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# Fertility changes in Latin America in the context of economic uncertainty

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## Abstract

We explored the relation between fertility and the business cycle in Latin America during the last three decades. First, we used aggregate data on fertility rates and economic performance from a panel of 18 nations. Second, we studied these same associations in the transitions to 1st, 2nd, and 3rd births with DHS individual data from ten countries. In general, childbearing declines during downturns. This behaviour is mainly associated to increasing unemployment rather than slowdowns in GPD growth, although we find a positive relationship between first births rates and growth. While periods of unemployment may be a good time to have children because opportunity costs are lower, we find that maternity is reduced or postponed in particular among the most recent cohorts and among urban and more educated women. This is consistent with the idea that, in this context, income effects are dominant.

### Keywords

fertility; unemployment; Latin America; economic crises; business cycle; growth

## Introduction

During the last three decades fertility rates have declined sharply across Latin American countries and, in some of them, maternity has been delayed. These decades have also witnessed, in most countries, a high degree of economic and political uncertainty in the form of macroeconomic imbalances, inflation, unemployment, and changes in political regimes. 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 during that time.

All of these factors are likely to have influenced key household decisions such as childbearing and health and education investments. Previous works have highlighted the direct effect of economic shocks on outcomes such as child health in Colombia (Miller and Urdinola 2007) and human capital accumulation in Peru (Schady 2004), amongst some of the most recent that focus on Latin America. Others have concentrated on the indirect consequences of the business cycle, through its influence on fertility changes, on health status of adults and children, children’s school enrolment, and time parents spend with

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children (Dehejia and Lleras-Muney 2004; Price 2007) for the US. Here we focus on the association between economic fluctuations and changes in fertility.

The decline in fertility in Latin America is explained as part of a long-term trend associated with rising development in the area. This has already been studied in great detail (see Guzman et al. 1996 and U.N. Population Division 2001 for an overview). We concentrate instead on fertility responses to economic fluctuations. This has been the focus of an extensive literature in demographic and economic history of Europe and the US (see Yule 1906; Galbraith and Thomas 1941; Kirk and Thomas 1960; Silver 1965; Weir 1984; Galloway 1988; Lee 1990; Southall and Gilbert 1996 for studies finding periods of procyclical fertility and Butz and Ward 1979 for countercyclical fertility, among many examples). However there are very few works that study those associations in the Latin American context and there is no consensus about the direction of the effects. Previous analysis of the effect of short-term economic changes on demographic variables either focused on just a few particular countries (see Goldani et al. 1989; Magno deCarvalho and Wong 1996 on Brazil; on Colombia by Parrado 2000; and chapters on Brazil, Chile, and Argentina in Tapinos, Mason and Bravo 1997, among others), found mixed results (see Palloni et al 1996) or did not cover the most acute recent Latin American economic crises (Palloni and Tienda 1992).

In this paper we explore the relation between fertility and the business cycle taking advantage of the existing cross-country and within-country differences in both fertility and economic conditions during a period that includes the most recent acute economic crises. We undertake two types of analysis: first, a macro data analysis where we estimate the changes in total fertility (TF) around a common trend in an unbalanced panel data of 18 Latin American countries for the last three decades; second, a micro data analysis where we estimate Cox proportional hazard models of transitions to 1st, 2nd, and 3rd births with individual data from Demographic and Health Surveys (DHS) available only for a subset of ten Latin American countries. The aggregate analysis by including a large set of countries, many of which are not covered by the DHS data (Argentina, Chile, Costa Rica, El Salvador, Honduras, Panama, Uruguay and Venezuela), provides us with a much more complete picture of the region than any previous research on this topic. Further, it allows us to examine the effects of macroeconomic conditions in a large set of countries with many common characteristics but also at different demographic and economic developmental stages. In contrast, the micro data cover fewer countries but provide great detail and flexibility to understand how economic shocks affect women of different SES and birth cohorts. We expect the impact to differ across education groups, cohorts or geographic location. To the best of our knowledge there are no works that attempted to study in detail the effect of economic fluctuations on fertility for such a complete set of Latin American countries during a long period of time.

Our findings are consistent between the two approaches. We take this as a very comforting sign of the robustness of our results. In both analyses we find that periods of relative high unemployment are associated with lower TF and with relative postponements of maternity (and to some extent second and third births). The association with first births is stronger among more educated women, later cohorts (which likely have more access to family planning), and those living in urban settings. This suggests that both individual unemployment shocks and aggregate economic uncertainty may have pro-cyclical effects on fertility rates.

## Changes in fertility and macroeconomic conditions in Latin America

### Fertility

The recent evolution of fertility and its decline has been very uneven across Latin American countries. Table 1 presents TF from 1950 to 2000 for all the countries under analysis (see appendix for data sources). Some countries, such as Argentina, Chile, and Uruguay, already displayed a relatively low level of fertility by 1970. Even though fertility continued to decline in the following years, the change was too sharp. Pantelides (1996, 2001) notes that the onset of fertility decline in Uruguay and Argentina took place in the 1920s and 1930s. It happened before other Latin American countries and close to the transition in most European countries. Chile was next but its transition only occurred in the 1960s.

Conversely, other countries underwent a rapid fertility transition during the last forty years. Brazil, Nicaragua and Mexico are among the most prominent. The causes of the rapid Brazilian fertility decline are still under analysis. However, the decline was not homogeneous across regions and diversity is still widespread (Magno de Carvalho and Wong 1996; Goldani 2002). Table 1 shows the TF in Brazil went from 5.33 in 1970 to 2.46 - close to the levels in Chile and Uruguay- in 1995. In Mexico, the fertility decline did not begin until the seventies and was exceptionally fast (Tuiran et al. 2001), decreasing from 6.73 in 1970 to just fewer than three children by 1995.

Finally, remarkably high fertility rates prevailed in many areas of Latin America by the turn of the century. TF in 2000 remained at 4.87 in Guatemala, 4.36 in Honduras, and 4.16 in Paraguay.

### Economic conditions

During the same period, Latin America also experienced multiple economic and political difficulties. Inflation, external debt crisis, income inequality, unemployment, fiscal deficits, high protectionism, and market oriented reforms are some of the main ingredients that dominated the economic scene in the last decades. Nonetheless, these shocks did not affect all countries in the same way.

Table 2 shows mean annual rates of GDP per head growth for the second half of last century. While some countries managed to grow at more than 2.5 per cent per year (Brazil and Chile, for example) others remained stagnant (Nicaragua) or even showed negative rates of growth (Venezuela). Downward cycles where the domestic product decreases more than 10 per cent in just one year were not uncommon. In 1975, Chile had a reduction of 13.8 per cent of GDP per head. A similar contraction was suffered by the Peruvian economy in 1989. More recently, in 2002 and 2003, Venezuela experienced a decline of 10.5 per cent and 11.3 per cent of their GDP per head. 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.

In terms of unemployment, there was a wide variation between countries. For example, while the Dominican Republic tends to have high levels of unemployment, official statistics show low rates for Mexico. There is also large variability within countries over time. An extreme case is Argentina where the unemployment rate increased from 5.8 per cent in 1991 to 18.8 per cent in 1995 and remained over 10 per cent until recently.

Unemployment and GDP growth tend to be negatively correlated but it is interesting to note that this does not need to be the case. After recent macroeconomic crises, the economic recovery in some Latin American countries did not translate into a proportional growth of jobs relative to the new economic bonanza. In Argentina during the early 1990s, for

example, record levels of unemployment co-existed with high rates of growth (Altimir and Beccaria 2002; Gonzalez-Rozada and Menendez 2006). If a country is experiencing "jobless growth", higher growth may not result in more opportunities for everyone (UNDP 2003). The InterAmerican Development Bank reports that "by 2000, the median unemployment rate was above 10 per cent, and as high as the rates seen in the region during the height of the debt crisis (1983–85), despite the fact that economic activity did not contract nearly as much in the late 1990s as in the 1980s (IADB 2004, p.15)". Given the long track of high inequality in Latin American societies and the increase of poverty levels and disparities during the recent economic shocks in some countries, it is possible that the gains from new growth were unevenly distributed across different groups in society and the highly educated (or urban population) benefited relatively more than the lower skilled (or rural dwellers).

Table 2 also shows summary information on inflation rates. 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 most countries in the region had at some point annual inflation rates higher than 100 per cent, and many suffered hyperinflation, such is 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.

## Analytical framework

The basic microeconomic model of fertility (Willis 1973; Becker 1991) identifies a broad set of factors that influence the number of children a woman will have until the end of her fertile years. Amongst the most relevant are households' desires over the number and quality of children, household members' labour supply decisions and access to family planning and infant mortality are amongst the most relevant. Declines in infant mortality, larger investments per child (Becker 1981) and dual-careers (Butz and Ward 1979; Becker 1981; Galor and Weil 1996) reduce the desired number of children. Increases in the availability of attractive consumer goods and an accentuation of individual autonomy strengthen this trend (Lesthaeghe and Surkyn 1988; Bumpass 1990; Surkyn and Lesthaeghe 2004). The decrease over the last decades in the cost and availability constraints of contraception has made this move towards smaller families and motherhood postponement possible (Goldin and Katz 2002 for the US; Weinberger 1996 for Latin America; Goldani 2002 for Brazil; Pantelides 2001 for Argentina; Parrado 2000 for Venezuela and Colombia; Population Division 2002 and Miller 2007 for Colombia; Tuiran et al. 2001 for Mexico).

### Fertility and unemployment

In this paper we explore whether differences in the economic environment where childbearing decisions are made are related to changes in fertility. In particular we study whether fertility responds to economic shocks and whether economic booms are accompanied by baby busts or baby booms. Within the standard microeconomic model of fertility, temporary unemployment shocks reduce women's opportunity cost of time without affecting long-term income in an important way. Therefore, the substitution effect prevails over any income effect from temporary decreases in earnings. The associated fall in opportunity costs (in terms of forgone wages) makes unemployment spells good times for childbearing (Becker 1972; Butz and Ward 1979; Schultz 1985; Galor and Weil 1996). However, in the context of structural or permanent unemployment --likely associated with sharp adjustment of expected income and increased uncertainty-- income effects outweigh the lower opportunity costs and fertility follows a procyclical pattern (Yule 1906; Silver 1965; Ben-Porath 1973; Becker 1981; Adsera 2005, 2010).

There are additional ways in which changes in unemployment and fertility may be related. First, wage effects may influence labour supply decisions. Maternity may require a short or partial withdrawal from the market. Due to high unemployment, a subsequent return to the market may be difficult. In this regard, women may alter the timing of their births if labour market experience is very significant for their earnings profile. If wages increase with experience and child-related expenditures are relatively fixed, women may postpone childbearing to accumulate human capital early in their career and guarantee better life-time wage-growth, benefits, and employment (Heckman and Willis 1976). Good working capital markets, though, would temper that result by allowing people to borrow more easily in order to smooth the cycle (Vijverberg 1984).

Second, a persistent unemployment spell may have a large negative impact on household permanent income (income effect). This may render childbearing unattractive not only to those directly affected by unemployment but also to those to which it constitutes a threat and who want to secure future employment. Furthermore, this is bound to affect both the timing of fertility and completed fertility. Delayed transitions to maternity often lead women to have fewer children than otherwise planned as fecundity decreases with age (Morgan 2003). If a substantial shift toward “quality of children” had previously occurred in the society, the impact of the income drop on the total number of children would be tempered. An analogous link between high unemployment and fertility behaviour was found in the interwar period and the 1930s depression in both the US and the UK (Galbraith and Thomas 1941; Becker 1981; Murphy 1992). Similarly during the last two decades, European fertility postponement and its associated reduction were important in countries where unemployment was prevalent and persistent –particularly among women- such as those in Southern Europe (Adsera 2004, 2005). Even economies which had lower levels of unemployment such as Norway, displayed these trends (Kravdal 2002). Likewise in an adverse labour market, parents may choose to invest more per child (increase quality) to improve their future outlook at the cost of reducing the number of children (Easterlin 1973; Becker et al.1990).

Long periods of unemployment may also have negative consequences in the marriage market. Lower income of women and their potential spouses may hamper their ability to buy or rent a home, to be economically independent, to afford a wedding party, and may also lower their appeal as partners. As a result, household formation and, consequentially, childbearing may be postponed. This mechanism has been studied in England and Wales (Yule 1906; Southall and Gilbert 1996); the US (Galbraith and Thomas 1941; Silver 1965), and Latin American countries (Palloni and Tienda 1992; Palloni et al 1996; Bravo 1997; Ortega and Reher 1997; Rios-Neto and Magno de Carvalho 1997), among others. The indirect impact of the economic crises on births through delayed union formation may be weaker in countries where new family units are more likely to form within an extended household without requiring and separate housing (Palloni et al. 1996) and economic independence. Since this analysis included all women from the time they turned age twelve, it picks up both the direct and the indirect effects, through marriage, of changing economic conditions.

Fertility responses to economic shocks may vary along the life-cycle or by education level. Previous analyses with US data have found differences in the response of women of different educational background within a cohort to changes in unemployment. Perry (2003) shows that college educated women portray procyclical fertility whereas those with high school or less reduce fertility when labour market conditions improve. Dehejia and Lleras Muney (2004) show that race and education are jointly associated with variation in fertility over the cycle. They find low-skill black (white) women to be less (more) likely to give birth during recessions. Several of the mechanisms above that explain the association between fertility and the business cycle can operate with unusual intensity for women of certain

educational backgrounds, and as a result, different economic opportunities. Women with lower education may face more severe credit constraints than others in their same cohort in a country with highly imperfect capital markets. Also, the degree of skill depreciation and resulting change in long-life income while outside the labour market may differ across educational backgrounds. In that regard, the skills of highly educated women who expect to access more formal jobs may be at a higher risk than those of others. Responses to economic shocks can also differ by age. For example, older women, in general more established in the labour market than their younger counterparts can to a greater degree protect themselves from unemployment oscillations.

### Fertility and growth

The relation between fertility and growth can also be either procyclical or countercyclical. Healthy growth rates lead to optimism and may reduce credit constraints but may also be accompanied by better labour market opportunities that increase the opportunity cost of childbearing. Previous analyses show procyclical births in Brazil and Chile during the twentieth century (Bravo 1997; Rios-Neto and Magno de Carvalho 1997). Ortega & Reher (1997) observe a procyclical fertility response to changes in GDP in Chile and Argentina since the 1930s with some gradual weakening until the 1970s and a strengthening of the relationship thereafter. Palloni et al. (1996) however find greater heterogeneity of responses in a sample of eleven Latin American countries.

The debt crisis of the 1980s is a particularly important episode to take into account when evaluating the relationship between fertility and economic stability in Latin American economies during this period. Some researchers found a decline in the rate of first marriage and an acceleration of the reduction in fertility in Brazil during the early 1980s when the country underwent a foreign debt crisis (Goldani et al. 1989). In our analysis we include period dummies in order to evaluate the effect of the external debt crisis.

## Macro-level analysis

### Methodology and data

We used a panel of 18 Latin American nations that covers more than three decades to study how different labour market and economic shocks may have affected fertility rates. 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. We obtained total fertility series from the UN Demographic Yearbook that uses data reported by countries from their vital statistics. When data from UN Demographic Yearbook were missing, we used the series in the International Database (IDB) of the US Bureau of the Census. The Appendix contains information on the missing observations and on the methodology employed by the IDB. Since some of the series in the IDB are estimated there is a risk of over-smoothing for some countries. We believe that this could potentially bias the results towards finding a lack of response of TF to economic fluctuations. In such case, our results would constitute a lower-bound of the true impact. For the period of estimation the mean TF of these countries was 3.5, with a standard deviation of 1.0, a minimum of 2.0 and a maximum of 6.7.

To account for the business cycle at each point in time we used information on changes in unemployment rates and GDP per head growth rates in the immediate past as well as dummy variables for periods of external debt crisis. We also included a series of changes in consumer prices, country dummies, and a linear time trend to control for other existing economic conditions.

The appendix details all sources and years of the data we used. GDP data were obtained from Economic Commission for Latin America and the Caribbean (ECLAC). Data on unemployment rates were obtained from a combination of sources including ECLAC, International Labour Organization (ILO) and the Central Bank of Dominican Republic. Price data were available from the International Financial Statistics published by the International Monetary Fund (IMF).

Most macroeconomic data were available from the late 1950s until 2003. However, information on unemployment rates was generally only available starting in the 1970s or 1980s and there were gaps in the data for some countries. We present estimations that included all the main covariates and thus only covered a period of 25 to 30 years per country (see appendix and Table 2 for the specific period in each case).

Haussman tests indicated random-effects models were inconsistent. Alternative specifications not shown here included either country-specific trends or year dummies. The models were also estimated using either GLS or panel consistent standard errors and produced similar results.

Variables such as TF and unemployment tend have autocorrelation (trends) which may create spurious correlation among them. To avoid this problem our analysis used rates of change ($\ln x_t - \ln x_{t-1}$) in the series. Some missing values in our series precluded us from using filters like Hodrick-Prescott (HP) for example, but other approaches such as first differences, partial first differences, error correction models, or de-trended series yielded similar results to the ones presented below. We used lagged macroeconomic variables to reflect the relevant timing of economic circumstances that might affect fertility decisions.

The analysis of the associations between demographic behaviour and aggregate measures of economic performance must recognize that those measures encapsulate both individual and aggregate shocks. The coefficient of aggregate measures of unemployment, for example, captures both the negative shocks at the individual level and the increased uncertainty from aggregate economic performance.

## Results

Table 3 presents four specifications of the estimates of changes in TF on either two or one lag of the major covariates. Results are fairly similar across columns.

Changes in unemployment are negatively and significantly associated with changes in fertility rates in our cross-country regressions. On its own, the change in unemployment lagged one year is significant (column (2)). The coefficient indicates an elasticity of 0.010. This implies that an increase of one standard deviation (4.37) in the mean unemployment rate (8.73) would reduce the TF 0.5 per cent.

While the first lag of unemployment change is significant, lags of higher order are not. The high serial correlation in the unemployment series introduces multicollinearity in the estimates. In that regard, the joint tests of the first two lags of changes in unemployment are significant and imply an elasticity of around −0.016 in columns (1) or (3). In estimates not included here, additional unemployment lags are not significantly different from zero and their inclusion does not change our results.

In column (3) we included a dummy variable for the most acute years of the Latin American debt. The coefficient on the dummy is negative and significant indicating a potentially temporary slowdown of fertility during that period. Note that this variable suggests an effect of the debt crisis on fertility decisions even when controlling for changes in unemployment

and growth rates. This result is consistent with previous findings for Brazil (Goldani et al. 1989).

In general growth rates are not statistically significant in the estimates of Table 3. When we excluded unemployment but kept the sample limited to the period for which unemployment was available (column (4)), the coefficient on the first lag of GDP growth is positive but not significant. Previous results in the literature are mixed. While some find a positive response to economic growth (e.g. Bravo 1997 for Chile; Ortega and Reher 1997 for Chile and Argentina), others find heterogeneous and muted responses (e.g. Hill and Palloni 1992; Palloni et al 1996).

The associations of unemployment and growth rates with changes in TF that we show in Table 3 imply a prevalence of income effects over substitution effects in childbearing decisions. These aggregate results are suggestive of an impact of the economic cycle on fertility decisions, but they may mask distinctive responses among subgroups of the population. We turn in the next section to our main analysis using individual data to analyze whether unemployment and economic growth affect women in different ways over their life-cycle and across cohorts and educational groups.

## Micro-level analysis

### Method and data

We used DHS available from ten of the countries in our sample to analyze the relationship between changing aggregate economic conditions and the individual spacing of children of over 100,000 women. DHS are not produced for all the 18 countries in the previous aggregate analysis. We used the latest DHS available at the time of writing the paper. Countries (and survey years) included in the estimates are Bolivia (1998), Brazil (1996), Colombia (2000), Dominican Republic (2002), Ecuador (1987), Guatemala (1998), Mexico (1987), Nicaragua (2001), Peru (2000), and Paraguay (1990).

The transitions to the first three births were estimated separately using Cox proportional hazard models. We drew individual fertility histories from the information on birth dates of women and their children in the DHS of each country. The dependent variable in all estimates was duration (measured in years) to a birth from either the previous birth or from age twelve in the case of the first birth. We chose to start exposure to first birth at age twelve given the high frequency of teen childbearing we observed in some of the countries. The mean age at first birth in the DHS was 20 years and 75 per cent of the women were mothers by age 23.

For each woman $i$, in country $c$ and year $y$ who entered a state (e.g. first birth) at time $t=0$, the (instantaneous) hazard ratio function at $t>0$ was assumed to take the proportional hazards form:

$$\lambda_{icyt}=\lambda_0(t)\, exp\,(x'_{icyt}\beta+m_{c(y-1)}\,\delta+T+C) \quad (1)$$

where $\lambda_0(t)$ is the baseline hazard function; $exp\,(\cdot)$ is the exponential function; $x_{it}$ is a vector of covariates summarizing observed differences between individuals; $m_{c(y-1)}$ is a vector of lagged aggregate economic conditions in country $c$ and $T$ is a time trend. Given that economic conditions within each country offered substantial variation over time, we included country fixed effects, $C$, and analyzed within-country changes in fertility as a response to changing economic conditions. Country fixed effects took care of unobservable cross-country differences. We used a grouped robust variance as estimated by Lin and Wei (1989) and clustered the errors within region-year in each country. We allowed the non-

parametric baseline hazard to vary for each birth-cohort to take into account differences among generations such as changes in values, access to information and family planning, and to distinguish those from variation in economic conditions. Women were divided in five groups according to their birth year: 1930s–40s; 1950s; 1960s; 1970s and 1980s. Estimates are presented in hazard ratios using alternatively common time trends or country specific time trends.

In addition to the country time-varying macroeconomic variables used in the first set of estimates, the models contained individual characteristics for each woman such as years of education, her place of residence whether urban or rural, and access to electricity in her dwelling. Information on the woman's previous fertility history such as age at first birth, gender of previous children, and months elapsed between births was included accordingly for each parity order.

## Results

Table 4 presents the estimated proportional hazard models of the transition to the first birth. We present different models that include two, four or no lags of unemployment rates, per head growth rates and a debt crisis dummy. The first four columns include a common time trend while columns (5) to (8) reproduce the same models using country specific time trends.

In the basic model that includes two unemployment lags (columns (1) and (5)) last year's unemployment is associated with a lower hazard to a first birth. Twice lagged unemployment is not significant on its own, although both lags are again jointly significant. We simulated the proportion of women that have become mothers by age 25 using the model in column (1) and by changing the unemployment rate while keeping all other variables at the mean. Around 73.7 per cent of women in a country are mothers by age 25 if we assume that the first two lags of unemployment are 5 per cent. This figure is only 71.6 per cent if the unemployment rate stands at 12 per cent.

To further understand the dynamics of this relationship, whether long or short term, we included four lags of the country's unemployment rate in a model of transition to motherhood in columns (2) and (6). Estimates confirm a short term negative association with unemployment but also portray a rebound in first births after the fourth lag of unemployment. This finding seems to imply that even though an unemployment hike may temporarily depress first births, it only partly reduces them.

An extra point of GDP per head growth rates increases hazard rates of first births between 6 and 10 per cent. In columns (3) and (7), where we excluded unemployment from the model, the coefficients of per capita income growth remained at very similar levels. Women facing periods of growth seem more likely to become mothers ceteris paribus.

In columns (4) and (8) we checked whether transitions to maternity are sensitive to particularly acute economic changes. We introduced a dummy for the most severe years of the debt crisis in Latin America (1983 and 1984). Birth rates are lower during periods of debt crises. Unemployment continues to be negatively associated to first births rates whereas economic booms boost them.

Table 5 shows transitions to higher parities. We present the most parsimonious model with two lags of unemployment. As was the case with first births, we find that the effect of unemployment is negative and statistically significant. However, GDP growth does not echo the positive effect we found in the first births estimates. As expected, estimates in Tables 4 and 5 indicate that the level of women's formal education is significantly and negatively

associated with transitions to first births. Interestingly, this negative association between education and birth rates is also present in models for second births. Researchers have found that in OECD countries this association is positive for second and third births (Kravdal 2001; Adsera 2010). This may partly result from not adjusting differential selectivity of earlier parity transitions when estimating parities separately (Kravdal 2001). The fact that this relationship does not hold for these countries may indicate, among other things, that the childcare options and their associated costs as well as the labour market women face are very different from those women face in richer nations. An alternative explanation is that the less educated in Latin America are pooling births much closer together than the more educated due to lack of access to proper family planning (Weinberger 1996).

Similarly, rural residence is not related to transitions to first births, but shows a large positive and significant association on higher order births. Access to electricity, used as a rough measure of wealth, is associated with longer time to a birth, particularly in high order births.

Finally, we estimated the basic two-lag model of transitions up to the 10th birth to simulate birth histories for different levels of unemployment. We used a woman with a constant set of characteristics (i.e. Colombian, urban, with electricity, 7 years of education) and kept the country conditions constant at the mean of the period (i.e. GDP growth at 0.5 per cent; inflation at 25 per cent) in order to establish a baseline. Increasing the unemployment rate from 5 to 12 per cent reduces the completed fertility from 4.34 to 4.1 and the proportion of women with at least three children from 73 to 68.5 per cent.

In the following subsections we present the models for different education groups, birth cohorts and place of residence.

**Differences across education groups—**We divide our sample in two groups of women: those with less than seven years of schooling (around 40 per cent of the sample), and those with seven or more. Additionally we present separate results for the highly educated group: those with more than twelve years of schooling (fewer than 15 per cent of the sample). Table 6 presents the distribution of educational attainment across countries for the women included in the sample. Two important details may be noted in these data. First, in some countries such as Paraguay and Guatemala, over two thirds of adult women had less than seven years of education. Second, in some countries such as Bolivia or Peru, educational inequalities are particularly large: on the one hand, around 15 per cent of the population has at least some post secondary education, but, on the other, around 40 per cent have less than seven years of schooling. Fertility behaviour is very different across education groups. Simulations of transitions to first birth, evaluated at the means, indicate that more than 50 per cent of women with less than 7 years of education are mothers at age 19. In contrast, women with more than a high school education only reach similar levels at around 27 years of age.

Table 7 presents the hazard ratio estimates for different education groups. In column (1), we observe that the second lag of unemployment is negatively associated with transitions to maternity among the less educated, and that both unemployment lags are jointly significant. In additional estimates we observe that birth rates rebound after four periods.

Among women with seven or more years of schooling the association is stronger and more contemporaneous, as only the previous year's unemployment is associated with delays in childbearing. Within this group, in the face of an adverse labour market, women with at least some tertiary education seem to postpone maternity the most (column 3). Simulations show that more educated women delay motherhood more than lower educated women when

unemployment increases. For example, assuming unemployment is 5 per cent, 52.4 per cent of women with less than seven years of education have at least one child by age 19. Unemployment rates of 12 per cent reduce this share 2 percentage points to 50.4 per cent. For highly educated women unemployment has a larger effect. At a rate of 5 per cent, almost 56 per cent have a baby by age 27. However if the unemployment rate is 12 per cent the percentage goes down to 52.1 percent.

For second and third births, the relative strength of these associations across education groups is reversed to a certain degree. For the less educated the negative coefficient of lagged unemployment in the models of second birth is sizable and the first two unemployment lags are also jointly significant for the third birth. For the pooled group of women with more than six years of studies, unemployment hikes are associated with later second births but the two year combined relationship is null or ambiguous with respect to the third birth. When we restrict the estimates to women with tertiary education we do not find any significant association of joblessness and prevalence of higher parity births.

Possibly those with more than a secondary education expect to be able to get a good job that matches their skills and are concerned about both the signal maternity sends to potential employers and about the depreciation of their skills while out of the labour force. Whereas the long-term wages of low skill women may not depend as much on experience, earlier years in the labour market may be more important for the long-term wages of women with more than a secondary education (Card and DiNardo 2002; Connolly and Gottschalk 2006). This may be reflected in the postponement of motherhood during recessions. However, once the more educated women have found more stable and protected positions, their skills might protect them against downturns.

Periods of positive growth significantly boost fertility of both the less educated and those with secondary and tertiary education when pooled together. However, we do not find any significant relationship between economic bonanza and first birth rates when we restrict the sample to women with post-secondary education. By contrast, the coefficients of growth rates for the second and third births are only significant and positive among the most educated. If we assume that the benefits of growth may be unevenly distributed, particularly in the very unequal Latin American societies, it is not surprising that growth boosts the fertility of the more educated.

So far we have supposed that women are active participants in the labour market. However, if women are not active participants, the same pro-cyclicality can result from shocks to the household income through the spouse's labour market situation. The arguments laid out before can apply to the spouse's income if there is a high degree of assortative mating in these unequal societies. The fact that more educated women are more sensitive to unemployment in their early stages childbearing than later in their life cycle may be related to their spouses' opportunities and ambitions when first entering the market.

In simulations we found that completed fertility for those with seven or more years of education was 3.01 assuming a 5 per cent unemployment rate. If unemployment were 12 per cent ceteris paribus, completed fertility would go down to 2.77 and the proportion of women with at least three children would decrease from 55.6 to 47.2 per cent. Conversely, simulated changes in completed fertility among those with less than seven years of education were small and the proportion with at least three children only decreased from 81.8 to 78.2.

**Differences across cohorts—**The surveys employed included many cohorts of women, from those who had just turned 12 to those who had already passed their childbearing years at the time of the interview. During these years, access to information, to health services and

family planning, and the role of women in the labour market have steadily changed in most of these countries. Younger cohorts may have lived through more economic turbulences than older cohorts but conceivably they have better tools to regulate their fertility (see Miller 2007 for the Colombian case). Unfortunately DHS do not provide retrospective information on access and knowledge of family planning.

Table 8 presents models of the transition to the first three births separately for women born before 1960 and for those born in 1960 and after. We have run our models partitioning the data at different dates from 1959 to 1965 and obtained similar results. We find that the childbearing decisions of younger cohorts seem to follow economic cycles more closely than those of older ones. Higher unemployment periods (economic booms) are significantly associated with delays (rushes) to the first three births among those born in 1960 or later. The coefficient of the first lag of growth is significant, positive and sizable for the first two births and the two first lags of growth are jointly significant in the model of third births. The hazard ratio indicates substantial delay of births in the presence of high unemployment even for the third birth. In simulations of the transition to the first birth among those born in 1960 or later we find that 49.5 per cent of women are mothers at age 21 if unemployment rates are 5 per cent but that this proportion decreases to 46.7 if unemployment rates hike to 12 per cent. Likewise, simulated completed fertility drops from 4.14 to 3.89 and the share of women with at least three children falls from 72.8 to 67.5 per cent.

Conversely, transition to maternity and to a second birth is unrelated to changes in unemployment or growth for women born before 1960. Moreover, their transition to third births appears to be countercyclical in relation to unemployment shocks but ambiguous in the presence of economic booms.

In models in Table 8, rural residence is not related to transitions to first births for younger cohorts and is negative for older women. However, it shows a positive and significant association with higher order births for both cohort groups. Both access to electricity and years of education are associated with lower birth rates. However, the size of the coefficients and the t-statistics are smaller for those born before 1960. This is likely related to lower prevalence of family planning among women of older cohorts as well as to the smaller sample size of this group.

**Rural versus urban—**Fertility transition has often been conceived as a diffusion process that starts in urban settings and moves to rural areas over time (UN Population Division 2002). Whether women live in a rural or an urban setting probably affects access to family planning and constrains childbearing decisions much like differences in educational background and birth cohort do. Additionally, children in rural areas are more likely to have an important role as economic contributors to the household wellbeing and to become a source of support to their parents in old age. Finally, economic fluctuations may affect urban and rural groups differently. Marichal (1989) notes that the Latin American recessions during the early 1980s may have hit the urban working class – whose incomes suffered massively and were more dependent on government spending – more than the rural workers. Table 9 presents the estimated model of transitions to different parities separately for women living in the city and for those in a rural setting. Urban women seem more responsive to changes in unemployment than those living in a rural area. In particular, the estimated hazard ratios for the one-year unemployment lag in the transition to any of the first three births are significantly under one among those in urban settings and smaller in size than those for women in rural areas. For the latter, only the second lag of unemployment is negative and significant in the transition to first births (though both are jointly significant). In transitions to higher parities the first lag of unemployment significantly reduces the hazard ration. Simulations from column (2) in Table 9 indicate that 69.3 per cent of urban

women are mothers by age 25 if unemployment is 5 per cent but only 66 per cent are when unemployment is 12 per cent.

The picture is more ambiguous regarding changes in economic growth, but, in general, economic expansions are associated with earlier maternity for all women.

Years of education seem to account for a larger portion of the variance in the transition to maternity among urban dwellers than among women in rural areas. This is not surprising as the heterogeneity in the educational spectrum is likely much larger in cities than elsewhere.

Birth history simulations showed that completed fertility for urban women would move down from 4.11 to 3.81, whereas that of those in rural areas would only decrease from 5.29 to 5.13 if unemployment rose from 5 to 12 per cent. Under similar circumstances, the proportion of women with at least three children would decline from 70.9 to 66.2 per cent in cities but only from 78.1 to 75.1 per cent in rural areas.

During the last decades, Latin America not only underwent important economic changes but also dramatic fluctuations in political instability. To account for political uncertainty we introduced controls for political instability, civil wars, and transitions to democracy in separate estimates (results available upon request). All results in the paper were robust to their inclusion.

## Conclusions

In this paper we explore if economic shocks affect fertility in Latin-America. Using aggregate data, we show a positive association between the business cycle and changes in total fertility. We also conduct our analysis using women's individual data. Both analyses provide consistent results. In general, birth rates are lower during downturns. This behaviour is mainly associated with increasing unemployment, although we find a positive and significant relationship between growth and first births using individual data. Growth also boosts rates of second and third births among the most educated. High unemployment is, in general, coupled with low rates of growth. However, the Latin American experience of the last fifty years contains periods of high growth with increasing unemployment and also episodes of stagnation with relatively low unemployment.

Even though periods of unemployment may be good to have children because opportunity costs are low, we find that maternity is reduced or postponed in particular among the most recent cohorts. This behaviour is consistent with the idea that, in this context, income effects are dominant when unemployment goes up.

The relationship between fertility rates and unemployment is not homogeneous across groups of women. Using individual DHS data, we find a strong association between adverse economic circumstances and delayed maternity among women who are urban, more educated, and come from younger cohorts. The association between unemployment and the transition to second or third births is, on the other hand, somewhat stronger for the least educated and for recent cohorts, while no large differences are observed by place of residence.

Whether these associations are specific to the severity of the economic turbulences that Latin American countries have undergone during the last decades remains to be seen. Our results point to more responsive childbearing behaviour in women of recent cohorts. As easy access to family planning progressively extends to the entire population and as increasingly educated Latin American women aim to secure more stable jobs, childbearing patterns may become even more tied to the economic fortunes of the country. However, whether women's

response remains mostly procyclical, as observed here, or countercyclical, may hinge on the acuteness and persistence of the economic shocks these countries undergo in the future.

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## References

Adsera, Alicia. Changing fertility rates in developed markets. The impact of labor market institutions. Journal of Population Economics. 2004; 17(1):17–43.

Adsera, Alicia. Vanishing children: from high unemployment to low fertility in developed countries. American Economic Review. 2005; 95(2):189–19.

Adsera, Alicia. Where are the babies? Labor market conditions and fertility in Europe. European Journal of Population. 2010 forthcoming.

Altimir, Oscar; Beccaria, Luis. Editorial: Universidad Nacional De Gral. Sarmiento, Argentina: 2002. Efectos de los cambios macroeconomicos y de las reformas sobre la pobreza urbana en Argentina.

Bajraj, Reynaldo; Bravo, Jorge; Tapinos, Georges. Economic adjustment and demographic responses in Latin America: an overview. In: Tapinos; Mason; Bravo, editors. Demographic responses to economic adjustment in Latin America. Oxford University Press; New York: 1997. p. 3-16.

Becker, Gary. An economic analysis of fertility, *Demographic and economic change in developed countries*. NBER conference series; 1960. p. 209-231.

Becker, Gary. A treatise on the family. Harvard University Press; Cambridge, Mass: 1991.

Ben Porath, Yoder. Short-terms fluctuations in fertility and economic activity in Israel. Demography. 1973; 10(2):185–204. [PubMed: 4596972]

Bravo, Jorge. Demographic consequences of economic adjustment in Chile. In: Tapinos; Mason; Bravo, editors. Demographic responses to economic adjustment in Latin America. Oxford University Press; New York: 1997. p. 156-173.

Bumpass, Larry. What's happening to the family? Interactions between demographic and institutional change. Demography. 1990; 27(4):483–498. [PubMed: 2249741]

Butz, William P.; Ward, Michael P. The emergence of countercyclical U.S. fertility. American Economic Review. 1979; 69(3):318–28.

Card, David; DiNardo, John E. Skill-biased technological change and rising wage inequality: some problems and puzzles. Journal of Labor Economics. 2002; 20(4):733–83.

Connolly, Helen; Gottschalk, Peter. Boston College Working Papers in Economics. Boston College Department of Economics; 2006. Differences in wage growth by education level: Do less educated workers gain less from work experience?; p. 473

Dehejia, Rajeev; Lleras-Muney, Adriana. Booms, busts and babies health. Quarterly Journal of Economics. 2004; 119(3):1091–1130.

Easterlin, Richard. Relative economic status and the American fertility swing. In: Sheldon, EB., editor. Family economic behavior: problems and prospects. Philadelphia: Lippincott; 1973. p. 170-223.

ECLAC. Economic Commission for Latin America and the Caribbean statistical yearbook for Latin America and the Caribbean. United Nations: (Various Issues)

Galbraith, Virginia L.; Thomas, Dorothy S. Birth rates and the interwar business cycles. Journal of the American Statistical Association. 1941; 36(2):465–476.

Galloway P. Basic patterns of annual variations in fertility, nuptiality, mortality and prices in pre-industrial Europe. Population Studies. 1988; 42(2):275–302. [PubMed: 11621566]

Galor, Oleg; Weil, David. The gender gap, fertility and growth. American Economic Review. 1996; 86(3):374–387.

Goldani, AM.; McCracken, SD.; Pullum, SW. Demographic change and stability in Brazil during a period of economic crisis. Population Association of America; Baltimore, MD: 1989 Mar-Apr.

Goldani, Ana Maria. Completing the fertility transition. UN Population Division; 2002. What will happen to Brazilian fertility?; p. 358-375.ESA/P/WP.172/Rev.1

Goldin, Claudia; Katz, Lawrence. The power of the pill: oral contraceptives and women's career and marriage decisions. Journal of Political Economy. 2002; 110(4):730–70.

Gonzalez-Rozada, Martin; Menendez, Alicia. Why have urban poverty and income inequality increased so much? Argentina 1991–2001. Economic Development and Cultural Change. 2006; 55(1):109–138.

Guzman, Jose Miguel; Singh, Susheela; Rodriguez, German; Pantelides, Edith A. The fertility transition in Latin America. Oxford University Press, Clarendon Press; Oxford: 1996.

Heckman, J.; Willis, R. Estimation of a stochastic model of reproduction: an econometric approach. In: Terleckyj, N., editor. Household production and consumption. Columbia University Press; New York: 1976. p. 99-138.

Hill, K.; Palloni, A. The peopling of the Americas. Vol. 3. Liege: IUSSP; 1992. Demographic responses to economic shocks: the case of Latin America; p. 411-438.

IADB. Economic and social progress report. Inter-American Development Bank; Washington DC: 2004. Good jobs wanted: labor markets in Latin America.

IMF. International financial statistics. (various issues)

Kirk, Dudley. Europe's population in the interwar years. League of Nations, Princeton University Press; Princeton: 1946.

Kirk, Dudley; Thomas, Dorothy Swaine. Demographic and economic change in developed countries. Princeton: 1960. The influence of business cycles on marriage and birth rates; p. 214-57.

Kravdal, Oystein. The high fertility of college educated women in Norway: an artifact of the separate modeling of each parity transition. Demographic Research. 2001; 5(6):187–216.

Kravdal, Oystein. The impact of individual and aggregate unemployment on fertility in Norway. Demographic Research. 2002; 6(10):263–294.

Lee R. The demographic response to economic crises in historical and contemporary populations. Population Bulletin of the United Nations. 1990; 29:1–15. [PubMed: 12343055]

Lesthaeghe, Ron; Surkyn, Johan. Cultural dynamics and economic theories of fertility change. Population and Development Review. 1988; 14(1):1–45.

Magno deCarvalho, Jose A.; Wong, Laure R. The fertility transition in Brazil: causes and consequences. In: Guzman, et al., editors. The fertility transition in Latin America. Oxford University Press, Clarendon Press; Oxford: 1996. p. 373-396.

Marichal, C. A century of debt crises in Latin America. Princeton, NJ: Princeton University Press; 1989.

Mason, Andrew. The response of fertility and mortality to economic crisis and structural adjustment policy during the 1980s: a review. In: Tapinos; Mason; Bravo, editors. Demographic Responses to Economic Adjustment in Latin America. Oxford University Press; New York: 1997. p. 17-34.

Miller, Grant. Unpublished manuscript. Stanford University; 2007. Contraception as development? New evidence from family planning in Colombia.

Miller, Grant; Piedad Urdinola, B. Unpublished manuscript. Stanford University; 2007. Time versus money in child health production: the case of coffee price fluctuations and child survival in Colombia.

Morgan SP. Low fertility in the twenty-first century. Demography. 2003; 40(4):589–603. [PubMed: 14686132]

Murphy M. Economic models of fertility in post-war Britain: a conceptual and statistical re-interpretation. Population Studies. 1992; 46(2):235–58. [PubMed: 11623036]

Ortega, Jose Antonio; Reher, David. Short-term economic fluctuations and demographic behaviour: some examples from twentieth-century South America. In: Tapinos; Mason; Bravo, editors. Demographic responses to economic adjustment in Latin America. Oxford University Press; New York: 1997. p. 129-155.

Pantelides, Edith A. A century and a quarter of fertility change in Argentina: 1869 to the present. In: Guzman, et al., editors. The fertility transition in Latin America. Oxford University Press, Clarendon Press; Oxford: 1996. p. 345-358.

Pantelides, Edith A. Completing the fertility transition. Department of Economic and Social Affairs, Population Division; United Nations: 2001. Completing the fertility transition: the case of Argentina.

Palloni, Alberto; Tienda, Marta. Demographic responses to economic recessions in Latin America since 1900. Sociological Inquiry. 1992; 62(2):246–270.

Palloni, Alberto; Hill, Kenneth; Aguirre, Guido Pinto. Economic swings and demographic changes in the history of Latin America. Population Studies. 1996; 50(1):105–132. [PubMed: 11609135]

Parrado, Emilio. Social change, population policies, and fertility decline in Colombia and Venezuela. Population Research and Policy Review. 2000; 19(5):421–457.

Price, Joseph. Parent-child quality time: does birth order matter? Journal of Human Resources. 2008; 43(1):240–265.

Rios-Neto, Eduardo; de Carvalho, Jose Alberto Magno. Demographic consequences of structural adjustment: the case of Brazil. In: Tapinos; Mason; Bravo, editors. Demographic responses to economic adjustment in Latin America. Oxford University Press; New York: 1997. p. 174-198.

Schady N. Do macroeconomic crises always slow human capital accumulation? World Bank Economic Review. 2004; 18(2):131–154.

Schultz TP. Changing world prices, women's wages, and the fertility transition: Sweden, 1860–1910. Journal of Political Economy. 1985; 93(6):1126–1154. [PubMed: 11617446]

Silver, Morris. Births, marriages, and business cycles in the United States. Journal of Political Economy. 1965; 73(3):237–255.

Southall H, Gilbert D. A good time to wed?: marriage and economic distress in England and Wales, 1839–1914. Economic History Review. 1996; 49(1):35–57.

Surkyn, Johan; Lesthaeghe, Ron. Value orientations and the second demographic transition (STD) in northern, western and southern Europe: an update. Demographic Research. 2004; S3(3):45–86.

Tapinos, Georges; Mason, Andrew; Bravo, Jorge. Demographic responses to economic adjustment in Latin America. Oxford University Press; New York: 1997.

Tuiran, Rodolfo; Partida, Virgilio; Mojarro, Octavio; Zuniga, Elena. Completing the fertility transition. Department of Economic and Social Affairs, Population Division; United Nations: 2001. Fertility in Mexico: trends and forecast; p. 483-506.

U.N. Development Program. Human development report. Oxford: 1993.

U.N. Population Division. Completing the fertility transition. Department of Economic and Social Affairs, Population Division; United Nations: 2001. Fertility levels and trends in countries with intermediate levels of fertility.

Vijverberg, W. Discrete choices in a continuous time model: life-cycle time allocation and fertility decisions. In: Schultz, TP.; Wolpin, K., editors. Research in population economics. Vol. 5. JAI Press; Greenwich, CT: 1984. p. 51-85.

Ward, Michael P.; Butz, William P. Completed fertility and its timing. Journal of Political Economy. 1980; 88(5):917–940.

Weinberger, Mary Beth. Changes in the mix of contraceptive methods during fertility decline: Latin America and the Caribbean. In: Guzman, et al., editors. The fertility transition in Latin America. Oxford University Press, Clarendon Press; Oxford: 1996. p. 151-178.

Weir D. Life under pressure: France and England 1670–1870. Journal of Economic History. 1984; 44(1):27–47.

Yule, G Udny. On the changes in the marriage and birth rates in England and Wales during the past half century; with an inquiry as to their probable causes. Journal of the Royal Statistical Society. 1906; 69(1):88–147.

# APPENDIX: Data sources and details

## Total fertility

United Nations: Demographic yearbook, historical supplement 1948–1997 (DYB Special Issue 1997)

United Nations: Demographic yearbook: focusing on natality (DYB Special Issue 1999).

United Nations: Demographic yearbook, various years.

US Bureau of the Census, International Database (IDB). Methodology on fertility data can be found on http://www.census.gov/ipc/www/idb/estandproj.pdf#fertdbe UN Demographic yearbook uses data reported by countries from their vital statistics whenever available. For some countries the data correspond to registration year as indicated in the publication. When data from UN Demographic yearbook were unavailable we used the series in the IDB US Bureau of the Census. As follows, we note the years for which complete economic aggregate data are available for the country but TF is not and, as a result, the observation is missing: Argentina (1971, 1973–74), Chile (1993), Dominican Republic (1961–62, 1965–67, 1971–72, 1974–76, 1978–79), Ecuador (1974, 1976–77, 1979–81, 1985–89), Honduras (1982, 1984–86), Panama (1985 Panama (1987), Uruguay (1981–84), Venezuela (1981–84, 1988–89).

No data imputation was done when information was missing.

## Unemployment

Argentina (1970–2004) ILO LABORSTA database based on Labor force surveys (Urban) National Institute of Census and Statistics, INDEC

Bolivia (1981–2003) CEPAL BADEINSO database based on official statistics (Urban)

Brazil (1976–2001) ILO LABORSTA database based on Monthly employment survey [Pesquisa mensal de emprego] Brazilian Institute of Geography and Statistics (IBGE). Missing 1980, 1991, 1994 and 2000.

Chile (1975–2003) ILO LABORSTA database based on National employment survey [Encuesta nacional de empleo] Department of household statistics, National Statistical Institute (INE).

Colombia (1975–2002) ILO LABORSTA database based on Continuous household survey [Encuesta continua de hogares] National Administrative Department of Statistics (DANE).

Costa Rica (1976–2004) ILO LABORSTA database based on Multi-purpose household survey, employment module [Encuesta de hogares de propósitos múltiples, módulo de empleo] General Directorate of Statistics and Census, Ministry of economy, industry and trade (DGEC Dominican Republic (1960–2004) Banco central de la Republica Dominicana, Departamento de cuentas nacionales y estadisticas economicas, Division de encuestas.

Ecuador (1974–2004) ILO LABORSTA database and CEPAL BADEINSO database both based on Periodic survey of employment, unemployment and underemployment in urban areas of Ecuador [Encuesta periódica sobre empleo, desempleo y subempleo en el área urbana del Ecuador] National Institute of Employment, Ministry of labour and human resources (INEM)

El Salvador (1978–2003) ILO LABORSTA database based on Labor force survey (Urban)

Guatemala (1980–2004) CEPAL BADEINSO database based on official statistics. Missing 1990 and 1999–2001

Honduras (1980–2003) CEPAL BADEINSO database based on official statistics. Missing 2000 (Urban)

Mexico (1980–2003) CEPAL BADEINSO database based on official statistics.

Nicaragua(1980–2004) CEPAL BADEINSO database based on official statistics.

Panama (1970–2003) ILO LABORSTA database based on Continuous household survey [Encuesta continua de hogares] Population and housing section, Directorate of statistics and censuses. Missing 1980–81 and 1990.

Paraguay (1979–2003) ILO LABORSTA database and CEPAL BADEINSO database both based on Household survey - Labour force [Encuesta de hogares - Mano de obra] General Directorate of Statistics and Census, Ministry of finance (DGEC).

Peru (1980–2003) CEPAL BADEINSO database based on Specialized employment level survey [Encuesta especializada de niveles de empleo] National Directorate of Censuses and Surveys (DNCE), National Institute of Statistics and Informatics (INEI). (Lima Metropolitan Area)

Uruguay (1980–2004) CEPAL BADEINSO database based on official statistics from Continuous household survey.

Venezuela (1975–2002) ILO LABORSTA database based on Household sample survey [Encuesta de hogares] Central Office of Statistics and Information Processing [Oficina Central de Estadística e Informática]

ILO, LABORSTA Database http://laborsta.ilo.org/

CEPAL, BADEINSO Database, http://www.eclac.org/cgi-bin/getprod.asp?xml=/deype/noticias/BaseDatos/9/14869/P14869.xml&xsl=/deype/tpl/p13f.xsl&base=/deype/tpl/top-bottom.xslTechnical Note: http://websie.eclac.cl/sisgen/SisGen_MuestraFicha.asp?indicador=127&id_estudio=5

No data imputation was done when information was missing.

## Gross domestic product

All countries (1951–2003): GDP per head growth rates. CEPAL BADEINSO database based on official country statistics. Corresponds to GDP at constant market prices in dollars of 1995.

## Inflation rate

All countries (1949–2003): Inflation rate computed as annual changes in consumer price index, International Financial Statistics (IFS) published by the International Monetary Fund based on official country statistics. Starting year for Brazil is 1960, for Chile 1950, for Costa Rica 1951, for Ecuador 1952, for Nicaragua 1970.

*Popul Stud (Camb)*. Author manuscript; available in PMC 2013 April 04.

**Table 1**

Total fertility across Latin America

| Country | 1950[1] | 1960[2] | 1970[3] | 1980[4] | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|---|---|
| Argentina | 3.20 | 3.10 | 3.10 | 3.50 | 2.97 | 2.62 | 2.42 |
| Bolivia | 6.75 | 6.67 | 6.54 | 5.53 | 4.89 | 4.36 | 3.66 |
| Brazil | 5.93 | 6.06 | 5.33 | 4.09 | 2.56 | 2.46 | 2.13 |
| Chile | 5.10 | 4.81 | 3.28 | 2.47 | 2.55 | 2.24 | 2.07 |
| Colombia | 6.76 | 6.76 | 4.65 | 3.60 | 2.92 | 2.87 | 2.69 |
| Costa Rica | 6.21 | 7.29 | 4.94 | 3.63 | 3.17 | 2.83 | 2.52 |
| Dominican Republic | 7.22 | 5.30 | 6.67 | 4.33 | 3.33 | 3.16 | 3.00 |
| Ecuador | 6.90 | 7.04 | 6.30 | 4.51 | 3.76 | 3.36 | 3.00 |
| El Salvador | 6.06 | 6.81 | 6.62 | 5.34 | 3.84 | 3.62 | 3.38 |
| Guatemala | 7.16 | 6.90 | 6.53 | 6.04 | 5.30 | 5.12 | 4.87 |
| Honduras | 7.05 | 6.05 | 5.98 | 6.44 | 5.28 | 4.84 | 4.36 |
| Mexico | 6.17 | 6.62 | 6.73 | 4.57 | 3.33 | 2.95 | 2.66 |
| Nicaragua | . | . | 7.21 | 6.14 | 5.17 | 4.15 | 3.23 |
| Panama | 5.05 | 5.76 | 4.99 | 3.63 | 2.88 | 2.72 | 2.64 |
| Paraguay | . | . | 5.83 | 5.06 | 4.61 | 4.37 | 4.16 |
| Peru | . | . | . | 4.70 | 3.76 | 3.39 | 2.80 |
| Uruguay | . | 2.95 | 3.00 | 2.66 | 2.53 | 2.37 | 2.16 |
| Venezuela | . | 6.60 | 5.68 | 4.13 | 3.62 | 2.94 | 2.51 |

Notes:

[1] Year is 1953 for Chile, Colombia, Costa Rica, and Honduras, 1954 for Panama, and 1955 for Mexico.

[2] Year is 1961 for Argentina, 1963 for Colombia and Uruguay.

[3] Year is 1973 for Colombia, 1971 for Nicaragua and 1972 for Paraguay.

[4] Year is 1982 for Ecuador

*Source*: See appendix for details.

**Table 2**

Economic conditions in Latin America

| GDP per head – Rates of growth | | | | | | Unemployment rates | | | | | Annual inflation rates | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Years | Mean | Std. Dev. | Min | Max | Years | Mean | Std. Dev. | Min | Max | Years | Mean | Std. Dev | Min | Max |
| Argentina | 1951–2003 | 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 |
| Bolivia | 1951–2003 | 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 |
| Brazil | 1951–2003 | 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 |
| Chile | 1951–2003 | 2.05 | 4.50 | −13.9 | 9.0 | 1975–2003 | 9.17 | 3.96 | 4.4 | 19.6 | 1950–2003 | 50.4 | 95.71 | 2.5 | 504 |
| Colombia | 1951–2003 | 1.75 | 1.95 | −5.6 | 5.4 | 1975–2002 | 11.37 | 3.38 | 7.6 | 20.5 | 1949–2003 | 16.1 | 9.05 | −2.4 | 33.0 |
| Costa Rica | 1951–2003 | 1.88 | 3.81 | −9.9 | 12.7 | 1976–2004 | 5.81 | 1.40 | 3.8 | 9.4 | 1951–2003 | 11.6 | 14.31 | −2.8 | 90.1 |
| Dom. Rep. | 1951–2003 | 2.54 | 4.61 | −13.8 | 13.7 | 1960–2004[1] | 18.65 | 4.97 | 6.4 | 35.0 | 1949–2003 | 9.5 | 13.07 | −3.9 | 50.5 |
| Ecuador | 1951–2003 | 2.13 | 5.44 | −9.7 | 30.4 | 1974–2004[2] | 8.65 | 2.58 | 4.4 | 15.1 | 1952–2003 | 20.2 | 21.43 | −5.0 | 96.1 |
| El Salvador | 1951–2003 | 0.93 | 3.56 | −11.3 | 8.9 | 1985–2004[3] | 8.21 | 2.37 | 6.2 | 16.9 | 1949–2003 | 8.3 | 8.30 | −4.5 | 31.9 |
| Guatemala | 1951–2003 | 1.10 | 2.49 | −5.8 | 6.4 | 1980–2003[4] | 5.90 | 3.64 | 1.5 | 14.0 | 1949–2003 | 7.5 | 8.88 | −2.1 | 41.2 |
| Honduras | 1951–2003 | 0.65 | 3.06 | −9.1 | 8.0 | 1980–2004[5] | 7.80 | 2.20 | 4.0 | 12.1 | 1949–2003 | 7.7 | 7.74 | −3.1 | 34.0 |
| Mexico | 1951–2003 | 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 |
| Nicaragua | 1951–2003 | 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 | 1951–2003 | 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 | −7.0 | 16.3 |
| Paraguay | 1951–2003 | 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 | 117 |
| Peru | 1951–2003 | 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 |
| Uruguay | 1951–2003 | 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 |
| Venezuela | 1951–2003 | −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 |

*Source*: GDP per head: ECLAC; Inflation: IMF; Unemployment: ILO, ECLAC, and Central Bank of Dominican Republic. See appendix for details. Missing information for:

[1] 1985 and 1989;

[2] 1976 and 1978–79;

[3] 1987;

[4] 1999–01;

[5] 2000;

[6] 1980–81 and 1990.

**Table 3**

Total fertility: the effects of unemployment and growth in Latin America

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | **Δ ln TF** | **Δ ln TF** | **Δ ln TF** | **Δ ln TF** |
| **Δ ln unemployment (t-1)** | −0.011 (−2.07) | −0.010 (−2.04) | −0.010 (−1.88) | |
| **Δ ln unemployment (t-2)** | −0.006 (−1.19) | | −0.005 (−1.01) | |
| **GDP per head growth (t-1)** | 0.000 (0.23) | 0.000 (0.36) | −0.000 (−0.20) | 0.0004 (1.34) |
| **GDP per head growth (t-2)** | −0.000 (−0.70) | | −0.000 (−0.96) | −0.000 (−0.29) |
| **Debt crisis 1983–84** | | | −0.010 (−1.97) | |
| **Joint significance of unemployment lags (p-value)** | 2.78 (0.063) | | 2.20 (0.112) | |
| **Observations** | 373 | 394 | 373 | 373 |
| **Number of countries** | 18 | 18 | 18 | 18 |

Notes:

The dependent variable is the change in log of total fertility. Models include two lags of inflation rates, country dummies and a time trend. t-statistics in parentheses.

*Source:* As for tables 1 & 2.

**Table 4**

Estimated hazard ratios from Cox proportional hazards models of transitions to first child, Demographic and Health Surveys in Latin American countries.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| ***Woman*** | | | | | | | | |
| **Years of education** | 0.912 (75.60) | 0.912 (70.36) | 0.912 (75.56) | 0.912 (75.59) | 0.912 (75.90) | 0.911 (70.74) | 0.912 (77.11) | 0.912 (75.89) |
| **Rural** | 0.992 (0.58) | 0.992 (0.57) | 0.992 (0.58) | 0.992 (0.58) | 0.992 (0.62) | 0.992 (0.58) | 0.990 (0.80) | 0.992 (0.63) |
| **Access to electricity** | 0.914 (5.93) | 0.903 (5.13) | 0.914 (5.89) | 0.914 (5.94) | 0.918 (5.61) | 0.907 (5.94) | 0.918 (5.66) | 0.918 (5.62) |
| ***Country*** | | | | | | | | |
| **Unemployment (t-1)** | 0.990 (3.32) | 0.990 (3.22) | | 0.990 (3.34) | 0.992 (2.54) | 0.992 (2.58) | | 0.992 (2.57) |
| **Unemployment (t-2)** | 0.998 (0.73) | 0.993 (1.76) | | 0.998 (0.68) | 0.997 (0.97) | 0.995 (1.29) | | 0.997 (0.84) |
| **Unemployment (t-3)** | | 0.997 (0.87) | | | | 0.996 (1.17) | | |
| **Unemployment (t-4)** | | 1.011 (3.82) | | | | 1.009 (3.03) | | |
| **GDP per head growth (t-1)** | 1.006 (4.01) | 1.008 (4.63) | 1.007 (4.85) | 1.006 (3.33) | 1.008 (5.05) | 1.010 (5.98) | 1.009 (6.13) | 1.006 (3.67) |
| **GDP per head growth (t-2)** | 0.999 (0.48) | 0.998 (1.31) | 1.001 (0.81) | 0.999 (0.54) | 1.000 (0.34) | 1.002 (0.88) | 1.001 (0.69) | 0.999 (0.49) |
| **Debt crisis 1983–84** | | | | 0.965 (1.80) | | | | 0.922 (4.05) |
| **Trend** | **Common** | **Common** | **Common** | **Common** | **Country** | **Country** | **Country** | **Country** |
| **Joint significance of unemployment lags (p- value)** | 38.25 (0.000) | 33.27 (0.000) | __ | 37.83 (0.000) | 18.93 (0.000) | 3353 (0.000) | | 18.14 (0.000) |
| **Observations** | 705921 | 620970 | 705921 | 705921 | 705921 | 620970 | 721439 | 705921 |

Notes:

The dependent variable is the number of years to a birth from age twelve. Models stratified by women's birth cohort (1930s–40s; 1950s; 1960s; 1970s and 1980s). Models include two lags of inflation rates, country dummies, time trend, age at first birth (for 2nd and 3rd births), months between 1st and 2nd birth (for 3rd birth) and gender of previous children.

Errors allow for correlation in unobservables between observations from the same region-year. Robust t-statistics in parentheses.

*Source:* Demographic and Health Surveys for Bolivia (1998), Brazil (1996), Colombia (2000), Dominican Republic (2002), Ecuador (1987), Guatemala (1998), Mexico (1987), Nicaragua (2001), Peru (2000), and Paraguay (1990).

**Table 5**

Estimated hazard ratios from Cox proportional hazards models of transitions to second and third child, Demographic and Health Surveys in Latin American countries.

| | Second | Third |
|---|---|---|
| ***Woman*** | | |
| **Years of education** | 0.973 (19.19) | 0.959 (22.48) |
| **Rural** | 1.163 (11.78) | 1.158 (8.83) |
| **Access to electricity** | 0.871 (9.59) | 0.838 (10.31) |
| ***Country*** | | |
| **Unemployment (t-1)** | 0.985 (5.33) | 0.989 (3.16) |
| **Unemployment (t-2)** | 1.002 (0.78) | 1.003 (0.98) |
| **GDP per head growth (t-1)** | 1.002 (1.33) | 0.999 (0.57) |
| **GDP per head growth (t-2)** | 0.996 (2.60) | 1.002 (1.43) |
| **Joint significance of unemployment lags (p- value)** | 55.75 (0.000) | 16.11 (0.000) |
| **Observations** | 212651 | 204621 |

Notes:

The dependent variable is the number of years to a birth from the previous birth. Models stratified by women's birth cohort (1930s–40s; 1950s; 1960s; 1970s and 1980s). Model stratified by women's birth cohort (1930s–40s; 1950s; 1960s; 1970s and 1980s). Models include two lags of inflation rates, country dummies, time trend, age at first birth (for 2nd and 3rd births), months between 1st and 2nd birth (for 3rd birth) and gender of previous children.

Errors allow for correlation in unobservables between observations from the same region-year. Robust t-statistics in parentheses.

*Source:* As for table 4.

## Table 6

Share of women by educational attainment in the Demographic and Health Survey sample.

| | Years of education | | |
|---|---|---|---|
| **Country (DHS year)** | **Less than 7** | **7 or more** | **13 or more** |
| Bolivia (1998) | 46 | 54 | 14 |
| Brazil (1996) | 55 | 45 | 5 |
| Colombia (2000) | 42 | 58 | 11 |
| Dominican Rep. (2002) | 36 | 64 | 13 |
| Ecuador (1987) | 55 | 45 | 9 |
| Guatemala (1998) | 82 | 18 | 2 |
| Mexico (1987) | 56 | 44 | 7 |
| Nicaragua (2001) | 60 | 40 | 7 |
| Paraguay (1990) | 67 | 33 | 5 |
| Peru (2000) | 39 | 61 | 16 |

*Source:* As for table 4.

**Table 7**

Estimated hazard ratios from Cox proportional hazards models of transitions to first, second and third child by mother's education groups, Demographic and Health Surveys in Latin American countries.

| | First | | | Second | | | Third | | |
|---|---|---|---|---|---|---|---|---|---|
| **Years of education** | **0–6** | **7+** | **13+** | **0–6** | **7+** | **13+** | **0–6** | **7+** | **13+** |
| ***Woman*** | | | | | | | | | |
| **Years of education** | 0.962 (11.85) | 0.856 (54.82) | 0.883 (10.24) | 0.989 (3.57) | 0.969 (9.90) | 0.970 (2.16) | 0.962 (10.42) | 0.966 (7.20) | 0.972 (1.40) |
| **Rural** | 0.965 (2.12) | 1.040 (1.93) | 1.195 (3.25) | 1.131 (8.10) | 1.176 (7.17) | 1.192 (2.91) | 1.131 (6.38) | 1.174 (5.13) | 1.371 (3.18) |
| **Access to electricity** | 0.910 (5.30) | 0.801 (7.45) | 0.795 (2.39) | 0.889 (7.24) | 0.846 (5.16) | 0.885 (1.13) | 0.857 (8.26) | 0.738 (7.35) | 0.913 (0.54) |
| ***Country*** | | | | | | | | | |
| **Unemployment (t-1)** | 0.998 (0.65) | 0.983 (3.78) | 0.980 (2.04) | 0.986 (3.99) | 0.985 (3.10) | 0.992 (0.73) | 0.995 (1.21) | 0.980 (2.92) | 0.972 (1.57) |
| **Unemployment (t-2)** | 0.992 (2.08) | 1.000 (0.05) | 1.001 (0.08) | 1.000 (0.09) | 1.002 (0.35) | 1.006 (0.55) | 0.995 (1.30) | 1.016 (2.51) | 1.037 (2.14) |
| **GDP per head growth (t-1)** | 1.007 (3.48) | 1.006 (2.64) | 1.003 (0.66) | 1.001 (0.36) | 1.005 (1.83) | 1.012 (2.26) | 1.000 (0.83) | 0.998 (0.70) | 0.999 (0.07) |
| **GDP per head growth (t-2)** | 1.000 (0.21) | 1.000 (0.21) | 1.000 (0.08) | 0.997 (1.76) | 0.997 (1.54) | 0.996 (0.87) | 1.000 (0.17) | 1.007 (2.41) | 1.010 (1.49) |
| **Joint significance of unemployment lags (p- value)** | 17.04 (0.000) | 35.53 (0.000) | 10.04 (0.006) | 38.50 (0.000) | 20.23 (0.000) | 0.54 (0.763) | 14.23 (0.000) | 8.61 (0.013) | 4.66 (0.097) |
| **Observations** | 260923 | 444998 | 124224 | 100930 | 111721 | 27752 | 104367 | 100254 | 23632 |

Notes:

The dependent variable is the number of years to a birth from either age twelve or the previous birth. Models stratified by women's birth cohort (1930s–40s; 1950s; 1960s; 1970s and 1980s). Models include two lags of inflation rates, country dummies, time trend, age at first birth (for $2^{nd}$ and $3^{rd}$ births), months between $1^{st}$ and $2^{nd}$ birth (for $3^{rd}$ birth) and gender of previous children.

Errors allow for correlation in unobservables between observations from the same region-year. Robust t-statistics in parentheses.

*Source:* As for table 4.

**Table 8**

Estimated hazard ratios from Cox proportional hazards models of transitions to first, second and third child by mother's birth cohort (born before or after 1960), Demographic and Health Surveys in Latin American countries.

| | First | | Second | | Third | |
|---|---|---|---|---|---|---|
| | **1960+** | **Before 1960** | **1960+** | **Before 1960** | **1960+** | **Before 1960** |
| *Woman*: | | | | | | |
| **Years of education** | 0.904 (77.35) | 0.953 (16.39) | 0.964 (22.16) | 0.995 (1.74) | 0.954 (21.11) | 0.965 (10.98) |
| **Rural** | 1.001 (0.037) | 0.904 (2.81) | 1.153 (9.99) | 1.186 (5.74) | 1.149 (7.09) | 1.188 (5.84) |
| **Electricity** | 0.930 (4.48) | 0.961 (0.83) | 0.876 (8.50) | 0.894 (3.02) | 0.830 (9.61) | 0.849 (4.72) |
| *Country* | | | | | | |
| **Unemployment (t-1)** | 0.986 (3.89) | 1.001 (0.20) | 0.983 (4.73) | 0.996 (0.686) | 0.987 (2.88) | 1.016 (2.44) |
| **Unemployment (t-2)** | 1.002 (0.64) | 0.993 (1.15) | 1.002 (0.44) | 0.999 (0.131) | 1.002 (0.41) | 1.011 (1.76) |
| **GDP per head growth (t-1)** | 1.008 (4.69) | 0.997 (0.69) | 1.005 (2.86) | 0.999 (0.246) | 1.003 (1.32) | 0.996 (1.09) |
| **GDP per head growth (t-2)** | 0.999 (0.58) | 1.001 (0.17) | 0.998 (1.33) | 0.996 (1.12) | 1.004 (1.75) | 1.007 (2.13) |
| **Joint significance of unemployment lags (p- value)** | 36.50 (0.000) | 1.35 (0.509) | 60.60 (0.000) | 0.76 (0.683) | 21.43 (0.000) | 20.81 (0.000) |
| **Observations** | 633697 | 72224 | 165187 | 47464 | 135792 | 68829 |

Notes:

The dependent variable is the number of years to a birth from either age twelve or the previous birth. Models include two lags of inflation rates, country dummies, time trend, age at first birth (for 2nd and 3rd births), months between 1st and 2nd birth (for 3rd birth) and gender of previous children.

Errors allow for correlation in unobservables between observations from the same region-year. Robust t-statistics in parentheses.

*Source:* As for table 4.

**Table 9**

Estimated hazard ratios from Cox proportional hazards models of transitions to first, second and third child by mother's place of residence (rural or urban), Demographic and Health Surveys in Latin American countries.

| | First | | Second | | Third | |
|---|---|---|---|---|---|---|
| | **Rural** | **Urban** | **Rural** | **Urban** | **Rural** | **Urban** |
| ***Woman*** | | | | | | |
| **Years of education** | 0.925 (35.03) | 0.906 (69.22) | 0.978 (9.56) | 0.972 (16.13) | 0.966 (10.74) | 0.957 (18.29) |
| **Electricity** | 0.952 (2.70) | 0.768 (8.35) | 0.883 (7.55) | 0.825 (5.98) | 0.848 (8.48) | 0.790 (6.49) |
| ***Country*** | | | | | | |
| **Unemployment (t-1)** | 0.999 (0.14) | 0.986 (3.66) | 0.988 (2.87) | 0.983 (4.43) | 0.991 (2.00) | 0.988 (2.46) |
| **Unemployment (t-2)** | 0.990 (2.24) | 1.001 (0.31) | 1.002 (0.58) | 1.001 (0.31) | 1.003 (0.62) | 1.003 (0.69) |
| **GDP per head growth (t-1)** | 1.008 (3.26) | 1.006 (2.80) | 1.004 (1.73) | 1.001 (0.53) | 1.002 (0.66) | 0.997 (1.17) |
| **GDP per head growth (t-2)** | 1.001 (0.25) | 0.999 (0.59) | 0.998 (1.11) | 0.995 (2.48) | 1.000 (0.11) | 1.004 (1.53) |
| **Joint significance of unemployment lags (p-value)** | 14.28 (0.000) | 28.54 (0.000) | 15.59 (0.000) | 41.48 (0.000) | 6.35 (0.042) | 10.26 (0.006) |
| **Observations** | 229626 | 476295 | 70386 | 142265 | 67621 | 137000 |

Notes:

The dependent variable is the number of years to a birth from either age twelve or the previous birth. Models stratified by women's birth cohort (1930s–40s; 1950s; 1960s; 1970s and 1980s). Models include two lags of inflation rates, country dummies, time trend, age at first birth (for $2^{nd}$ and $3^{rd}$ births), months between $1^{st}$ and $2^{nd}$ birth (for $3^{rd}$ birth) and gender of previous children.

Errors allow for correlation in unobservables between observations from the same region-year. Robust t-statistics in parentheses.

*Source:* As for table 4.