, O54, I21.

Labor Markets in Latin America:

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A Supply-Side Story

Introduction

One of the main concerns of Latin Americans today is the lack of adequate employment opportunities.[1] This concern is based on the widespread perception that not enough employment is being generated, and that few individuals have access to well-remunerated jobs. The perceptions find some support in several statistical sources. For instance, ILO (1997) shows that during the 1990s the rate of growth of employment in most Latin American countries slowed down, while unemployment rates declined in only a few countries. Also, there is some evidence that the distribution of wages has deteriorated in the region.[2]

Most of the debate on employment, unemployment and inequality has concentrated on the demand side of the problem - particularly, on determining the extent to which these changes are associated with stabilization policies and economic reform.[3] There has also been growing interest on the role played by labor market institutions.[4] These approaches are necessary for understanding the changes in labor market outcomes in the region, but there are other major transformations taking place in Latin America that have not been part of the discussion. Specifically, not much has been said about the role played by changes in the determinants of labor supply.

This paper argues that the factors affecting labor supply have also been driving the reductions in employment growth, the changes in unemployment and the increases in wage inequality in Latin America during the 1990s.

The two main forces driving labor supply in the region have been demographics and education. The major transformation in demographics is that Latin America is starting to age. The reduction in population growth since the mid 1960s has triggered sharp changes in the age composition of the population in subsequent decades. One important consequence is that new generations are successively smaller and thus the growth rate of the working age population is falling. Another consequence is that the share of relatively older age groups is increasing.

With regard to education, younger generations are increasingly more educated than older ones, but

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[1] See Latinobarometro (1997), and Lora and Marquez (1998).

[2] Lora and Olivera (1998) and Lora and Marquez (1998) present some evidence on this. In Section III of this work we document this fact for several Latin American countries with data from household surveys.

[3] Specially around the relationship between trade liberalization or privatization programs, and the demand for particular kinds of labor (some examples are Robbins (1996) and Lora and Olivera (1998)).

[4] See for instance the work by Lora and Pages (1997) and Marquez and Pages (1998).

progress has nevertheless been strikingly slow. Perhaps the most important transformation in education is that the variance of schooling within countries have been expanding in recent years. One important exception is a reversal of the gender gap. Women are now advancing faster than men through the education system and attaining higher schooling levels on average.

Demographics and schooling affect employment through two main channels. First, there is an impact through population growth. Between the 1980s and 1990s there was a deceleration in the growth of employment mainly because the rate of growth of the working age population -- caused by earlier reductions in fertility -- slowed down. Second, there is an impact through fertility, age composition and education. During the 1980s the proportion of females participating in the labor market increased sharply and this, in turn, increased labor supply and overall employment growth. In the 1990s, some of the same factors which led to rising female participation rates began to diminish. Perhaps the largest effect was due to the relatively large share of women in the 30-39 age group - an age at which participation rates peak for women. During the 1990s participation did not continue to expand at the same pace in part because the share of older women -- who tend to participate less -- started to grow, and this contributed to the deceleration in employment growth.

Demographics and education affected unemployment in the 1990s, as well. The share of young work force entrants declined in the 1990s relative to the 1980s. This had a moderating effect on unemployment rates in most countries because the young typically have unemployment rates which are four times greater than for older workers. This led the "natural" rate of unemployment, which is affected by the proportion of individuals entering the market for the first time, to be somewhat lower. By contrast, the share of young women entering the labor force increased due to improvements in education, reductions in fertility and changes in the age composition of the labor force. Since differences in unemployment are even more striking among women -- unemployment rates are eight times greater for younger women than older ones -- and since their participation rates have remained at high levels, they have contributed toward keeping overall unemployment rates high.

The demographic transition and changes in schooling also have strong effects on wage inequality and income differentials through three key mechanisms. First, inequality is affected by changes in the age structure of the population. Income inequality among young workers is generally half as large as for older workers. As each cohort ages, the more educated individuals in that cohort experience substantial increases in earnings, while the earnings of poorly educated workers do not increase substantially. Since older cohorts have greater income inequality, the aging of the Latin American population is leading to higher aggregate measures of income inequality.

Second, wage inequality is also rising because the distribution of education has been changing. Consider a non-mean adjusted measure of inequality such as the variance of schooling. In a seeming paradox, the variance of schooling has increased at the same time that average educational attainment has increased and the variance has fallen within younger age groups. There are two effects associated with this phenomena. The first is related to differences in mean levels of educational attainment across generations. When new generations with more years of schooling enter the market, the difference between them and older generations increases the absolute disparity of educational

attainment. The second reason is that the dispersion of schooling within cohorts is not constant. Consider the process of advancing from a condition of universally low levels of schooling. At the beginning of the process the differences within a given cohort are small since almost everyone has no schooling. As schooling improves, some people receive more education, leading to larger educational differences. By the end of the process, schooling levels are universally high, and the differences within the young age groups will again be small. All the countries in the region are at the stage in which each new generation now has a lower variance of schooling than its predecessor. However, in many countries the oldest generations have even lower variances of schooling so the net effect of the entry and exit effects is to increase the overall variance of schooling. Although this is largely a statistical artifact, and all relative measures of schooling inequality have declined, this "Kuznetzian" process has important implications for wage inequality.

Third, since educational progress has been so low -- it has taken 10 years to raise the average level of schooling by 1 year in the region -- the growth in the supply of the highest skills has been slow, and has not been able to keep pace with demand. Other things being equal, this tends to raise the wages of highly skilled employees relative to unskilled employees, and thereby contributes to widening the income gap between highly and poorly educated individuals.

Apart from the impact that demographics and schooling have had on labor supply in Latin America during the 1990s, these two variables will play an even more important role in the determination of employment, unemployment and inequality in the future. The expected changes provide a good guide for policy discussions about the supply-side of the problem.

The rest of this paper is organized as follows. Section I describes the key trends in demographics and education in more detail. Section II discusses the impact of these two variables on labor supply and employment, while Section III looks at the implications for unemployment. Section IV studies the connection between these determinants of the changes in labor supply and income inequality. Finally, Section V concludes and describes what the future might look like.

I. Demographic Trends and Education in Latin America

According to the most recent population statistics, Latin America is the second "youngest" region in the world[5]. The average age is approximately 27 years, which is higher than the average for Africa (22 years), and much lower than in Europe and North America, where the mean is between 36 and 38 years.

Since the mid 1960s, the rate of growth of the population in the region has been declining consistently. By 1965 the annual rate was 2.7%, but now it is slightly below 1.6%. These reductions are the result of a long term demographic transition which is common to all countries, and which has

[5]UN population statistics, 1996 revision (See UN (1997)).

been characterized by CELADE as having four stages[6]: (I) the first stage is characterized by slow population growth (approximately 2.5%) resulting from both high fertility and high mortality rates; (ii) in the second stage population growth rises (to approximately 3%) because fertility remains high while mortality rates decline -- particularly among infants; (iii) in the third stage mortality rates remain low and fertility rates decline, thereby lowering population growth rates (to approximately 2%); (iv) finally, in the fourth stage fertility and mortality rates are both low, and population growth rates stabilize (at about 1%). According to this classification scheme Latin America is in the third stage of the transition together with Asia, while Africa is moving through stage two, and North America and Europe have entered stage four.

As countries progress through the demographic transition, important changes occur in the age structure. For example, in 1950, approximately 40% of the Latin America population was younger than 14 years of age and its share increased until the 1970s (See Figure 1). However, as a consequence of declining fertility rates, this age group's share declined steadily, so that by 1997 it accounted for only about 30% of the population. At the same time, the share of 20-44 year olds increased from 31% to 40% of the population. In fact, the relative size of the working age population has been increasing dramatically since the 1960s, but that process is slowing down, and will stop by 2010.

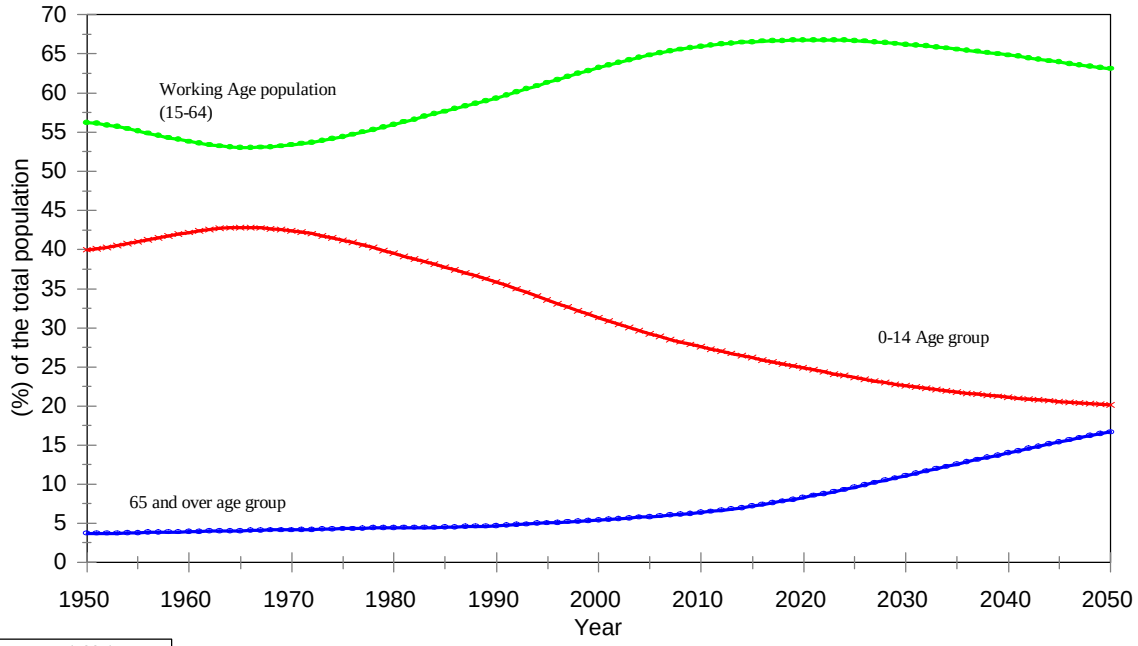
Figure 2 shows the future stages of the transition by projecting Latin America's age structure to the year 2050.[7] By the year 2010, the proportion of individuals below 35 years of age will start declining sharply, while the groups above 35 will increase in size. In sum, Latin America is ageing, and the proportion of individuals who are 65 or older is going to increase considerably through the first half of the next century.

[6]Celade (1996).

[7]Calculated from UN (1997) population projections.

Figure 1

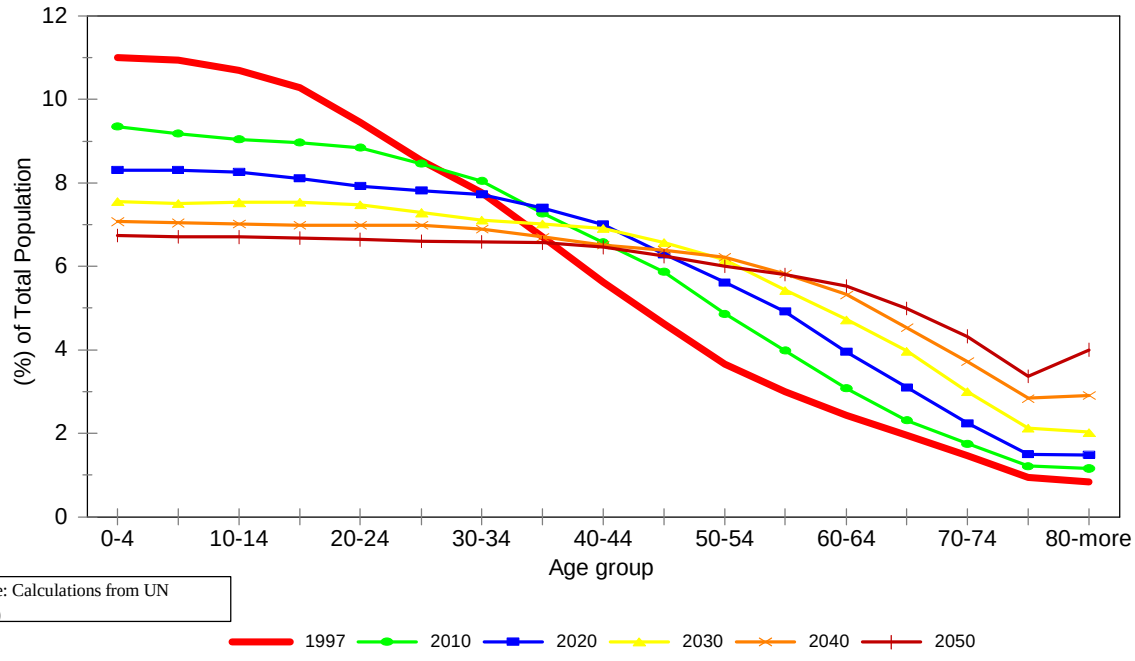
Relative Importance of Different Age Groups in LAC 1950-2050



Source: UN (1997)

Figure 2

Distribution of the Population by Age Group in Latin America, 1997-2050

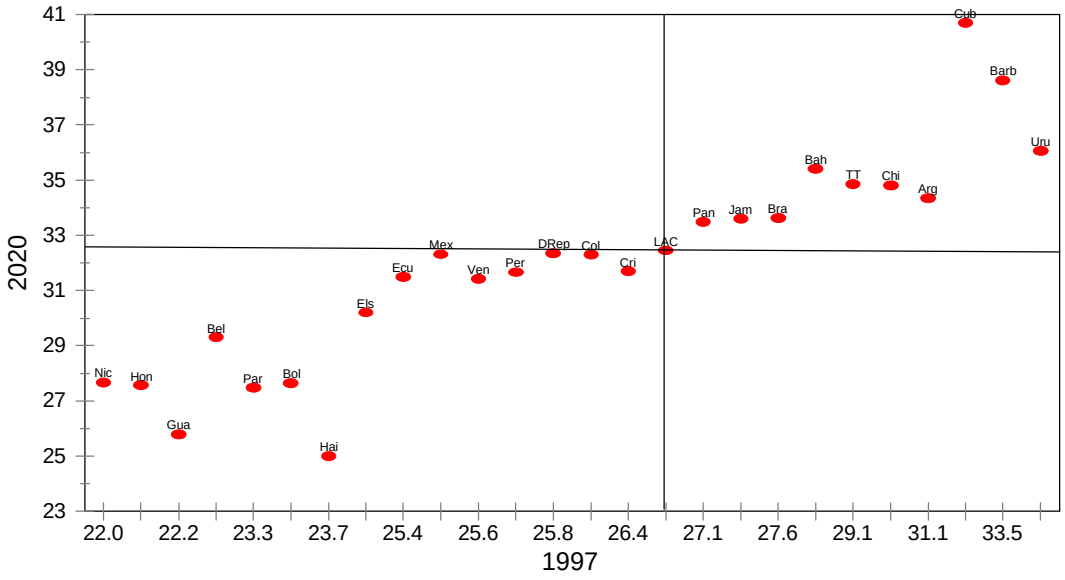


Source: Calculations from UN (1997)

These regional averages give a good idea about where Latin America stands in the world, but there are important differences within the region. For instance, the average age in Latin America ranges from as low as 22 years in Nicaragua, Honduras and Guatemala, to almost 34 years in Uruguay and Barbados (See Figure 3). This range within the region is as large as the differences between the regions of the world. Figure 3 also shows the average age expected in the year 2020. It demonstrates that demographic differences within the region will increase significantly. While the differences in average age between the "youngest" and "oldest" countries is now 11.5 years, it will grow to 16 years by 2020.

Figure 3

Average Age of the Population
in LAC Countries in 1997 and 2020



For the purpose of this work, we have classified Latin America countries into four groups according to their age structure. First, there are seven countries (Nicaragua, Honduras, Guatemala, Belize, Paraguay, Bolivia and Haiti) that are clearly in the second stage of the demographic transition described above, and in which the population share of the youngest age-groups is highest (see Figure 4a). The next two groups are countries that are in the third stage of transition, but which nonetheless vary considerably and can be usefully split into two groups. We classify the "younger" countries in stage IIIa (El Salvador, Ecuador, Mexico, Venezuela, Peru, Dominican Republic, Colombia and Costa Rica) and the "older countries" in stage IIIb (Panama, Jamaica, Brazil, Chile and Argentina). Finally, the five countries who have the lowest proportion of individuals between the ages of zero and 14 -- The Bahamas, Trinidad & Tobago, Cuba, Barbados, and Uruguay -- are classified in stage IV.

Figure 4a

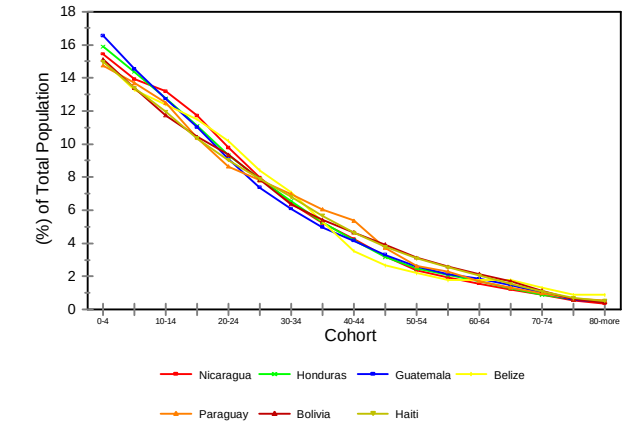


Figure 4b

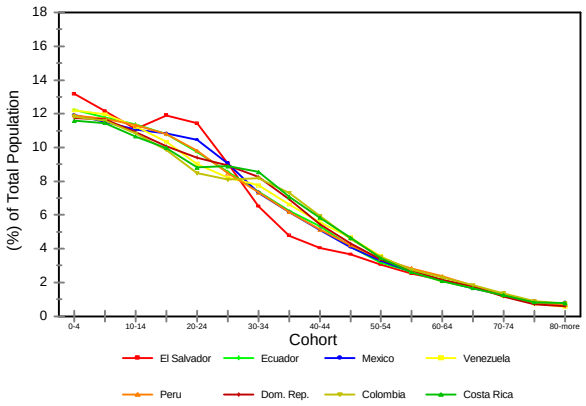


Figure 4c

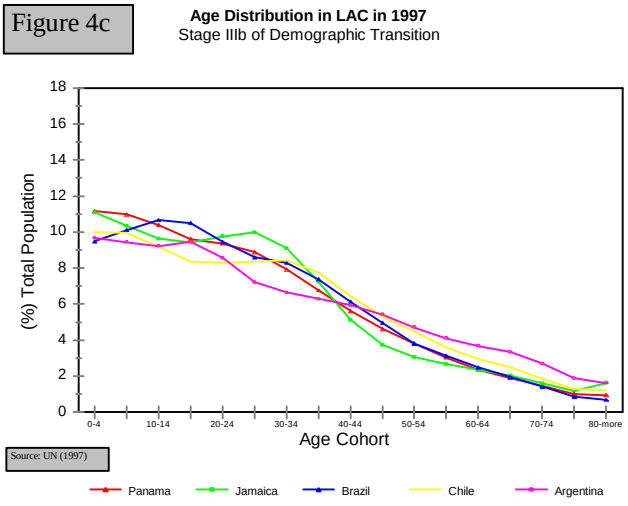
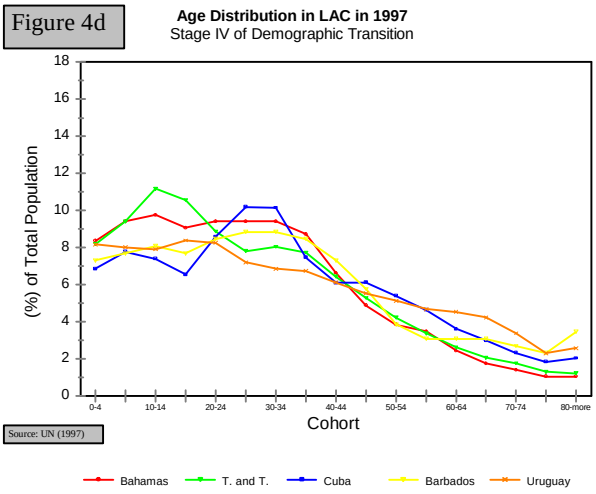


Figure 4d



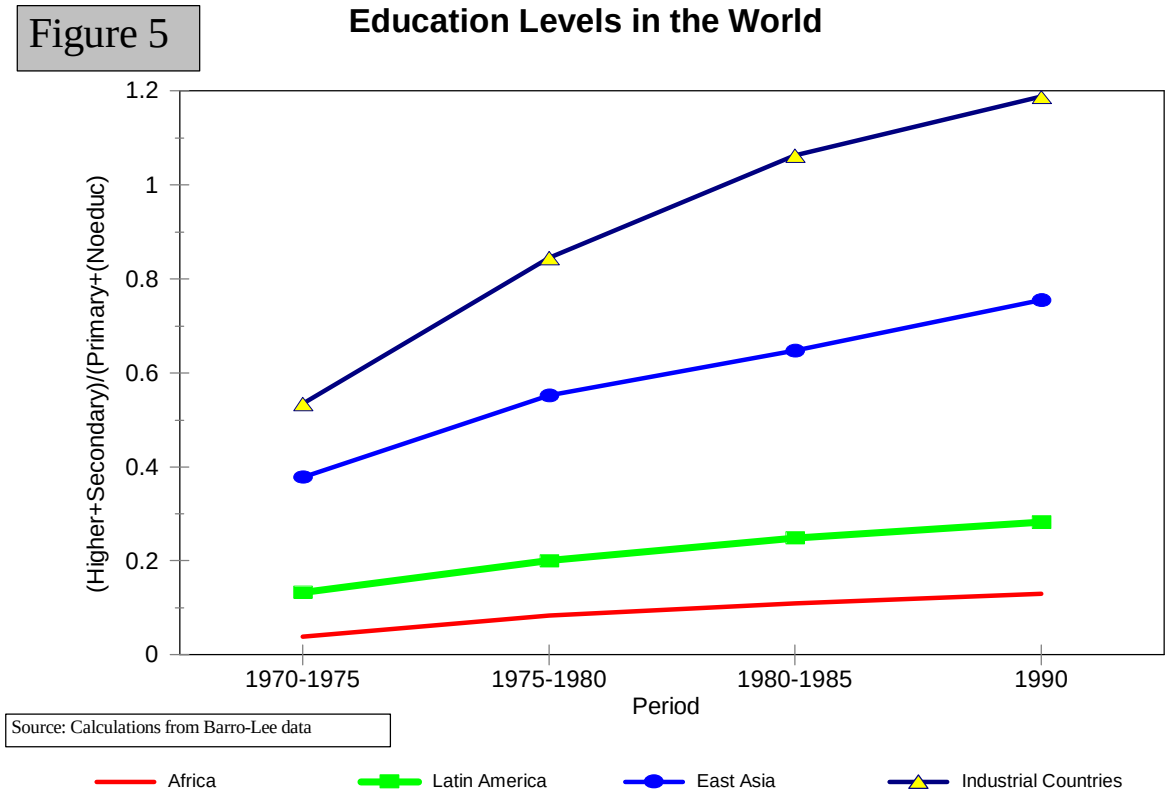
The countries in group II are going to continue to have high dependency ratios, and a growing work force, because of the continuing expansion of younger cohorts. Countries in groups IIIa and IIIb will begin to see dependency ratios drop while work force growth will begin to slow. The countries in group IV are already seeing a stabilization of the cohorts entering the labor force, but will be the first ones to experience rising dependency as a consequence of the growing elderly population. These changes in the age composition of the population will have implications for employment, unemployment, and inequality depending on the characteristics of each successive generation as they enter the labor force and age.

The Schooling Paradox: Kuznets Revisited

Apart from the size and age composition of the potential entrants into the labor market, another key determinant of labor supply is the level and distribution of education. Changes in the level and distribution of education affect both the quality and quantity of skills available in an economy, and hence affect average as well as relative wages between groups with different levels of education.

From an international perspective, Latin America has made strikingly slow progress in education.[8] In 1970, in the industrial countries, the ratio of individuals above 25 years of age with secondary education or higher to those with primary education or less was only 0.5 (See Figure 5). By the 1990s, the ratio had almost reversed and now there are around 1.2 persons with at least a secondary education for each individual with primary education or less. There was also strong improvement in East Asia, where the ratio rose from around 0.4 in 1970 to more than 0.6 in the early 1990s. In Latin America, by contrast, the ratio rose from less than 0.2 to around 0.25. Thus, there has been a widening gap between Latin America on the one hand, and East Asia and the industrialized countries on the other, starting at least as early as 1970. By international standards, higher and secondary education are relatively more scarce in Latin America than in other regions.
Table 1 presents some comparisons between the Latin American countries calculated from household

Figure 5



[8]Londoño and Székely (1997) give more details on this.

survey data[9]. As with the age structure, there are large differences between countries. For instance, in Guatemala about 53% of the population above 25 years of age have no schooling and less than 5% have higher education. By contrast, in Costa Rica fewer than 10% have no education while about 15% have completed some higher education. In Jamaica and Trinidad & Tobago, educational attainment is quite concentrated among those with primary and secondary schooling. These countries have the smallest proportions of uneducated and highly educated individuals, while more than 90% of the population has primary or secondary education.

TABLE 1
DISTRIBUTION OF THE POPULATION 25 YEARS AND OLDER BY EDUCATION LEVEL IN THE 1990'S (PROPORTIONS)

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

Source: Calculations from household survey data

* Source: Calculations from Barro-Lee (1996)

Note: 1- The surveys for Argentina include only Gran Buenos Aires

2- The surveys for Bolivia include only urban areas

3- The surveys for Uruguay include only urban areas

[9]This and the following sections heavily rely on calculations from household surveys. A description of the data can be found in the Appendix.

Table 1 confirms that individuals with secondary education and above are still a minority in the region. The number of people with no education or some primary education, relative to the number of individuals with secondary education or higher education (see the ratio presented in the table) is particularly high in Guatemala, El Salvador, Honduras Nicaragua, Paraguay, Trinidad & Tobago, and Brazil, where there are on average around 3 individuals with low education for each individual with secondary or more. At the other extreme, the lowest ratios are found in Chile, Peru and Paraguay.

The data provide an idea about the stock of education in Latin American countries, but they do not say much about trends in educational attainment in the region, which are generally poor. Using household survey data,[10] Table 2 presents mean years of schooling for 10, 15, 18 and 25 year olds in ten countries in the region for two points in time, and demonstrates that education policies have been only moderately successful in raising student achievement.[11] For instance, in the early 1980s, the typical 15 year old Latin American completed 5.3 years of schooling, and by the mid 1990s that average had increased only to 5.5. A 15 year old who begins school at a normal age and proceeds through school without dropping out or repeating a grade should have completed nine years of education. Therefore, a very large gap between the expected and the attained level of schooling remains.

The gap between expected and actual educational attainment is even wider among 18 year olds who should have completed 11 or 12 years of schooling. The typical 18 year old Latin American had completed only 6.2 years of schooling in the early 1980s, while this average had increased marginally to 6.5 in the 1990s. The gap between the expected and actual educational attainment for 18 year olds is between 5 and 6 years. Brazil and Honduras present the biggest lags in attainment, followed by Mexico, Colombia, Venezuela and Costa Rica. The notable exception is Chile, where the gaps are much smaller.

[10]We processed the data from 26 household surveys belonging to 16 Latin American countries for the longest possible period between 1980 and the 1990s. We chose the longest periods because we are interested in capturing long run trends. A detailed description of the data can be found in Appendix I. Since the surveys for Argentina, Bolivia and Uruguay are not nationally representative, the changes in these countries should be interpreted with care because they are highly influenced by changes in migration and urbanization.

[11]See Barros & Lam (1996) and Duryea (1997) for more details. These authors argue that student attainment in Brazil is low because of high repetition rates, delayed entrance to school and/or high drop out rates at young ages.

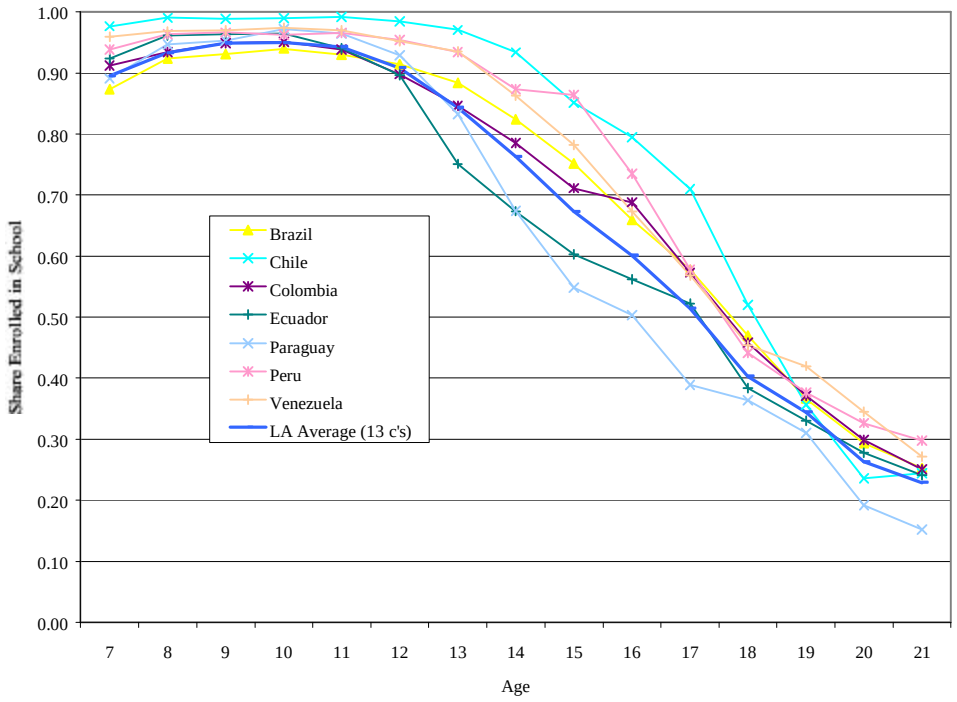
Table 2. Mean Schooling Levels For Various Ages and Countries

	Age 10		Age 15		Age 18		Age 25	
	Boys	Girls	Boys	Girls	Boys	Girls	Men	Women
Brazil								
1981	1.22	1.43	3.86	4.21	5.08	5.42	5.58	5.78
1995	1.73	1.96	4.60	5.24	5.62	6.48	6.45	6.99
Chile								
1987	4.27	4.39	8.44	8.52	9.83	9.91	10.13	10.05
1994	4.13	4.22	8.56	8.65	9.84	10.19	10.95	10.94
Colombia								
1995	2.82	2.86	6.20	6.48	7.33	8.15	7.96	8.12
Costa Rica								
1981	**(3)**	**(3)**	6.63	6.79	7.39	7.83	7.67	8.03
1995	2.77	2.91	6.61	6.93	7.59	7.86	8.24	8.65
Ecuador								
1995	3.51	3.54	6.68	7.31	7.96	8.86	9.19	9.76
El Salvador								
1995	2.02	2.08	5.13	5.63	6.35	6.83	6.75	7.21
Honduras								
1989	1.88	1.91	4.74	4.98	4.99	5.51	5.46	5.65
1996	2.21	2.45	4.96	5.64	5.72	6.28	5.89	6.34
Mexico								
1984	2.86	2.91	6.45	6.88	7.65	7.23	7.68	6.70
1994	2.89	2.83	7.08	7.22	8.53	8.33	9.15	8.93
Nicaragua								
1993	2.07	2.37	4.47	4.90	5.02	6.15	5.66	5.92
Panama								
1995	3.34	3.49	7.14	7.88	8.60	9.53	9.45	10.15
Paraguay								
1995	2.53	2.77	6.06	6.20	7.23	7.62	7.43	7.15
Peru								
1985	3.50	3.22	6.98	6.77	8.42	8.12	9.21	8.69
1996	2.14	2.02	6.91	7.03	9.13	8.77	9.58	8.80
Venezuela								
1981	2.77	3.05	5.95	6.64	7.07	7.83	7.37	7.26
1995	3.50	3.77	6.81	7.55	7.90	8.78	8.44	9.27
Argentina (1)								
1980	3.39	3.58	7.33	8.16	9.55	9.84	10.00	10.20
1996	3.50	3.50	9.02	8.73	10.07	10.61	10.94	11.66
Bolivia (2)								
1986	4.13	3.85	7.98	7.69	10.28	9.54	10.08	9.37
1995	3.57	3.63	8.09	7.82	10.37	9.70	11.20	10.03
Uruguay (2)								
1981	3.23	3.31	7.75	7.65	8.92	9.04	9.64	9.51
1995	3.52	3.68	8.12	8.41	9.44	9.92	10.44	11.01

Note: (1) The surveys for Argentina include only the Gran Buenos Aires area.
(2) The surveys for Bolivia and Uruguay include only urban areas.
(3) These surveys do not report schooling for 10 year olds.

Source: Duryea and Szekely, 1998, calculations from household surveys.

Figure 5B. Enrollment Rates, 7 South American Countries



Enrollment Rates, 5 Central American Countries

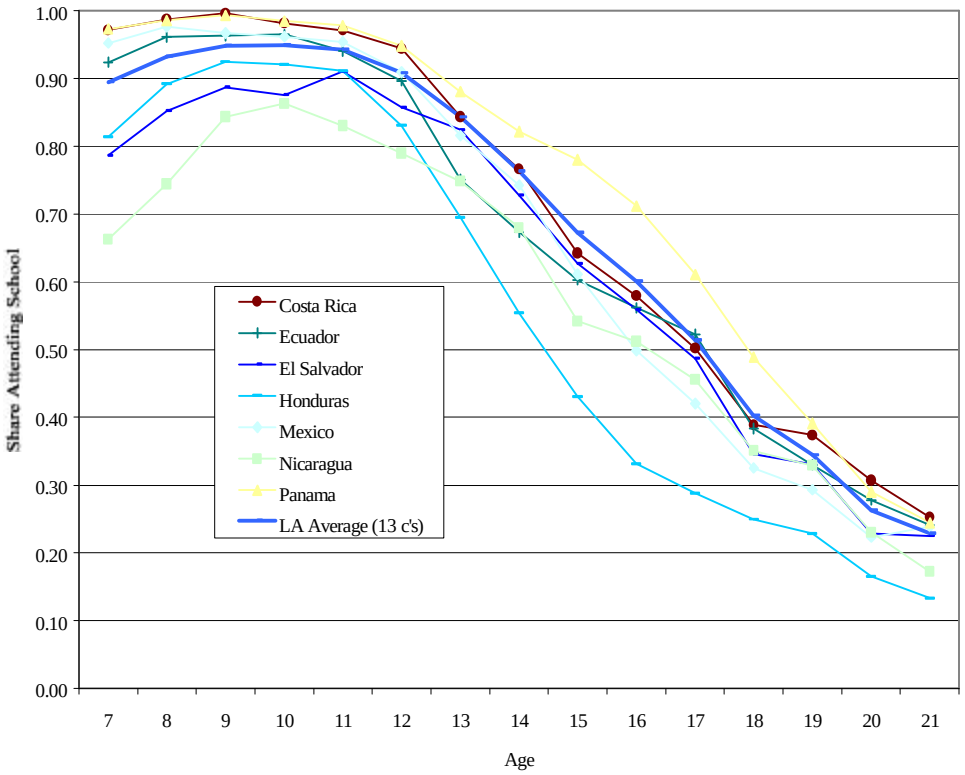


Figure 5B demonstrates that enrollment in school drops steadily after children reach age 12. Even in Mexico, where mean schooling levels are relatively high, enrollment falls from 95% at age 11 to 82% at age 13. Chile is the sole country which maintains enrollment rates over 90% through age 14, a necessary but not sufficient condition for attaining almost no gap in expected schooling at age 15 in Table 2. Brazil's high repetition rates mean that it's average standing in the enrollment charts does not translate to average educational attainment. Table A4.1 in the appendix lists the enrollment rates by age for the 12 countries shown in Figure 5B as well as the 3 urban countries.

TABLE 2a
SECONDARY COMPLETION RATES BY GENDER FOR 20-22 YEAR OLDS
(DATA FROM HOUSEHOLD SURVEYS CIRCA 1995)

Country and Year	Females	Males
Brazil 95	24.35	18.55
Chile 94	58.74	54.62
Colombia 95	43.23	38.23
Costa Rica 95	34.59	30.02
Ecuador 95	38.95	35.30
El Salvador 95	26.35	26.36
Honduras 96	20.63	13.34
Mexico 94	33.04	29.28
Nicaragua 93	16.64	11.97
Panama 95	50.58	44.25
Paraguay 95	24.67	22.17
Peru 96	59.58	63.34
Venezuela 95	47.28	36.06
Argentina 96[1]	58.63	44.25
Bolivia 95[2]	55.89	68.29
Uruguay 95[3]	45.60	34.34

Note: 1- The surveys for Argentina include only Gran Buenos Aires

2- The surveys for Bolivia include only urban areas

3- The surveys for Uruguay include only urban areas

Source: Author's calculations

Table 2a presents the proportion of 20-22 year olds that have finished their secondary education in sixteen Latin American countries around 1995 (we choose this group because most individuals are not likely to continue secondary level education beyond this point). If these individuals had started school at the normal age (around 6 or 7) and did not interrupt their education, they should have achieved at least secondary education by this age. However, a majority of this cohort has not completed secondary schooling. On average, only 41% of 20-22 year old males and 46% of females have completed their secondary education. Even though there are differences between countries, the ratios in all cases are strikingly low. They range from about 21%, 33% and 35% in Honduras, Mexico and Costa Rica, to almost 60% in Chile. Under the current circumstances, it is unlikely that 20-22 year olds will acquire much more education in the following years. Therefore, a large proportion of individuals searching for jobs or working in the next 45 years will not have achieved education levels above secondary.

Moreover, there are substantial differences in education attainment along the income distribution. Tables A1.2a through A1.2f in the Appendix show the average years of education by decile of 12, 15, 18 21 and 24 year olds in the 16 Latin American countries for which we have household survey data. The differences among 12 year olds and even among 15 year olds are not very large (with the exception of Brazil, El Salvador and Paraguay, where young children in the poorest decile already show a considerable gap with respect to children in the top 10% at this age). Differences in attainment start to be more apparent at 18 years of age, where on average a child in the poorest 30% of the distribution has three years less of education than 18 year olds in the richest 10%. These differentials expand to around 5 and 6 years for 21 and 24 year olds.

The slow pace of overall educational progress is also apparent in a longer run perspective. By comparing the average educational attainment of individuals born in 1968-70 (who are 25-27 years old in 1995) to the average for individuals born 30 years earlier (who are 55-57 years old in 1995), it is apparent that it has taken three decades to increase the average schooling of the typical Latin American male by three years (See Table 3). In other words, educational attainment has increased by only one year per decade. Table 3 also shows that educational progress among women has been faster, although the levels remain low by international standards.

Among the countries with nationally representative data in this sample Mexico, Peru, Ecuador and Chile have improved the education across generations relatively faster, while Brazil, Costa Rica and Paraguay have registered slower progress. Chile has maintained the highest level of schooling in this sample for both men and women over the entire period. The gain across the 30 years was approximately three years for males in Colombia, Chile and Peru while it was approximately 2.5 years for Brazil, Honduras, and Costa Rica, but it should be noted that these last two countries started out with higher education levels. Men in Mexico and Ecuador have made larger absolute improvements across generations than men in other countries (men born in the 1968-70 cohorts had on average 4 more years of schooling than men born thirty years earlier). Mexican and Ecuadoran males born in the 1930s had very low schooling levels, similar to Brazil, but the cohorts born since the 1960s have met or surpassed educational attainment levels in Venezuela, Colombia, and Costa Rica. By contrast, Brazilian men have failed to bridge the historical gap of 1.5 years of schooling below Venezuelan

men, and recent cohorts now also lag 1.5 or more years behind Colombia, Costa Rica and Mexico.

Figure A.1 in the appendix demonstrates that the improvements in educational attainment were not steady over the thirty year period. In the vast majority of countries the pace of improvements has unfortunately slowed for cohorts born after the 1960s. The recent progress in Mexico and Chile proves that stagnation at a mean level of 8 or 9 years is not inevitable.

In another aspect, relative educational attainment has changed dramatically: the gender gap in schooling has changed considerably since 1960. In all thirteen countries women have made larger gains than men. In half the countries, the gain for women over the same 30-year period was a year or more than the gain for men. Table 3 shows that men from the 1938-40 cohort had nearly an additional year of schooling than women in Chile, Colombia, Honduras, Mexico, Paraguay and Venezuela. Not only has the advantage been eliminated throughout the region, women now attain higher mean levels of schooling in Brazil, Venezuela, Honduras, Ecuador, Colombia, El Salvador, Panama and Nicaragua.[12] The male education advantage was eliminated among cohorts born prior to the 1960s in Brazil, Venezuela, Colombia, and Chile and was eliminated more recently in Mexico and Paraguay. Costa Rica and Panama have historically maintained equal educational attainment for males and females, although women now enjoy a slight advantage. It is important to note the stark contrasts which appear when the data are examined within urban and rural areas. In many countries girls still attain lower levels of schooling than boys in rural areas. The national data shown in Table 2 reflects the favorable standings of girls in urban areas.

Dispersion of Schooling Has Changed in Important Ways

A measure such as the mean years of schooling for the adult population provides a good indicator of the average level of skill available in the potential labor force, but since Latin America is characterized by high inequality, it is also important to consider how education is distributed. Table 4 shows summary measures of the distribution of the stock of education. One striking result is that the dispersion of the stock of schooling, as measured by the variance, increased over the 10-15 year period for both men and women in Brazil, Mexico, Costa Rica, Honduras, and Uruguay. In Chile, Venezuela, Argentina and Peru the variance remained about the same for men. The variance increased for women more than men in Venezuela, Mexico, Argentina and Bolivia. While there are many possible indices with which to measure schooling inequality, we will focus on the variance of schooling because it is linked to wage inequality through standard labor economic theory. In fact, the last column shows that a mean adjusted measures of schooling inequality, such as the coefficient of variation, fell for all countries in Table 4. So one could say that "inequality of schooling" fell but at the same time the increase in the variance of schooling will translate into higher wage inequality.

[12] The possible exception is Peru, where 18 and 25 year old men have higher levels of schooling than women. While girls are on par with boys below the age of 15, it remains to be seen if these girls stop their schooling at earlier ages than boys.

TABLE 3. MEAN SCHOOLING FOR 1938-40 COHORTS AND 1968-70 COHORTS (HOUSEHOLD SURVEY DATA CIRCA 1995)

	Mean schooling for 1938-1940 Cohort	Mean schooling for 1968-1970 Cohort	Difference in Mean over 30 Years
Males			
Brazil	3.91	6.33	2.42
Chile	7.84	10.94	3.10
Colombia	5.08	7.99	2.92
Costa Rica	5.68	8.18	2.50
Ecuador	4.91	9.19	4.28
El Salvador	3.85	7.18	3.33
Honduras	3.42	6.23	2.81
Mexico	4.52	8.94	4.42
Nicaragua	2.95	5.76	2.81
Panama	6.77	9.64	2.87
Paraguay	5.04	7.68	2.64
Peru	6.33	9.62	3.29
Venezuela	5.89	8.50	2.61
Argentina (1)	9.15	11.23	2.07
Bolivia (2)	8.90	11.57	2.67
Uruguay (2)	7.67	10.40	2.72
Females			
Brazil	3.54	6.94	3.41
Chile	6.78	11.01	4.22
Colombia	4.34	8.27	3.93
Costa Rica	5.33	8.29	2.96
Ecuador	4.42	9.42	5.00
El Salvador	3.27	6.88	3.61
Honduras	2.74	6.42	3.69
Mexico	3.41	8.77	5.37
Nicaragua	2.69	6.18	3.49
Panama	7.00	10.34	3.34
Paraguay	4.12	7.54	3.42
Peru	4.25	8.56	4.31
Venezuela	5.20	9.20	4.00
Argentina (1)	8.61	11.65	3.04
Bolivia (2)	5.66	9.82	4.16
Uruguay (2)	7.40	10.65	3.25

Note: (1) The surveys for Argentina include only the Gran Buenos Aires area.
(2) The surveys for Bolivia and Uruguay include only urban areas.

Source: Duryea and Szekely, calculations from household surveys.

TABLE 4
DISTRIBUTION OF STOCK OF SCHOOLING
AS MEASURED BY THE VARIANCE
POPULATION 25 YEARS AND OLDER

		Males			Females		
Country	Year	Mean	Variance	Coef. Var.	Mean	Variance	Coef. Var.
Brazil	1981	4.01	17.62	1.05	3.66	15.83	1.09
	1995	5.26	20.82	0.87	5.21	20.53	0.87
Chile	1987	8.39	22.24	0.56	7.88	20.55	0.58
	1994	9.01	21.78	0.51	8.57	20.81	0.53
Costa Rica	1981	5.82	17.73	0.72	5.54	15.11	0.70
	1995	7.10	19.54	0.62	6.97	18.40	0.62
Honduras	1989	4.01	18.69	1.08	3.71	16.72	1.10
	1996	4.79	21.05	0.96	4.61	19.29	0.95
Mexico	1984	5.31	22.30	0.89	4.43	16.40	0.91
	1994	6.55	28.98	0.82	5.93	25.51	0.85
Peru	1985	7.47	22.09	0.63	5.47	23.47	0.89
	1996	8.04	21.59	0.58	6.42	24.97	0.78
Venezuela	1981	5.86	17.56	0.72	5.14	16.25	0.78
	1995	7.01	18.55	0.56	6.82	20.25	0.60
Argentina (1)	1980	7.92	17.14	0.52	7.24	14.71	0.53
	1996	8.91	16.24	0.53	8.47	21.84	0.55
Bolivia (2)	1986	9.06	22.70	0.53	6.96	23.56	0.70
	1995	10.03	24.18	0.49	7.72	30.08	0.71
Uruguay (2)	1981	6.83	16.49	0.59	6.63	15.79	0.60
	1995	8.13	18.97	0.54	7.93	19.06	0.55

Note: (1) The surveys for Argentina include only the Gran Buenos Aires area.
(2) The surveys include only urban areas.
Source: Duryea and Szekely, calculations from household surveys.

Paradoxically the increase in variance of schooling for the stock of potential workers has coincided with "improvements" in the distribution of schooling, notably 1) increases in mean schooling and 2) declines in the variance of schooling for younger generations. Both of these effects can be regarded as a natural process of increasing schooling from a lower to an upper bound. Specifically the variance of the stock of schooling depends on the disparities between cohorts and is also a function of the variances within cohorts. First, when younger groups enter the labor force with higher levels of education than older groups, the difference between these groups increases the variance of schooling Second, disparities in educational attainment within generations follow an inverted "U" path through time. At the beginning of the process schooling levels are universally low and inequality is correspondingly low. When some individuals begin completing higher levels of education, the

dispersion of schooling within the new generation increases. In later stages, as primary or secondary schooling become universal, the dispersion in attainment declines.[13] The variance of the stock of schooling thus will change as some individuals enter and others exit the population. In many countries the "exiters" from the population tend to be old with low variance of schooling which more than offsets the improvements arising from the incoming generations.

As we mentioned previously, increases in the variance of the stock of schooling does not signify that recent schooling policies have been a failure.[14] A good example of these dynamics is Mexico which is illustrated in Appendix FigureA.2. The variance of the stock of schooling increased by 30%, faster than any other country in Table 4. At the same time the mean years of schooling across generations increased faster than in any other country, and the variance of schooling within recent cohorts has been declining relatively rapidly in Mexico.[15]

In sum, Latin America has undergone significant changes in its age structure and educational profile during the last 30 years. The countries are all progressing through the standard demographic transition, and are ageing. In some countries, the population continues to remain fairly young, and the share of those entering working age will continue to rise in the near term. But in most countries, the share of the very young in the population has stabilized or is even declining. In education, the attainment of Latin America's work force has increased over time, but very slowly relative to other regions and to expected levels. Women have made gains that put them on par with or above the educational attainment of men. Despite progress in reducing the relative inequality of schooling, the distribution of the stock of schooling will put upward pressure on wage inequality among adult workes. In the following sections we will show that these changes in demographics and schooling have had important effects on the behavior of labor markets in the region and, in particular, that they help to explain the evolution of employment, unemployment and income differentials in Latin America during the 1990s.

[13] Duryea and Szekely, 1998, decompose the change in overall variance into between and within cohort effects.

[14] Figure A2 in Appendix I clarifies this. As can be seen, the distribution of schooling in Mexico as measured by the variance, has been lower for each of the new generations since the 1960s, but even so, the dispersion of the stock of schooling is increasing. The reason is that the older generations also had very low education dispersion and as they exit the population, there is an dispersion-increasing effect that dominates the progressive effect of the new generations. In contrast, Chile has reached the stage at which cohort dispersion is declining with new generations. This has contributed to the reduction in the variance of schooling since "exiters" tend to have higher dispersion that the new entrants.

[15] See figure A1 in Appendix I.

II. The Effect of Demographics and Education on Labor Supply and Employment

During the 1990s employment growth slowed down in Latin America.[16] At first glance this seems rather surprising because the present decade has been one of economic recovery. In this section we show that one of the reasons for this slowdown is the demographic transition described above. Demographic changes have affected employment directly, through a decline in the rate of growth of the working age population; and indirectly, through a decline in the pace of female labor market participation resulting from changes in the age structure of the population, reductions in fertility and higher levels of schooling among females.

The most direct effect of demographic trends upon employment are due to the pace at which young people enter the labor force. The relative size of the working age population in Latin America has been expanding for the past 30 years, as we illustrated in Figure 1, as a consequence of changes in fertility and mortality. More recently the rate of growth of the working age population has begun to decline, from a pace of 3% annually during the 1980s, to only 2.5% in the 1990s. If the growth rate of potential participants in the labor market declines, then employment growth and unemployment tend to fall. Therefore, the declining growth of the work force partially explains the decline in employment growth in the 1990s.

In addition to the declining working age population growth rate, the pace at which participation rates have increased in recent decades is also moderating. These changes have been driven mostly by female participation rates, which, in turn, have been driven by demographic and educational factors. In this section we give some evidence on the connection.

Figure 6 shows that total labor market participation in Latin America increased from around 64% to 70% during the 1980s, but continued to rise at a much slower pace during the 1990s. The figure also shows that practically the entire shift was caused by the substantial increase in female participation. Women accounted for only 23% of the labor force in 1970, but their share increased to 36% over the next 26 years.

Figure 7 compares the changes in female participation across countries.[17] All of the countries for which information is available have followed the same trend during the past 26 years, with the exception of Haiti, and the largest increases were registered in Paraguay, Colombia, Argentina, Honduras, Bolivia and Guatemala.

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[16] ILO (1997) and Lora and Marquez (1998) provide evidence on this.

[17] Psacharopoulos and Tzannatos (1992) already showed that female participation rates increased markedly between the 1960s and the 1980s, and here we extend the analysis to the 1990s. To produce this figure we used data from ILO (1997), which includes participation rates for the period 1960-1992. Additionally, we processed the information in household surveys from Argentina, Bolivia, Brazil, Costa Rica, Chile, Mexico, Peru, Venezuela, Honduras and Colombia to obtain estimates for around 1995.

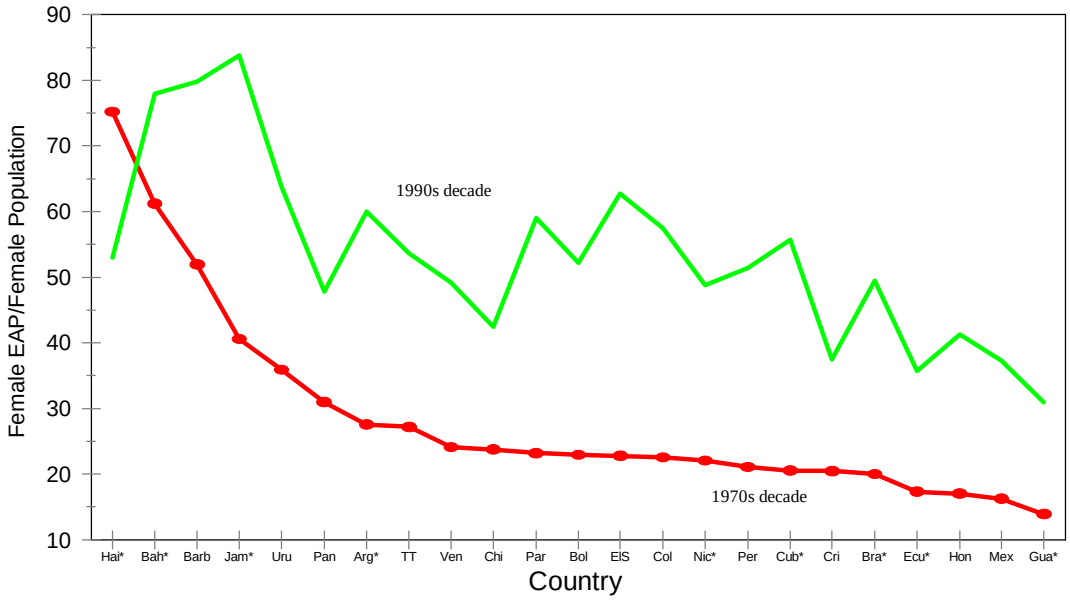
Figure 6

Participation Rates and Male-Female
Composition of the Labor Force in LAC

Source: ILO (1997) and Household Surveys

Figure 7

Female Participation Rates by Country
In Latin America



Source: ILO (1997) and calculations from household surveys.

TABLE 5

PARTICIPATION RATES FOR MEN AND WOMEN AGES 30-45 BY LEVEL OF COMPLETED SCHOOLING

	Women				Men			
	A	B	C	D	A	B	C	D
Country and Year	No Education	Primary	Secondary	Higher	No Education	Primary	Secondary	Higher
Brazil 81	0.34	0.37	0.53	0.82	0.95	0.97	0.97	0.98
Brazil 95	0.50	0.57	0.67	0.87	0.92	0.95	0.97	0.98
Chile 87	0.25	0.30	0.39	0.70	0.81	0.94	0.96	0.98
Chile 94	0.34	0.36	0.46	0.74	0.80	0.95	0.98	0.98
Colombia 95	0.42	0.46	0.61	0.87	0.92	0.98	0.98	0.98
Costa Rica 81	0.87	0.91	0.93	0.93	0.91	0.96	0.98	0.93
Costa Rica 95	0.34	0.35	0.48	0.70	0.87	0.97	0.98	0.97
Ecuador 95	0.68	0.61	0.62	0.81	0.88	0.96	0.98	0.98
El Salvador 95	0.41	0.57	0.70	0.90	0.89	0.93	0.94	0.94
Honduras 89	0.26	0.40	0.61	0.76	0.96	0.98	0.95	0.97
Honduras 96	0.32	0.49	0.60	0.72	0.95	0.98	0.98	0.97
Mexico 84	0.37	0.39	0.47	0.72	0.74	0.97	0.98	0.98
Mexico 94	0.37	0.39	0.47	0.72	0.74	0.97	0.98	0.98
Nicaragua 93	0.33	0.49	0.66	0.72	0.90	0.89	0.89	0.95
Panama 95	0.20	0.34	0.55	0.83	0.84	0.96	0.96	0.97
Paraguay 95	0.72	0.73	0.73	0.86	0.79	0.98	0.99	0.99
Peru 85/6	0.82	0.78	0.66	0.78	0.92	0.98	0.96	0.97
Peru 96	0.77	0.71	0.64	0.72	0.89	0.98	0.94	0.97
Venezuela 81	0.23	0.33	0.52	0.76	0.95	0.98	0.98	0.97
Venezuela 95	0.31	0.41	0.60	0.83	0.90	0.97	0.97	0.96
Argentina 81[1]	0.63	0.34	0.42	0.71	0.98	0.98	0.98	0.97
Argentina 96[1]	0.64	0.48	0.56	0.80	0.75	0.96	0.98	0.99
Bolivia 86[2]	0.45	0.43	0.48	0.61	0.87	0.96	0.97	0.87
Bolivia 95[2]	0.68	0.68	0.63	0.80	0.95	0.98	0.97	0.96
Uruguay 81[3]	0.47	0.47	0.52	0.80	0.63	0.97	0.98	0.99
Uruguay 95[3]	0.34	0.59	0.73	0.91	0.40	0.97	0.99	0.99

Source: Calculations from household survey data

Note: 1- The surveys for Argentina include only Gran Buenos Aires

2- The surveys for Bolivia include only urban areas

3- The surveys for Uruguay include only urban areas

Female participation rates are strongly influenced by fertility and education. When fertility rates decline more women enter the labor market because women with fewer children have more time available for market oriented activities[18]. The declining fertility rates in the region have allowed more women to enter the labor market, and thereby increased the potential rate of employment growth.

Increasing education for women has also contributed to higher female labor force participation rates.[19] Table 5 shows that participation rates in Latin America increase considerably with education.[20] For instance, in Honduras women with no schooling have participation rates of about 32%, while higher education have a participation rate of 72%. The average ratio between the participation rates of women in the lowest education category to those in the highest category is approximately one to three. By contrast, male labor force participation is relatively constant across education groups and does not vary over time. Therefore, in addition to declining fertility, the rising educational attainment of women is having a significant impact on the pace of labor supply growth in the region.

To assess the magnitudes of these demographic and schooling effects, we estimate a regression in which changes in women's labor supply are a function of changes in education, fertility, and other control variables.[21] The results indicate that reductions in fertility and increases in average education are associated with increases in female participation.[22]

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[18]One can also argue that women tend to have fewer children to be able to enter the labor market. The direction of the causality between these two variables is difficult to disentangle.

[19]In the literature on participation in industrialized countries it has been shown that one of the major sources of the rises in female participation has been the change in family structure toward one-person and single-parent households. We examined this argument by using household survey data for Argentina, Bolivia, Brazil, Costa Rica, Chile, Mexico, Peru, Venezuela, Honduras and Colombia. Surprisingly, family structures in these countries have remained very stable for the past 15 years. Interestingly, if there has been any change in household composition it seems to have been given by a reduction in the importance of nuclear/traditional families, and an increase in extended households, which is precisely the opposite trend observed in industrial countries.

[20]The only exception is Peru in 1985.

[21]This exercise involves a number of econometric problems, such as endogeneity. Appendix II presents a detailed discussion of how we have addressed the issues. For presentation purposes we show the most intuitive results, but it should be stressed that when one tries to correct for all these potential problems, the conclusions we obtain are exactly the same.

[22]As we know that income is generally a strong determinant of participation, we test for the significance of average wages, industrial wages, and the minimum wage (equations 1, 2 and 3). Surprisingly we find that each of these variables has a negative effect on participation, and only the minimum wage continues to be significant when we control for other variables. One plausible explanation is that wages in Latin America are only relevant for participation decisions when the family has low income, and as the minimum wage is likely to be closer to the incomes of the poor than average or industrial wages, it can be capturing an "added worker" effect, where households have to incorporate more of their members in the labor market when incomes decline. In other words, participation acts as a buffer stock at low incomes. To verify what type of education has more influence on female participation, we estimated another set of regressions (see tables in Appendix II), and found that the positive relation between average education and participation is totally driven by higher education.

Labor force participation rates vary not only with education but also with age, especially for women. Therefore, the ageing of Latin America's population is another factor that would affect female labor force participation, and thereby labor supply growth. As shown below, female labor force participation increased relatively quickly in the 1980s because a large share of women were in the age group that tends to have the highest participation rates. By contrast, in the 1990s, this cohort entered older age groups who are less likely to remain in the labor force. Hence, the ageing of the population has also led to a moderation of labor supply growth, through this effect on women's overall participation in the labor force.

In Figures 8 and 9, we illustrate the differences in average participation rates for men and women as a function of their age. The most notable difference is that the age profile of male participation rates is characterized by a smooth inverted "U," while the age profile for females varies markedly across countries which can be broadly classified in three groups.[23] In the first of these groups, including countries as diverse as Argentina, Honduras and Trinidad & Tobago, participation rates peak at age 20-29. In the second group, which includes 9 of the 19 countries for which we have data, female participation rates are characterized by a smoother inverted "U" curve which peaks between 30 and 39 years of age. In the third group, including Chile, Jamaica, and Panama, the participation rates peak at around 40 years of age. In all cases, female participation rates fall sharply after 45 years, instead of declining smoothly as is the case for men.

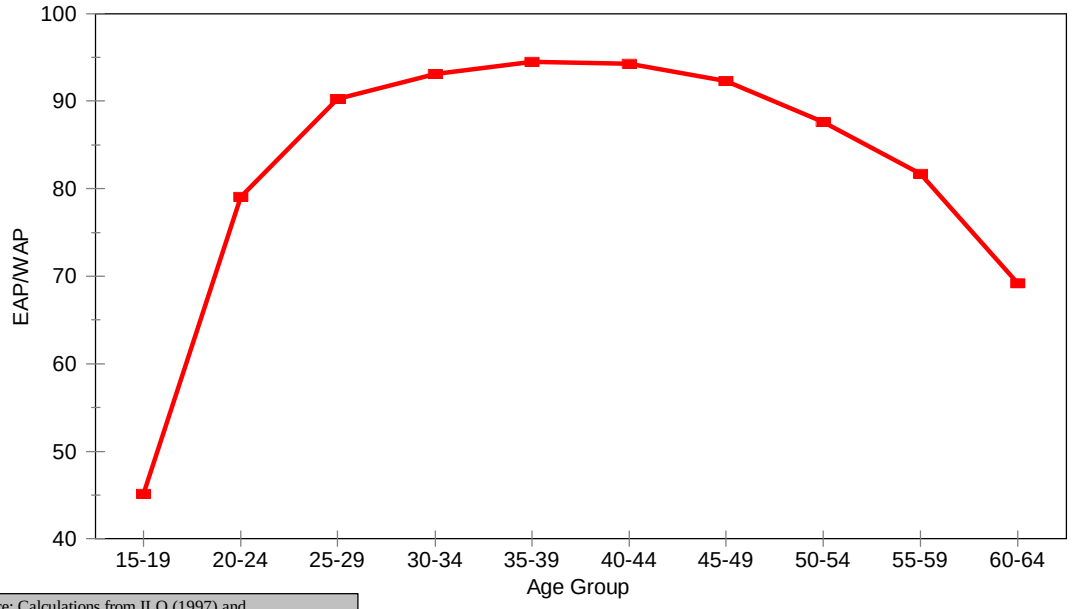
Latin American female participation rates differ significantly from those of the industrial countries (See Figure 9). Female labor force participation rates are much higher in developed countries for all age groups. The cross sectional data in Figure 9 suggests that female participation rates peak at ages 30-40 but to verify if women change their participation behavior through the life cycle we should follow the same person trhough time. The data to do this is not available but we can follow the participation behavior of different birth cohorts from a single country through time. Figure 9a plots the participation rates of 16 birth cohorts, by using the information from five Brazilian household surveys comprising the period 1981 to 1995 (the surveys belong to 1981, 1984, 1987, 1990 and 1995)[24]. For instance women born in 1952-54 are observed at ages 27-29 age in 1981, ages 30-32 in 1984, ages 33-35 in 1987, ages 36-39 in 1990, and ages 41-43 in 1995, with the idea that observing the behavior of a group is a good substitute to following individuals.

[23]In this case, we notice that the form of the curve differs across countries. Appendix II contains a set of graphs where we show the age profile of female participation for 23 Latin American countries, and we compare the rate in the early 1970s, with the latest date available around 1996.

[24]We use Brazil because it is the country for which a larger number of household surveys is available to us.

Figure 8

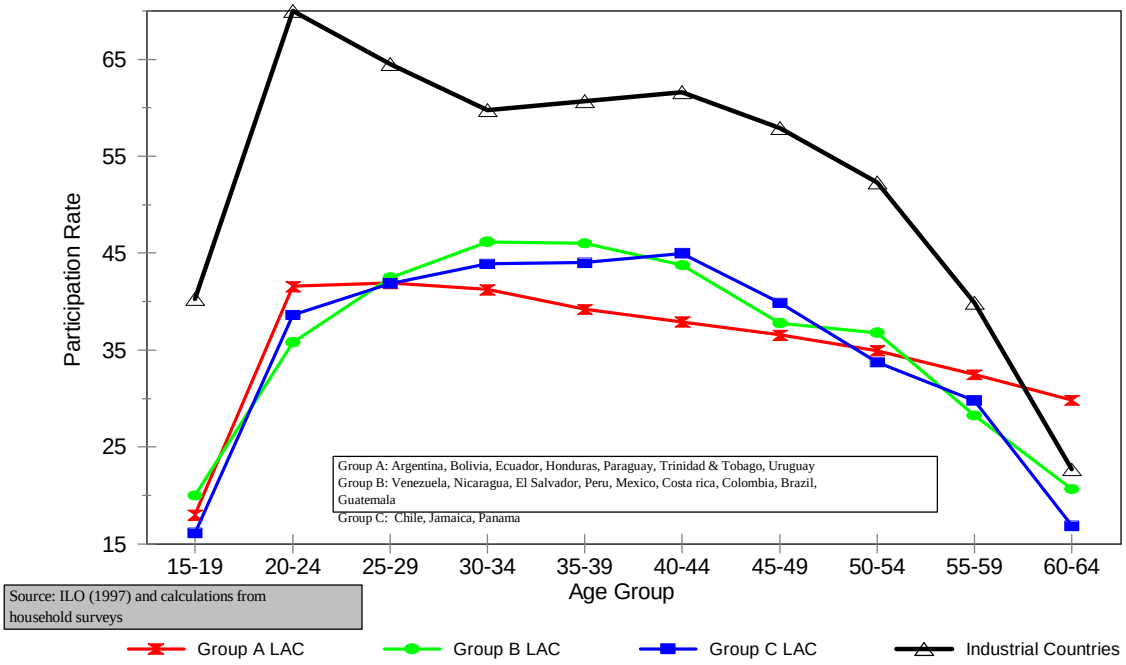
Average Male Participation in LAC
By Age Group in the 1990s



Source: Calculations from ILO (1997) and household surveyes.

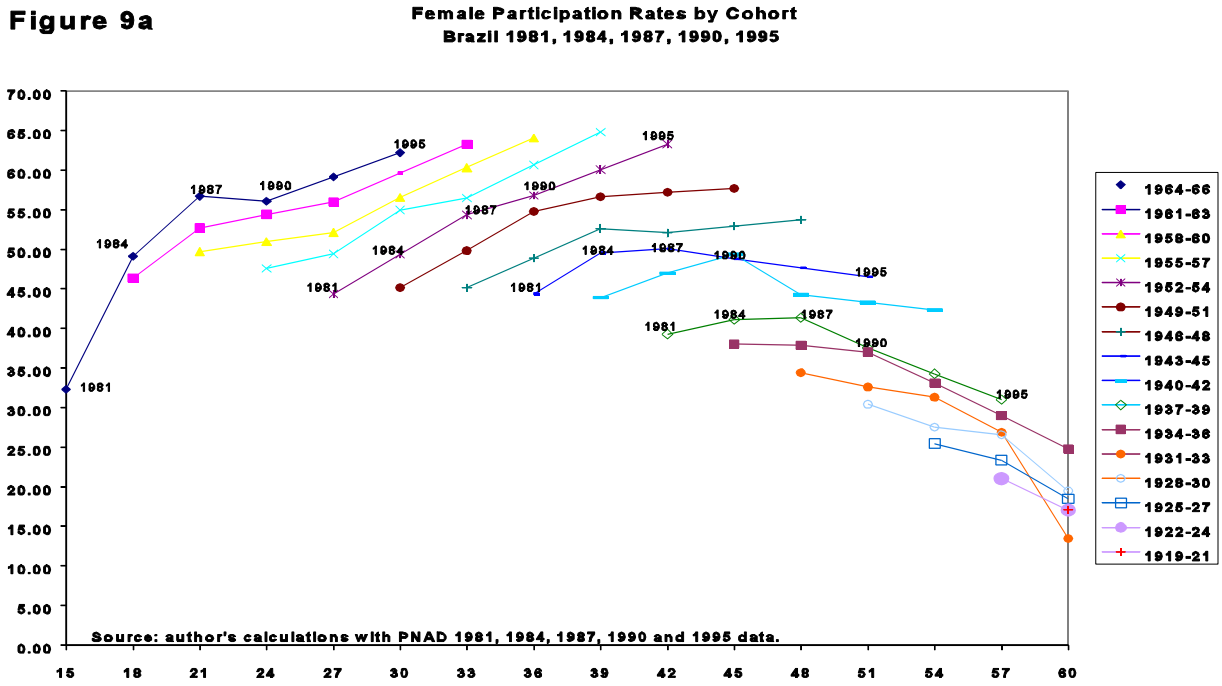
Figure 9

Female Participation in LAC and
Industrial Countries in the 1990s



Source: ILO (1997) and calculations from household surveys

Figure 9a

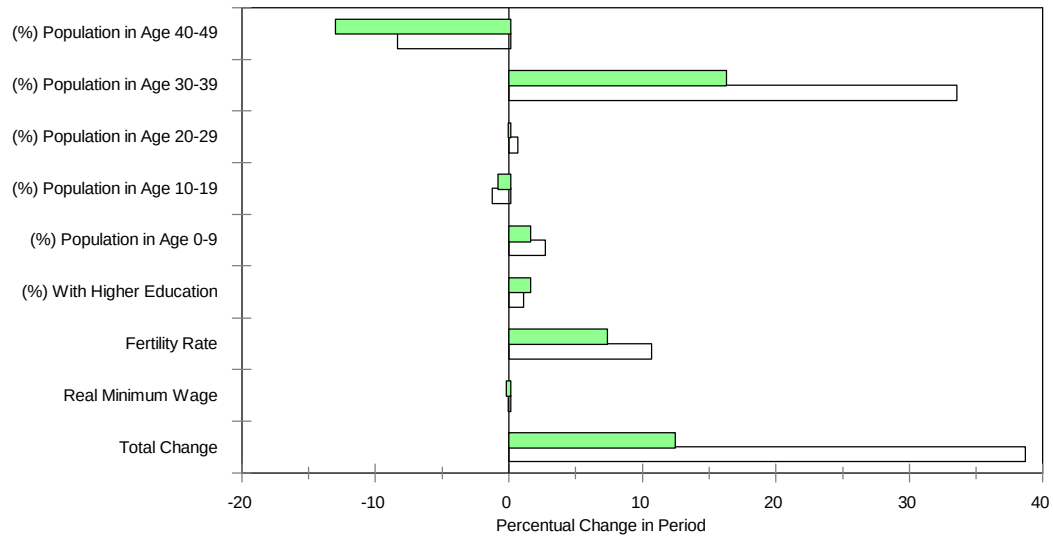


The cohort participation patterns in figure 9a reinforces the idea that there is some relation between age and participation. Participation does fall at older ages, although not as early or steeply as represented by the cross-sectional data in Figure 9. According to the figure, cohorts which were 30 years of age or more in 1981, increased their participation rates when they went from the ages of 30 to around 45, and reduced their participation thereafter. For instance, at age 36-38 the 1943-45 cohort participated at the rate of 45% in 1981. Their rate increased to about 50% in 1984 and 1987, and then started declining as the cohort reached 45-47 years of age in 1990. By 1995, the cohort was approximately 46-49 years of age and had a participation rate of around 46%, similar to the rate observed at age 36 and below the peak reached by age 40. Similar patterns are observed for the 11 cohorts that were ages 30 or more in 1981.

One interesting aspect of the figure, is that in all cases, younger cohorts have higher participation rates than older ones. For instance, the 1952-54 cohort registered a participation rate of 53% in 1987, when they reached age 33-35. In contrast, the cohort born six years earlier (1958-60) registered a rate of female labor force participation of 45% when they were ages 33-35. In fact this phenomenon contributes to the steeper age participation profiles in the cross-sectional survey. In other words, if one were to connect the points using the 1981 survey it would appear that women's participation is stable or slightly falling between the ages of 30-40. Arend's (1997) and Duryea's (1995) papers note that increases in educational attainment by successive cohorts of women in Brazil contributed to the rise in participation rates from 1976-1990.

Figure 10

What Explains the Change in Female
Labor Market Participation?



Source: Authors' calculations.

Figures 9 and 9a illustrate that the combination of the ageing of the population and the age profile of female labor force participation rates is a very important determinant of labor supply growth. To estimate the effect of these factors on female participation rates, we added several demographic variables into the base equation (see Appendix II and Table A2.2 for the results).[25] Fertility and education continue to be good explanatory variables, but now we also find that the demographic transition is one of the strongest determinants of the sharp rise in female labor market participation rates in Latin America.[26] By using the regression results we decompose the changes in participation and summarize our findings in Figure 10.

The figure shows, first, that total participation rates in Latin America increased by approximately 35%

[25]Specifically, we include the proportion of total population in the 0-9, 10-19, 20-29, 30-39, and 40-49 age groups, respectively.

[26]Lower female participation rates are associated with large proportions of the population in the 0-9 age group. On the other hand, higher participation is associated with cases where the relative weight of the 20-29 and the 30-39 age group increases. Recalling the age-participation profiles presented before, the rates plunge for women after 45 years of age, and in line with this finding the regression shows that rises in the population weight of the 40-49 age group are associated with lower participation. Additionally, it should be noted that the explanatory power of the independent variables increases from 48% to 59% when we include the age structure of the population into the regression.

during the 1980s. Around 10 percentage points were associated with reductions in fertility. Another three percentage points were linked to rising educational attainment; this effect is not that large because educational progress has been slow and concentrated among younger age groups. The most striking result is that around 30 percentage points of the increase in participation rates are associated with the change in the age composition of the population. Specifically, the relative size of the 30-39 age group increased by 15% during the decade, and since this is the group which registers the highest participation rates, total female participation increased. It can also be seen that the relative size of the 40-49 group -- which registers lower participation rates -- also expanded and this tended to reduce participation. However, as this expansion was smaller (around 8%), it was offset by the change in the 30-39 age group.

With respect to the 1990s, female participation continued to expand, although at a slower pace. In the 1980s the average annual increase was of 3.4%, while in the 1990s it fell to 2.4%. As illustrated in Figure 10, the main difference between the 1980s and 1990s, are the changes in age composition. During the 1990s, the 30-39 age group continued to expand in relative terms, but it did so by 8%. In contrast, the 40-49 age group increased its relative size by 15%. So, in the 1990s there were two age effects that canceled each other. On the one hand, participation tended to rise due to the expansion of the groups that participate more, but on the other it tended to decline due to the expansion of the groups that participate less.[27] As both effects were of similar magnitude, the net effect was small.

In sum, our results show that fertility, schooling and the age structure of the population affect labor supply through their influence over female participation decisions.

Labor Supply and Employment

Changes in labor supply are determined by changes in the size of the potential labor force, and by changes in participation rates. Due to the region's demographic transition, the new generations entering working age have become smaller, and consequently the growth rate of the working age population also slowed down in the 1990s. With respect to participation, we showed that for Latin

[27]It should be stressed that we performed a set of tests to check for the robustness of our econometric results (see Appendix II), and none of our conclusions change.

FIGURE 11

		Rate of growth of working age population between 1980s and 1990s	
		↑	↓
Rate of growth of participation rates between 1980s and 1990s	↑	A Argentina $L^S \uparrow$	C Dominican Rep. $\downarrow L^S$ Mexico, Peru $L^S \uparrow$
	↓	B Bolivia, Uruguay $\downarrow L^S$	D Bahamas, Barbados, Brazil, Chile, Colombia, Costa Rica, Ecuador, Honduras, Paraguay, Venezuela $\downarrow L^S$

L^S : Rate of growth of labor supply.

America as a whole the rise in participation rates is also slowing down. The net effect is that for the first time since the mid 1960s, the growth rate of the labor force is declining.

Although this pattern applies to most of the countries in the region, some differences remain. Figure 11 classifies countries according to changes in the working age population and the labor force participation rate between the 1980s and 1990s. In 10 out of the 16 countries in our sample, the growth rate both of the working age population and of participation rates decelerated; consequently, they experienced net reductions in the rate of labor supply growth (See Quadrant D). In two countries, (Bolivia and Uruguay) the pace of labor supply growth declined, in spite of an increase in the rate of growth of the working age population in the 1990s (see quadrant B). The net decline in labor supply growth was the result of a deceleration in the participation rate.

In 3 of the 16 countries, the growth rate of the working age population declined at the same time that participation rates continued to rise (See Quadrant C). In one of these, the Dominican Republic, the net effect was a decline in the growth rate of labor supply. However, in Mexico and Peru -- which are 2 of only 3 three countries -- the growth rate of labor supply increased. In these 2 countries,

increases in the growth rate of participation outweighed the effect of reductions in the rate of growth of the working age population. Finally, Argentina is the only country where the growth of labor supply accelerated both because of an acceleration in the growth of the working age population and participation rates (See Quadrant A).[28]

By itself, a decline in the pace of labor supply growth will not reduce employment or unemployment since labor demand also plays a role. Nevertheless, labor supply is an important factor in the labor market. If there were no changes in demand, declines in the rate of labor supply growth, like those experienced by most of the countries described above, will reduce employment. As long as unemployment does not change dramatically over time in a given country, the rate of employment growth in the long run must correspond to the rate of growth of labor supply.

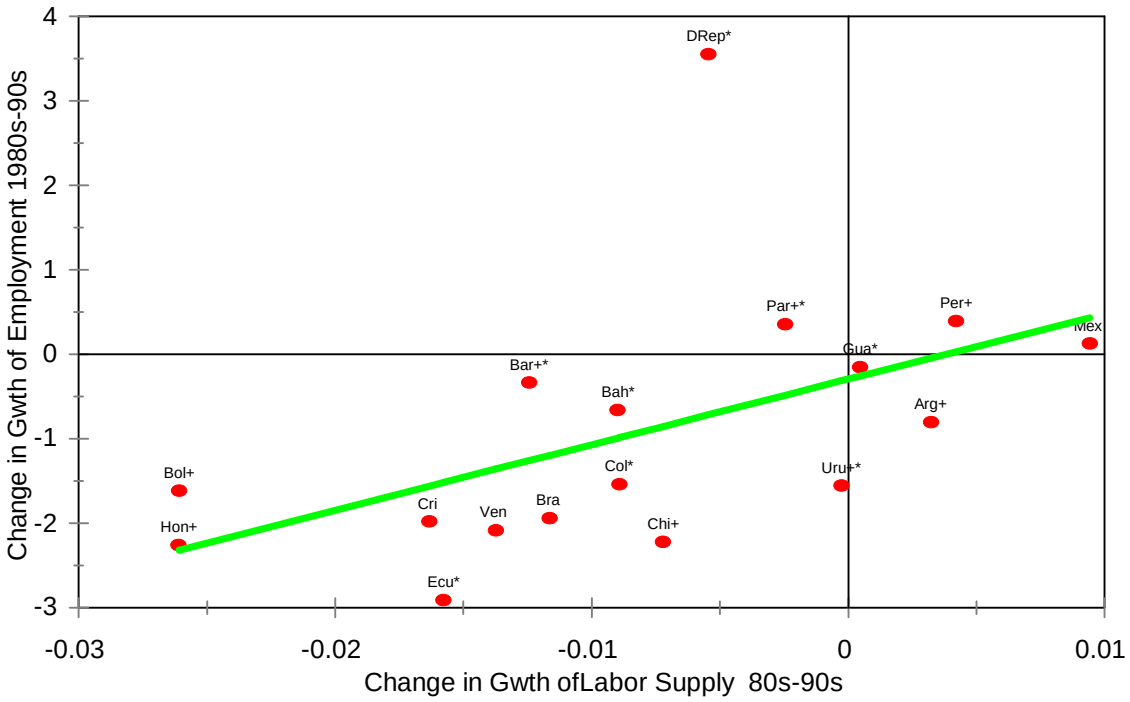
Since the rate of labor supply growth has been declining in most of the countries in the region, we would expect that the rate of employment growth would also decline. Figure 12 verifies this argument with data from these 16 Latin American countries. The figure plots the change in the rate of labor supply growth between the 1980s and 1990s, and the change in employment growth. There is a clear positive relationship. In the 1990s, employment growth accelerated in those countries where the pace of labor supply growth increased, while employment grew at a slower pace in the countries where labor supply growth decelerated.

In sum, trends in demographics and schooling play an important role in determining changes in employment growth through their effect on labor supply. If the rate of growth of the working age population continues to decline in future years, as suggested by Figure 1, and if female participation rates continue to increase at a slower pace due to changes in the age structure of the population, we would expect that the labor force growth rate will decline in most countries over the next few decades. In addition, if unemployment rates remain fairly constant in the future, the rate of employment growth will stabilize at a lower level in most of the countries in the region at the start of the next century.

[28]It may seem surprising that the working age population grew faster in the 1990s in Argentina and Uruguay, which are relatively "old" countries. In the next section we clarify this issue.

Figure 12

Change in Growth of Employment and
Labor Supply Between 1980s and 1990s



Source: Authors' calculations from UN (1997), ILO (1997) and household surveys.

III. Demographics and Schooling Affect Unemployment

Demographic trends and changes in schooling affect not only employment growth, but also unemployment rates. This is because people of different ages and educational attainment have different probabilities of finding and staying in jobs. In particular, younger individuals take longer to find jobs when they are unemployed and also are more likely to move from job to job. This is partly a consequence of taking time to find the "right" job (in terms of a match between the job's characteristics and the individual's skills and preferences) as well as more limited information about the individual because of their more limited experience. By contrast, older workers have generally established long-term relationships with employers, and have greater experience to judge the fit between their current job and their best alternatives. Employers are less likely to fire these older workers because they may have specific skills and experience that are valuable, or because their longer tenure raises severance payments. Similar arguments can be made about how rates of unemployment vary between men and women. Thus, demographic factors will affect the aggregate

rate of unemployment.

TABLE 6
OPEN UNEMPLOYMENT RATES BY SEX AND AGE IN URBAN AREAS, 1994.

Country	Gender	Age Group					Young/Elderly
		Total	15-24	25-34	35-44	45 and over	ratio
Argentina	Total	13.0	22.8	10.0	10.5	10.3	2.2
	Male	11.5	20.3	8.8	7.3	10.5	1.9
	Female	15.5	26.7	11.9	15.4	10.0	2.7
Bolivia	Total	3.2	5.8	2.8	2.0	2.1	2.8
	Male	3.4	6.3	2.5	2.1	2.9	2.2
	Female	2.9	5.2	3.2	1.9	0.9	5.8
Brazil	Total	7.4	14.3	6.9	4.3	2.6	5.5
	Male	6.4	12.4	5.5	3.8	2.7	4.6
	Female	8.9	17.0	8.8	5.0	2.5	6.8
Colombia	Total	8.0	16.2	7.6	4.7	3.3	4.9
	Male	5.4	11.9	4.4	3.4	2.9	4.1
	Female	11.6	21.0	11.6	6.3	4.2	5.0
Costa Rica	Total	4.2	9.7	3.8	2.3	1.6	6.1
	Male	3.7	8.6	3.7	1.5	1.6	5.4
	Female	5.1	11.6	4.0	3.5	1.5	7.7
Chile	Total	6.8	16.1	6.5	3.7	3.7	4.4
	Male	5.9	14.0	5.5	3.0	3.9	3.6
	Female	8.4	19.3	8.4	4.9	3.4	5.7
Honduras	Total	4.1	7.1	3.6	3.1	1.3	5.5
	Male	4.5	7.5	3.7	4.1	2.0	3.8
	Female	3.4	6.6	3.6	1.3	0.1	66.0
Mexico	Total	4.5	9.4	2.9	2.3	3.1	3.0
	Male	5.1	10.0	3.0	2.8	4.2	2.4
	Female	3.6	8.3	2.7	1.2	0.4	20.8
Panama	Total	15.7	31.0	15.1	9.7	5.9	5.3
	Male	12.4	27.5	9.7	6.8	5.7	4.8
	Female	21.0	36.9	22.7	14.0	6.2	6.0
Paraguay	Total	4.4	8.3	3.2	2.9	2.6	3.2
	Male	5.1	9.9	3.4	3.1	3.9	2.5
	Female	3.5	6.5	3.0	2.6	0.7	9.3
Uruguay	Total	9.7	24.7	8.4	5.5	3.8	6.5
	Male	7.3	19.8	4.9	3.4	3.4	5.8
	Female	13.0	31.5	12.8	7.8	4.5	7.0
Venezuela	Total	8.9	17.1	9.1	5.3	4.2	4.1
	Male	9.1	17.2	8.8	5.9	4.9	3.5
	Female	8.3	17.0	9.6	4.2	2.5	6.8

Note: (1) The surveys for Argentina include only Gran Buenos Aires.

(2) The surveys for Bolivia and Colombia include only urban areas.

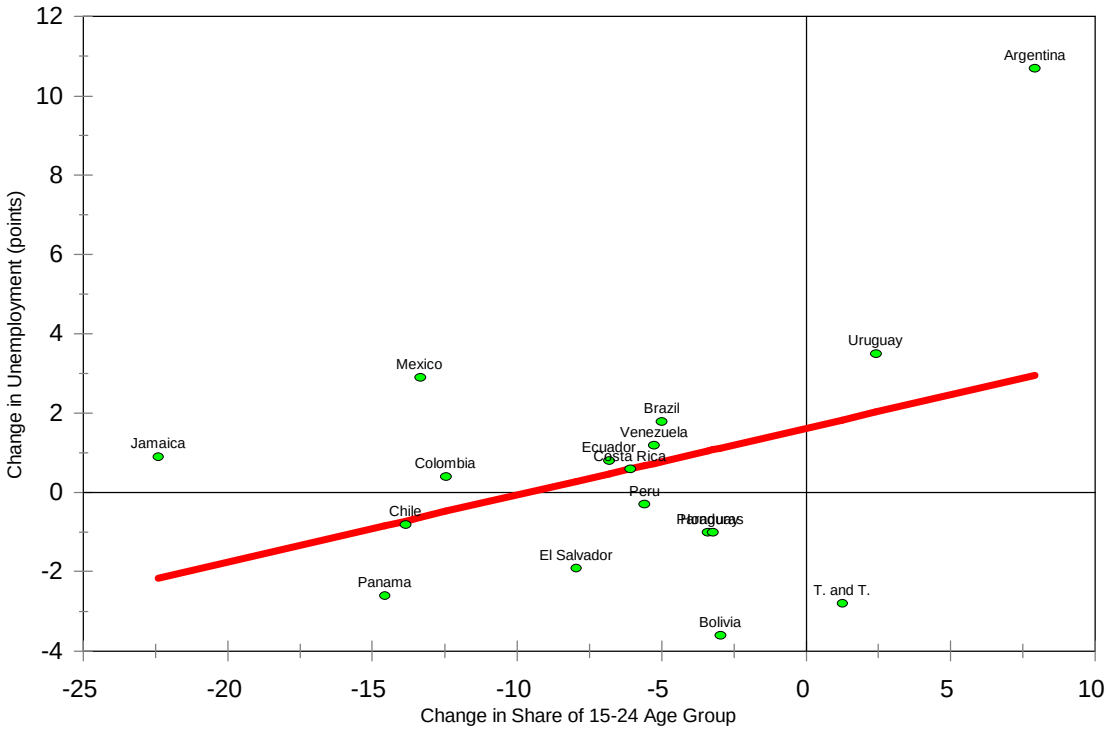
Source: ECLAC (1997)

The differences in unemployment rates by age and gender are shown in Table 6 for several countries, and confirm that these rates are unequivocally higher for younger individuals in Latin America. The differences are particularly striking when we compare the unemployment rates among 15-24 year olds to the rates registered by individuals older than 45. For these 12 countries, unemployment is four times higher on average among the younger groups than among the older groups.

Clearly, an increase the share of the working age population among the young will increase the number of individuals who are in a relatively volatile employment phase. If the 15-24 age group increases as a share of the labor force, the number of young individuals entering the labor market for the first time or searching for new jobs will increase, and aggregate unemployment will tend to be higher. A simple plot of the change in the relative weight of the 15-24 age group versus the change in unemployment during the 1990s for a set of countries confirms this relationship (See Figure 13).[29] In line with our argument, we find that there is a positive relation between the change in the relative size of the 15-24 age group and unemployment in the region.

Figure 13

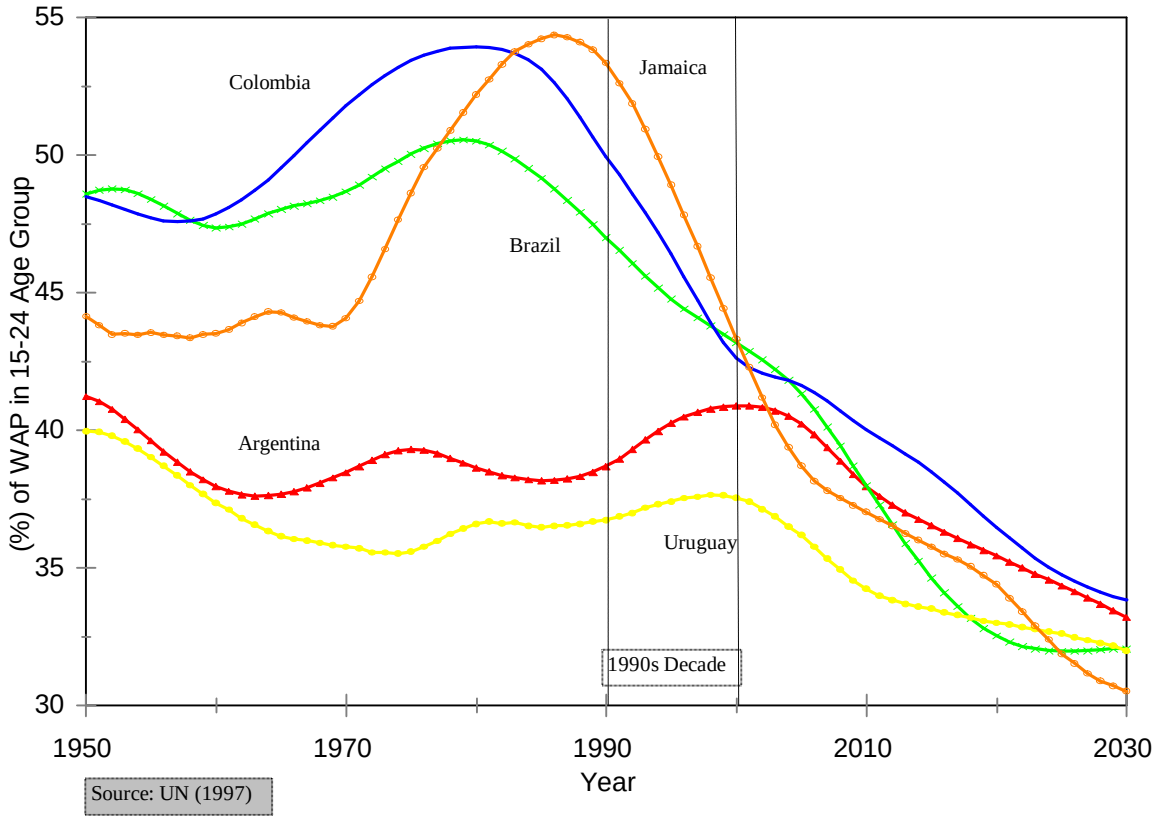
Changes in Unemployment and in Age
Structure Between 1990 and 1996



[29]This is the relative weight of the group with respect to the whole working age population.

Figure 14

Share of the 15-24 Age Group
With Respect to the Working Age Pop.



Two of the Latin American countries which have faced the largest increases in unemployment over the past decade, Argentina and Uruguay, are precisely those countries in which the share of the young entering the labor force increased the most. At first sight, this seems to contradict the earlier discussion which showed that these countries are among the "oldest" countries in the region. In fact, Argentina and Uruguay do have a much smaller share of 15-24 year olds in their population than other Latin American countries (See Figure 14). However, the population weight of this young age group increased in both countries during the 1990s. In Argentina, the share increased sharply from around 37% to 41% in only five years; while in Colombia, Jamaica, and Brazil, the size of this young group declined steadily through 1990s. In the case of Argentina, the sudden rise in the population share of the 15-24 group in the 1990s is a response to a sharp increase in fertility by almost 10% that took place during the period 1967-1975. The fact that a "baby boom" during the late 1960s could have implications for labor market outcomes twenty years later is a good example of the importance of the supply-side story.

Unemployment rates among women are substantially different from men in ways that are tending to aggravate unemployment in the region. The differences in unemployment by age are much larger for women than for men. On average young men are 3.7 times more likely to be unemployment than the oldest working age group; while young women are almost eight times more likely to be unemployed than older women. There are even cases like Mexico where women 15-24 years of age register unemployment rates almost 20 times larger than women 45 and over.

In addition to the factors related to age which are common to both sexes, the difference in unemployment rates and age profiles for women are strongly affected by having children. Women typically enter the labor market when they are relatively young, but many of them exit (permanently or temporarily) during childbearing years.[30] It may be more difficult for women to get jobs when employers are less certain that they will remain with the firm; in some cases because it will not be as worthwhile for employers to invest the same amount in training, while in other cases there may be mandatory and costly maternity benefits. Women may also face discrimination in the labor market or there may be reasons that it is more difficult for them to find a good match between their skills and characteristics and the available jobs. Regardless of the reason, the higher rate of unemployment among younger women has tended to increase the unemployment rate of the region as a result of their increasing labor force participation rates. Therefore, the "natural" rate of unemployment has not only changed because there are more or less young individuals searching for employment, but also because an increasing proportion of those individuals are women.

By calculating how much unemployment would change only as a consequence of the changing composition of the labor force, due to the growing share of young workers and of women, it is possible to estimate the effect of these trends on the changes in unemployment during the 1990s (See Table 7). The third column in the table contains the change in total unemployment actually observed between 1990 and 1996, while in the fourth column we show how much unemployment would have changed solely as a result of the trends in age structure and participation rates.[31] According to these figures, unemployment in Argentina, Brazil and Uruguay would have increased by 1.02, 0.18 and 0.38 points, respectively during the 1990s if the only shifts taking place were changes in the age and gender composition of the labor force.[32] Total unemployment did, in fact, increase in these three

[30]In fact, in figure 9 we showed that one of the major differences between female participation in the region and the pattern observed in industrial countries, is that Latin American females return to the market at much lower rates.

[31]The result is obtained as follows. First, we divide the labor force by age group and gender in 1990 and obtain the distribution of the labor force in each cell (the groups are the same as in Table 6). Then we multiply the unemployment rate of each group by its relative weight and obtain the total unemployment rate in 1990. We divide the labor force in the same way with the 1996 data and obtain 1996 weights. Finally we apply the 1996 weights to the unemployment rate by age and gender observed in 1990, and the result is the change in unemployment due to changes in age and gender composition of the labor force.

[32]Figures 11 and 14 show that Argentina and Uruguay are about the only two countries in which the growth of the working age population accelerated in the 1990s due to the expansion of the 15-24 age group. In both of these countries female participation rates increased in the 1990s, which means that women represented a

countries; and around 10% of the increase in the unemployment rate can be accounted for by these demographic changes in the "natural" rate of unemployment.

TABLE 7
EFFECT OF THE AGE STRUCTURE OF THE POPULATION ON THE CHANGE IN UNEMPLOYMENT IN THE 1990s

Country	Unemployment Rate		Change in Unempl. (Points)	Points due to Changes in Age Structure	(%) Change in Unemployment Due to Change in Age Structure
	1990	1996			
Argentina	7.3	18.0	10.7	1.02	9.54
Bolivia	7.2	3.6	-3.6	-0.13	3.60
Brazil	4.3	6.1	1.8	0.18	9.79
Chile	7.4	6.6	-0.8	-0.41	51.53
Colombia	11.0	11.4	0.4	-0.36	-89.27
Costa Rica	4.6	5.2	0.6	-0.28	-47.29
Honduras	4.2	3.2	-1	-0.21	21.09
Mexico	2.7	5.6	2.9	-0.25	-8.77
Panama	16.3	13.7	-2.6	-0.88	34.03
Paraguay	6.6	5.6	-1	-0.10	10.37
Uruguay	9.3	12.8	3.5	0.38	10.86
Venezuela	9.9	11.1	1.2	-0.56	-47.02
Average	7.57	8.58	1.01		

Source: Authors' calculations using data from UN (1997) and ECLAC (1997)

In all the other countries in the sample, however, the demographic changes have had a moderating influence on the unemployment rate. If the only changes taking place in the 1990s had been the shifts in the age and gender composition of the labor force in these countries, then the unemployment rate would actually have declined. In the case of Chile, Panama, Honduras, Paraguay and Bolivia, total unemployment did decline, and according to our estimates the reduction associated with the decline in the "natural" rate of unemployment was 51%, 34%, 22%, 10.3% and 3.6%, respectively.

In the four remaining cases, total unemployment rose despite a decline in the natural rate of unemployment. In Mexico, unemployment would have actually fallen by 0.25 points instead of increasing by 2.9 points as a result of the changing composition of the work force. In Colombia, Costa Rica and Venezuela, the observed increases in unemployment were somewhat lower than they would have been in the 1990s were it not for the decline in the "natural" rate. The differences between the actual changes in unemployment and the expected impact of demographic trends was

larger proportion of the labor force.

due to the effects of demand and the institutional settings of these countries.

Since we have some idea about how the age structure of countries will change in the future, it is possible to estimate the expected impact of the demographic transition on unemployment (See Table 8).[33] In 1996, the average unemployment rate in the region was 8.6%, and if the age structure of the population changes as predicted, unemployment will be 2.2 and almost 3.0 points smaller by the year 2010 and 2020, respectively. The predicted effects are particularly large in Panama, Colombia, Brazil, Venezuela, Chile and Mexico.

Table 8

Expected Reduction in Unemployment Due to Changes in Age Composition (Percentage points)

Country	2010	2020
Argentina	-1.77	-2.36
Bolivia	-1.69	-2.19
Brasil	-2.50	-3.38
Chile	-2.31	-2.98
Colombia	-2.63	-3.48
Costa Rica	-2.04	-2.67
Honduras	-1.80	-2.43
Mexico	-2.31	-2.91
Panama	-3.78	-5.12
Paraguay	-1.77	-2.35
Uruguay	-2.00	-2.63
Venezuela	-2.33	-3.17
Average	-2.24	-2.97

Source: Authors' calculations using data from UN (1997) and ECLAC (1997)

IV. The Effects of Demographics and Schooling on Inequality

[33] We use population projections from UN (1997), and estimate the effects by using the 1996 structure of the labor force in terms of gender and age, and the unemployment rate by category, to obtain the total unemployment rate in 1996. To estimate the effect in 2010, we use the projected age structure and female participation rates for that year to obtain the new weights, and recompute the unemployment figure with this data and the 1996 age-gender specific rates. We proceed in the same way with the 2020 data.

One of the main concerns of Latin Americans today is the limited access to highly remunerated jobs. Despite higher growth and lower volatility in the 1990s, wage inequality increased in many countries and household income inequality has not declined at the expected rate. Table 9 demonstrates that the Gini index for wage incomes increased or remained high in all seven of the countries for which we have reliable data in two separate years.[34] According to the table, there have been sharp rises in wage inequality in Mexico (where the Gini increased by 20%), Argentina, Bolivia and Venezuela. The distribution of wages also deteriorated, although only slightly in Brazil, and remained stable in Chile and Costa Rica. So, the general perception of an increase in wage inequality is well-founded.

TABLE 9
SUPPLY-SIDE EFFECTS OF DEMOGRAPHICS AND SCHOOLING ON WAGE INEQUALITY

					Direction of Pressure on Wage Inequality		
Country	Period	Gini Wages 1980s	Gini Wages 1990s	Change in Wage Inequality (points)	Change in Age Structure	Change in Dispersion of Schooling	Change in Return (Price) to High Skill
Brazil	81-95	53.7	55.6	1.9	+	+	+
Chile	87-94	40.2	40.6	0.4	+	-	-
Costa Rica	81-95	55.5	55.5	0.0	neutral	+	+
Honduras	89-96	--	--	--	-	+	+
Mexico	84-94	43.1	51.9	8.8	neutral	+	+
Venezuela	81-95	35.0	39.3	4.3	neutral	-	-
Argentina (1)	80-96	38.8	42.4	3.6	+	+	+
Bolivia (2)	86-95	49.3	56.2	6.9	-	+	+

Note: (1) The surveys for Argentina include only the Gran Buenos Aires area.
(2) The surveys for Bolivia include only urban areas.
Source: Authors' calculations.

Although much of the current debate over these trends in inequality focuses on the effects of the crises in the 1980s, stabilization programs and institutional reforms, we will argue that demographic trends and changes in schooling can explain a portion of the change in income inequality. First, the ageing of the population increases aggregate income inequality because the distribution of income within older cohorts is larger than within

[34]The table refers to urban males in the 18-65 age group. We use this sample because these individuals have particularly strong labor market attachment, and therefore changes in wages are less likely to reflect changes in participation rates.

younger groups. Second, the rising educational attainments of the new generations are leading to higher variances of schooling. One of the reasons is that increasing the education of the young lead to differences between generations, which in turn increases income inequality. Another reason is that education differences within new generations are declining, but these reductions are not enough to reduce the overall variance of schooling. Finally, the slow pace of educational progress has limited the supply of highly skilled individuals to the labor force at a time when demand for such workers is rising; this exacerbates income inequality by driving a wider wedge between the wages of more skilled and less skilled workers.

The Surprising Effect of Demographics on Inequality

Income inequality is higher among older individuals than among younger ones; therefore, as the population ages and the share of older groups increase, aggregate income inequality will also rise. Figure 15 shows how income differences vary with age and schooling levels in Brazil.[35] Similar figures for Argentina, Bolivia, Chile, Colombia, Costa Rica, Honduras, Mexico, Peru and Venezuela are presented in figure A3.1 in Appendix III.[36] We find that in all these countries the income differences between the young are relatively small, but the income gap widens as people grow older. Those who invested in training and education in childhood and early adulthood will receive the returns to their investment later in life, and since there are differences in education and training, the income gap between those with and without education will widen over time.[37] By way of illustration, consider two individuals who are both 25 years old, but one has no education and the other has completed university. At 25 years of age, the income difference will be relatively small (about four to one in Latin America). As time goes by, the individual with higher education will receive substantial pay increases while the unskilled individual will not. By the time these individuals are more than 45 years of age, the highly educated individual will be earning, on average, about eight times more than the uneducated person.

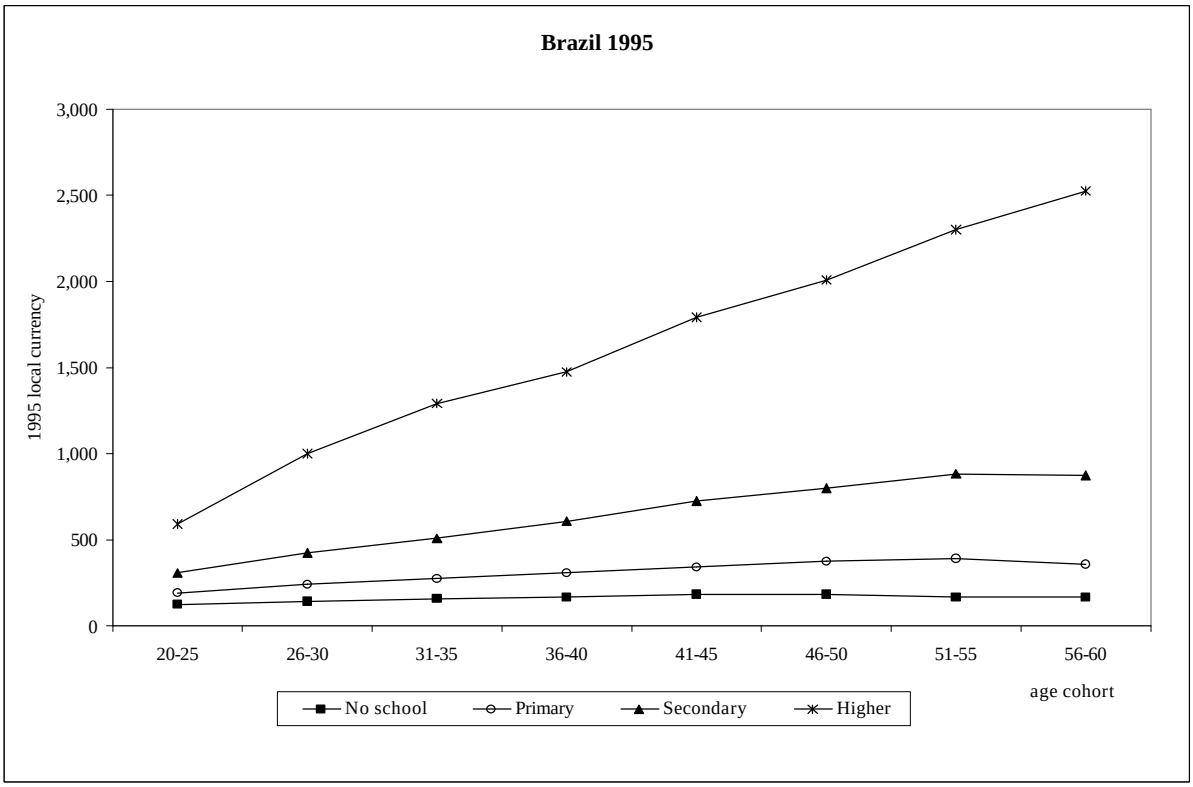
Figure 15
Average Income of Earners by Age and Education Level in Brazil, 1995

[35]The best way to know if the argument is true would be to follow individuals differing only in the amount of training and education received, for a large number of years, and then find out if in reality their income gap varied as described. Unfortunately this kind of data is not available, so we use household survey data as an alternative.

[36]In these graphs we plot incomes in absolute terms for presentation purposes, but we also performed the same calculations for log wages to focus on differences in growth rates, and the results lead us to similar conclusions. All results were obtained by processing household survey micro data.

[37]Behrman (1996) explains this.

Thus, if the income gaps maintain this same general pattern, income distribution will deteriorate as countries age. For example, consider how low income inequality would be in Brazil if the entire

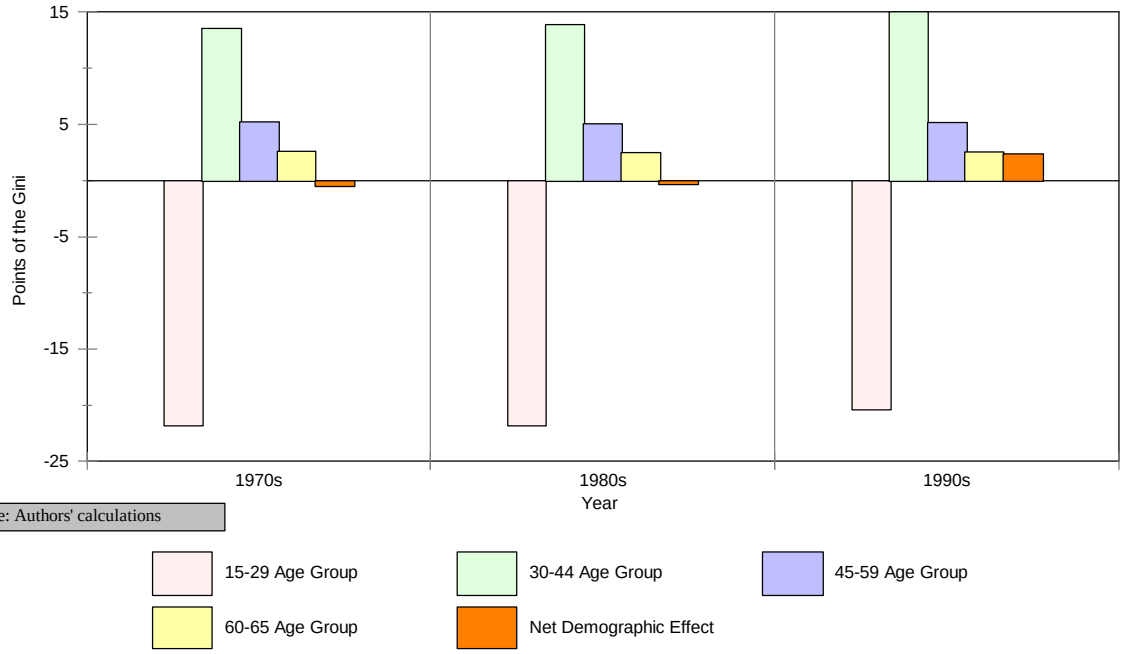


population was concentrated in the 20-25 age group by looking at Figure 15. If, however, the entire population were concentrated in the 40-50 age groups, income inequality would be much higher because of the wider income difference between highly and poorly educated individuals. In other words, as a country ages, income inequality tends to rise because people with higher education will have had a chance of benefitting from the returns to their human capital.[38] After retirement age the differences will tend to decline.

[38]In other words, the inequalities within age-groups tend to expand with age. Deaton (1997) explains this type of results in more detail and provides some evidence for developing countries of other regions. Lam (1997) has used data from Brazil and the United States and also reaches the conclusion that for individuals 24 and older, within age-group inequality increases through the life cycle. However, Lam (1997) and Behrman (1997) have explained that when a country ages, there are other forces acting on the distribution. Specifically, young individuals tend to have lower incomes than older ones, and so if one starts from a situation where all the population is concentrated in the young age group, but one individual grows older and receives higher income, the inequality *between* the age groups will tend to rise. Generally, the between-group component of inequality will tend to reduce when a country ages. The evidence summarized in Tables 16 and 17, and in Appendix III suggest that in Latin America as a whole, the *within* group component of inequality - which increases with age - has dominated.

Figure 16

Effects of the Age Composition of the
Population on Income Distribution

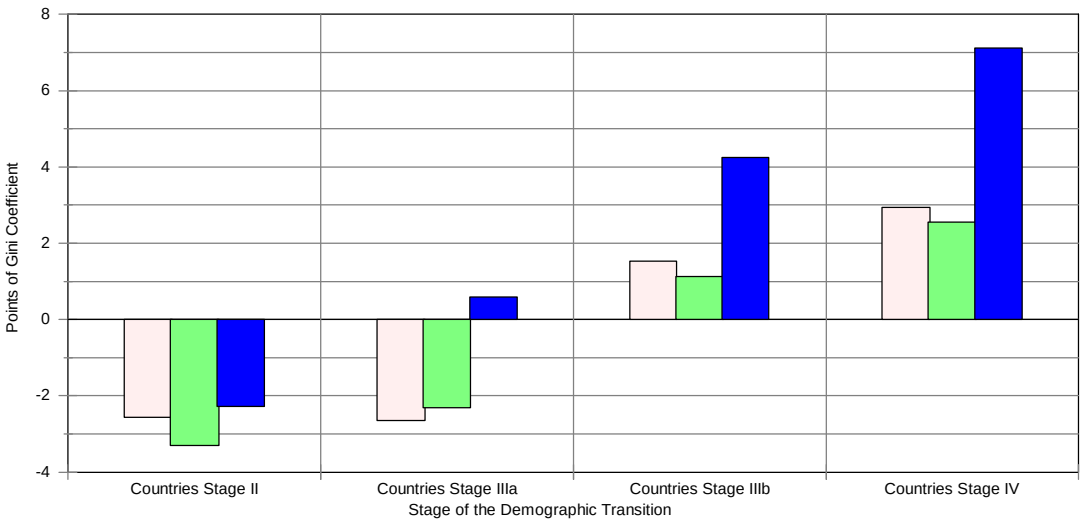


Source: Authors' calculations

15-29 Age Group
30-44 Age Group
45-59 Age Group
60-65 Age Group
Net Demographic Effect

Figure 17

Impact of the Demographic Transition
on Inequality in Groups of Countries



Source: Authors' calcualtions

1970s
1980s
1990s

Since Latin America is going through a stage of the demographic transition where several countries are starting to age, the inequality-increasing effect of the transition may have been present in the region for some time. To check if demographics impact inequality in the way we have argued, we estimated an econometric model where changes in inequality are explained by macroeconomic variables, education, and demographics. The regression results and the discussion of the methodological issues involved in the estimation are presented in Appendix III.

Figures 16 and 17 summarize our findings and assess the quantitative significance of our results. The first figure shows the independent contribution of each age group on total income inequality in Latin America. The results suggest that the 15-24 age group has had an equalizing effect, presumably because the income gap is smaller among the young, while the other age groups exacerbate inequality because, as the population ages, the income gap widens. The figure also shows that the net demographic effect (calculated by adding up the positive and negative contributions of each age group) was neutral during the 1970s and 1980s. However, in the 1990s the population was already ageing at a faster rate, and this contributed to a rise of three points in the Gini index.

Since Latin America comprises countries at different stages of the demographic transition, we distinguished them in the same way as before (Figures 4a to 4d) and applied the regression results to the age structure of the population of each country group. Figure 17 presents these results and shows that demographic factors have reduced inequality in the "youngest" countries (those that are going through stage II) precisely due to the high concentration of individuals at younger ages. During the 1980s these demographic forces reduced the Gini coefficient by 3.4 points and in the 1990s the effect was still negative but of a smaller magnitude. In the middle-aged countries in stage IIIa, the demographic factors tended to reduce inequality in the 1970s and 1980s, but as larger proportions of the population entered older age brackets in the 1990s, the demographic changes tended to increase overall inequality -- accounting for about 1 additional point of the Gini index. Countries in stages IIIb and IV, in which older cohorts have become more important, experienced demographic effects which have exacerbated income inequality consistently since the 1970s, and the impact has been particularly large in the 1990s. In the "oldest" countries in the region, the fact that larger proportions of the population are concentrated in older ages, accounts for a full 5 points of the Gini index. The fourth column in Table 9 shows the sign of the demographic effect in eight countries. There is only one case (Bolivia) where wage inequality increased despite the inequality-reducing effects of demographic trends in that country. In the 3 countries where demographic trends are contributing to greater income inequality (Argentina, Brazil, and Chile), income distribution did in fact worsen.

Changes in the Relative Supply of Education and Increases in Wage Inequality

Changes in schooling experienced by Latin American countries have also contributed to changes in income inequality in two different ways. First, the variance of schooling has increased in many

countries which has led to higher income inequality.[39] Second, the pace of educational progress has not matched the rate at which demand for highly skilled individuals has increased. As a result, the wages of highly educated individuals are rising relative to the less educated, further exacerbating income inequality. The direction of the first effect is shown for 8 countries in Table 9. In 6 of them, Argentina, Bolivia, Brazil, Costa Rica, Honduras, and Mexico, changes in the dispersion of schooling have contributed to rising wage inequality. In all of these except Costa Rica, wage inequality has in fact increased. Chile, however, has advanced to a stage in which the variance of schooling for the stock of workers is falling over time, and the result has been downward pressure on income inequality.[40]

The second effect, resulting from changes in the relative earnings of highly educated workers, has tended to reinforce the changes in educational disparities. In all of the countries included in Table 9, the proportion of the adult population with secondary or higher schooling increased. If the relative demand for different skills had remained the same in the 1990s as in the 1980s, these supply increases should have been associated with a relative decline in the earnings of the more educated. However, in all of these countries returns to higher levels of schooling increased, except for Venezuela and Chile.[41] In other words, the wage premium associated with completing a year of post-secondary schooling increased at the same time that the relative supply of individuals with higher schooling increased. This implies that the growing supply of educated individuals was not sufficient to keep pace with the increasing demand for these highly skilled workers in most countries.

As discussed in Section I, increases in the variance of the stock of education in many countries does not necessarily mean that recent education policies have failed. In fact relative schooling inequality has fallen for both the stock of adults and among the flow of new potential workers for all countries included in Table 4 and Figure A.2. Unfortunately the process of advancing the distribution from a low bound to an upper bound implies initial increases in the variance of the stock which implies initial increases in wage inequality.

The net impact of changes in the age structure of the population, the dispersion of schooling and shifts in the relative supply of skills on wage inequality have varied across countries (See Table 9).

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[39] As previously discussed mean adjusted measures of schooling inequality fell for all countries in Table 4 as detailed in Duryea and Szekely 1998. We focus on the variance of schooling since in a simple Mincerian earnings function the variance of wages is a function of the variance of schooling.

[40] Duryea, 1997 decomposes the changes in wage inequality for Brazil, Mexico and Venezuela into the contribution from a) changes in observed skill (schooling and experience), b) changes in the returns to characteristics (price changes) and c) changes in returns to unobserved skill. The full decomposition is based on in Juhn, et.al. (1993). The results are consistent with the changes in the distribution of schooling. In Venezuela the decline in schooling inequality contributed to a decline in wage inequality. In Brazil and Mexico the change in the distribution of education has worked to increase wage inequality, and apparently this has been an important determinant of the deterioration in the wage distribution.

[41] The returns to schooling are calculated from a regression of log wages on schooling and labor market experience. See Duryea 1997 for details.

In Argentina and Brazil, the Gini index for wages rose by 3.6 and 1.9 points, respectively. In these cases, the changes in the age structure, the increase in educational disparities, and the rise in the wage premium for higher education all contributed to exacerbate inequality. In Mexico and Bolivia, wage inequality increased by 8.8 and 6.9 Gini points, respectively (the largest shifts registered). In these two countries, changes in the age structure of the population were neutral or inequality-reducing, but schooling disparities widened in both countries and the premium to higher education increased. Therefore, part of the shift could be accounted for by these last two supply-side effects; while in Bolivia changes in the age composition of the population offset some of this increasing inequality. In Costa Rica there was no change in wage inequality in spite of greater education differences and higher premiums for the highest skills.

Chile and Venezuela experienced an opposite pattern of demographic and schooling effects. Changes in the age structure of the population contributed to raising wage inequality or were neutral, while education differences and the wage premium for the highest skills tended to reduce inequality. Partly as a consequence of the schooling effects, the Chilean Gini index increased marginally despite the inequality-reducing effect of changes in its age structure. Venezuela's Gini index rose by 4.3 points despite a neutral age composition effect and the presence of inequality-reducing schooling factors.

V. Conclusions

Employment growth, unemployment rates, and wage inequality have definitely been affected by supply factors in Latin America. Changes in demographics and education improve our understanding on the overall decline in employment, the changing pattern of unemployment, and the rise in wage inequality. By adding them to the demand and institutional factors we obtain a clearer picture about labor markets in Latin America.

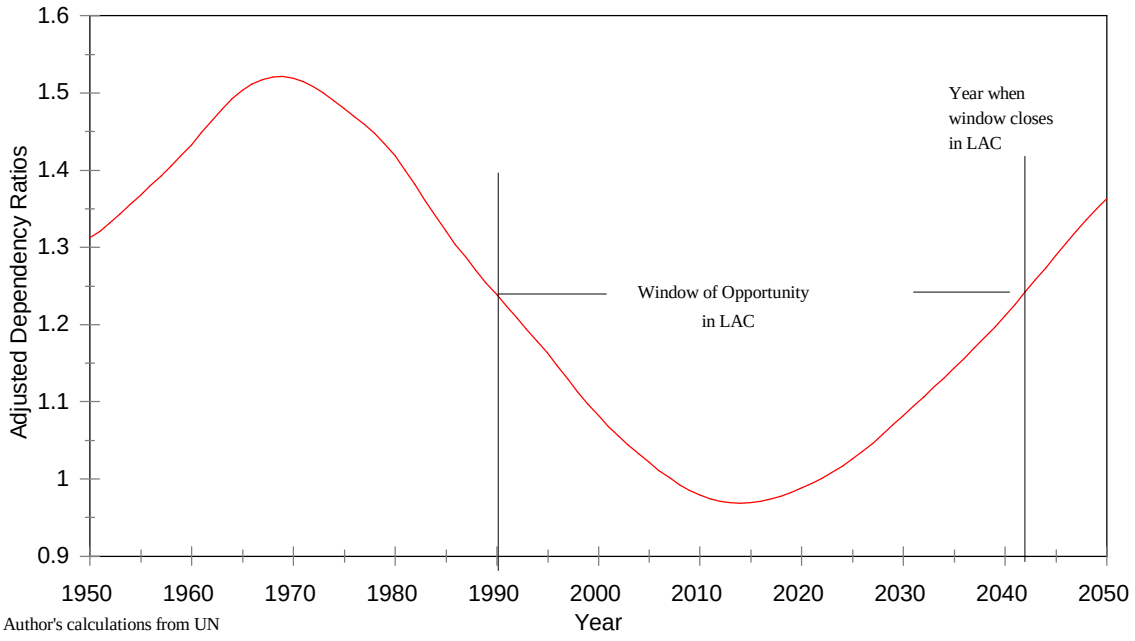
What about the future? For some time now, the Latin American region has been "investing" in its young because approximately 40% of its population was of school-age, a group that is normally supported by other household members who are of working-age. However, during the first decades of the next century the share of individuals aged 19 years or more will increase, and so total dependency rates will fall. The population weight of the elderly (defined as individuals 65 and older) — who are not economically active -- is also increasing, so eventually the share of "dependents" in the population will grow again.

Figure 18 presents the evolution of the total dependency rate in the region, and shows that Latin America is entering a "window of opportunity" during which the share of the working age population will be growing relative to the share of dependents, whether young or old. This "window" represents an opportunity because when a higher proportion of household members are in working age, more investment per child and greater savings for retirement can be made. However, this window will begin to close as the population ages. The total dependency rate will rise again to its current level by approximately 2040. The region's "window of opportunity" (defined as the years of low dependency)

will last on average for the following 40 years.[42] Figure 19 plots the year in which the "window" will close in each country.

Figure 20

The Demographic Window of Opportunity
In Latin America

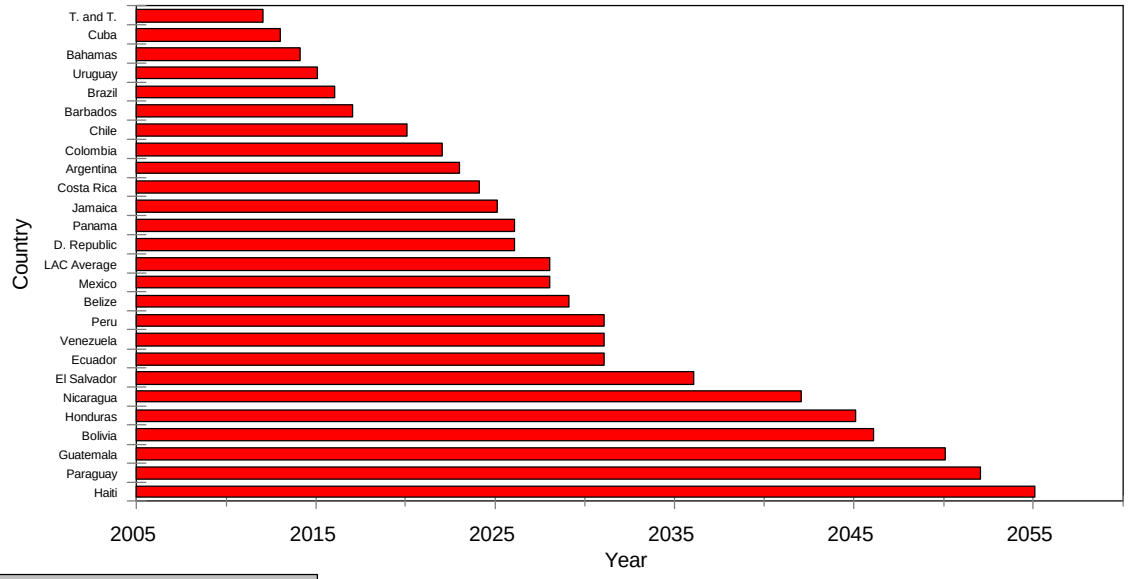


Source: Author's calculations from UN (1997). The dependency ratios are adjusted for the cost differencial of supporting the elderly vs. the cost of supporting children.

[42]Calculations from the population data and projections in UN (1997). The dependency ratios give different weights to the elderly (aged 65 or more) and to children (aged 0-19), because it is relatively more expensive to finance the cost of supporting the elderly (i.e. due to high medical costs), than the investment needed to support a child. To calculate the relative weights, we estimated the amount of public resources that are spent on the population over 65 years of age, and under 20 years of age, respectively. Specifically we compared public expenditures per capita in education and public expenditures per capita in social security for the elderly, obtained from Inter-American Development Bank (1996). The result was that one elderly person absorbs, on average, 4 times more public resources than children.

Figure 2.19

Last Year of Demographic Window of Opportunity in LAC



Source: Calculations from UN (1997)

According to these estimates, the "window" will close soonest for Trinidad & Tobago, around the year 2012, while it will remain open for Guatemala, Paraguay and Haiti until after 2050. The share of the elderly is increasing very fast in several countries relative to the working age population, and this will require a faster accumulation of private or public resources in the near future to provide for retirement and medical expenditures. Pressure on pension systems, social security programs, and families who support elderly members will be felt strongly within the next 15 years in Trinidad and Tobago, Cuba, The Bahamas, Uruguay, Brazil and Barbados; and within the next 20 years in Chile, Colombia, Argentina, Costa Rica and Jamaica. The question is: what is the best way to make provisions for this event?

Currently, the share of retirees is still not large, so one option is to seize the opportunity for initiating social security reform. Such reforms have already taken place in seven Latin American countries (Chile, Argentina, Peru, Colombia, Uruguay, Mexico and Bolivia). Lessons from the region and from OECD countries show that it is more difficult to solve this problem when the elderly have already become a relatively large group of the population. The demographic "window of opportunity" provides Latin American countries with a chance to generate large net savings while moving to fully funded systems before serious problems arise.

The "window of opportunity" is also highly relevant for education because it provides an excellent

chance for improving the quality of schooling. Until recently, most countries were in an early stage of the demographic transition and the share of the 0-15 age-group was increasing rapidly. This put pressure on the demand for education services which had to respond through massive expansions. Since providing education has large fixed costs such as infrastructure and training a corps of skilled teachers, countries have had difficulty investing enough to catch up with the demand generated by the demographic trends. However, as the population share of school-age children begins to decline, simply maintaining the same tax contribution per worker and the level of overall educational spending represents more resources per student.[43] If more resources per child can be translated into better schooling quality, there is a significant opportunity to improve the quality of education in the region.

[43]For a comparison of Latin America and other regions of the world in terms of tax effort, demographic effects, and education, see Inter-American Development Bank (1996: p. 250).

APPENDIX I

Table A1.1 DESCRIPTION OF THE DATA

	Country	Year	Name of the survey	Coverage	Reference Month	Sample size Households	Individuals
1	Argentina	80	Encuesta Permanente de Hogares	Gran Buenos Aires	October	3,400	11,905
		96	Encuesta Permanente de Hogares	Gran Buenos Aires	April and May	3,459	11,749
2	Bolivia	86	Encuesta Permanente de Hogares	Urban	1986	2,788	12,226
		95	Encuesta Integrada de Hogares	Urban	June	5,455	25,314
3	Brazil	81	Pesquisa Nacional por Amostra de Domicilios	National	September	103,961	482,611
		95	Pesquisa Nacional por Amostra de Domicilios	National	September	85,270	334,263
4	Chile	87	Encuesta de Caracterización Socioeconómica Nacional	National	November	22,700	97,044
		94	Encuesta de Caracterización Socioeconómica Nacional	National	November and December	45,379	178,057
5	Colombia	95	Encuesta Nacional de Hogares - Fuerza de Trabajo	National	September	18,255	79,012
6	Costa Rica	81	Encuesta Nacional de Hogares - Empleo y Desempleo	National	July	6,604	22,170
		95	Encuesta de Hogares de Propósitos Múltiples	National	July	9,639	40,613
7	Ecuador	95	Encuesta de Condiciones de Vida	National	August to November	5,810	26,941
8	El Salvador	95	Encuesta de Hogares de Propósitos Múltiples	National	1995	8,482	40,004
9	Honduras	89	Encuesta Permanente de Hogares de Propósitos Múltiples	National	September	8,727	46,672
		96	Encuesta Permanente de Hogares de Propósitos Múltiples	National	September	6,428	33,172
10	Mexico	84	Encuesta Nacional de Ingreso Gasto de los Hogares	National	Third quarter	4,735	23,985
		94	Encuesta Nacional de Ingreso Gasto de los Hogares	National	Third quarter	12,815	60,365
11	Nicaragua	93	Encuesta Nacional de Hogares Sobre Medicion de Niveles de Vida	National	February to June	4,458	24,542
12	Panama	95	Encuesta Continua de Hogares	National	August	9,875	40,320
13	Paraguay	95	Encuesta de Hogares - Mano de Obra	National	August to November	4,667	21,910
14	Peru	85-86	Encuesta Nacional de Hogares sobre Medición de Niveles de Vida	National	July 1985 to July 1986	4,913	26,323
		96	Encuesta Nacional de Hogares sobre Niveles de Vida y Pobreza	National	Fourth quarter	16,744	88,863
15	Uruguay	81	Encuesta Nacional de Hogares	Urban	Second semester	9,506	32,610
		95	Encuesta Continua de Hogares	Urban	1995	20,057	64,930
16	Venezuela	81	Encuesta de Hogares por Muestra	National	Second semester	45,421	239,649
		95	Encuesta de Hogares por Muestreo	National	Second semester	16,784	92,450

a. Can not separate between property and capital rent.

b. Can not separate between property rent, capital rent, and transfers.

Table A1.2.a Average years of schooling 25-65 year olds

	Argentina	Bolivia	Brasil	Colombia	Costa Rica	Chile	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Venezuela	Average
Decile	1996	1995	1995	1995	1995	1994	1995	1995	1996	1994	1995	1995	1996	1995	1995	
I	7.10	6.44	2.41	4.86	4.51	6.31	3.92	2.01	2.76	3.08	4.61	3.62	5.85	6.30	5.85	4.64
II	7.70	7.31	3.02	5.62	5.01	7.16	4.77	2.40	2.95	3.52	5.77	3.80	6.31	6.83	6.31	5.23
III	7.84	7.73	3.38	5.93	5.61	7.64	5.39	2.78	3.25	4.39	6.84	4.33	6.47	7.22	6.60	5.69
IV	8.28	8.15	3.82	6.37	6.01	8.02	5.67	3.17	3.71	5.43	7.55	4.93	6.19	7.49	6.86	6.11
V	8.84	8.14	4.32	6.63	6.33	8.45	6.63	3.53	4.21	5.93	8.09	5.15	6.29	7.81	6.76	6.47
VI	9.39	8.58	4.84	6.96	6.67	8.91	7.36	4.10	4.46	6.23	8.84	5.69	6.83	8.28	7.32	6.96
VII	9.65	9.20	5.68	7.18	7.37	9.43	8.10	5.20	4.88	7.31	9.45	6.67	7.40	8.99	7.17	7.58
VIII	10.28	9.61	6.37	7.73	7.83	10.30	8.37	6.19	5.92	7.83	10.20	7.35	8.27	9.53	7.72	8.23
IX	11.73	10.83	7.50	7.75	9.01	11.30	9.44	7.58	6.74	8.66	11.50	8.19	9.06	10.64	8.21	9.21
X	14.24	12.12	10.33	6.68	11.85	13.12	11.76	11.02	8.98	11.24	13.93	10.75	10.84	12.68	9.93	11.30

Source: Author's calculations from household survey data.

Table A1.2.b Average years of schooling 12 year olds

	Argentina	Bolivia	Brasil	Colombia	Costa Rica	Chile	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Venezuela	Average
Decile	1996	1995	1995	1995	1995	1994	1995	1995	1996	1994	1995	1995	1996	1995	1995	
I	4.10	4.96	1.89	4.16	4.03	5.63	4.56	2.65	3.35	4.01	4.73	3.39	3.46	5.04	4.76	4.05
II	3.50	5.36	2.30	4.49	4.18	5.78	4.43	3.11	3.21	4.03	4.98	3.75	3.52	5.65	5.09	4.22
III	3.91	5.39	2.61	4.57	4.07	5.86	4.89	3.14	3.23	4.37	5.13	3.69	3.35	5.50	5.14	4.32
IV	5.05	5.69	2.94	4.86	4.62	6.07	4.93	3.10	3.80	4.34	5.31	4.28	3.21	5.83	5.23	4.62
V	4.60	5.40	3.31	4.45	4.43	6.03	5.48	3.28	3.78	4.64	5.60	3.78	3.45	5.77	5.20	4.61
VI	3.50	5.33	3.67	4.61	4.65	6.16	5.40	3.85	3.73	4.86	5.47	4.21	3.68	5.82	4.92	4.66
VII	4.28	5.40	3.91	4.53	4.99	6.05	5.47	3.86	3.81	4.72	5.67	4.59	3.96	5.59	5.24	4.80
VIII	4.84	5.62	4.12	3.79	4.76	6.28	5.58	4.19	4.41	5.25	5.60	4.45	4.42	6.04	5.17	4.97
IX	4.34	5.50	4.44	4.06	5.25	6.19	5.47	4.27	4.14	4.85	5.75	4.76	4.54	5.41	5.55	4.97
X	3.50	5.92	4.74	4.23	5.10	6.12	5.53	4.81	4.85	5.06	6.03	4.69	4.11	5.72	5.80	5.08

Source: Author's calculations from household survey data.

Table A1.2.c Average years of schooling 15 year olds

	Argentina	Bolivia	Brasil	Colombia	Costa Rica	Chile	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Venezuela	Average
Decile	1996	1995	1995	1995	1995	1994	1995	1995	1996	1994	1995	1995	1996	1995	1995	
I	7.78	7.53	3.14	6.17	5.97	7.88	5.85	4.19	4.63	6.04	6.12	5.07	6.69	7.31	6.63	6.07
II	8.37	8.02	3.65	6.63	6.17	8.16	6.15	4.76	4.09	6.49	6.79	5.39	6.55	8.05	7.09	6.42
III	9.01	8.11	4.04	6.64	6.56	8.64	7.10	4.41	4.92	6.72	7.35	6.21	6.74	8.24	7.15	6.79
IV	9.23	8.11	4.40	6.63	6.70	8.50	6.94	4.67	4.70	6.81	7.41	5.83	7.10	8.57	7.09	6.85
V	9.44	8.22	4.92	6.83	6.38	8.57	7.06	5.08	5.18	7.33	7.87	6.15	6.50	8.41	7.10	7.00
VI	9.55	7.72	5.23	6.93	6.71	9.23	7.88	5.35	4.84	7.81	7.65	6.37	6.45	8.82	7.12	7.18
VII	9.27	8.27	5.88	6.79	6.74	8.66	7.39	5.75	5.64	7.64	8.04	5.97	7.06	8.35	7.56	7.27
VIII	9.29	8.10	6.10	5.94	7.49	8.99	7.20	6.42	6.04	7.85	8.33	6.95	7.35	8.55	7.00	7.44
IX	9.50	8.20	6.62	5.68	7.34	8.51	7.44	6.99	6.47	9.03	8.37	6.98	7.82	8.81	7.42	7.68
X	9.50	8.13	7.09	5.86	7.52	9.31	8.07	7.91	6.71	8.32	8.50	7.02	7.75	9.00	8.29	7.93

Source: Author's calculations from household survey data.

Table A1.2.d Average years of schooling 18 year olds

	Argentina	Bolivia	Brasil	Colombia	Costa Rica	Chile	Ecuador	El Salvado	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Venezuela	Average
Decile	1996	1995	1995	1995	1995	1994	1995	1995	1996	1994	1995	1995	1996	1995	1995	
I	8.84	10.42	3.70	7.78	6.60	8.90	6.67	4.60	5.33	6.08	6.83	5.81	8.57	8.55	7.58	7.08
II	8.85	10.20	4.33	7.80	7.14	9.49	7.46	5.44	4.80	6.65	7.29	5.81	8.58	8.99	7.96	7.39
III	9.59	10.29	4.96	8.23	6.63	9.47	7.37	5.65	5.19	7.68	7.55	5.44	8.50	9.26	8.27	7.61
IV	9.59	10.33	5.22	7.91	7.24	9.40	7.92	5.67	5.22	7.95	9.03	6.02	7.79	9.36	8.28	7.79
V	10.23	10.15	5.79	8.08	6.69	10.04	8.22	6.06	5.64	9.06	9.69	7.90	8.25	9.86	8.49	8.28
VI	10.12	10.28	6.21	8.31	7.84	9.71	8.46	6.04	5.98	9.10	9.66	8.19	9.12	9.95	8.00	8.46
VII	11.60	10.16	6.84	8.30	8.29	10.20	8.50	7.09	6.50	9.03	10.01	8.00	9.18	9.87	8.02	8.77
VIII	12.01	10.38	6.93	7.16	7.74	10.84	10.09	8.00	6.31	9.95	10.26	8.24	9.89	10.58	8.67	9.14
IX	12.71	10.04	8.45	7.30	8.88	11.35	9.34	8.18	6.61	9.22	11.01	8.40	9.98	10.55	8.65	9.38
X	14.14	10.87	9.29	6.64	10.18	11.23	10.38	9.61	7.38	10.89	11.59	9.86	10.24	11.12	9.65	10.20

Source: Author's calculations from household survey data.

Table A1.2.e Average years of schooling 21 year olds

	Argentina	Bolivia	Brasil	Colombia	Costa Rica	Chile	Ecuador	El Salvado	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Venezuela	Average
Decile	1996	1995	1995	1995	1995	1994	1995	1995	1996	1994	1995	1995	1996	1995	1995	
I	6.41	10.94	4.13	7.19	5.70	9.03	7.99	5.73	4.81	6.01	6.16	4.23	9.00	7.50	7.35	6.81
II	8.68	11.15	4.29	7.62	6.35	9.75	7.85	4.72	4.82	6.99	7.92	4.88	9.53	8.86	8.28	7.45
III	9.84	10.97	4.87	8.62	6.61	9.67	8.23	4.86	4.45	7.76	8.54	4.83	8.45	9.05	8.57	7.69
IV	9.58	11.43	5.42	8.98	6.37	10.24	8.88	5.91	5.05	9.01	9.36	6.55	9.29	9.67	8.64	8.29
V	10.90	10.64	5.68	8.97	7.41	10.75	8.81	6.85	5.52	8.89	9.45	5.56	9.13	10.08	8.41	8.47
VI	11.43	11.44	6.80	8.78	7.58	11.61	9.17	6.91	5.77	9.18	10.37	6.63	9.30	10.42	8.37	8.92
VII	12.13	11.58	7.35	8.89	7.65	11.67	10.58	7.64	7.00	10.29	10.68	8.40	8.96	10.50	9.39	9.51
VIII	12.83	10.96	7.83	9.22	8.84	12.07	10.10	8.73	6.98	9.18	11.06	8.40	9.98	11.18	8.81	9.75
IX	13.11	11.66	8.79	8.68	10.12	12.51	10.03	9.35	8.45	9.92	11.48	9.43	11.16	11.62	9.20	10.37
X	14.04	12.64	10.63	7.89	11.29	13.48	11.10	11.82	9.04	11.32	12.38	10.91	11.08	12.14	10.20	11.33

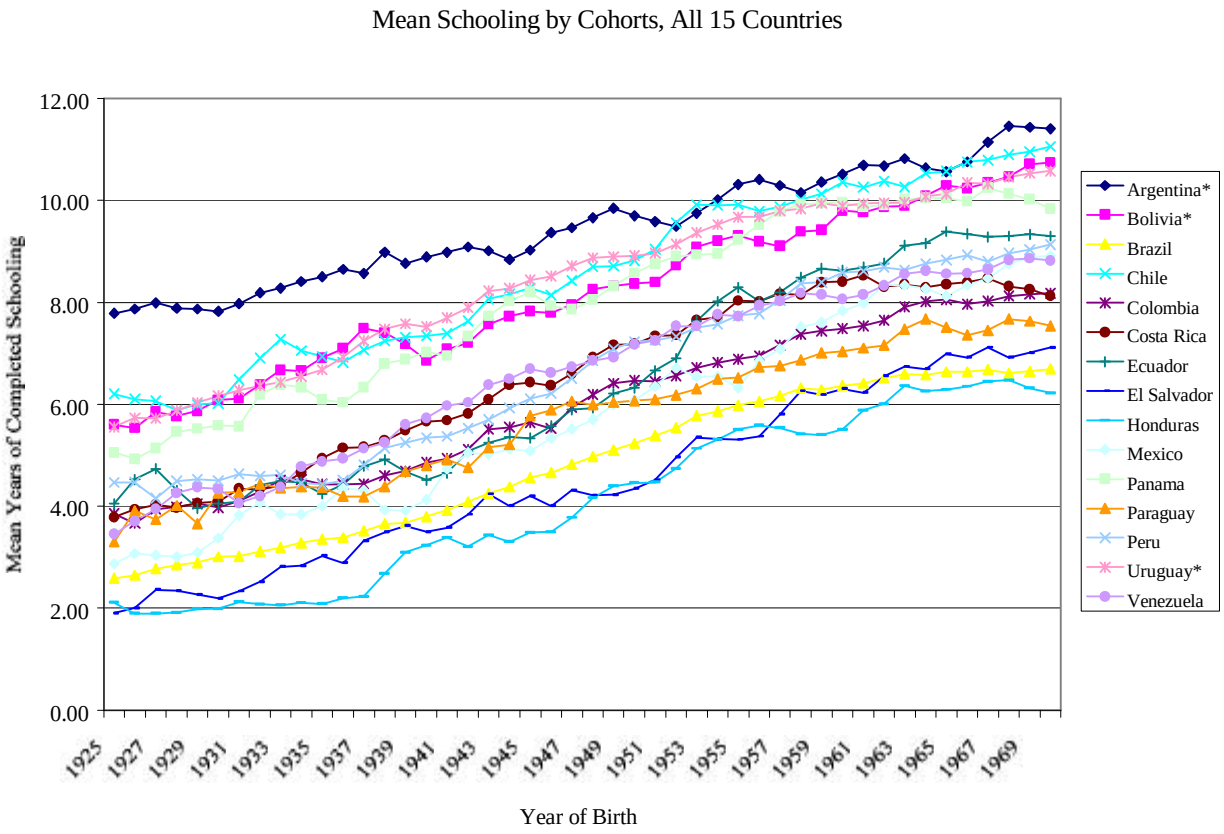
Source: Author's calculations from household survey data.

Table A1.2.f Average years of schooling 24 year olds

	Argentina	Bolivia	Brasil	Colombia	Costa Rica	Chile	Ecuador	El Salvado	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Venezuela	Average
Decile	1996	1995	1995	1995	1995	1994	1995	1995	1996	1994	1995	1995	1996	1995	1995	
I	6.60	9.99	3.95	6.48	5.24	8.36	6.15	3.39	4.72	5.54	6.26	4.50	8.18	7.15	7.20	6.25
II	8.21	10.15	4.18	6.92	5.87	8.93	6.76	4.48	4.53	5.82	7.84	6.27	8.54	8.14	8.07	6.98
III	9.77	9.70	4.73	8.04	6.21	9.42	7.95	5.40	4.95	7.33	7.71	5.87	9.33	8.86	8.66	7.60
IV	9.17	10.53	5.47	7.95	6.45	10.21	7.45	4.73	4.68	8.28	8.79	5.22	8.94	9.38	7.98	7.68
V	9.34	10.23	5.99	8.42	6.71	10.25	9.30	5.78	5.42	8.41	9.32	7.27	8.41	10.64	8.39	8.26
VI	10.36	10.08	6.76	8.15	7.10	11.02	8.60	6.32	4.79	8.77	10.36	6.65	8.73	10.94	7.65	8.42
VII	10.82	11.11	7.16	9.38	7.79	11.37	9.36	7.51	6.49	10.78	10.64	7.68	9.71	11.02	9.54	9.36
VIII	11.90	11.91	8.32	8.87	8.71	12.16	9.61	8.76	6.74	9.83	11.46	8.35	10.22	11.46	8.41	9.78
IX	12.32	11.70	8.92	8.18	10.05	13.32	10.35	11.23	6.90	10.62	12.36	8.66	10.50	12.05	9.22	10.43
X	13.80	13.51	11.04	7.88	11.60	13.93	11.72	12.57	9.99	11.91	14.15	10.96	11.63	12.99	10.30	11.86

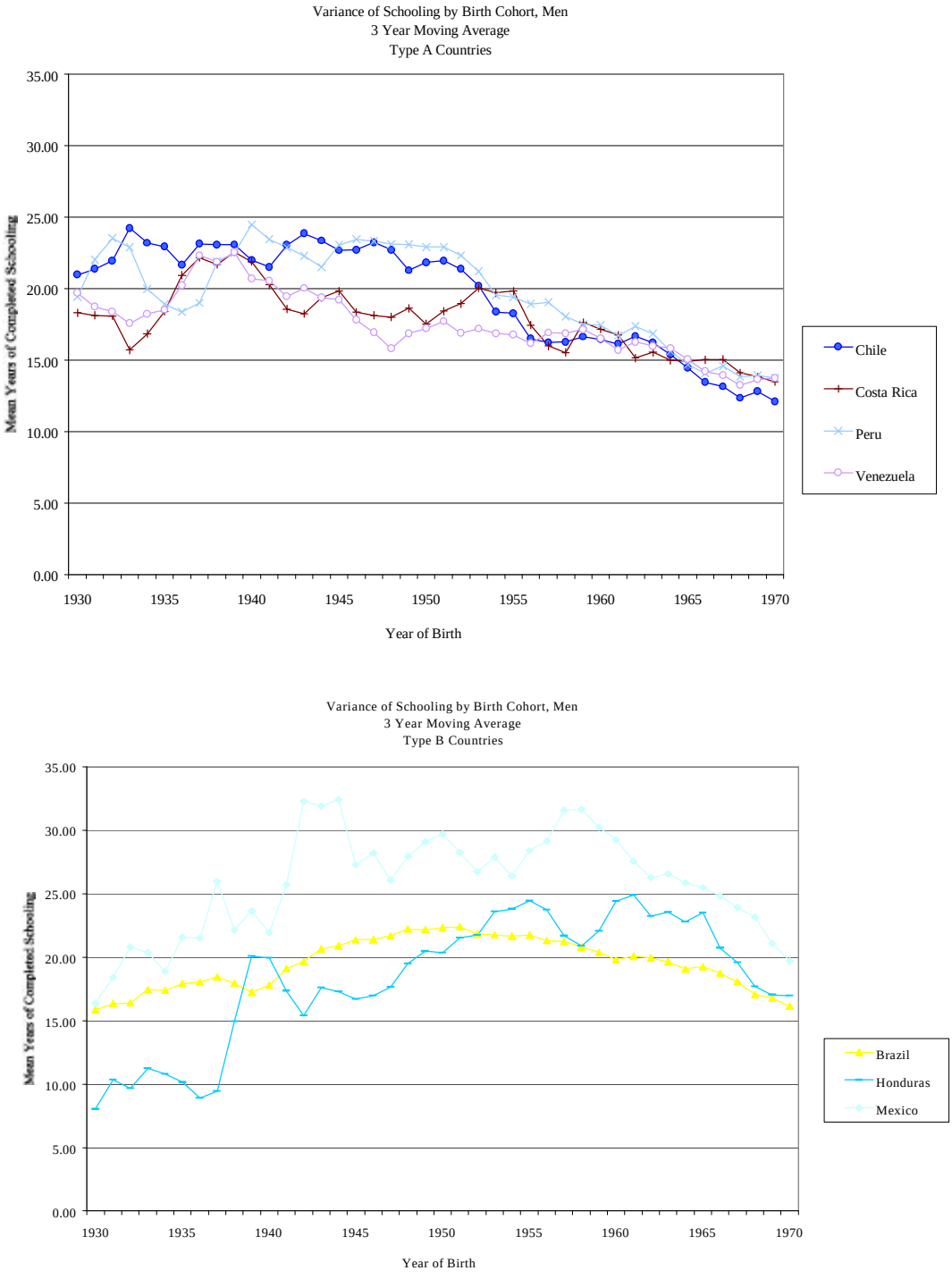
Source: Author's calculations from household survey data.

Figure A.1



Source: Duryea and Szekely, 1998.

Figure A.2



Source: Duryea and Szekely, 1998.

Appendix IV
Enrollment Rates by Age

Table A4.1

Country and Year	Enrollment Rates by Age 7	10	12	15	18	20	21
Brazil 1995	0.87	0.94	0.91	0.75	0.47	0.29	0.25
Chile 1994	0.98	0.99	0.98	0.85	0.52	0.24	0.24
Colombia 1995	0.91	0.95	0.90	0.71	0.46	0.30	0.25
Costa Rica 1995	0.97	0.98	0.94	0.64	0.39	0.31	0.25
Ecuador 1995	0.92	0.97	0.90	0.60	0.38	0.28	0.24
El Salvador 1995	0.79	0.88	0.86	0.63	0.35	0.23	0.22
Honduras 1996	0.81	0.92	0.83	0.43	0.25	0.16	0.13
Mexico 1994	0.95	0.96	0.91	0.61	0.33	0.22	0.24
Nicaragua 1993	0.66	0.86	0.79	0.54	0.35	0.23	0.17
Panama 1995	0.97	0.99	0.95	0.78	0.49	0.29	0.24
Paraguay 1995	0.89	0.97	0.93	0.55	0.36	0.19	0.15
Peru 1996	0.94	0.96	0.95	0.86	0.44	0.33	0.30
Venezuela 1995	0.96	0.97	0.95	0.78	0.45	0.34	0.27
Cross-country Average	0.90	0.95	0.91	0.67	0.40	0.26	0.23
Argentina 1996 (1)	1.00	1.00	0.99	0.73	0.52	0.34	0.42
Bolivia 1995 (2)	0.98	0.99	0.98	0.91	0.74	0.57	0.56
Uruguay 1995 (3)	1.00	0.99	0.97	0.78	0.46	0.33	0.28
Cross-country Average	0.99	0.99	0.98	0.81	0.57	0.41	0.42

Note: (1) The surveys for Argentina include only the Gran Buenos Aires area.
(2) The surveys for Bolivia and Uruguay include only urban areas.
Source: Author's calculations.

Appendix II[44]

Supply-Side Analysis of Labor Market Participation

To examine changes in female participation, we estimate a model where changes in the supply of labor are driven by demographics, education, and other control variables. All the data used in the estimations comes from a panel with information from 22 Latin American countries for the period 1970-1996. The data on participation was taken from two sources. For the period 1960-1992 we used ILO (1997), and for Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Honduras, Mexico, Peru and Venezuela we obtained female participation rates for years close to 1995, directly from household surveys (see table A1.1 in Appendix I for details). Fertility indicators were taken from UN (1997), while the information on female education is from Barro-Lee (1996). Data on wages are from ILO (1997 and other years).

Table A2.1

FEMALE LABOR MARKET PARTICIPATION IN LAC

Independent Variable	Dependent Variable: Female Participation Rate*					
	-1	-2	-3	-4	(5)	(6)
Method of Estimation	fe	fe	fe	fe	be	re
Income Variables						
Average Wages	**-0.001** (-1.2)					
Average Wages in Manufacturing		**-0.001** (-2.3)				
Minimum Wage			**-0.001** (-3.4)	**-0.001** (-1.3)	**0.00** (-0.3)	**0.00** (-1.7)
Fertility and Education						
Fertility Rate				**-1.64** (-5.4)	**-0.67** (-2.5)	**-0.18** (-6.0)
Average Education of Female WAP				**0.2** (3.5)	**0.2** (1.3)	**0.2** (2.9)
Constant	**-0.2** (-2.0)	**-0.1** (-2.3)	**-0.2** (-2.6)	**-0.9** (-2.3)	**3.3** (2.1)	**-2.6** (-0.7)
R-squared	**0.01**	**0.05**	**0.08**	**0.44**	**0.33**	**0.20**
Number of Observations	**154**	**127**	**156**	**145**	**20**	**145**

** 't' Statistics in parenthesis*

**Specifically, we used the following measure as dependent variable: ln(p/(1-p)), where p denoes female labor market participation rate.*

Table

[44]This Appendix is based on joint work with Diana Weinhold.

A.2.1 assesses the relation female labor market participation on the one hand, and fertility and average years of schooling on the other, by controlling for income. In Table A.2.2 we run the base regression by testing which type of education matters the most, and we find that the relation between female education and participation is totally driven by higher schooling. In Table A.2.3 we include demographics into the base equation.

Table A2.2

FEMALE LABOR MARKET PARTICIPATION AND EDUCATION

Independent Variable	Dep. Variable: Female Participation Rate*			
	-1	-2	-3	-4
Method of Estimation	fe	fe	fe	fe
Minimum Wage	**0.00** (-1.0)	**-0.01** (-2.0)	**-0.01** (-2.0)	**0.00** (-1.1)
Fertility Rate	**-0.161** (-5.2)	**-0.216** (-7.8)	**-0.207** (-7.1)	**-0.156** (-5.4)
Education				
(%) with no education	**-0.0269** (-3.4)			
(%) with primary education		**-0.015** (-1.4)		
(%) with secondary education			**0.24** (1.2)	
(%) with higher education				**1.0** **(4.7)**
Constant	**0.9** (5.2)	**0.6** (3.7)	**0.2** (0.9)	**-2.9** (-1.5)
R-squared	**0.44**	**0.40**	**0.39**	**0.48**
Number of Observations	**145**	**145**	**145**	**145**

** 't' Statistics in parenthesis*

**Specifically, we used the following measure as dependent variable: ln(p/(1-p)), where p denoes female labor market participation rate.*

The use of these variables introduces a number of econometric problems. For instance the regression coefficients could be simply capturing differences between countries, which result in omitted variable bias. Additionally, we could have problems of endogeneity because fertility and education are not totally exogenous to participation (in fact, the decision to participate or not could be fully determined by the fact that an individual chooses to attend school or to enter a child-bearing stage), and as we are dealing with a mix of cross sections and time series some variables that appear to be correlated could simply be following common trends. Another issue is that some of the variables included in the analysis can be following dynamic processes capturing unobserved factors.

Table A2.3

FEMALE LABOR MARKET PARTICIPATION AND DEMOGRAPHICS

Independent Variable	
Method of Estimation	fe
Minimum Wage	**0.00** (-0.6)
Fertility Rate	**-0.023** (-3.9)
(%) with higher education	**0.001** (1.6)
Demographic Variables	
(%) Population in Age 0-9	**-0.003** (-2.17)
(%) Population in Age 10-19	**0.004** (0.26)
(%) Population in Age 20-29	**0.002** (1.7)
(%) Population in Age 30-39	**0.07** (3.0)
(%) Population in Age 40-49	**-0.04** (-1.83)
Constant	**-0.3** (-0.2)
R-squared	**0.59**
Number of Observations	**145**

** 't' Statistics in parenthesis*

**Specifically, we used the following measure as dependent variable: ln(p/(1-p)), where p denoes female labor market participation rate.*

In what follows we discuss how we addressed these important issues, but in sum, we used fixed effects to tackle the problem of omitted variables, we used instrumental variables to account for endogeneity, we estimated regressions both in levels and changes to correct for possibility that some variables are non-stationary, and we also estimated regressions with lags to capture dynamics. For presentation purposes we present the most intuitive results in the main text and derive the decomposition in Figure 10 from these same results, but it should be stressed that when one attempts to correct for these potential problems, the conclusions we do not vary.

The basic model

This is a simple model that checks for the robustness of the results presented in the previous three tables. The basic structure is as follows:

(1) WLPit = F (MLPit, AGEit, EDUCit, FERTit, MACROit)

Where:
WLP = Women's labor force participation rate
MLP = Men's labor force participation rate
AGE = Age structure of the population
EDUC = Education of the female population
FERT = Fertility rate of the population
MACRO = other macro economic control variables that indicate economic growth, openness, financial depth, urban population rate, and composition of the economy between manufacturing and services.
it = are subscript indices for country I in time t, respectively.

However we believe that decisions regarding fertility and labor force participation are made jointly in most cases, in which case fertility becomes an endogenous variable. To address this problem we build a supplementary model of fertility:

(2) FERTit = F (AGEit, EDUCit, IMRit, MACROit)

Where IMR is the infant mortality rate.

In this case the infant mortality rate is chosen as an exogenous variable which we assume is correlated with fertility decisions but not with labor force participation decisions (i.e. the identifying instrumental variable). Thus our final model is:

(3) WLPit = F (MLPit, AGEit, EDUCit, FERTIVit, MACROit)

Where FERTIV is the instrumented fertility rate.

Data for estimating this model is available for at least some time periods from Argentina, Brazil, Chile, Colombia, Costa Rica, The Dominican Republic, Ecuador, Guatemala, Honduras, Haiti, Jamaica, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Uruguay and Venezuela. Bolivia has been omitted from the analysis due to data outliers (see table A2.7 where Mexico has also been omitted from the regression). In general data was available on each country in the early 1960s, the early 1970s, the early 1980s and the early 1990s. In addition many countries had data available scattered throughout the 1980s and early 1990s in no particular pattern. In order to maximize the amount of information utilized while insuring that the periods of analysis were comparable across countries data that was collected as close to 1960, 1970, 1980 and 1990 as

possible and the average annual growth rate over the specific interval of time for each country was calculated for each variable. Thus the data correspond as closely a possible to the decades of the sixties, the seventies and the eighties.

The variables used were chosen to correspond as closely as possible to the hypothesized factors considered during the development of the basic model. Women's (men's) labor force participation rates were calculated at the ratio of economically active women (men) to total female (male) population age 25 to 59. Education variables measure the percentage of women ages twenty-five and older that have completed primary, secondary and higher education levels, respectively. This data was available every five years and was generated by linear interpolation where necessary. Total fertility rates and infant mortality rates were obtained from the World Tables of the World Bank and UN (1997). The age structure of the population was obtained from the United Nations in the form of a cohort census. General macroeconomic control variables were taken from the Summers and Heston Penn World Tables and the World Tables and include per capital GDP growth, openness, and the percentage of population living in urban areas. Formally the variables used in the empirical analysis and their definitions are:

variable	**definition**
FLP	Female labor force participation rate
MLP	Male labor force participation rate
FSP	percentage of females that have completed primary school
FSS	percentage of females that have completed secondary school
FSH	percentage of females that have completed higher schooling
COH1	population between 25 and 34 years of age
COH2	population between 35 and 40 years of age
COH3	population between 45 and 54 years of age
COH4	population between 55 and 59 years of age
TFR	Total fertility rate (instrumented variable is FERTIV)
IMR	Infant mortality rate
GGDP	per capita GDP growth rate
OPEN	openness = ratio of (exports + imports) to GDP
URBT	percentage of population living in urban areas
FDEP	measure of financial depth
MANUF	percentage of output of manufacturing

Methodology

In order to empirically estimate the model there are several issues that must be considered. The first is that many of these variables: labor force participation, fertility rates, education etc. are trending over time and may even be non stationary in nature in that they may not tend back to some trend-mean. Thus they would appear to be correlated even if variations in one really had no impact on variations in the others. The second issue is that these variables are also following

dynamic processes: the increase in female participation, education and fertility in any given year will depend on the past values of the levels of these variables and perhaps on the previous growth rates. Empirically the dynamics will be even more important as they capture not only the intrinsic dynamic evolution of the processes themselves but also many of the unobservable factors that are influencing the variables. Third, since our data set is a panel of countries we might also wish to consider the possibility that the nature of the relationship between the variables of interest may vary with certain country characteristics such as the levels and pace of cultural and economic development and relevant initial conditions. Of course there are other possibilities that could be explored, such as whether the relationships in question may be non-linear in nature, whether the processes within each country are truly independent as basic OLS requires, or whether there are spillover effects and/or common shocks that play a role in determining women's participation rates. For the purposes of this analysis we shall focus only on the first three issues and leave these other modeling issues for later.

A simple way to address the first problem is estimate the model in growth rates rather than in levels. For example, if our proposed model is:

(4) $WLFP_{it} = a + b1MLFP_{it} + b2AGE_{it} + b3EDUC_{it} + b4FERT_{it} + b5MACRO_{it} + u_{it}$

then it follows that

(5) $WLFP_{it-1} = a + b1MLFP_{it-1} + b2AGE_{it-1} + b3EDUC_{it-1} + b4FERT_{it-1} + b5MACRO_{it-1} + u_{it-1}$

If we take logs of both sides of each equation and subtract (5) from (4) we get:

(6) $GWLFP_{it} = b1GMLFP_{it} + b2GAGE_{it} + b3GEDUC_{it} + b4GFERT_{it} + b5GMACRO_{it} + e_{it}$

Where all our variables are now expressed in growth rates. If we include an intercept this model eliminates the influence of any common trend in the levels on the estimates of the coefficients and also differences out the country-specific time-invariant characteristics that might influence the relationships in question. We also would like to test whether initial conditions have an impact by including the initial level variables. Of course we still may have second-order country effects or trends in the growth rates so will shall consider both the possibilities of country and time effects in the estimation. Our final model with which we begin our analysis then becomes:

(7) $GWLFP_{it} = a_i + t_t + b1GMLFP_{it} + b2GAGE_{it} + b3GEDUC_{it} + b4GFERT_{it} + b5GMACRO_{it} + b6WLFP1960 + e_{it}$

Due to the small number of total observations (50) we are extremely parsimonious throughout the analysis. A general-to-simple modeling strategy is adopted in which control variables are systematically excluded from the model if statistical tests indicate that the variable's effect is

insignificantly different from zero. In some cases insignificant variables are left in the model if the apparent lack of a relationship is itself of interest. In addition all the regressions were corrected for the presence of heteroskedasticity using White's generalized approach.

With extreme caution we could also introduce a simple dynamic structure into this basic model as well. Including lags of the exogenous variables allows for lagged responses to changes (although a 10-year lag in response seems to be quite extreme), although it exhausts quite a few degrees of freedom in the estimation. The short time dimension of the data makes it more difficult to confidently include lagged dependent variables into the model. If the dynamics vary from country to country and these idiosyncrasies are not taken into account then a simultaneity bias will be introduced into the estimation due to correlation between the error term and the explanatory variables. With our three decades we could instrument for the lagged dependent variable but would be left with very few observations (only one observation for each country) which is problematical in itself. Thus we restrict our exploration of the dynamics to lags in response to exogenous variables as well as examining whether or not the growth rates depend on certain initial conditions. After several specifications are explored we find that the dynamic models are quite unsatisfactory. Not only are there more parameters to estimate with substantially fewer observations, but there are no significant and interesting results that could lead to greater insight. Thus we rely on a static model for the remainder of this analysis.

Results

There are N=50 observations for all regressions. The first regression estimated is the first-stage model of the growth of the total fertility rate. As we are not conducting any tests of hypotheses on the estimated coefficients parsimony is less important and a variety of control variables are included. In addition, several fixed effects dummies were significant (or almost so) and were allowed to remain in the regression.

TABLE A2.4
DEPENDENT VARIABLE: GTFR

Variable	Parameter est.	t-statistic	Prob > |T|
INTERCEPT	-0.0004	0.0780	0.9383
CDUM5	-0.0234	-2.8390	0.0072
CDUM7	-0.0191	-2.6030	0.0130
CDUM9	-0.0106	-1.3120	0.1972
CDUM15	-0.0092	-1.2650	0.2136
CDUM18	-0.0087	-1.2870	0.2056
GIMR	0.1777	2.1220	0.0402
GFSS	-0.1136	-2.4320	0.0197
GCOH1	-0.1897	-1.0010	0.3232
GGDP	0.1132	1.5040	0.1408
OPEN	-0.0001	-1.1560	0.2548

R-square: 0.4498 Adj R-sq: 0.3087
N=50

Table A2.5 presents the results of the second stage regression, omitting the time effects:

TABLE A2.5
DEPENDENT VARIABLE: GFLP

Variable	Parameter est.	t-statistic	Prob > [T]
INTERCEPT	-0.0080	-0.8450	0.4028
GMPR	2.1068	2.7520	0.0086
GTFRIV	-1.0109	-2.3340	0.0242
GFSH	0.2200	2.5790	0.0133
GCOH1	-0.4650	-1.2550	0.2161
GCOH2	0.5996	1.4360	0.1580

N=50

Readers are reminded that a general-to-simple methodology has been adopted and these represent only the final regressions. Thus none of the macro control variables were found to be significant in the second regression. Also interesting is the finding that secondary schooling seems to be important in the fertility equation, while it is completion of higher schooling that is important in the labor force participation decision. The signs of the variables are consistent with our priors as well. Higher growth of the labor force participation among men is associated with higher participation among women. The growth fertility rates is inversely related to female labor force participation. The cohort (age) variables are not statistically significant in the regression. However they suggest that increases in the 35-40 year old cohort is associated with higher participation. Earlier regressions in which female labor force participation was modeled as only a function of cohort changes yielded similar, insignificant coefficient estimates.

As we have noted above, Bolivia has been omitted from the analysis due to some clearly outlying data. However it is possible that there are other countries in the sample with peculiar relationships between the variables in question that may have a disproportionate effect on our results and lead us to general conclusion that is in fact an idiosyncratic feature of only one country. To check for such outlier countries we systematically delete one country at a time from the data set and redo the regression analysis. The average error-sum-of-squares is then compared for the remaining data for each omitted country. Countries who have had a disproportionately large impact on the estimated regressors will display error-sums-of-squares for the remaining data estimates that is substantially lower than the average value. The result of this exercise is that we find the error-sum-of-squares of the regression analysis excluding Mexico (at .00055) is 2.2 standard deviations

lower than the average value (.00062). Thus we examine the regression results excluding both Bolivia and Mexico and find, as illustrated in table 3, that in fact the coefficient on GCOH2 (growth of the cohort from 35 to 40 years of age) is positive and significant. Further analysis confirms that the lack of significance of previous regressions was due to the influence of Mexico and its idiosyncratic demographic/ labor force participation relationship. The results are consistent with our intuition.

TABLE A2.6
DEPENDENT VARIABLE: GFLP
(With time effects, excluding Mexico)

Variable	Parameter est.	t-statistic	Prob > |T|
INTERCEPT	0.0089	0.0777	0.4419
GMPR	0.8529	1.2640	0.2139
GTFRIV	-1.2772	-3.5040	0.0012
GFSH	0.1468	1.8270	0.0754
GCOH1	-0.9159	-2.4150	0.0205
GCOH2	0.1050	0.2130	0.8326
DECADE2	-0.0276	-2.7130	0.0099
DECADE3	-0.0095	-0.9450	0.3507

N=47

As previously discussed, the model specification was arrived at by a systematic reduction in the list of dependent variables. However, with a new sample size this reduction may no longer be valid so we redo the entire analysis excluding Mexico in order to test whether or not some of our macro control variables may now be significant. Without Mexico in the sample we find no evidence of significant heteroskedasticity in the regressions. However the exclusion does not change the lack of significant coefficient estimates on the macro control variables.

All of the results contained herein are subject to the caveat that due to data scarcity we are examining only the static, contemporaneous correlation of the average annual growth rates over ten years of the variables. Thus we have not taken into account any dynamic process, nor have we been able to capture any short-run relationships that may exist.

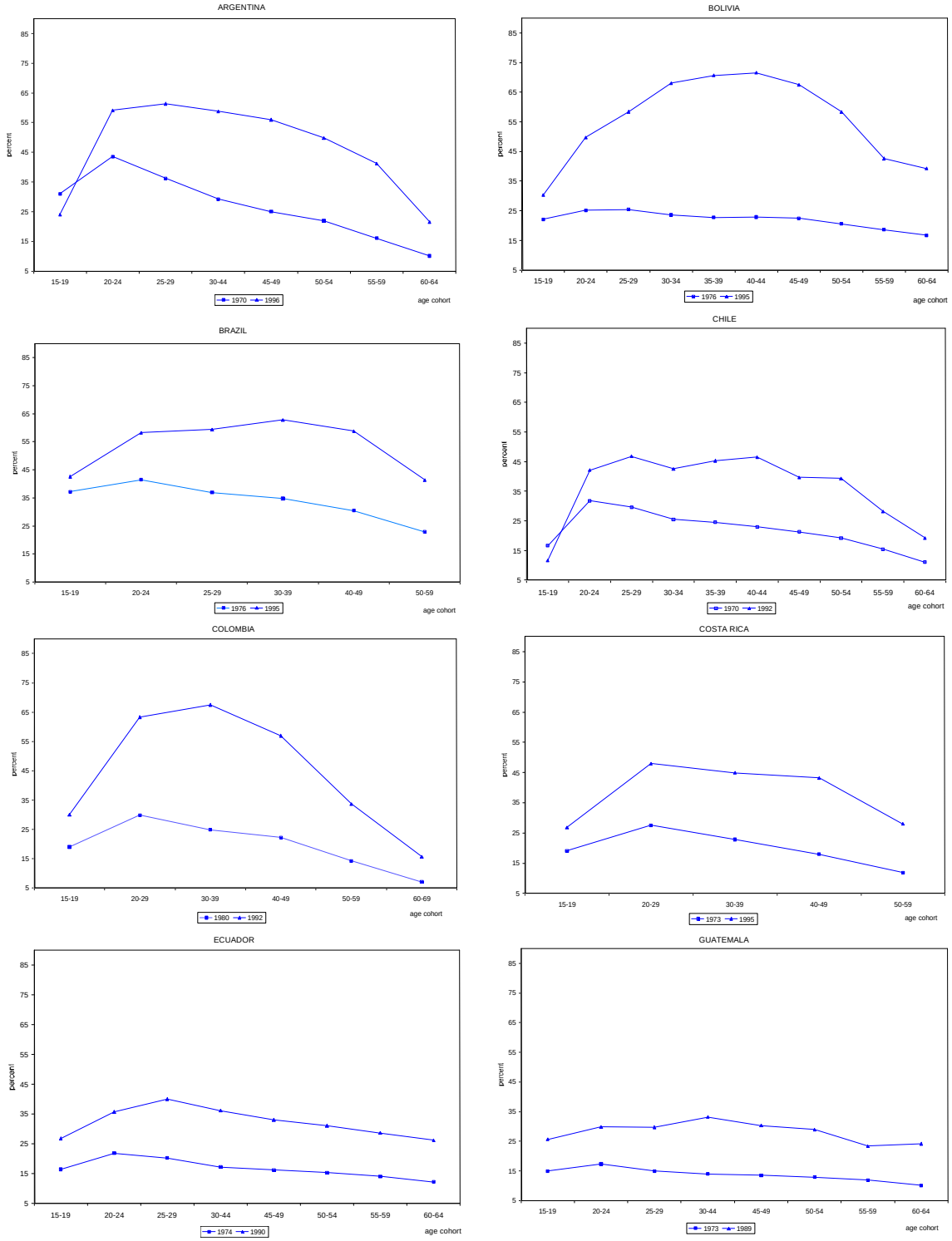
The main conclusion we extract from all these robustness tests to our basic result is that the age composition of the population has a significant impact on female participation rates after controlling for several econometric problems. Increases in the middle age cohort is associated with a significant increase in the overall female participation rate.

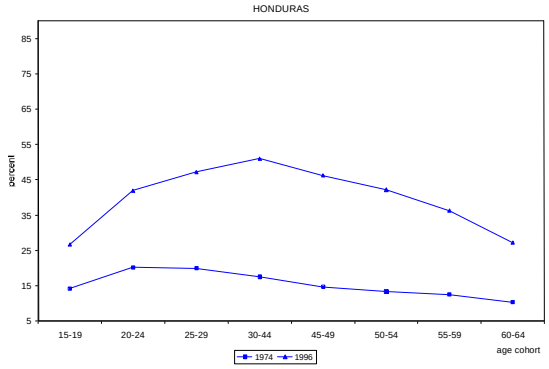
TABLE A2.7
DEPENDENT VARIABLE: GFLP
(Without time effects, excluding Mexico)

Variable	Parameter est.	t-statistic	Prob > |T|
INTERCEPT	-0.0079	-0.8760	0.3864
GMPR	1.4769	2.1490	0.0376
GTFRTV	-1.2158	-3.3920	0.0015
GFSH	0.1718	2.2430	0.0304
GCOH1	-0.5382	-1.5850	0.1206
GCOH2	0.7391	1.9510	0.0579

N=47

Figure A2.1
Female Participation Rates by Age Group

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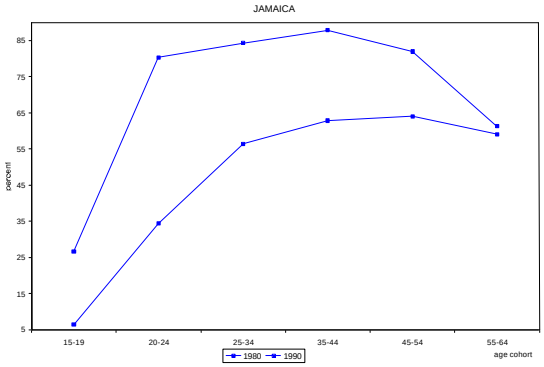
45-49
50-54
55-59
60-64
age cohort
1974
1996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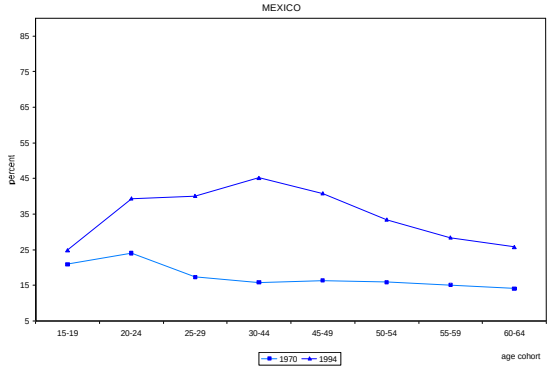
age cohort
1980
1990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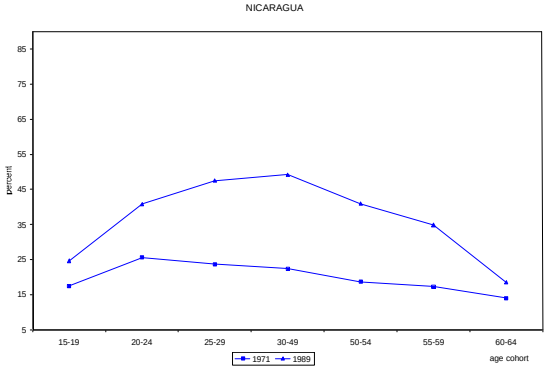
60-64
age cohort
1970
1994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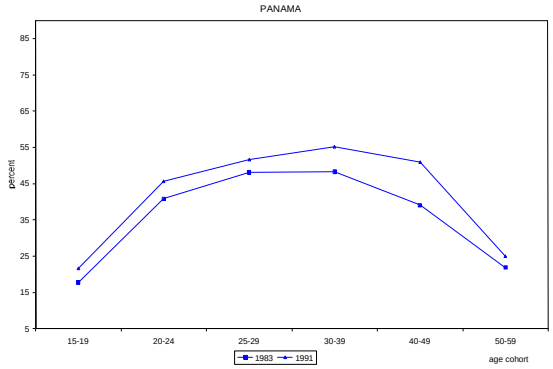
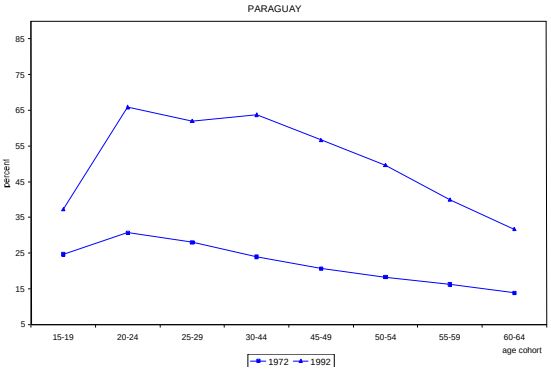
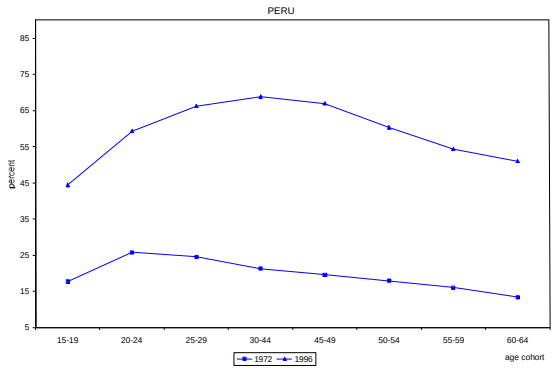
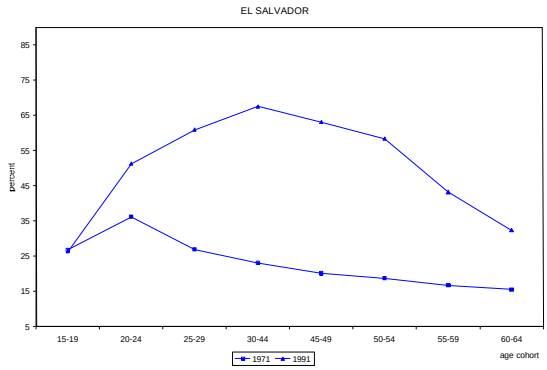
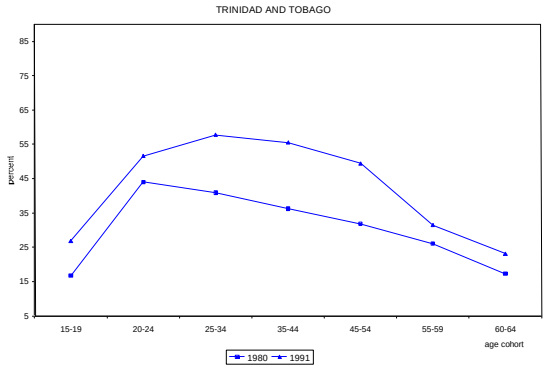
55-59
60-64
age cohort
1971
1989

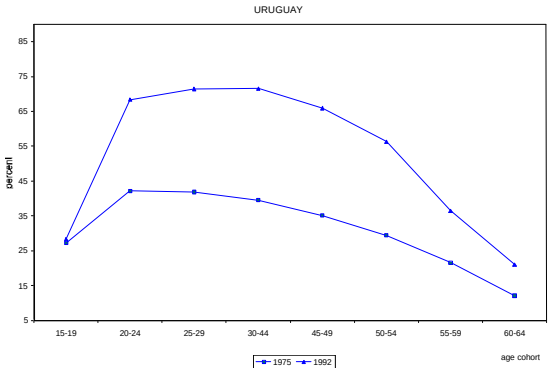

PANAMA
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-29
30-39
40-49
50-59
age cohort
1983
1991

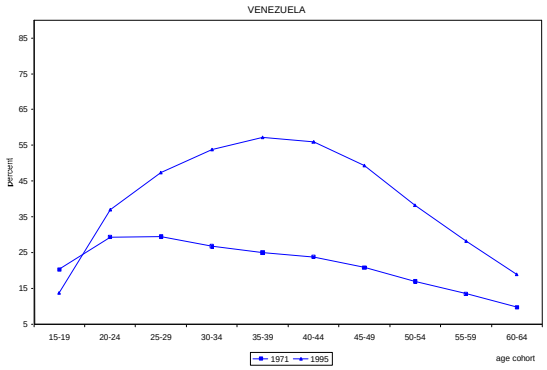

PARAGUAY
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-29
30-44
45-49
50-54
55-59
60-64
age cohort
1972
1992


PERU
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-29
30-44
45-49
50-54
55-59
60-64
age cohort
1972
1996


EL SALVADOR
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-29
30-44
45-49
50-54
55-59
60-64
age cohort
1971
1991

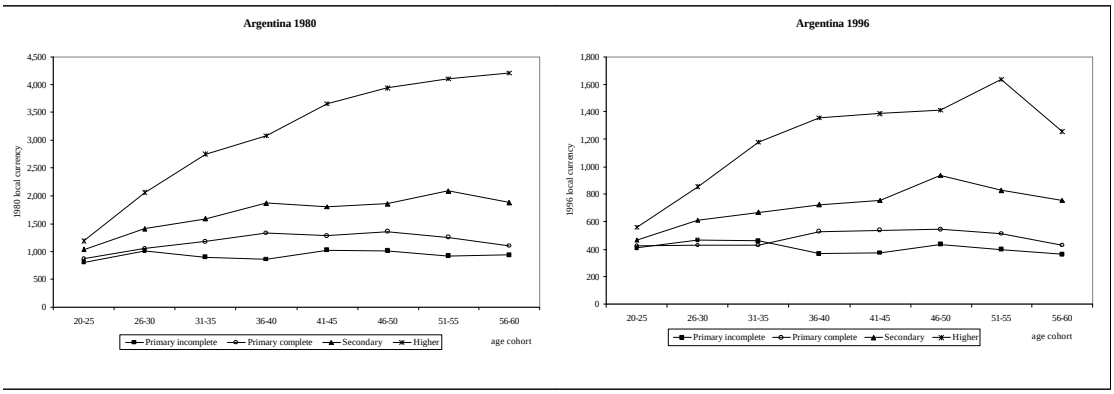

TRINIDAD AND TOBAGO
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-34
35-44
45-54
55-59
60-64
age cohort
1980
1991

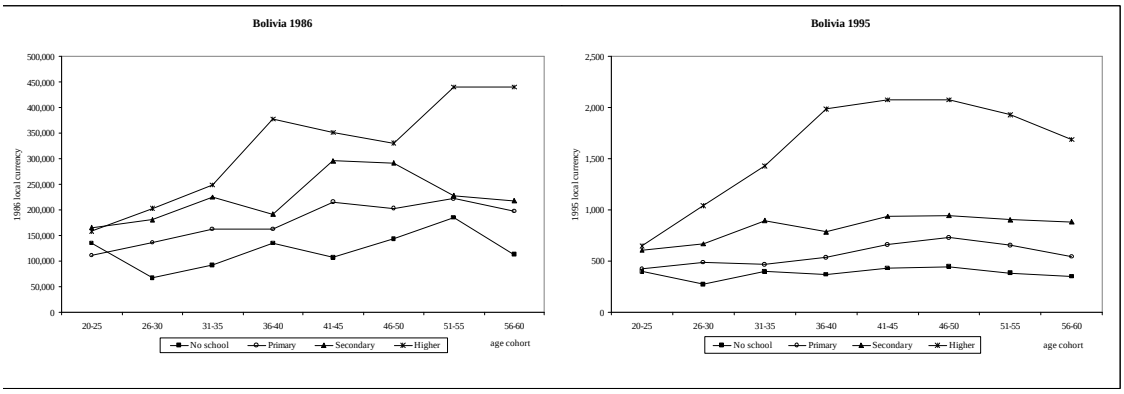

URUGUAY
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-29
30-44
45-49
50-54
55-59
60-64
age cohort
1975
1992

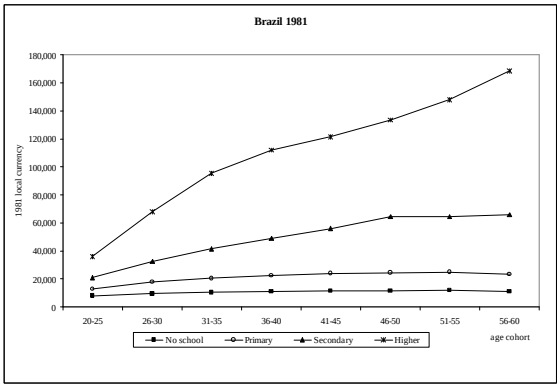

VENEZUELA
percent
85
75
65
55
45
35
25
15
5
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
age cohort
1971
1995

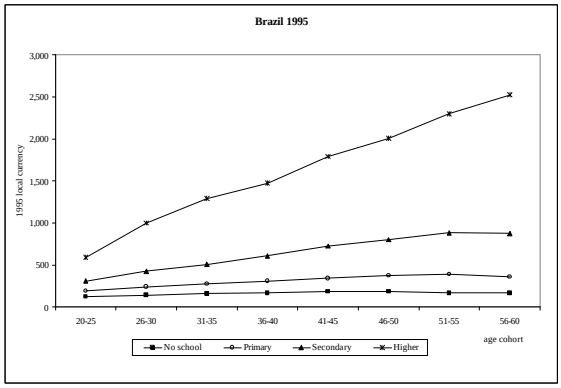
Appendix III

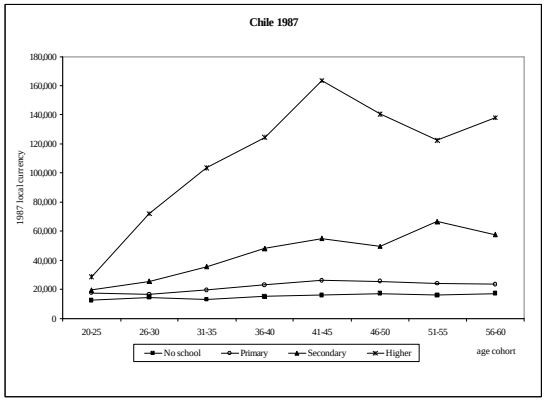
FIGURE A3.1
AVERAGE INCOME OF EARNERS BY AGE AND EDUCATION LEVEL

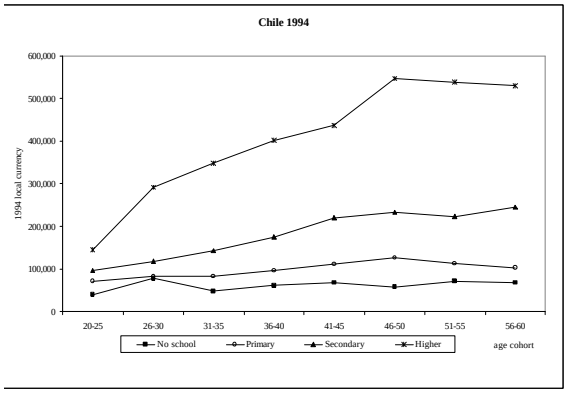


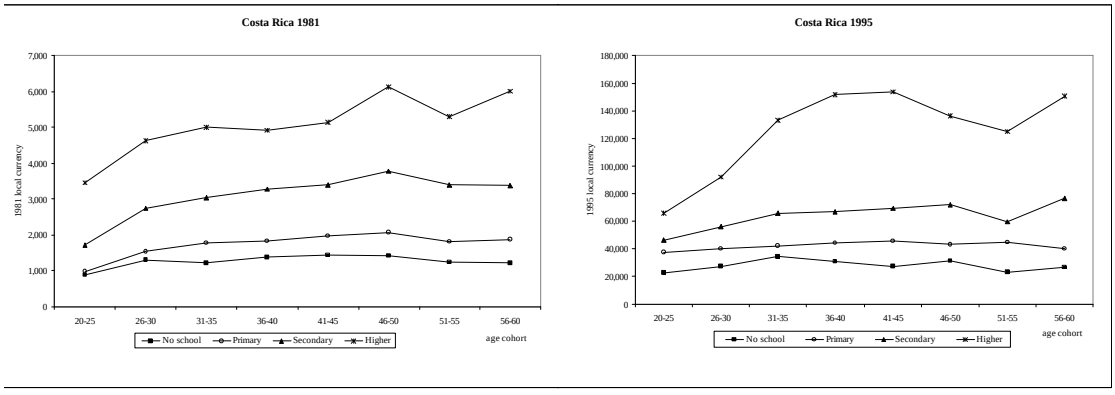


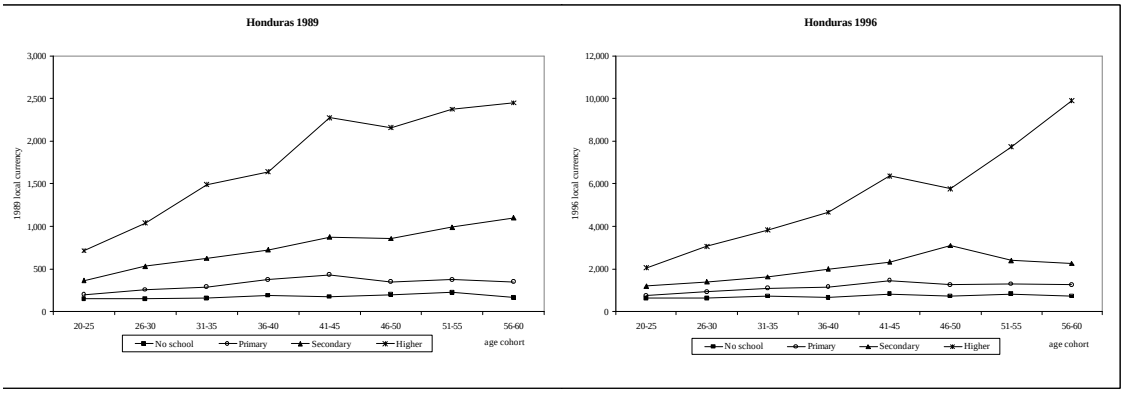


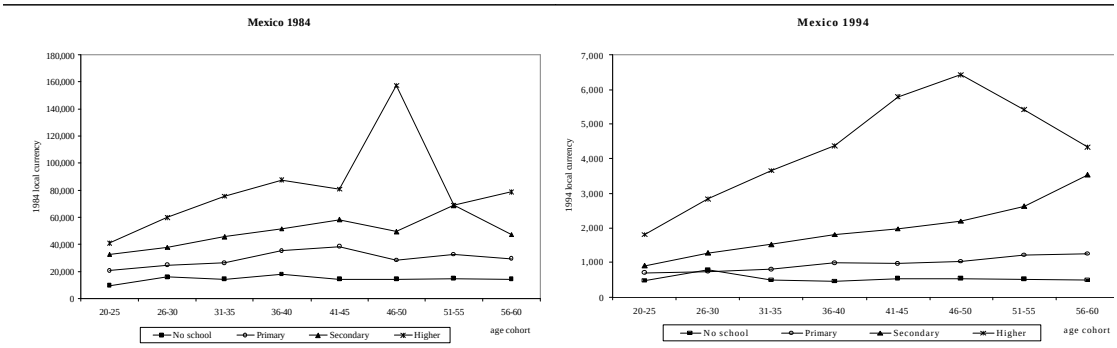


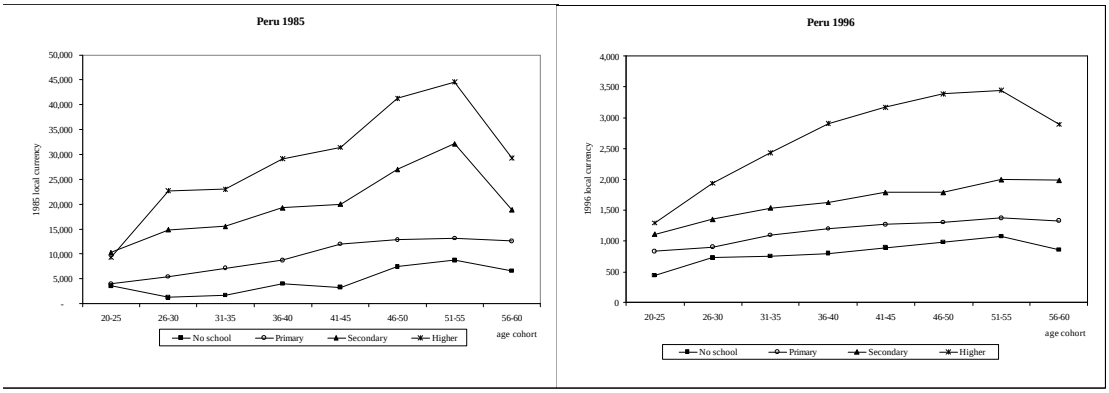

Chile 1987
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1987 local currency
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
No school
Primary
Secondary
Higher
age cohort

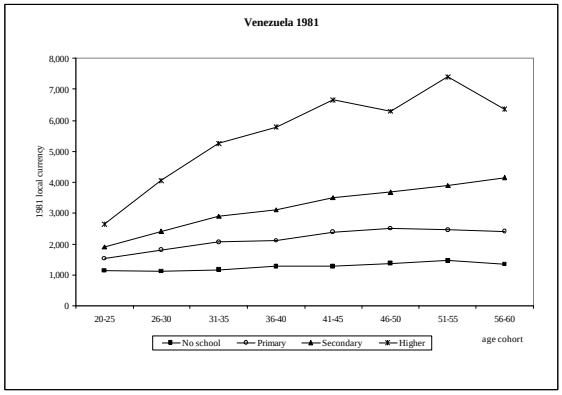

Chile 1994
600,000
500,000
400,000
300,000
200,000
100,000
0
1994 local currency
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
No school
Primary
Secondary
Higher
age cohort


Costa Rica 1981
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1981 local currency
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
No school
Primary
Secondary
Higher
age cohort
Costa Rica 1995
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1995 local currency
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
No school
Primary
Secondary
Higher
age cohort


Honduras 1989
1989 local currency
3,000
2,500
2,000
1,500
1,000
500
0
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher
Honduras 1996
1996 local currency
12,000
10,000
8,000
6,000
4,000
2,000
0
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher


Mexico 1984
1984 local currency
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher
Mexico 1994
1994 local currency
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher


Peru 1985
1985 local currency
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher
Peru 1996
1996 local currency
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher


Venezuela 1981
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1981 local currency
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher

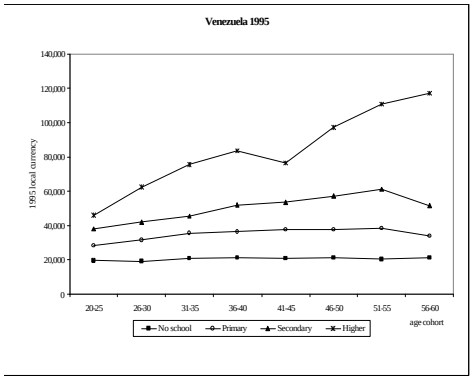

Venezuela 1995
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1995 local currency
20-25
26-30
31-35
36-40
41-45
46-50
51-55
56-60
age cohort
No school
Primary
Secondary
Higher

TABLE A3.1
INCOME DISTRIBUTION AND DEMOGRAPHIC VARIABLES

Independent Variable	Dependent Variable: Gini Coefficient					
	(1)	(2)	(3)	(4)	(5)	(6)
Method of Estimation	fe	fe	fe	fe	fe	fe
Macro Control Variables						
Unemployment Rate	**0.597**	**0.45**	**0.55**	**0.53**	**0.46**	**0.56**
	(3.7)	(2.6)	(3.14)	(3.1)	(2.5)	(3.3)
Inflation (Bounded)	**-2.200**	**0.98**	**1.08**	**1.43**	**1.21**	**-1.20**
	(-0.54)	(0.26)	(0.3)	(0.4)	(.30)	(0.3)
Real Minimum Wage	**-0.034**	**-0.03**	**-0.03**	**-0.03**	**-0.03**	**-0.20**
	(-2.03)	(-2.16)	(-2.03)	(-2.15)	(-2.0)	(-1.9)
Education						
Average Years of Education		**43.14**	**35.97**	**32.76**	**44.97**	**40.18**
		(2.26)	(1.9)	(1.9)	(2.1)	(2.2)
Squared Average Years of Education		**-23.17**	**-20.90**	**-18.19**	**-24.84**	**-21.60**
		(-1.83)	(-1.8)	(-1.7)	(-1.1)	(-1.9)
Demographic Variables						
% WAP in 15-29 Age Group			**-0.44**			
			(-1.9)			
% WAP in 30-44 Age Group				**0.47**		
				(1.9)		
% WAP in 45-59 Age Group					**0.29**	
					(1.8)	
% WAP in 60-65 Age Group						**0.65**
						(2.4)
Constant	**50.4**	**40.0**	**63.6**	**28.2**	**34.5**	**16.2**
	(16.0)	(8.4)	(4.7)	(3.5)	(1.2)	(1.5)
R-squared	**0.25**	**0.44**	**0.48**	**0.47**	**0.44**	**0.50**
Number of Observations	**73**	**73**	**73**	**73**	**73**	**73**

** 't' Statistics in parenthesis*

3.2 Econometric Results

Londoño and Székely (1997) showed that changes in income inequality in Latin America are well explained by macroeconomic variables and education. For the purposes of this work we use an econometric specification similar to theirs, and expand it by introducing demographic variables.

The exercise is performed by using the data set put together by Londoño and Székely (1997a), which consists on 73 observations from the Deininger-Squire data set, plus 40

observations obtained directly from household surveys[45]. The expanded data set consists of 113 Gini coefficients belonging to 13 countries from 1970-1995, which covers 83% of the Latin American population. The panel includes 31 observations for the 1970s, 43 for the 1980s, and 39 for the 1990s.[46] The criteria for including countries in the sample was that the income distribution indicator fulfills at least the following minimum requirements: (*I*) it is obtained from a household survey, (ii) it contains information on all income sources, (iii) the unit of observation is the household or the individual, and (iv) it is representative at the national level. By fulfilling these requirements we minimize measurement error bias.

Table A3.1 presents our results[47]. The first set of variables captures changes in the macroeconomic environment. Specifically, we control for inflation, the minimum wage (to capture the economic cycle) and changes in unemployment. We then introduce education and education squared because we know from section I in this work that the relation between education progress and inequality is non-linear. To capture the effects of demographics we introduce the population share of various age groups. The number of observations is reduced to 73 since we do not have information on education and unemployment for all the years for which we have data on distribution.

We estimate the regression using fixed effects because our intention is to identify whether changes in age structure of a population within a given country affect the distribution of income. We performed the regressions using random effects to check for the robustness of our results. The coefficients passed the Hausman test comfortably.

[45]The countries in the sample are The Bahamas, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Guatemala, Honduras, Jamaica, Mexico, Panama, Peru and Venezuela.

[46] On average, there is one observation per country every four years, but there are differences between countries. For instance, Venezuela has 22 surveys from 1970-1995, while Guatemala has only 3. There are also countries like The Bahamas, Brazil, and Costa Rica with 10 or more observations (which gives an average of one observation almost every two years). The remaining countries have one survey approximately every 4 years.

[47]Data on unemployment and wages are from ILO (various years). Inflation is calculated from the World Penn Tables. Education indicators were taken from the Barro-Lee (1996) data set, while the demographic variables come from UN (1997).

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