

Fertility Changes in Latin America in the Context of Economic and Political Uncertainty

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Introduction

During the last three decades fertility rates have declined sharply across Latin-American countries and fertility has been delayed in some countries – see Table 1 for data on the evolution of total fertility rates. These decades have also witnessed, in some countries, a high degree of economic and political uncertainty in the form of high inflation, persistent unemployment, and political regime changes. The economic literature refers to the decade of the 1980s as the “lost decade” because of the adverse economic conditions and lack of growth in most Latin American countries. Those factors are likely to have influenced key household decisions such as childbearing.

The decrease in fertility across Latin-America is explained as part of a long-term decline with the rising development in the area. At the same time there may be short-term responses of current fertility (the timing of births) to temporary economic fluctuations. It is difficult to differentiate short run from long-run changes. Previous analysis of the effect of short-term economic changes on demographic variables in Latin-America found mixed results. Among others, the chapters in Tapinos, Mason and Bravo (1997) use distributed lag analysis of responses around the trend of marriage, fertility and births of different order to economic fluctuations.

In this paper we explore the relation between fertility and economic and political conditions taking advantage of the existing cross-country differences in both fertility and country conditions. We do this by using both aggregate and micro-level data. We undertake two types of analysis to study the evolution of fertility around the declining trend. First, we conduct a macro data analysis where we estimate the total fertility rate (TFR) and age-specific fertility rates around a common trend in a panel data of 18 Latin

American Countries since the 1950s¹. Second, we conduct a micro data analysis where we estimate Cox Proportional Hazard models of transitions to 1st, 2nd, 3rd and 4th births with individual data from 10 Latin American countries.

The following section describes the recent trends in fertility behavior and economic conditions across Latin America. Next, we lay out some hypothesis about the relation between both sets of variables. A description of the panel data and its results follows. Finally, the analysis of individual data from the Demographic and Health Surveys (DHS) for a subset of countries closes the paper.

Changes in Fertility and Economic Conditions in Latin America

The recent evolution of fertility and its decline has been very uneven across Latin-American countries. Table 1 presents the total fertility rate from 1970 to 1995 for countries under analysis in this paper. Graph 1 shows the evolution of country age-specific fertility rates since 1960 to the present. Some countries, such as Argentina, Chile, and Uruguay, already displayed a relatively low level of fertility in 1970 and, even though fertility has declined in the following years, the change in fertility rates has not been too sharp. Pantelides (2001) notes that the onset of fertility decline in Uruguay and Argentina took place in the 1920s and 1930s. It happened before all the other Latin American countries and close to the transition in most European countries. Chile was the next to experience the transition but it only occurred in 1960. Thus, it is not surprising to observe that the graphs for the age-specific fertility rates for these countries are relatively flat for the period displayed.

¹ Our panel includes: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

Conversely, other countries underwent a rapid fertility transition during the last forty years. Brazil and Mexico are among the most prominent. The causes of the rapid Brazilian fertility decline are still under analysis but, importantly, the decline was not homogeneous across regions and diversity is still widespread (Goldani 2001). In Mexico, the fertility decline did not begin until the mid-sixties and was exceptionally fast (Tuiran et al. 2001). Table 1 shows the total fertility rate in Brazil went from 5.33 in 1970 to 2.46 -close to the levels in Chile and Uruguay- in 1995. Similarly, TFR in Mexico moved down from 6.73 in 1970 to just under 3 in 1995.

Finally, remarkably high fertility rates prevailed in many areas of Latin America by the mid 1990s. Fertility rates in 1995 remained at 5.12 in Guatemala, 4.84 in Honduras, 4.36 in Bolivia, 4.37 in Paraguay and 4.15 in Nicaragua.

Latin America has also experienced all sorts of economic and political difficulties. Inflation, debt crisis, income inequality, unemployment, fiscal deficits, high protectionism and market oriented reforms, are some of the main ingredients that dominate the economic scene in the last decades.

Traditionally, it was the South American countries, such as Argentina, Brazil, Bolivia, Chile, and Uruguay that had been very prone to high inflation while others could be classified as moderate and low inflation economies. However, as Table 2 shows, most countries in the region had at some point annual inflation rates beyond 100%, and many suffered hyperinflation, such the case of Argentina, Bolivia, Brazil, Peru and Nicaragua during the 1980s and beginning of the 1990s. In trying to reduce high inflation, many different stabilization policies were experimented through the years with various results.

In terms of unemployment, there is a wide variation between Latin American countries. For example, while the Dominican Republic tends to have high levels of unemployment, the official statistics show low rates for Mexico. There is also large variability within countries. An extreme case is the one of Argentina where the unemployment rate increased from 5.8% in 1991 to 18.8% in 1995 and remains high until the present.

Table 2 shows mean annual rates of growth for the second half of last century. While some countries managed to grow at more than 2.5% per year (Brazil and Chile, for example) others remained stagnant (Nicaragua) or even show negative rates (Venezuela). Downward cycles where the domestic product decreases more than 10% in just one year are not uncommon. In 1975, Chile had a reduction of 13.8% of GDP per capita. A similar contraction was suffered in the Peruvian economy in 1989. More recently, in 2002 and 2003, Venezuela experienced a decline of 10.5% and 11.3% of their GDP per capita. Unfortunately the list continues. We can also find periods of high growth, Brazil during the first half of the 1970s, Mexico from 1978 to 1981, Argentina from 1991 to 1995, and Chile for most of the 1990s, among others.

Political conditions have also been highly unstable in the region. Populist governments and dictatorships, alternated in many Latin American countries for many years. Unrest and even civil wars are not rare. Very few countries have a tradition of democratically elected governments with no interruptions. Costa Rica is usually signed as an exception of such in the Latin American context. Countries, like Chile and Nicaragua, have very short lived experience with socialist governments. They are also part of a larger group of countries that suffered brutal dictatorships, such as Paraguay and

Argentina. Starting in the 1980s, most of the region has transitioned from military regimes to democratically elected governments; however the process has not always been smooth.

Analytical Framework

In this section we lay down some hypothesis of how we expect the underlying economic and political conditions to affect fertility decisions.

Economic Conditions.

In this paper we explore whether cross-country differences in the environment where childbearing decisions are made explain in part cross-country changes in fertility. As we show elsewhere for the case of Europe (Adsera 2004), even if temporary spells of unemployment may be good periods to give birth (Butz and Ward 1979, Galor and Weil 1996), when unemployment is both persistent and particularly intense for both young female and male workers, it may be accompanied by reductions in family size. A negative unemployment shock in the context of structural unemployment leads to a sharp adjustment of expected income and to increased uncertainty. Given the recent increase of unemployment in countries such Argentina, we explore whether the Latin American trends in fertility resemble those in Europe. Thus, the response to an unemployment shock can be:

–Countercyclical: Temporary spells of unemployment reduce women’s opportunity cost of time. These are good periods to give birth where substitution effect prevails. (Becker 1972, Butz and Ward 1979, Galor and Weil 1996).

–Procyclical: Due to sharp adjustment of expected income, liquidity constraints and to increased uncertainty it is better to postpone childbearing (Ben-Porath 1973) as has been the case in Europe in the context of structural unemployment (Adsera 2004, 2005).

Similarly, the response to positive growth rates can be either procyclical or countercyclical. Healthy growth rates lead to optimism and may reduce liquidity constraints but also they may be accompanied with better labor market opportunities that increase the opportunity cost of childbearing.

Furthermore, the effect of employment changes and growth changes need not to be symmetric. Growth does not need to imply more employment opportunities for all. If we believe that growth may be unevenly distributed across different groups in society, one interesting question we may pose is whether the effect of growth and employment over demographic behavior varies across society. Does it vary by age-group? Does it vary by education level? Is it different for first-time mothers than for those who are already mothers?

Periods of high inflation followed by stabilization measures, such as fiscal discipline, de-regularization and increased trade openness, adopted to control prices have been a constant presence in the Latin-America economies during the last decades. Price instability may have an ambiguous effect over decision oriented demographic variables such as fertility and nuptiality. Previous studies do not find a clear relation. Ortega & Reher (1997), for example, note that the effect of inflation and GDP growth had similar patterns in Chile and Argentina until the early 1970s. Then the importance of GDP changes as a determinant of household decisions tended to increase but that of inflation diminished drastically. As noted, one of the most important characteristics of the period

under analysis is the prevalence of periods of high inflation and even hyperinflation. Periods of very high inflation should increase uncertainty and make long-term planning more difficult. Still the effect on demographic variables may depend upon to what degree these changes are expected. Most importantly, these periods may be followed by periods of structural adjustment with increases in unemployment or/and reductions in growth rates that may impose more real costs to families planning the timing of marriage and childbearing

The debt crises of the 1980s are another important presence when evaluating the economic stability of Latin-American economies during this period. Researchers have found for example sharp fertility decline in Brazil during 1980-84, the years when the country underwent a foreign debt crisis (Goldani et al, 1989). In our analysis we will include period dummies to evaluate whether this is a robust result found across countries.

Political Regime and Stability

In the same way economic uncertainty can affect household investment and childbearing decisions, changes in the political landscape of a nation are likely to affect those decisions. The direction of the effect of a political change can go in either direction. Birth rates seem to be higher under authoritarian regimes than under democracies even after controlling for income and other obvious covariates (Przeworski et al. 2000). However, changes from authoritarian regimes to democracy should imply higher certainty that encourage long-term investments such as children.

With regard to the regime transition it would be easy to imagine that the period of unrest or uncertainty that precedes regime changes should affect (deter) family decisions

in the short-run. Researchers have found, for example, abrupt changes in nuptiality and births in Chile (and Uruguay) at the beginning of the 1970s may have been affected by a climate of political instability (Bajraj et al. 1997). Given the diversity of transitions that Latin American countries have undergone during the last three decades we want to analyze their effect on fertility changes.

Macro-Level Analysis

Methodology

First, we use a panel of 18 Latin American nations for over 45 years to study how different labor market and political institutions have shaped the fertility trends of different age groups. The dependent variables under analysis are either the Total Fertility Rate (TFR) or the Age-Specific Fertility rates in each country.

To proxy for economic uncertainty we use information on unemployment rates (CEPAL and ILO) as well as the variance of gross domestic product (and/or household consumption) and GDP per capita growth rates (CEPAL, Penn Tables) in the immediate past. We use a series on changes in consumer prices, changes in inflation and dummies for hyperinflation periods to proxy expectations of growth and market stability. These data are available from the IFS published by IMF.

Control variables include urbanization levels (World Bank), and literacy of the population (United Nations). Future work will also include controls for female labor force participation (from ILO and/or country national offices) as well as measures of contraceptive use and infant mortality (both from United Nations) among others.

To account for changes in government performance and political instability we use measures of the extent of democracy (from the series collected by Boix-Rosatto), and civil war and civil unrest (Banks Dataset and Sambanis).

The sample period of analysis varies depending on the covariates included. Most macroeconomic data and information on democracy are available from the late 1950s. However, for most of the countries we only have information on unemployment rates starting in 1980. The sample extends to 2003 for most countries.

The unbalanced panel is estimated through random-effects with a common time trend for all countries. Hausman tests indicate consistency and, as a result, the random-effects models are included instead of fixed-effects for efficiency reasons. Alternative specifications not shown here include country-specific trends. Alternative estimates with GLS and Panel consistent standard errors yield similar results.

Results

The main result in Table 3 is that the effect of unemployment is negative and that the second lag of unemployment is stronger than the first when both are included.

Also new democracies experience a boost of fertility in the sample of the last 20 years.

Periods of hyperinflation are associated with decreases of fertility for the same period.

If unemployment is not included (Table 4), our sample extends to the late 1950s. Results show that growth rates are also positively associated with fertility. Further, periods when inflation accelerates (as opposed of those of inflation adjustment) are coupled with larger TFR. Note however that in our panel of 18 nations, we encounter many observations with large negative growth rate of inflation that point to periods of

structural adjustment after high inflation. Thus, it is important to be cautious when interpreting the effect of inflation when not including unemployment since periods of deflation may be accompanied by increases in unemployment and the coefficients may be just showing a short-run trade-off between inflation and unemployment. Further, democracy and civil unrest do not show any affect in the long series.

Tables 5 and 6 show some results for age-specific fertility rates for the periods 1950-2003 and 1980-2003, respectively. In Table 5, consistent with previous findings in the literature, the effect of unemployment is more contemporaneous and persistent for young ages than for the rest. Those are the ages where most first births occur. For older ages, unemployment has a lagged impact. We find a similar effect in the second part of the paper when using micro-data. Interestingly unemployment is associated with larger fertility rates for women ages 35-39. It might be the case that this age-group may be already more sheltered from adverse conditions of the market if they have larger experience in it. Similarly, growth and democracy are associated with higher fertility of older women.

Inflation rate and its lags do not show significant effects. When a high inflation (>100% per year) dummy is included as a covariate in these regressions covering 1980 to 2003, its estimated coefficient is negative.

Table 6 shows that positive growth in the immediate past is associated with higher fertility. The effect for the two-year lag is significant for all groups except teenagers and the one-year lag is also significantly positive for the older age-groups.

With regard to price stability, inflation does not have any significant association with changes in the TFR or age-specific fertility rates. Conversely there is a lagged

negative effect of high inflations and on decreases of inflation rate both for the TFR and for fertility rates of women age 25 and over (see Appendix A.2). While high levels of inflation may increase uncertainty and therefore translate into less fertility, harsh adjustment policies used to sharply reduce inflation may have also severe short run effects on unemployment and growth and negatively affect fertility.

We have estimated several extensions to the model. When we include longer lags of unemployment and inflation, the second lag of unemployment continues to enter negatively in the estimates but we find a positive coefficient in the 4th lag of unemployment that hints to some “catch up” or rebound in fertility. Further civil wars (with one lag) slow down the country fertility. Finally, to account for debt crises we have included period dummies and only obtained mixed results.

Micro-Level Analysis

Methodology

We use Demographic and Health Surveys (DHS) for several countries to analyze the effect of those aggregate conditions in the individual spacing of children of over 100,000 women. Countries included in the estimates are Bolivia, Brazil, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Nicaragua, Peru, and Paraguay. Only the latest DHS for each country is used in this paper. Appendix A includes the date of each survey. Most of the surveys are from either the late 1990s or the last five years. However, surveys from Mexico and Ecuador are from 1987. In future work we expect to include alternative datasets for these countries to cover the last decade.

The timing of the first three births is estimated using Cox proportional hazard models. For women $i = 1, 2, \dots, N$ who each enter a state (e.g. first birth) at time $t=0$, the (instantaneous) hazard ratio function for i^{th} person at time $t>0$ is assumed to take the proportional hazards form

$$\lambda_{it} = \lambda_0(t) \exp (X'_{it} \beta) \quad (1)$$

where $\lambda_0(t)$ is the baseline hazard function; $\exp (.)$ is the exponential function; X_{it} is a vector of covariates summarizing observed differences between individuals as well as the characteristics of the labor market where they live at time t ; and β is a vector of parameters to be estimated. We use a grouped robust variance as estimated by Lin and Wei (1989).

We draw individual fertility histories from the DHS for each country. The dependent variable in all estimates is years to a birth from either the previous birth or age 12 in the case of the first birth. Estimates are stratified by birth-cohort to take into account different cohort-trends in fertility. We include country dummies to analyze within-country changes in the timing of fertility as a response to changing economic conditions. Estimates in the tables are presented in hazard ratios.

Covariates include both individual characteristics of each woman and changing economic and political condition of the country. We control for the woman's years of education, her place of residence whether urban or rural, and her access to electricity (as a proxy of household assets). Information on the woman's previous fertility history such as age at first birth, gender of the previous children and months elapsed between births is included accordingly for each parity order. All the other covariates in the analysis are time-varying conditions of the country used in the first part of the paper.

Results

Consistent with previous findings, first and second births react to unemployment changes more quickly than higher order births whose response is more spread and lagged. We observe a rebound in first births after the fourth lag of unemployment (similar to that found in the panel analysis).

In alternative estimates available upon request we have included some additional covariates. Lagged democracy boosts transitions to 1st, 2nd, and 4th births. Conversely, current and lagged civil wars encourage postponement of 2nd and 3rd births (particularly lagged effect). Finally, surprisingly lagged periods of high inflations boost first birth. This may be a compositional result of the postponement of births during the periods of adjustment that follow periods of high inflation. During periods of high inflation, and particularly for those where inflation rates go beyond 400%, 3rd and 4th births are delayed.

As noted in the analytical section, one interesting issue to study is whether the effect of changes in unemployment and economic growth are symmetric and whether their impact is differential across age or educational groups. In the aggregate panel we already noted some differences across age groups in the analysis of age-specific fertility. Here we divide the sample in two groups of women: those with less than 7 years of schooling (around 40% of the sample) and those with more than 12 years of schooling (around 15% of the sample).

Results show, indeed, a different impact of changes in labor market conditions and overall growth for these two distinct groups of women. Table 8 presents the hazard

ratios for estimates for each birth when unemployment rates are included. Thus, the earlier observations correspond to 1980. Table 9 presents a summary of the results obtained with and without including unemployment rates.

In Table 8 we observe that for the first birth, periods of positive growth in per capita income boost fertility of the less educated whereas increases in unemployment in recent periods do not affect the timing of first birth for this group. If anything, we observe a catch up after four periods. Conversely, unemployment induces some delay in the childbearing plans of the most educated. Facing an adverse labor market, college-educated women seem to postpone maternity may be in search of a good position that accords to their skills.

In the case of the second and third births things somewhat reverse. The effect of growth is positive for the more educated but we do not find any effect of unemployment. By contrast, the negative effect of unemployment is large for the less educated.

Conceivably this may reflect the fact that college-educated women may be already more sheltered in the labor market. After having postponed childbearing until obtaining a more stable position in the labor market, they may be less subject to the short-term fluctuations than the less educated women. On the other hand, if we think that the benefits of growth in per capita income may be more unevenly distributed, particularly in the very unequal Latin-American societies, it is not surprising that growth boosts the fertility of the more educated. Furthermore, as indicated in Table 9, periods of high inflation have a large negative effect on the more educated, particularly for the third birth.

Finally, growth since 1980 (but not for more extended sample periods) boosts transitions to fourth births across educational groups and unemployment delays them.

College educated women transit noticeably faster to a fourth birth if the gender of their previous children is the same.

Conclusions

In this paper we have explored whether cross-country differences in the economic and political environment where childbearing decisions are made, explain in part cross-country changes in Latin-American fertility.

We undertake two types of analysis to study the evolution of fertility around the declining trend. First, we conduct a macro data analysis where we estimate the total fertility rate (TFR) and age-specific fertility rates around a common trend in a panel data of 18 Latin American Countries since the 1950s. The main findings include a short-term negative effect of unemployment during the period 1980-2003. The effect is particularly significant for the two-year lag for all ages and also for the one-year lag among women 15-24 yrs. Also, we find that the total fertility rate is positively associated with growth of per capita income in the estimates since the 1950s. The effect is stronger and more immediate for the older age groups.

With regard to price stability, inflation does not have any significant association with changes in the TFR or age-specific fertility rates. Conversely there is a lagged negative effect of high inflations and/or (sharp) decreases of inflation rate both for the TFR and for fertility rates of women age 25 and over.

Democracy lagged one period is associated with higher fertility since the 1980s and especially for the group of 35-44 years old. However, when the series is extended to the 1950s, the coefficient of democracy is not significant in the TFR regression.

Second, we conduct a micro data analysis where we estimate Cox Proportional Hazard models of transitions to 1st, 2nd, 3rd and 4th births with individual data from 10 Latin American countries.

Overall we find a more contemporaneous effect of unemployment for lower parities, younger age-groups, and less educated women (for second births and third births). There is some initial evidence of a positive effect of political stability on fertility, after controlling for economic conditions at the individual and aggregate level. Growth boosts fertility, particularly of higher parities, older age-groups and more educated women.

REFERENCES

- Adsera, Alicia 2004 a. "Changing Fertility Rates in Developed Markets. The Impact of Labor Market Institutions." *Journal of Population Economics* 17: 17-43.
- _____. 2005. "Vanishing Children: From High Unemployment to Low Fertility in Developed Countries." *American Economic Review Papers and Proceedings*, forthcoming.
- Bajraj, Reynaldo; Jorge Bravo and Georges Tapinos (1997) "Economic Adjustment and Demographic Responses in Latin America: An Overview" in *Demographic Responses to Economic Adjustment in Latin America*, Tapinos, Mason and Bravo (Eds.), Oxford University Press, New York.
- Becker, G, 1960. "An Economic Analysis of Fertility." Pp. 209-231 in *Demographic and Economic Change in Developed Countries*, NBER conference series 11, Princeton.
- _____. 1991 *A Treatise on the Family*. Harvard University Press, Cambridge, Mass.
- Ben Porath, Yoder (1973) "Short-terms fluctuations in Fertility and Economic Activity in Israel", *Demography*, 10 (May): 185-204.
- Boix, Carles and Sebastian Rosato (2004)
- Bravo, Jorge (1997) "Demographic Consequences of Economic Adjustment in Chile" in *Demographic Responses to Economic Adjustment in Latin America*, Tapinos, Mason and Bravo (Eds.), Oxford University Press, New York.
- Butz William P. and Ward, Michael P. "The Emergence of Countercyclical U.S.Fertility." *American Economic Review*, June 1979, 69(3): 318-28.
- CEPAL (Various Issues)

- Goldani, A.M., S.D. McCracken and S.W. Pullum (1989) “Demographic Change and Stability in Brazil during a Period of Economic Crisis”, Population Association of America, Baltimore, MD, March 30-April 1.
- Goldani, Ana Maria (2001), “What will happen to Brazilian Fertility?” in *Completing the Fertility Transition*, Department of Economic and Social Affairs, Population Division, United Nations.
- Mason, Andrew (1997) “The Response of Fertility and Mortality to economic Crisis and Structural Adjustment Policy during the 1980s: A Review” in *Demographic Responses to Economic Adjustment in Latin America*, Tapinos, Mason and Bravo (Eds.), Oxford University Press, New York.
- Ortega, Jose Antonio and David Reher (1997) “Short-term Economic Fluctuations and Demographic Behaviour: Some Examples from Twentieth-Century South America in *Demographic Responses to Economic Adjustment in Latin America*, Tapinos, Mason and Bravo (Eds.), Oxford University Press, New York.
- Pantelides, Edith Alejandra (2001), “Completing the Fertility Transition: The Case of Argentina” in *Completing the Fertility Transition*, Department of Economic and Social Affairs, Population Division, United Nations.
- Przeworski et al. (2000)
- Rios-Neto, Eduardo and Jose Alberto Magno de Carvalho (1997) “Demographic Consequences of Structural Adjustment: The Case of Brazil” in *Demographic Responses to Economic Adjustment in Latin America*, Tapinos, Mason and Bravo (Eds.), Oxford University Press, New York.

Tapinos, Georges; Andrew Mason and Jorge Bravo (1997) *Demographic Responses to Economic Adjustment in Latin America*, Oxford University Press, New York.

Tuiran, Rodolfo; Virgilio Partida, Octavio Mojarro and Elena Zuniga (2001) “Fertility in Mexico: Trends and Forecast” in *Completing the Fertility Transition*, Department of Economic and Social Affairs, Population Division, United Nations.

Table 1: Total Fertility Rates across Latin America

Country	1970	1980	1990	1995
Argentina	3.10	3.50	2.97	2.62
Bolivia	6.54	5.53	4.89	4.36
Brazil	5.33	4.09	2.56	2.46
Chile	3.28	2.47	2.55	2.24
Colombia	4.65	3.60	2.92	2.87
Costa Rica	4.94	3.63	3.17	2.83
Dominican Republic	6.67	4.33	3.33	3.16
Ecuador	6.30	.	3.76	3.36
El Salvador	6.62	5.34	3.84	3.62
Guatemala	6.53	6.04	5.30	5.12
Honduras	5.98	6.44	5.28	4.84
Mexico	6.73	4.57	3.33	2.95
Nicaragua	7.21	6.14	5.17	4.15
Panama	4.99	3.63	2.88	2.72
Paraguay	5.83	5.06	4.61	4.37
Peru	.	4.70	3.76	3.39
Uruguay	3.00	2.66	2.53	2.37
Venezuela	5.68	4.13	3.62	2.94

Note: year is 1973 for Colombia, 1971 for Nicaragua and 1972 for Paraguay.

Table 2. Economic Conditions

	GDP per capita – Rates of Growth 1951-2003				Unemployment Rates				Annual Inflation Rates					
	Mean	Std. Dev.	Min	Max	Years	Mean	Std. Dev.	Min	Max	Years	Mean	Std. Dev.	Min	Max
Argentina	0.95	4.96	-11.7	9.1	1970-2004	8.33	5.48	2.0	19.6	1949-2003	183.9	518.5	-1.2	3079.8
Bolivia	0.51	3.52	-12.2	5.5	1981-2003	6.86	2.10	3.1	11.6	1949-2003	270.5	1586.6	-0.7	11749.6
Brazil	2.57	3.79	-6.3	11.3	1976-2001	4.92	2.42	1.8	9.6	1960-2003	285.2	627.5	3.2	2947.7
Chile	2.05	4.50	-13.9	9.0	1975-2003	9.17	3.96	4.4	19.6	1950-2003	50.4	95.7	2.5	504.7
Colombia	1.75	1.95	-5.6	5.4	1975-2002	11.37	3.38	7.6	20.5	1949-2003	16.1	9.0	-2.4	33.0
Costa Rica	1.88	3.81	-9.9	12.7	1976-2004	5.81	1.40	3.8	9.4	1951-2003	11.6	14.3	-2.8	90.1
Dom. Rep.	2.54	4.61	-13.8	13.7	1960-2004 ¹	18.65	4.97	6.4	35.0	1949-2003	9.5	13.1	-3.9	50.5
Ecuador	2.13	5.44	-9.7	30.4	1974-2004 ²	8.65	2.58	4.4	15.1	1952-2003	20.2	21.4	-5.0	96.1
El Salvador	0.93	3.56	-11.3	8.9	1985-2004 ³	8.21	2.37	6.2	16.9	1949-2003	8.3	8.3	-4.5	31.9
Guatemala	1.10	2.49	-5.8	6.4	1980-2003 ⁴	5.90	3.64	1.5	14.0	1949-2003	7.5	8.9	-2.1	41.2
Honduras	0.65	3.06	-9.1	8.0	1980-2004 ⁵	7.80	2.20	4.0	12.1	1949-2003	7.7	7.7	-3.1	34.0
Mexico	2.02	3.02	-7.8	7.5	1980-2004	3.80	1.19	2.2	6.6	1949-2003	21.4	28.8	-1.5	131.8
Nicaragua	0.10	6.25	-28.7	12.3	1980-2003	9.69	4.75	2.3	17.8	1970-2003	814.7	2272.3	2.8	10205
Panama	2.16	4.13	-17.6	12.2	1970-2003 ⁶	11.28	3.34	5.8	16.3	1949-2003	2.0	3.5	-0.7	16.3
Paraguay	1.42	3.27	-5.8	7.9	1979-2003	6.83	2.71	2.2	14.7	1949-2003	17.9	19.7	-0.9	116.7
Peru	0.98	4.54	-14.1	10.8	1980-2004	8.20	1.44	4.8	10.1	1949-2003	242.9	1097.1	0.2	7481.7
Uruguay	0.85	4.30	-13.3	8.2	1980-2004	11.17	2.97	6.7	17.0	1949-2003	42.5	31.8	-4.4	125.3
Venezuela	-0.27	4.47	-11.3	7.9	1975-2004	9.97	3.58	4.6	18.0	1949-2003	16.2	21.6	-2.8	99.9

Sources. GDP per capita: Cepal; Inflation: IMF; Unemployment: ILO, Cepal, and Central Bank of Dominican Republic.

Missing information for: ¹1985 and 1989; ²1976 and 1978-79; ³1987; ⁴1999-01; ⁵2000; ⁶1980-81 and 1990.

(Political -- to be included)

Table 3: Total Fertility Rate: Unemployment, inflation and growth 1980-2003.

	(1)	(2)	(3)
% Urban in 1960	0.00090 (0.10)	0.001 (0.13)	0.003 (0.32)
Rate literacy	-0.09983 (11.51)**	-0.099 (14.19)**	-0.102 (11.75)**
Unemployment (t-1)	-0.00533 (0.77)	-0.027 (6.49)**	-0.009 (1.25)
Unemployment (t-2)	-0.02791 (4.12)**		-0.029 (4.30)**
Inflation (t-1)	0.00000 (0.25)	0.000 (0.68)	
Inflation (t-2)	0.00000 (0.37)		
Gdp pc rate_1	0.00310 (0.87)	-0.003 (0.97)	0.000 (0.08)
Gdp pc rate_2	-0.00131 (0.40)		-0.005 (1.44)
Democracyt (t-1)	0.09956 (2.24)*		0.121 (2.72)**
Civil Unrest (t-1)	-0.00814 (0.77)		-0.011 (1.05)
Inflation(t-1)> 100			-0.120 (2.32)*
Linear trend	-0.02846 (6.36)**	-0.027 (7.84)**	-0.028 (6.26)**
Constant	13.49600 (25.15)**	13.391 (29.58)**	13.645 (24.76)** (2.32)*
Observations	313	396	313
Number of countries	18	18	18

Note: Unbalanced Panel random effects.

Absolute value of z statistics in parentheses. ** significant at 5%; * significant at 10%.

Table 4: Total Fertility Rate: Growth and Price Changes, 1950s-2003

	(1)	(2)
% Urban in 1960	-0.034 (6.76)**	-0.035 (5.99)**
Rate literacy	-0.023 (4.66)**	-0.021 (3.94)**
Inflation (t-1)	0.00003 (0.99)	
Inflation (t-2)	0.00002 (0.62)	
Gdp pc rate_1	0.0097 (1.74)*	0.014 (2.35)**
Gdp pc rate_2	0.0124 (2.29)*	0.013 (2.32)**
Democracy (t-1)	-0.036 (0.63)	-0.030 (0.52)
Civil unrest (t-1)		-0.003 (0.18)
Inflation(t-1) > 100		0.015 (0.16)
% change inflation (t-1)		0.030 (3.52)**
% change inflation (t-2)		0.005 (0.98)
Linear trend	-0.063 (18.14)**	-0.064 (16.44)**
Constant	10.08 (38.2)**	10.03 (33.4)**
Observations	621	582
Countries	18	18

Note: Unbalanced Panel random effects.

Absolute value of z statistics in parentheses. ** significant at 5%; * significant at 10%.

Table 5. Age-Specific Fertility Rate: Unemployment, Growth and Inflation 1980-2003.

	F1519	F2024	F2529	F3034	F3539	F4044	F4549
% Urban in 1960	-0.515 (2.02)*	-1.355 (4.54)**	0.304 (0.75)	0.818 (2.06)*	0.550 (1.43)	0.004 (0.02)	0.014 (0.20)
Rate literacy	-1.378 (4.97)**	-1.652 (4.93)**	-4.156 (9.88)**	-4.973 (11.82)**	-4.326 (11.88)**	-1.927 (10.02)**	-0.481 (6.93)**
Unempl.(t-1)	-0.630 (2.43)**	-0.779 (2.42)**	-0.320 (0.84)	0.489 (1.27)	0.622 (2.00)**	0.127 (0.83)	0.009 (0.15)
Unempl.(t-2)	-0.426 (1.66)*	-0.865 (2.72)**	-1.325 (3.52)**	-1.747 (4.59)**	-1.576 (5.14)**	-0.672 (4.44)**	-0.114 (1.89)*
Inflation(t-1)	0.000 (0.58)	0.000 (0.93)	0.000 (0.50)	0.000 (0.55)	0.000 (0.48)	-0.000 (0.12)	-0.000 (0.37)
Inflation(t-2)	0.000 (0.66)	0.001 (1.28)	0.000 (0.58)	0.000 (0.28)	0.000 (0.32)	0.000 (0.00)	-0.000 (0.29)
Gdp pc rate_1	-0.094 (0.76)	0.228 (1.50)#	0.042 (0.23)	0.269 (1.47)	0.240 (1.63)#	0.137 (1.89)*	0.002 (0.06)
Gdp pc rate_2	-0.177 (1.55)#	-0.124 (0.87)	-0.233 (1.39)	-0.126 (0.74)	-0.049 (0.36)	-0.040 (0.59)	-0.039 (1.44)
Democracy(t-1)	0.322 (0.21)	1.531 (0.81)	0.097 (0.04)	0.103 (0.05)	4.995 (2.71)**	4.096 (4.49)**	0.626 (1.73)
Linear trend	-0.304 (2.13)*	-2.511 (14.44)**	-1.344 (6.24)**	-0.511 (2.37)*	-0.792 (4.30)**	-0.452 (4.71)**	-0.089 (2.53)*
Constant	253.739 (15.2)**	517.745 (26.1)**	588.759 (22.8)**	549.270 (21.4)**	467.238 (19.8)**	221.501 (15.8)**	51.767 (11.8)**
Observations	335	335	335	335	335	335	335
Countries	18	18	18	18	18	18	18

Note: Unbalanced Panel, Random effects.

Absolute value of z statistics in parentheses. ** significant at 5%; * signific. at 10%, # significant at 15%.

Table 6. Age-Specific Fertility Rate: Growth and Inflation 1950s-2003.

	F1519	F2024	F2529	F3034	F3539	F4044	F4549
% Urban in 1960	-1.002	-2.144	-1.546	-1.177	-1.279	-0.720	0.018
	(3.71)**	(9.40)**	(5.53)**	(3.82)**	(4.12)**	(3.64)**	(0.25)
Rate literacy	-0.252	0.277	-0.174	-0.705	-0.289	-0.239	-0.487
	(1.73)	(1.24)	(0.68)	(2.78)**	(1.26)	(1.81)	(11.57)**
Inflation (t-1)	0.001	0.002	0.001	0.001	0.001	0.000	-0.000
	(1.32)	(1.20)	(0.86)	(0.75)	(0.70)	(0.25)	(0.15)
Inflation (t-2)	0.001	0.001	0.001	0.000	0.000	-0.000	-0.000
	(1.31)	(1.10)	(0.49)	(0.32)	(0.36)	(0.18)	(0.64)
Gdp pc rate_1	-0.036	0.237	0.324	0.452	0.346	0.248	0.074
	(0.28)	(0.96)	(1.24)	(1.84)*	(1.64)*	(2.08)*	(2.03)*
Gdp pc rate_2	0.056	0.480	0.644	0.860	0.759	0.339	0.089
	(0.44)	(1.92)*	(2.43)*	(3.45)**	(3.55)**	(2.81)**	(2.40)*
Democracy(t-1)	3.672	2.503	-2.469	-6.439	-5.037	-2.444	-2.202
	(2.61)**	(0.94)	(0.87)	(2.38)*	(2.16)*	(1.85)*	(5.39)**
Linear trend	-0.694	-3.189	-3.449	-2.716	-2.583	-1.144	-0.108
	(7.03)**	(19.64)**	(19.12)**	(15.33)**	(16.42)**	(12.65)**	(3.80)**
Constant	188.362	409.357	426.715	381.172	296.355	146.102	54.144
	(14.1)**	(33.7)**	(29.1)**	(23.9)**	(18.7)**	(14.7)**	(14.6)**
Observations	555	555	555	555	555	555	555
Countries	18	18	18	18	18	18	18

Note: Unbalanced Panel random effects.

Absolute value of z statistics in parentheses. ** significant at 5%; * significant at 10%.

Table 7.a Proportional Hazard Models of Transitions to births of different order.

	1st	1st	2nd	2nd
Woman Years of Education	0.912	0.912	0.972	0.973
	(59.09)**	(62.14)**	(17.28)**	(18.84)**
Rural	0.990	0.987	1.174	1.155
	(0.55)	(0.80)	(10.07)**	(9.79)**
Has electricity	0.902	0.911	0.870	0.866
	(5.16)**	(4.97)**	(8.27)**	(9.25)**
<i>Country:</i>				
Rate literacy	0.978	0.986	0.969	0.972
	(6.31)**	(4.48)**	(9.00)**	(9.37)**
Unemp. -1	0.989	0.989	0.985	0.982
	(3.55)**	(3.67)**	(4.96)**	(6.62)**
Unemp. -2	0.994	0.998	1.001	1.002
	(1.57)	(0.77)	(0.39)	(0.83)
Unemp. -3	0.995		0.994	
	(1.36)		(1.71)	
Unemp. -4	1.012		1.000	
	(4.12)**		(0.16)	
Infl. -1	1.000	1.000	1.000	1.000
	(3.27)**	(2.92)**	(1.67)	(2.03)*
Infl. -2	1.000	1.000	1.000	1.000
	(1.62)	(1.68)	(1.53)	(1.48)
ChGdp pc_1	1.008	1.007	1.003	1.002
	(4.69)**	(4.34)**	(1.88)	(1.62)
ChGdp pc_2	1.000	1.000	0.998	0.997
	(0.22)	(0.16)	(1.15)	(2.44)*
Obs.	596523	694160	181097	207055

Note: Hazard ratios from Cox Proportional hazard model stratified by three birth cohorts. Data from DHS of 10 countries. Robust z-statistics in parentheses ** significant 5%; * 10%, #15%. Estimates include parity specific variables, and country dummies.

Table 7.b Proportional Hazard Models of Transitions to births of different order.

	3rd	3rd	4th	4th
Woman Years of Education	0.977 (13.04)**	0.977 (14.27)**	0.938 (23.33)**	0.938 (25.30)**
Rural	1.094 (5.52)**	1.086 (5.44)**	1.183 (7.79)**	1.155 (6.84)**
Has electricity	0.901 (6.18)**	0.893 (7.18)**	0.849 (7.68)**	0.848 (8.08)**
<i>Country:</i>				
Rate literacy	1.041 (10.01)**	1.037 (10.37)**	0.955 (8.88)**	0.960 (8.95)**
Unemp. -1	1.004 (1.18)	1.005 (1.29)	1.003 (0.59)	1.001 (0.23)
Unemp. -2	0.998 (0.40)	0.984 (4.77)**	0.997 (0.40)	0.993 (1.60)
Unemp. -3	0.993 (1.39)		0.988 (2.12)*	
Unemp. -4	0.986 (3.84)**		1.004 (0.91)	
Infl. -1	1.000 (3.76)**	1.000 (4.10)**	1.000 (1.92)	1.000 (1.39)
Infl. -2	1.000 (2.15)*	1.000 (3.48)**	1.000 (1.21)	1.000 (1.77)
ChGdp pc_1	0.997 (1.81)	0.997 (1.81)	1.005 (1.95)	1.005 (2.54)*
ChGdp pc_2	1.010 (4.87)**	1.004 (2.64)**	0.999 (0.56)	0.999 (0.49)
Obs.	84527	100538	143945	163268

Note: Hazard ratios from Cox Proportional hazard model stratified by three birth cohorts. Data from DHS of 10 countries. Robust z-statistics in parentheses ** significant 5%; * 10%, #15%. Estimates include parity specific variables, and country dummies.

Table 8. Proportional Hazard Models of Transitions to births of different order by Education Group.

	1st		2 nd	
	Educ 0-6	Educ 13+	Educ 0-6	Educ 13+
Unemp. -1	0.996 (1.10)	0.979 (1.96)*	0.987 (3.53)**	0.992 (0.69)
Unemp. -2	0.994 (1.24)	1.009 (0.64)	1.001 (0.27)	1.013 (0.80)
Unemp. -3	0.992 (1.68)*	0.976 (1.94)*	0.992 (1.72)*	0.990 (0.66)
Unemp. -4	1.009 (2.41)**	1.014 (1.38)	0.998 (0.50)	0.995 (0.38)
Infl. -1	1.000 (0.17)	1.000 (2.82)**	1.000 (0.63)	1.000 (0.56)
Infl. -2	1.000 (0.47)	1.000 (0.22)	1.000 (1.55)#	1.000 (0.69)
ChGdp pc_1	1.007 (3.15)**	1.006 (1.17)	1.002 (0.96)	1.012 (2.11)**
ChGdp pc_2	1.000 (0.16)	1.004 (0.91)	0.998 (0.79)	1.000 (0.05)
Obs.	216353	107307	84385	24832

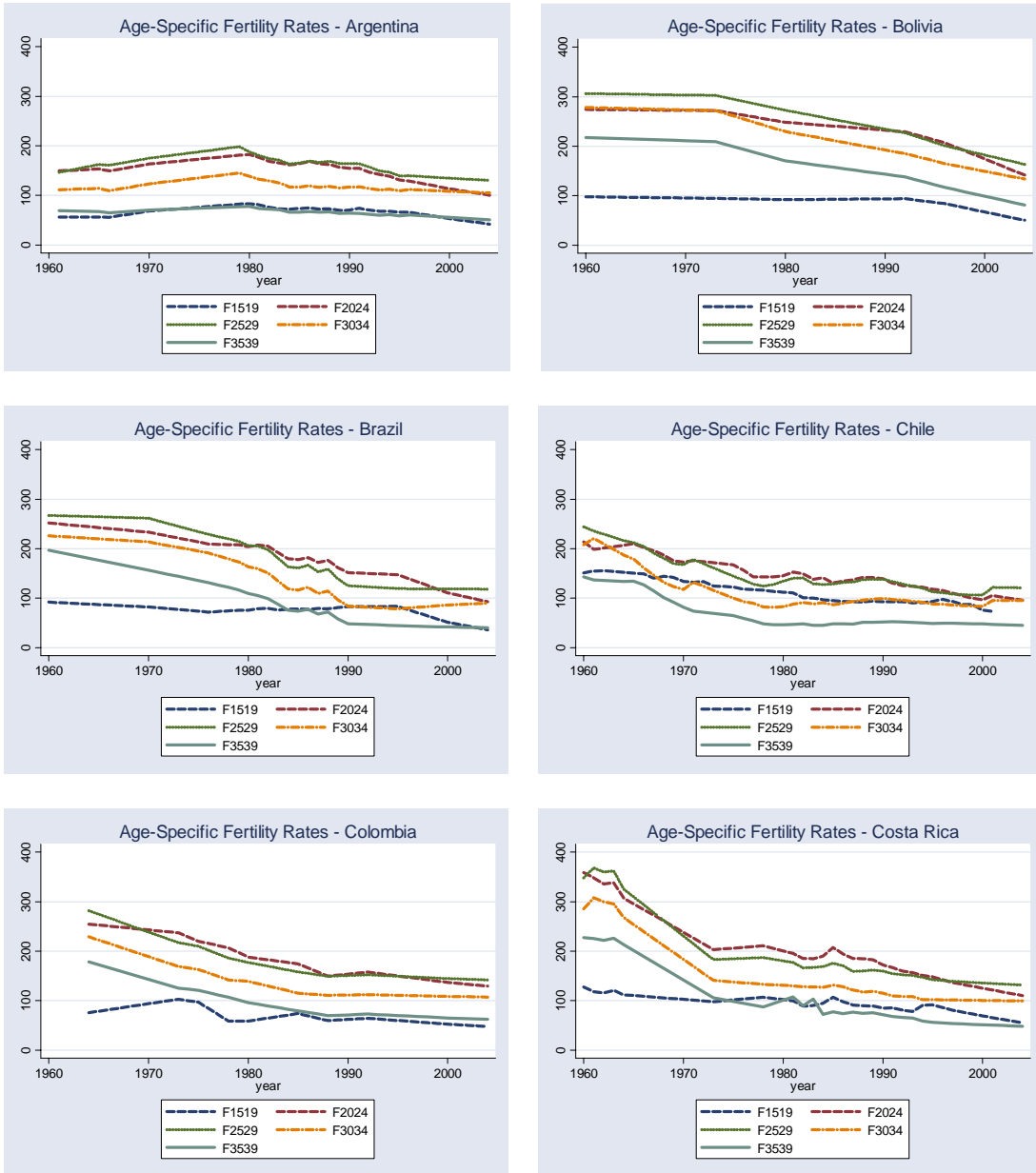
	3rd		4 th	
	Educ 0-6	Educ 13+	Educ 0-6	Educ 13+
Unemp. -1	1.005 (1.16)	0.999 (0.04)	1.006 (1.17)	1.020 (0.74)
Unemp. -2	0.991 (1.57)#	1.013 (0.59)	0.998 (0.32)	0.954 (1.34)
Unemp. -3	1.001 (0.26)	0.985 (0.71)	0.988 (1.79)*	0.929 (1.96)*
Unemp. -4	0.986 (3.26)**	0.976 (1.55)#	1.003 (0.60)	1.058 (1.99)*
Infl. -1	1.000 (2.63)**	1.000 (1.55)	1.000 (1.04)	1.000 (0.49)
Infl. -2	1.000 (1.22)	1.000 (1.15)	1.000 (0.82)	1.000 (0.12)
ChGdp pc_1	0.999 (0.65)	0.993 (0.85)	1.005 (2.20)**	1.042 (3.01)**
ChGdp pc_2	1.006 (2.71)**	1.020 (2.47)**	0.999 (0.43)	0.981 (1.35)
Obs.	50978	6540	83324	12559

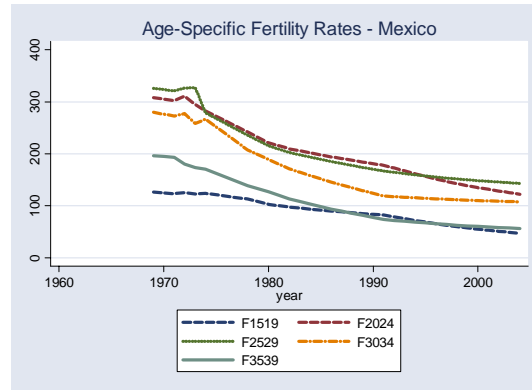
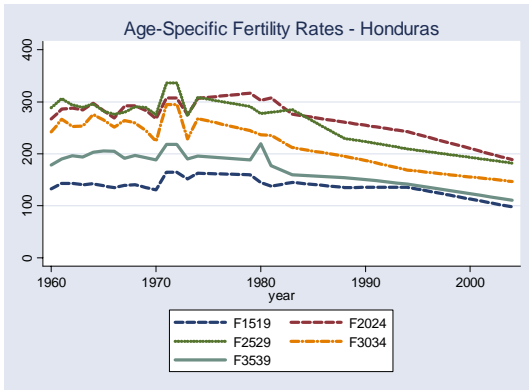
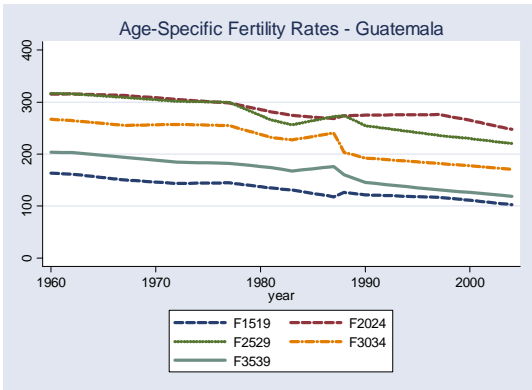
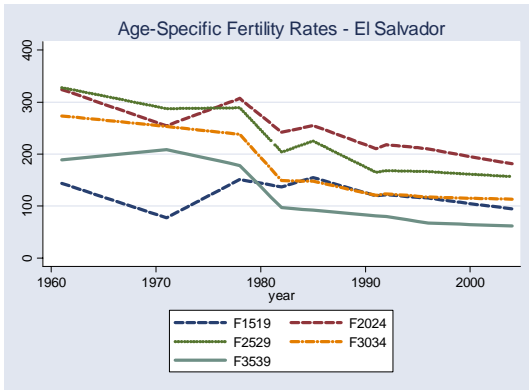
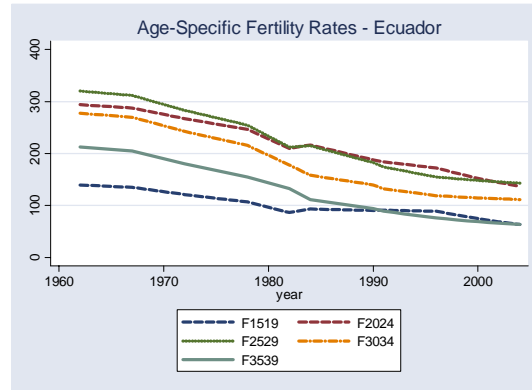
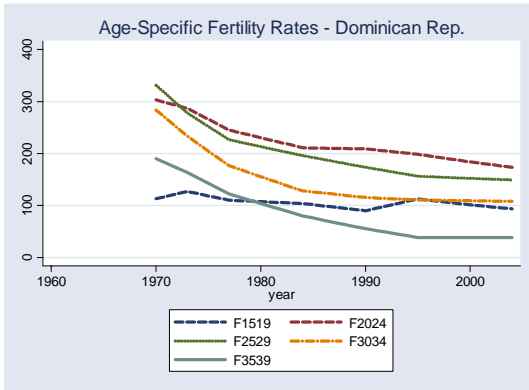
Note: Hazard ratios from Cox Proportional hazard model. Data from DHS of 10 countries. Robust z-statistics in parentheses ** significant 5%; * 10%, #15%. Estimates include woman's years of education, access to electricity, rural/urban residence, parity specific variables, the country's literacy rate and country dummies.

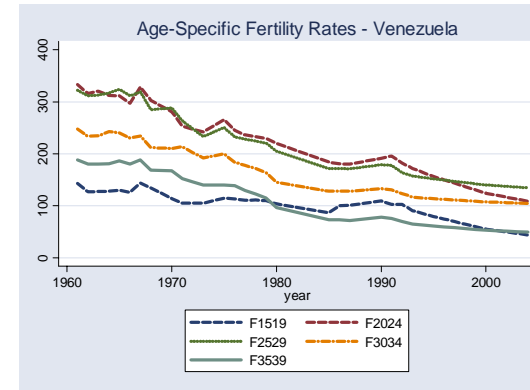
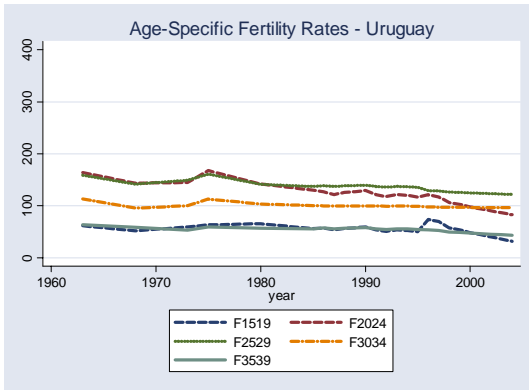
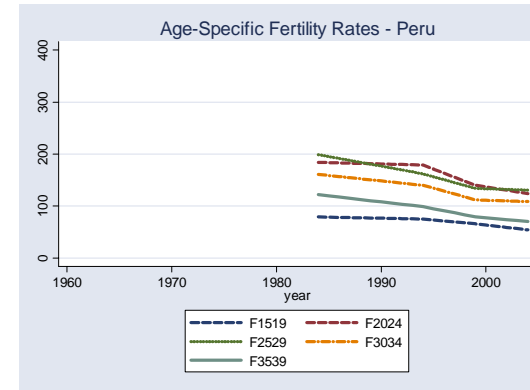
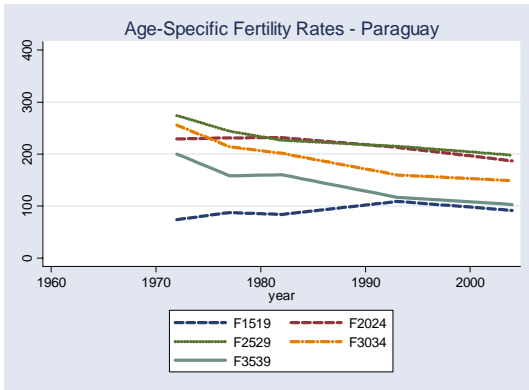
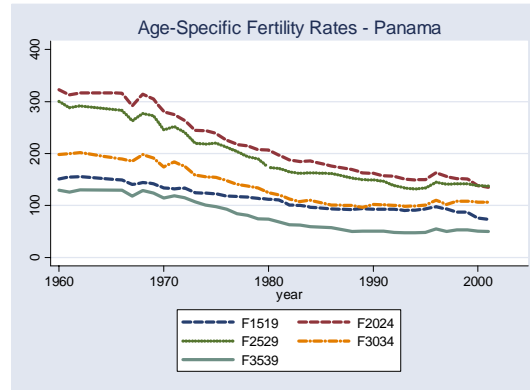
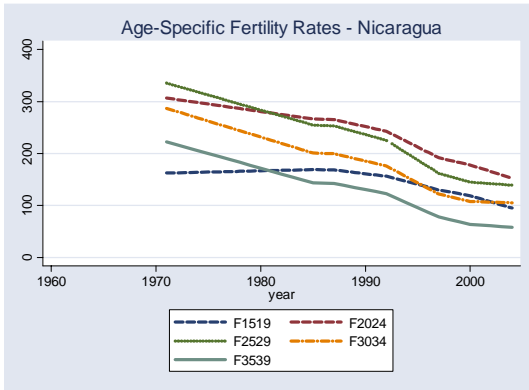
Table 9. Summary of Results for Transitions to Births by Education Group.

Birth	0-6 years	13+ years	Comparison
1st	(+) Growth (t-1) (+) Unemp (t-4) weak	(-) Unemp. (t-1)(t-3) No growth effect	More educated postpone maternity in adverse labor market (until employed or good position)
2nd, 3rd	(-) unemployment (t-1) (t-3) for 2 nd (t-2) (t-4) for 3 rd (+) Inflation?	(+) growth since the 1950s.(very large for 3 rd birth since 80s) No unemployment effect. (-) High inflation (large effect for 3rd)	Employment matters more for less educated. The more educated may be already sheltered. Growth may favor relatively more the more educated if unequal?
4th	(+) growth in 80-03	(+) growth in 80-03 (large effect) Search Gender variety	Growth for the period since 80s for all , not before

Graph 1. Age Specific Fertility Rates 1960-2004







Appendix A.1 Demographic Health Surveys used in the analysis.

Country	DHS
Bolivia	1998
Brazil	1996
Colombia	2000
Dominican Republic	2002
Ecuador	1987
Guatemala	1998
Mexico	1987
Nicaragua	2001
Paraguay	1990
Peru	2000

Appendix A.2

Age-Specific Fertility Rate: High inflation and change in inflation 1950s-2003.

	F1519	F2024	F2529	F3034	F3539	F4044	F4549
Inflation (t-1)> 100	0.421	-2.570	-5.075	-7.571	-8.071	-4.293	-0.865
	(0.23)	(1.15)	(2.00)**	(3.08)**	(4.02)**	(4.32)**	(2.11)**
% change inflation (t-1)	-0.213	0.439	1.414	1.928	1.232	0.598	0.176
	(1.05)	(1.73)*	(4.91)**	(6.93)**	(5.43)**	(5.32)**	(3.80)**
Observations	335	335	335	335	335	335	335
Countries	18	18	18	18	18	18	18

Note: Unbalanced Panel, Random effects.

Absolute value of z statistics in parentheses. ** significant at 5%; * significant at 10%, # significant at 15%. Estimates include % urban in 1960, literacy rate, two lags of unemployment rate and growth of per capita income and a linear trend.