# WORKING PAPER

# Increasingly Heterogeneous Ages at First Birth by Education in 'Conservative' Southern-European and 'Liberal' Anglo-American Family-Policy Regimes

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**Abstract**

The claim that family-policy regime may influence socio-economic differentials in fertility has to date been explored mainly with respect to 'liberal' Anglo-American regimes. We broaden the contrast with 'family-friendly' regimes here to include in the 'family-unfriendly' group 'conservative' Southern European regimes. Comparing education differentials in age at first birth, we find educationally-heterogeneous shifts between 1950s and 1960s birth cohorts of women in Greece, Italy, and Spain. The patterns of these shifts are similar to those seen for British and American birth cohorts, and contrast with educationally-homogeneous shifts across birth cohorts in Norway and France. We argue that these findings support the hypothesis that the role of family-policy regime in mediating growth in socio-economic differentials in fertility has increased as combining employment and family has become more normative among women throughout industrialized countries.

**Keywords**: fertility; first births; education; family policy; combining data.

**Introduction**

Shifts towards later and lower fertility have occurred across developed countries. Cross-national comparisons have focused on demographic features of these shifts, meaning age, cohort, and parity (Chandola, Coleman and Hiorns 1999; Frejka and Calot 2001; Kohler and Ortega 2002; Frejka and Sardon 2007). This demographic focus has often led to the characterization of change within a given country as homogeneous. The study of socio-economic correlates of fertility change has accordingly been limited largely to aggregate measures such as the overall female labor-force participation rates (Engelhardt and Prskawetz 2004) and the proportions of women going on to higher education or leaving the family home as young adults (Kohler, Billari, and Ortega 2002). Changes in within-country socio-economic differentials in fertility have been given correspondingly little attention, and have largely been limited to contrasts between Anglo-American and continental European regimes (e.g., McLanahan 2004; Rendall et al 2005). We address this gap in the present study of cross-cohort changes in timing of first births by education across three family-policy regime types that include 'conservative' Southern European regimes. We investigate whether changes in the timing of first births in Southern Europe match more closely the increasing socio-economic differentials of 'liberal' Anglo-American regimes or the unchanged, and generally smaller, socio-economic differentials of countries with universalistic family-policy regimes of subsidized child-care and maternity leave.

In the remainder of the paper, we first describe theory and evidence on institutional influences on fertility, indicating where this points to potential sources of growth in, and mitigation of, socio-economic differentials in fertility. We next describe

the unique combination of large-scale population data sources and methods for combining population and survey data in our study that allows for more precise estimation of educational differentials by age and parity across cohorts. We follow this with results and discussion.

*Theory and Evidence on Institutional Influences on Fertility*

Theoretical explanations for trends and cross-national differences in lower and later fertility have emphasized women's increasing employment opportunities and institutional environments for combining employment and motherhood (Morgan 2003; Adsera 2004). The positive relationship between fertility and female labor force participation that has emerged since the mid-1980s (Ahn and Mira 2002) has added considerable impetus to this argument. Family policies that facilitate the combining of employment and motherhood roles through the provision of subsidized child-care and maternity leave compensation and rights to return to work after the leave are believed to be especially important for mitigating role incompatibility (Pampel 2001; Castles 2003). While strong effects on employment continuity among mothers in countries with such family policies have been found (Ruhm 1998; Stier, Lewin-Epstein, and Braun 2001; Rønsen and Sundström 2002), conclusions about the effects of family policy on fertility have been mixed (Gauthier 2005; McDonald 2006). Brewster and Rindfuss (2000), among others, have argued that this may be due to the relatively crude measurement possible with aggregate-level analyses, and not to a lack of any real effect. Gauthier and Hatzius (1997) also note, in discussing the limitations of aggregate measures, that family policies differentially influence the fertility of women with different labor-market opportunities.

Milligan (2005) provides evidence of such differential effects of cash benefits for the Quebec province of Canada.

The strongest evidence of growth in socio-economic differentials in the timing of fertility between women with different labor-market opportunities has been seen in the U.S. and Britain.  In both countries, age at first birth has continued to increase among college-educated women, while changing little among less educated women (Rindfuss, Morgan, and Offutt 1996; McLanahan 2004; Sullivan 2005; Kneale and Joshi 2008; Sigle-Rushton 2008).  Indications of similar trends across Anglo-American regimes, however, are also seen in the analyses of Chandola et al (2002).  Theoretical treatments of fertility timing make career-interruption costs the foundation of socio-economic differentials (Cigno and Ermisch 1989), and indicate a potentially important role for public interventions in the price of child-care in mediating these differentials (Ermisch 1989).  Gustaffson and colleagues (Gustaffson and Wetzels 2000; Gustaffson 2001) use cross-national differences in public interventions to explain why the fertility-timing patterns of Anglo-American countries contrast with those of the Nordic countries.  They argue that while the market price of day-care differentiates women's ability to combine employment and motherhood in Anglo-American countries, the publicly-subsidized child-care and generous maternity-leave provisions of the Nordic countries mitigate such differentiation.  A family-policy "regime" of publicly-subsidized child-care and maternity-leave provides strong incentives for women across socio-economic levels to first secure permanent employment before entering parenthood, and then to proceed quickly to childbearing with their jobs held for their return after each maternity leave. Outside of the Nordic countries, France has long had a similar family-policy regime of

subsidized child-care integrated with maternity leave.  Gornick et al (1997) and Pampel (2001) accordingly rank France with the Nordic countries on their respective "employment support for mothers" and "women-friendliness" scales (see also Henderson and White 2004).  Consistent with Gustaffson's arguments about the mechanisms promoting homogeneous fertility timing in 'universalistic' policy regimes, Menon and Widmer (2002) find postponement of childbearing in response to unemployment in France to be at least as great among low-educated women as among women with higher education levels.

Cross-national studies of socio-economic differentials in fertility change, however, have been slow to emerge.  Gustafsson et al (1996) provide point-in-time comparisons in support of lesser socio-economic differentials in the combining of employment and motherhood in Sweden than in Germany or the U.K.  Additional indications of the potential power of institutional context to influence fertility distributions are seen in findings of less marked socio-economic differentials in parity progression hazards in the universalistic countries of Scandanavia and France than elsewhere in Europe (Ekert-Jaffé et al 2002; Callens and Croux 2005).  Rendall et al (2005) add a cohort dimension to educational differentials in age at first birth, showing that shifts out of early childbearing are more uniform by education (observed in women's mid-20s) in France and Norway than they are in the U.K.  Extending the finding for Norway across Nordic countries, Andersson et al (2008) find that women with different levels of education have had parallel increases in median age at first birth from cohorts born just after the Second World War to cohorts born in the late 1960s.  Contrasting socioeconomic patterns of change in ages at first birth between Britain and France have

been linked directly to career trajectories by Rendall et al (2009). They find that ages at first birth increased for women in all occupations in France, but that ages at first birth remained unchanged among low-skill British women at the same time that strong increases in age at first birth were seen for women in intermediate and high-skill occupations. They use these findings to argue that family policies that influence the compatibility of employment and childbearing have become a more important determinant of socio-economic differentials in fertility timing as the salience of combining employment and childbearing has increased.

Anglo-American 'liberal' regimes, however, are not the only ones that offer relatively little support for women to combine employment with childbearing. 'Conservative' regimes, particularly those in Southern Europe, regulate maternity leave, but otherwise offer few of the supports such as the large-scale subsidized day-care programs that are seen in France and the Nordic countries (Gauthier 2005). Studies of fertility change in Southern European countries have emphasized the multiple barriers to combining fertility and employment, especially at younger ages, leading to Southern Europe frequently being considered as an institutional context distinct from that of other conservative countries (e.g., Gauthier 2002; Billari and Philapov 2005). These barriers include high youth unemployment and temporary employment and high self employment (Adam 1996; Adsera 2004), familial cultural values against institutional forms of child-care and early home-leaving (Bettio and Villa 1998; Billari 2004), and lack of affordable housing (Bernadi 2005). Perhaps in part because of the precipitous falls in fertility in these countries (Kohler, Billari, and Ortega 2002), these contextual arguments for late and low fertility in Southern Europe have been framed as universally-applicable

constraints on family formation (e.g., Sánchez-Barricarte and Fernández-Carro 2007) and not as forces that may apply differentially between women according to their labor-market opportunities.

An alternative theoretical framework incorporating socio-economic differentials is available when the Southern European countries' family-policy regimes are located within the general 'conservative' model (Esping-Andersen 1999). In this model, support is provided for women to raise children at home but not to combine childbearing with employment continuity. Taking Germany as a reference point, Schulze and Tyrell (2002) argue that as the labor-market opportunities for higher-educated women have increased, conservative family-policy regimes have had the effect of increasing socio-economic differentials in fertility because the opportunity costs of childbearing women with better labor-market opportunities are much greater in this regime type (for supportive evidence on these costs, see DiPrete et al 2003). Schulze and Tyrell refer to the resulting socio-economic differentials in fertility as "reproductive polarization." To date, there has been little empirical testing of this theory's applicability to contrasts between women in conservative family-policy regimes with women in other regime types, although Billari and Philapov (2005) provide suggestive evidence of contrasts that are consistent with it.

**Data and Methods**

We estimate changes in the timing of first births by education for 1950s and 1960s birth cohorts of native-born women in seven countries representing three models of family policy: (1) The "Universalistic" model, represented by France and Norway; (2) the Liberal "Anglo-American" model, represented by the United Kingdom and the United

States; and (3) the Conservative "Southern European" model, represented by Greece, Italy, and Spain. While the standard classification of countries, following Esping-Andersen (1999), places France among the Conservative welfare regimes, we argue that its large-scale, publicly-subsidized day-care puts France much more among the Social Democratic regimes specifically in the family-policy domain of welfare regimes. This is as suggested by the rankings of Gornick et al and Pampel cited earlier. To avoid confusion with the exact groupings of countries used by Esping-Andersen and subsequent authors, henceforth we use the term 'Universalistic' in place of Social Democratic, 'Southern European' in place of Conservative, and 'Anglo-American' in place of Liberal.

Recognizing the considerable challenges of achieving comparability between countries, a very simple analytical structure is adopted. Year of birth, age, and education are the only individual dimensions analyzed for each of the seven countries. A major innovation of the study is its joint use of population and survey data sources to achieve statistically precise and cross-nationally comparable estimates for the three countries, Italy, Spain, and the U.S., for which available population-level data on births and years of exposure include age, cohort, and parity, but not completed education. This allows us to include at least two countries from each of the three family-policy regime types.

A range of data sources is used for our analyses (see Appendix for details). Full population data are used for Greece (2001 Census) and Norway (linked education and birth registration databases up to 2001). For France and the United Kingdom (England and Wales only), Census microdata linked to birth registrations are used. The Fertility and Family Surveys (FFS, United Nations 2002) are used for Italy (1995), Spain (1995), and the United States (being the 1995 and 2002 National Survey of Family Growth), but

are combined with other sample survey data to both increase total sample sizes and to extend the period of observation to later years. These additional survey data are: for Italy the 1998 Multipurpose survey; for Spain the 1999 Fertility Survey; and for the United States, the 1995 Current Population Survey. Using the constrained estimation method of Handcock and colleagues (Handcock, Huovilainen, and Rendall 2000; Handcock, Rendall, and Cheadle 2005), we first pool person-years across the sample surveys in each of these three countries and then constrain to population age-specific first birth probabilities. An illustration of this method as applied to first births by education in Italy is seen in Rendall et al (2008).

In our data, there is differential censoring of fertility histories according to the woman's single-year birth cohort and the year of most recent observation in the population or survey data source. For each country, therefore, we first estimate annual first birth probabilities (hazards) by cohort, age, and educational attainment, and then use a first-birth life table (e.g., Chen and Morgan 1991) to transform these into cumulative proportions of women in the cohort and education category having a first birth by given ages. For the 1950s cohorts, these proportions extend to age 43, close to the end of the reproductive lifetime. For the 1960s cohorts, they extend to age 33. Given the calendar-year structure of most of our data, the French "generation" definition of age, defined as age attained in the calendar year, is used in place of the more usual "age at last birthday" definition. In general, age according to the "generation" definition will be about half a year younger than according to the "age at last birthday" definition.

Five-year groups of 1950s and 1960s birth cohorts ten years apart are defined for each country. Where data allow (Norway and Greece, for which we have 100 percent

population data), the estimates are for the most recent, 1955-59 and 1965-69 cohorts. Otherwise, we use the most recent five-year cohorts for which close to the entire reproductive lifetime is observed with sufficient sample numbers. The linked Census and birth registration data of England and Wales allow for 1954-58 and 1964-68 cohorts. For France, the 1999 Census microdata sample allows for the 1955-59 and 1963-67 cohorts to be analyzed. The 1951-55 and 1961-65 cohorts groups are used for three FFS countries (Italy, Spain, and the U.S.), as the FFS was conducted in 1995 in each of these countries, and later sample surveys are either not sufficiently recent (1998 and 1999 respectively for Italy and Spain) or not sufficiently large (the 2002 survey for the U.S.) to allow for precise estimates for more recent cohorts. The 1951-55 and 1961-65 cohorts groups are used for Italy additionally because population data on first births were no longer compiled after 1999.

The comparisons of cohorts ten years apart in each country are important for both substantive and methodological reasons. Substantively, they allow us to explore the hypothesis that *growth* in socio-economic differentials in fertility will occur in less employment-supporting family-policy regimes as the importance of labor-market opportunities increase in women's lifetime trajectories. Methodologically, the cross-cohort data provide a form of "difference in difference" analysis that controls for differences in education systems between the countries.

We restrict our analyses to native-born women, for both substantive and empirical reasons. Substantively, we are interested in comparing cohorts of women who, ten years apart, received that country's education and were exposed through their reproductive lives to that country's family policy and labor market institutions. Empirically, our

methods of analysis involve combining person-years of exposure to first birth in surveys collected at different years with population data for those same years of exposure to produce cohort estimates. Implicitly, this combination of data assumes a closed population over the reproductive years, an assumption that will be reasonably approximated only for native-born women. This results in an imperfect match between survey and population data in Italy, Spain, and the U.S. Our comparisons of the first-birth by age relationship estimated from the survey and population data demonstrated no significant mismatches in levels for our age and cohort combinations in the U.S. and Italy (see also Rendall et al, forthcoming, for Italy). First-birth probabilities are significantly higher in the survey than population, however, for Spain's 1960s cohort, a difference that may be due to biases from either source. Some overstatement of the shifts towards later childbearing across cohorts may therefore result. This has relatively little effect on the contrasts by education, however, as the population data scale and smooth the education-specific patterns equally for the three education categories. In particular, our result of no decline in proportions of low-education women giving birth by age 20 holds whether or not the estimates are constrained to population-level age-specific first birth probabilities (results not shown).

Education presents the greatest challenges for developing comparable definitions between countries. Educational systems vary considerably between the seven countries. Variability also is found between data sources in both when the individual is asked to report education and to what level of detail. In the countries where surveys are pooled, an additional element of complexity is provided by the pooling of surveys in which women's ages differ according to survey date. Our solution is to apply as closely as

possible a common, three-category educational attainment classification based on the International Standard Classification of Education (ISCED, see OECD 2003). With the exception of Norway, described separately below, we code education as follows. "High" education level is coded for women who have completed any level of tertiary education (ISCED levels 4, 5, and 6). The tertiary level is defined to include both vocational and general education, including two-year, three-year, four-year and longer programs. The "medium" education level is assigned to women who have completed the highest secondary qualification (ISCED level 2 or 3). The "low" education level approximates those levels of education that fall short of the highest secondary-school level (ISCED level 1). From the Norwegian database available to us at the time of the data extraction, we coded education to include "lower" secondary school qualifications (ISCED level 2 in addition to level 1), and the "medium" education level includes "post-secondary, non-tertiary" vocational qualifications at the ISCED level 4 (in addition to "upper secondary" qualifications at ISCED level 3).

In general, the comparability of education across countries is compromised by variations especially in the length of time in tertiary education before a qualification is awarded (see Gustafsson and Kalwij 2006, ch.1). No "lower-secondary" qualifications are awarded in the U.S., meaning that its "low education" group is more like that of Norway than the other countries. In the Southern European countries, time until the award of a university qualification is longer and many more students are enrolled than obtain a tertiary qualification. Our cross-cohort analytical framework is especially useful here for controlling for these contrasts in educational systems, as these system contrasts between countries are largely constant over time.

Methodological work on estimation of the relationship of education to fertility has shown that it matters greatly whether education is measured before or after fertility exposure, and whether schooling is still in progress (Kravdal 2004; see also Billari and Philipov 2005). We handle this problem here by measuring education always at the most recently observed point in the data, interpreting this as a measure of lifetime completed education. In practical terms, this is the only common definition possible across the diverse data sources. It does, however, raise some issues of comparability between countries and between cohorts. In the survey data sources, education is observed at different ages depending on the year of the survey. In both the survey and population data sources, the age at observation is ten years younger for the 1960s cohorts than for the 1950s cohorts. In all cases, however, educational attainment is measured between ages 25 and 43, and therefore the problems of comparability between cohorts and data sources are unlikely to be severe. A second issue is the potential two-way causal relationships between education and fertility. This needs to be borne in mind when interpreting the results. The interpretation we give here is that the results indicate how educational attainment and associated employment trajectories of women are differentially compatible with family-formation according to the policy and institutional environment of that country.

**Results**

We first compare the distributions by education of women from the 1950s and 1960s cohorts of the seven countries (see Figure 1). Recall that educational attainment is observed at ages 10 years younger for the 1960s cohort (between ages 25 and 35) than for

the 1950s cohort (between ages 35 and 45). Women in Italy and Spain had the lowest

completed education, notwithstanding major decreases in proportions in the low-educated

category between the 1950s cohorts and the 1960s cohorts. In Greece, educational gains

were even greater: A halving in low-educated women occurred between the 1950s and

1960s cohorts at the same time as the proportion of high-educated women increased from

20 per cent to 33 per cent. Like Greece, France is notable for its simultaneously

substantial proportions of both low-educated and high-educated women. The U.S. and the

U.K. are notable for having, with Norway, the lowest proportions of low-educated

women. These similarities in education distributions between countries from different

regime types and differences in distributions between countries within regime types are

useful analytically, as they reduce the likelihood that differences in education-specific

fertility between regime types are attributable largely to the nature of their education

distributions.


[FIGURE 1 ABOUT HERE]


We begin our analyses of first births by education by presenting for the seven

countries' 1960s cohorts their distributions of ages at first birth up to age 33, separately

for each of the three education levels (see Figure 2a to 2g). The two Universalistic

countries, France and Norway, are the most consistently distinct from both the Anglo-

American and Southern European countries for their younger ages at which high-

educated women enter motherhood. In both France and Norway, the modal age of first

birth is 27. This is only five to seven years older than for low-educated in these two

countries (model ages 22 and 20 respectively) and only three years older than for medium-educated women (modal age 24 for both).  The first-birth distributions of women from the three education groups in these two countries are, with the exception of the more peaked distribution for low-educated Norwegian women, similar in their shapes.

In contrast, in the Anglo-American and Southern European countries, greater variability in both shape and location of their first-birth distributions is seen between education categories.  The distributions of ages at first birth for high-educated women tend to be flatter and are stretched towards lower peaks in women's late 20s to early 30s. Their modal ages at first birth for high-educated women are also significantly later, at or around age 30.  The youngest modal age among these five countries is the U.S., at age 28. This is, however, at a level that is significantly lower (around 0.06 as a proportion of all high-educated women in the cohort) than for France and Norway.  Italy and Spain's high-educated women provide exceptions to the stretched shape of the distribution of ages at first birth.  The very few first births that occur to high-educated women under age 25 will in part be responsible for the more peaked distribution around age 30 (just under 0.08 of the cohort), even when the first-birth hazards around age 30 are lower than those for France and Norway (results not shown).  Differences of ten years in modal ages at first birth between low-educated and high-educated women are seen in the U.K. (30 versus 20 years old), in the U.S. (28 versus 18 years old), and in Italy (30 to 31 versus 20 to 21 years old).  While in Spain the modal age difference is only five years, the humped shape of low-educated women's ages at first birth, extending from age 20, contrasts greatly with the more peaked shape about age 30 of Spain's high-educated women.

A greater range of shapes and locations of first-birth distributions is seen across countries within a given regime type for medium-educated women. The patterns of first births by education in U.S. and Greece are remarkable for the very large gaps between the modal ages of medium-educated and high-educated first births: 20 versus 28 years old for the U.S. and 20 versus 28 to 30 years old for Greece. In Spain, the U.K., and Italy, medium-educated women have distributions of ages at first birth that are more similar to the distributions for high-educated than low-educated women. In Greece and the U.S., medium-educated women have distributions of ages at first birth that resemble more those of low-educated women. More detailed attention to differences in education systems and labor-market opportunities for women educated only to secondary-school level between the countries may be needed to uncover reasons for these patterns of greater similarity respectively to low-educated and high-educated women. A strong commonality across countries, however, is nevertheless that the proportions of medium-educated women having first births in their early to mid-20s are substantially greater than for high-educated women.

We next compare the distributions of ages at first birth between the 1950s and 1960s cohorts. This allows us to evaluate differences in growth in educational differentials in first births between countries of different regime types. For this analysis, three age groups are formed: under 20, 21 to 25, and 26 to 33 years old (see Table 1). Early childbearing is marked by first births up to age 20. We consider ages 21 to 25 and ages 26 to 33 as middle periods for having a first birth. For the 1950s cohort only, age 43

is used to mark close-to-final proportions having a first birth.  We describe first births at ages 34 to 43 as late (see, for example, Bewley, Davies, and Braude 2005).

Remarkably for a period of rapid overall declines in fertility at young ages especially in Southern Europe (Frejka and Sardon 2007), the proportions of low-educated women having a first birth up to age 20 were largely unchanged between the 1950s and 1960s cohorts in all five of the Anglo-American and Southern European countries.  Half of all low-educated U.S. women and one-third of all low-educated U.K. women had a first birth by age 20 in both the 1950s and 1960s cohorts.  Two-fifths of low-educated Greek women and a quarter of low-educated Italian women continued to have first births by age 20.  The proportion in Spain remained at under a fifth of the 1960s cohort, as it already was for the 1950s cohort of low-educated women.  In contrast, substantial declines in the proportion of low-educated women giving birth by age 20 were seen in both France and Norway: from 29 to 25 per cent and from 44 to 32 per cent respectively. Given the persistence of early fertility seen earlier for the Anglo-American and Southern European countries, it is no surprise that only in France and Norway were there substantial increases in the proportions of low-educated women having their first birth between ages 26 and 33.  It further reinforces, however, the differences in the positions of low-educated women in overall distribution of ages at first birth between the Universalistic versus Anglo-American and Southern European countries.

[TABLE 1 ABOUT HERE]

An additional strong indicator of growth in timing differentials by education in the Anglo-American and Southern European countries is found in cumulative first births to age 33 by education in the 1950s versus 1960s cohorts. Already in the 1950s cohort, differences by education were smaller in France and Norway than they were in the Anglo-American and Southern European countries. All countries display a common education gradient, with low-educated women being the most likely (between 82 and 89 per cent), and high-educated women the least likely, to have given birth by age 33. In only two countries, the U.S. and Italy, however, did less than two-thirds of the high-educated women in the 1950s cohort have a first birth by age 33. For the 1960s cohort, in contrast, only in France and Norway did as many as two-thirds of high-educated women give birth by age 33, including almost three quarters of high-educated women in Norway. Of the Anglo-American and Southern European countries, only in the U.K. (55 per cent) and in Greece (60 per cent) did more than half of high-educated women give birth by age 33. In Spain only 32 per cent, and in Italy only 25 per cent, of high-educated women in the 1960s cohort had given birth by age 33.

We have concentrated the discussion so far on education-specific differentials in fertility. These will be only part of the explanation of why the overall distribution of ages at first birth may be more homogeneous in the Universalistic countries. Changes in the education *distributions* will also explain some of the change in the overall age distributions of first birth. Education-specific relationships, and changes to them across cohorts, will have a greater or lesser impact on the changes in the overall distribution of first births by age depending on the nature and magnitudes of changes in educational composition between cohorts. For example, where the proportions of low-educated

women have declined substantially, persistently high early childbearing among this group will have a smaller effect on overall early childbearing. To separate out the effects of distributional change on the overall distribution of age at first birth from those of behavioral change, we compare the changes that would have resulted from behavioral change alone, counterfactually maintaining the educational distributions for the 1960s cohort at the 1950s cohorts' values (see the "all (1950s cohort education distribution)" rows of Table 1).

Shifts towards first births at older ages for the 1960s cohort than for the 1950s cohort are seen in all countries (see the "all" rows). The proportions having a first birth up to age 20 and between ages 21 and 25 are lower in the 1960s cohorts than in the 1950s cohorts for all seven countries. Higher concentrations of ages at first birth in the 21 to 33 age range are seen in the Universalistic countries especially for the 1960s cohorts. Almost 70 per cent of the 1960s cohorts of both France and Norway had a first birth between the ages of 21 and 33. In the other five countries, between 40 and 60 per cent only of the 1960s cohort had a first birth in this age range.

The expected positive effects of educational advancement on increasing ages at first birth between the 1950s and 1960s cohorts are seen in all countries except in the U.S., where the observed education distributions did not change. The largest effect of educational advancement between the 1950s and 1960s cohorts was seen in Greece. Recall that Greece's proportion of women with low educational attainment halved, and its proportion with high educational attainment increased by more than 50 per cent across these cohorts. While in Greece these distributional changes had little net impact on the large (11 percentage-point) decline in first births at ages 21 to 25, they are sufficient to

explain all of the 7 percentage-point decline in women having a first birth by age 20, and 5.5 percentage points of the 8 percentage-point increase in women having a birth between the ages of 26 and 33. In general, the effects of changes in education-specific fertility are seen to be larger than the effects of changes in the distribution of education between the 1950s and 1960s cohorts across the seven countries of our study.

**Discussion**

We used a combination of population and survey data sources to estimate changes in the timing of first births by education in seven countries representing three different family-policy regime types. These estimates allowed us to explore further the "reproductive polarization" hypothesis that family policy mediates the growth of socio-economic differentials in fertility (Ekert-Jaffé et al 2002; Schulze and Tyrell 2002; Rendall et al 2009). The evidence we find of educationally-homogeneous shifts in ages at first birth in the Universalistic countries of our study (France and Norway) and educationally-heterogeneous shifts in ages at first birth in both the Anglo-American countries (U.K. and U.S.) and the Southern European countries (Greece, Italy, and Spain) is consistent with this hypothesis. In particular, an increasingly strong mediating role of family policy for the socio-economic distribution of fertility timing is suggested by our findings. First, likelihood of early entry to motherhood was unchanged among low-educated women in both the Anglo-American and Southern European countries, while it decreased in the Universalistic countries. Second, a much greater proportion of high-educated women in the Universalistic countries than in the Anglo-American and Southern European countries continued to enter motherhood before their mid-30s.

The direction of the contrasts at early ages is surprisingly uniform between the Anglo-American and Southern European country groups.  While previous studies have shown persistence of early childbearing at relatively high levels among low-educated women in Anglo-American countries, particularly the U.S., we are not aware of previous studies that have highlighted persistent early childbearing among women with low education in conservative countries.  We have done so here for three Southern European countries, for which the main concern has been for late rather than early childbearing.  While this concern is clearly justified also by our findings, we give it an additional socioeconomic dimension.  We find that only a quarter and a third respectively of high-educated women of the 1960s cohorts of Italy and Spain had given birth entering their mid-30s, compared to about half of high-educated women of the 1960s cohorts in the U.S. and in the U.K., and approaching three quarters of high-educated women of the 1960s cohorts of France and Norway.

The middle position of the Anglo-American countries with respect to late childbearing among high-educated women, between the Southern European and Universalistic countries of our study, is consistent with the conclusions of previous research that private solutions ease the constraints on combining employment and childbearing in 'liberal' countries more than in 'conservative' countries (Davies, Joshi, and Peronaci 2000; DiPrete et al 2003).  Our cross-regime comparison indicates, moreover, that educational advancement itself is not sufficient to explain the magnitudes of shifts towards later first births.  Arguments by Gustafsson and colleagues, in particular, that the universalistic regimes of publicly subsidized child-care integrated with maternity leave facilitate "on time" childbearing are instead supported by these comparisons.

While in the present study we have shown this for only the two countries of France and Norway, results in Andersson et al (2008) show moderate increases in median ages at birth across education groups in Denmark, Finland, and Sweden as well as in Norway.

Socioeconomic differentials in fertility have previously been emphasized in studies of patterns in the 'liberal' Anglo-American countries (McLanahan 2004; Sigle-Rushton 2008). Consistent with this, we find here that the U.S., with half its low-education women giving birth by age 20, continues to exhibit the highest proportion of early childbearers among the low-education group. Greece, however, with two fifths of its low-education women giving birth by age 20, and very low prevalence of early childbearing among other education groups, exhibits at least as strong an educational differential in the timing of early fertility as in the U.S., and a stronger educational differential than that seen in the U.K. And while the proportion of low-education Spanish and Italian women giving birth at early ages was much lower than in the Anglo-American countries, the proportions were both persistent across cohorts (unlike in France and Norway) and involved substantial fractions of the cohorts due to the relatively low educational attainment in those two countries.

In Southern Europe and elsewhere among the conservative countries of continental Europe, later fertility has evoked concerns that lower completed fertility may result (Sobotka 2004). Shifts to later fertility among higher-educated women in the U.S., meanwhile, have been viewed as a positive, even "optimal" phenomenon (Martin 2001; McLanahan 2004). The contrast we have shown here with timing in France and Norway raises the question about whether the shifts towards later entry to motherhood in the Anglo-American countries really are optimal. While public and private solutions to the

problem of combining fertility and employment may currently have similar results in terms of overall fertility levels (Morgan 2003), ongoing increases in age at first birth among high-educated women may risk thwarting their fertility plans more in countries such as the U.S. with private solutions (Quesnel-Vallée and Morgan 2003) than in countries such as France with public solutions (Toulemon and Mazuy 2001). The evidence presented here indicates that private solutions to the problem of reconciling women's family and employment roles are associated with increasingly heterogeneous distributions of ages at first birth across socio-economic strata. We attribute this increase in heterogeneity to an increase in the salience of employment-fertility compatibility for women in industrialized countries, in the context of family-policy regimes that do little to facilitate the combining of employment and childbearing. While being far from conclusive evidence on the mechanisms generating these associations between regime type and fertility-timing distributions, the similarities in patterns between the Southern European and Anglo-American countries' nevertheless adds significantly to existing evidence in support of the hypothesis of an increasing importance of family policy for socio-economic differentials in fertility.

**Appendix: Data Sources and Estimation Methods**

*A.  Population Register or Census data: Greece and Norway*

*Greece: 2001 Census data*

The data on fertility and education and woman's country of birth used here come from the 2001 Census of population, with tabulations supplied to the authors by the National Statistical Service of Greece.  The Census asks for number of children born and year of birth of the first child.  Because the Census took place in March 2001, data on births in full calendar years up to 2000 only were used.  Women were also asked for their highest educational qualification attained.  Of the 12 possible categories, we included any tertiary qualifications as "high-educated," and either lower-secondary or upper-secondary qualifications as "medium-education."

*B.  Birth registrations linked to administrative and census microdata: Norway, France, and the U.K.*

Special compilations of linked databases of population, birth registrations and educational qualifications in Norway and linked census and birth registration data in France and in the U.K. (specifically, England and Wales) are used to estimate their first births by education hazards.

The Norwegian Statistical Population Register is updated continuously and the Educational Databases annually.  We use extracts of longitudinal data up to and including 2001 linked across the two databases.  No deficiencies of coverage or problems of linkage for native-born women are believed to occur in the Norwegian databases.

The dataset used for France and the U.K. are respectively the French Demographic Panel (EDP, INSEE 1995) and the ONS Longitudinal Study (LS, Hattersley and Creeser 1995). The LS links census and birth records since 1971 for a representative sample of 1 in 100 women in England and Wales, while the EDP does so since 1968 for a 1 in 200 sample in France. Because the two countries' populations are approximately the same size, the sample sizes are approximately twice as large in England and Wales as in France. For both the EDP and LS, a type of "attrition" occurs due to non-linkage of approximately 10 to 15 per cent of births in the LS (Babb and Hattersley 1992), and somewhat less than this in the EDP (Robert-Bobée 2003). We correct for non-linkage for England and Wales using the national parity-specific fertility rates (Smallwood 2002), and for France using a sample from the 1999 Census called the Family Survey. In each case, we assumed no linkage differentials by education, consistent with the findings of Babb and Hattersley (1992) and Robert-Bobée (2003). For both countries, we select into our samples for analysis only those women present across all the censuses covering their childbearing ages, and we smooth the first birth probabilities using a moving three-year weighted average that assigns a weight of 0.5 to the central age and 0.25 to each of the adjacent ages.

*C. Combined Surveys Constrained to Population 1$^{st}$ Birth Probabilities: Italy, Spain, and the U.S.A.*

The Fertility and Family Surveys (FFS, United Nations 2002) are used for Italy (1995), Spain (1995), and the United States (being the 1995 and 2002 National Survey of Family Growth). A major advantage of these datasets is that key variables are coded in and

internationally comparable way.  Of particular interest for the present study is the

educational attainment variable that is coded to the ISCED (International Standard

Classification of Education) categories.  We coded "high education" for women with any

tertiary education qualification (ISCED codes 4, 5 and 6), and "medium" education for

women who completed secondary education and obtained a secondary school

qualification for that country (ISCED code 2 or 3).  The equivalent educational levels

were coded for the non-FFS sample survey datasets of each country.  These additional

survey data both increase total sample sizes and to extend the period of observation to

later years.  They are: for Italy the 1998 Multipurpose survey (ISTAT 2000); for Spain

the 1999 Fertility Survey; and for the United States, the 1995 Current Population Survey.

Using the constrained estimation method of Rendall et al (2008), we first pool person-

years across the sample surveys in each of these three countries and then constrain to

population age-specific first birth probabilities.  We compare sample sizes and

educational attainment between the 1995 and subsequent years' surveys in Table A1.


[TABLE A1 ABOUT HERE]


Sample sizes are of each survey's number of female respondents born in the years

1951-55 and 1961-65 respectively.  The pooled samples are highest overall in the USA,

at 7,699 for the 1951-55 cohort and 9,150 for the 1961-65 cohort.  Only 1,234

observations are available after 1995, however, and these are for the 1961-65 cohort only.

The Italian pooled sample is the next largest, at 3,042 for the 1951-55 cohort and 3,766

for the 1961-65 cohort.  The Spain pooled sample is approximately half this size, at 1,590

for the 1951-55 cohort and 2,104 for the 1961-65 cohort. Fortunately, however, for both Italy and Spain the larger of their two surveys is the one with the more recent data collection, and so the greatest amount of exposure at older ages. In Italy, there are approximately three times as many women from both cohorts in the Multiscopo (2,098 and 2,694 respectively) as in the FFS (944 and 1,072 respectively). Spain's combined sample sizes are the smallest of the three countries. In Spain's 1999 Fertility Survey, however, there are approximately double the number of person-years of women compared to the 1995 FFS: 1,051 and 1,339 in the Fertility Survey and in the FFS respectively for the 1951-55 and 1961-65 cohorts. Some understatement of the percentages of high-educated women in both Spain and the U.S. are seen in the high proportions of the 1960s cohorts with a high education respectively in the 1999 Spanish Fertility Survey and the 2002 U.S. than in the 1995 surveys of those two countries.

*Population data*

For Italy, Giorgi (1993) calculated first birth probabilities by single-year cohort. We use these probabilities, subsequently updated by Giorgi to 1997, as our population-level estimates of first-birth probabilities by single-year age.

For Spain, we observed numbers of first births by year of birth from 1980 onwards, the first year in Spain for which birth order is available. We used assumptions of constant distributions of births by parity to allocate parity to births before 1980 in the Spanish birth registration data. We followed a procedure based on reducing the eligible population of calendar-year birth cohorts by first births in earlier years to members of the cohort, and adjusting for mortality using life tables and adjusting for net migration using

Census to Census change in the total cohort and assumptions about the parity distribution on net emigrants or net immigrants among the native born. This affects only the 1951-55 cohort, at younger ages. For both Spain and Italy, we checked our population estimates for conformity to those in the European Demographic Observatory database. For Spain this check was possible only for the 1961-65 cohort.

For the US, we use the set of age, year, and parity-specific first birth probabilities compiled by Schoen (2005) from the National Center for Health Statistics series.

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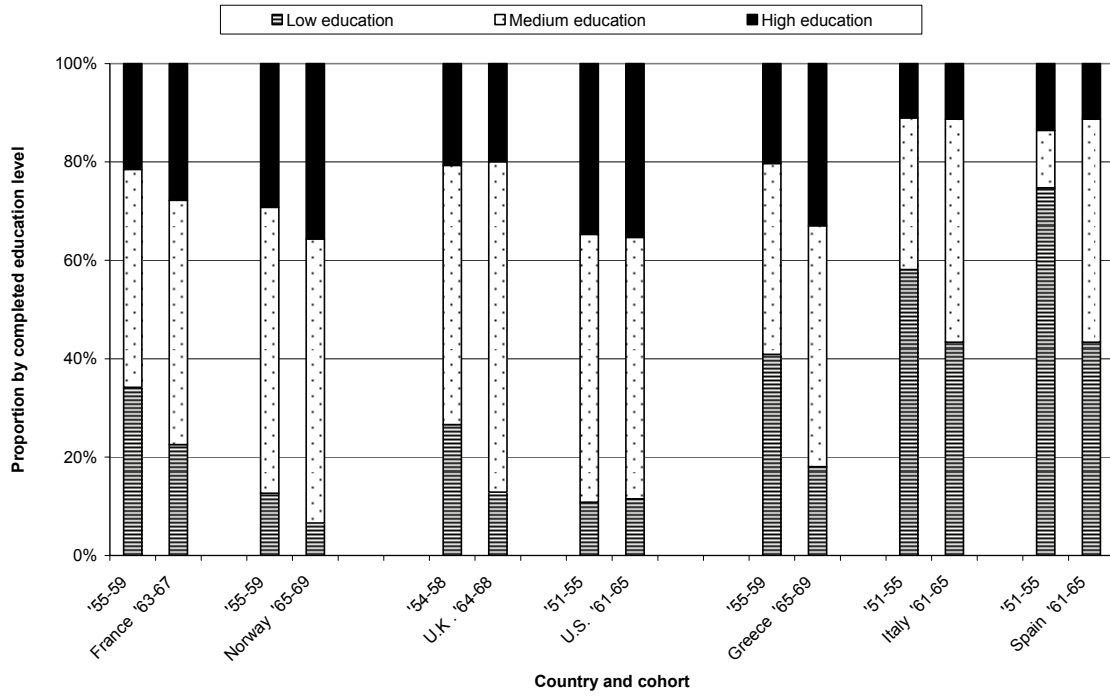**Figure 1  Education distributions by country and cohort**



Legend: ⊞ Low education   ☐ Medium education   ■ High education

Y-axis: Proportion by completed education level (0%, 20%, 40%, 60%, 80%, 100%)

X-axis (Country and cohort): France '55-59, '63-67; Norway '55-59, '65-69; U.K. '54-58, '64-68; U.S. '51-55, '61-65; Greece '55-59, '65-69; Italy '51-55, '61-65; Spain '51-55, '61-65
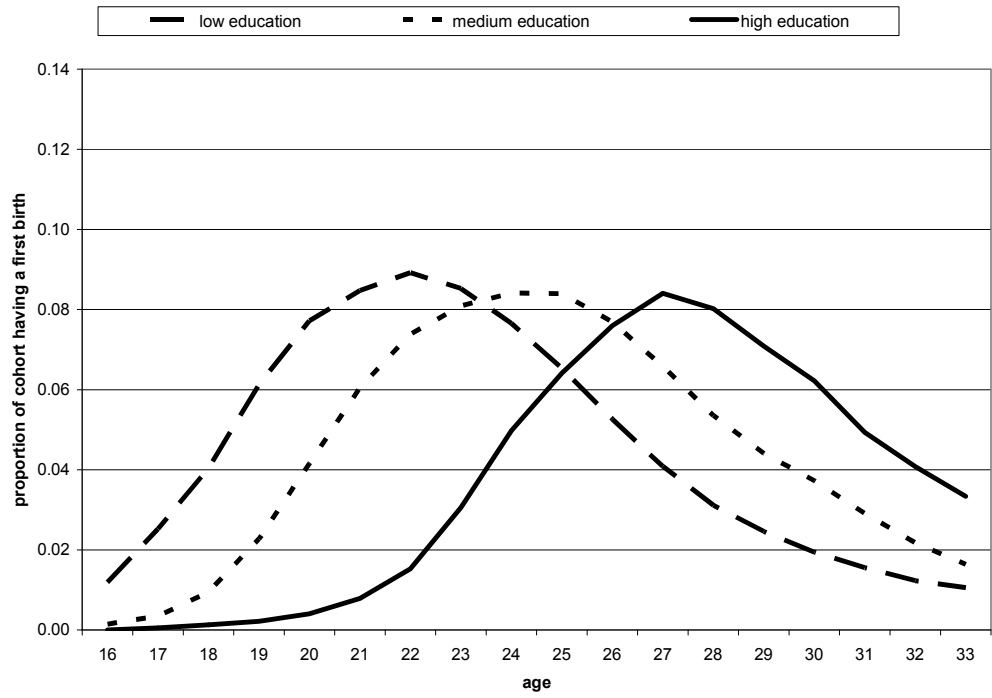
**Figure 2a  France 1965-69 cohort**

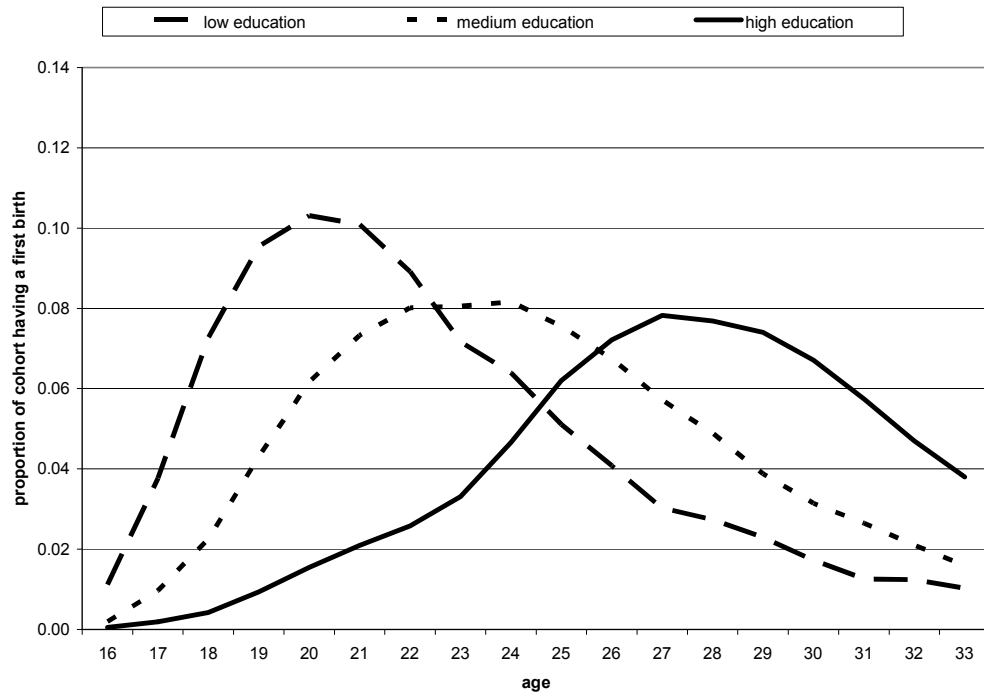**Figure 2b  Norway 1965-69 cohort**

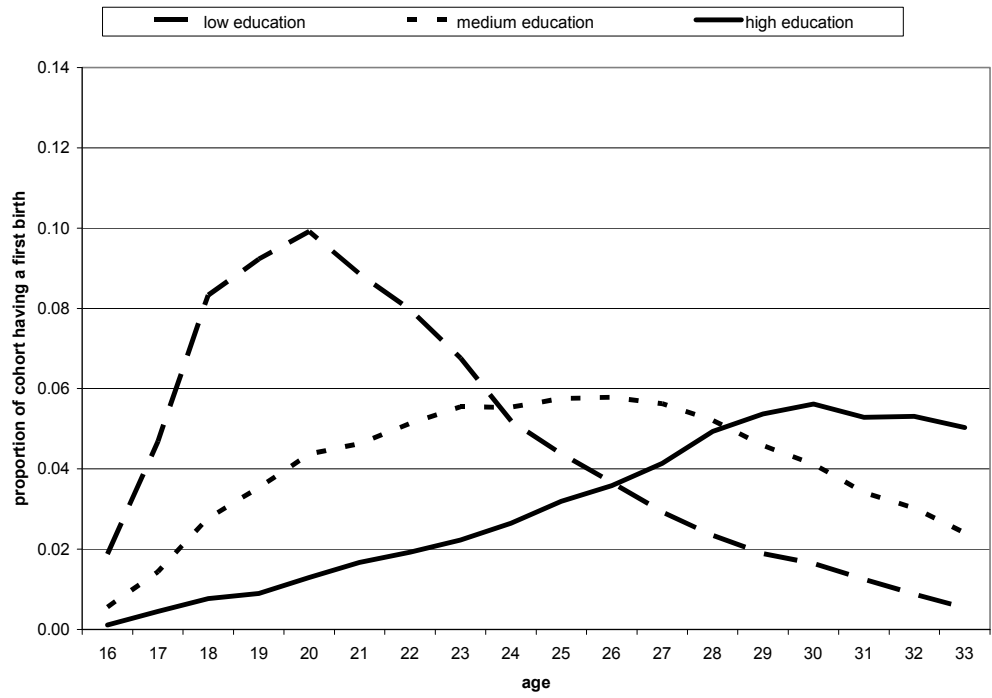# Figure 2c  England and Wales 1964-68 cohort
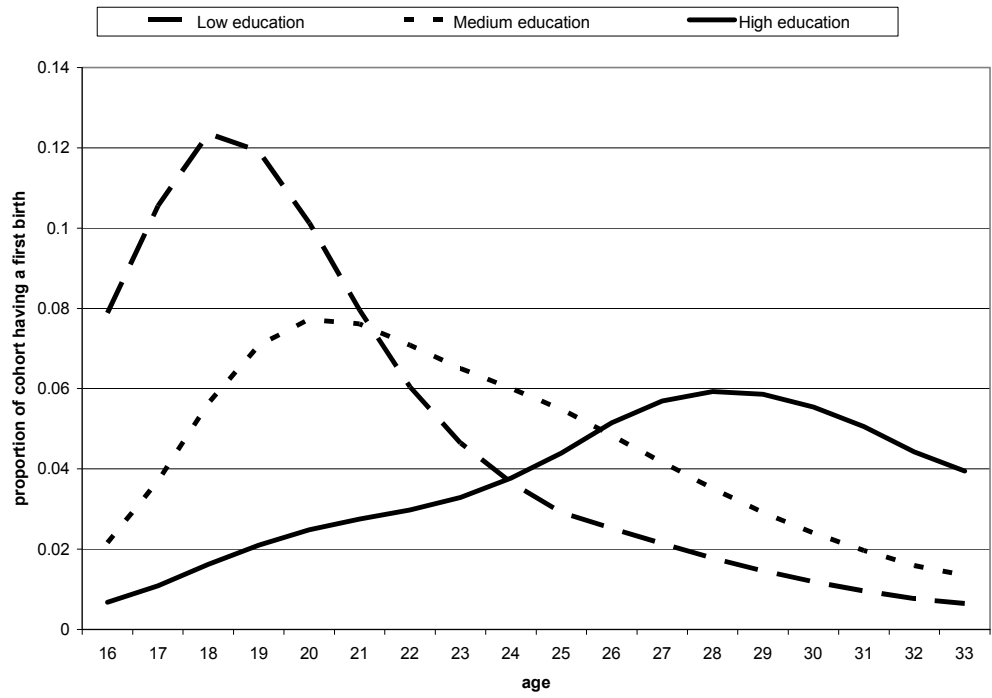
**Figure 2d  U.S.A. 1961-65 cohort**

**Figure 2e  Greece 1965-69 cohort**

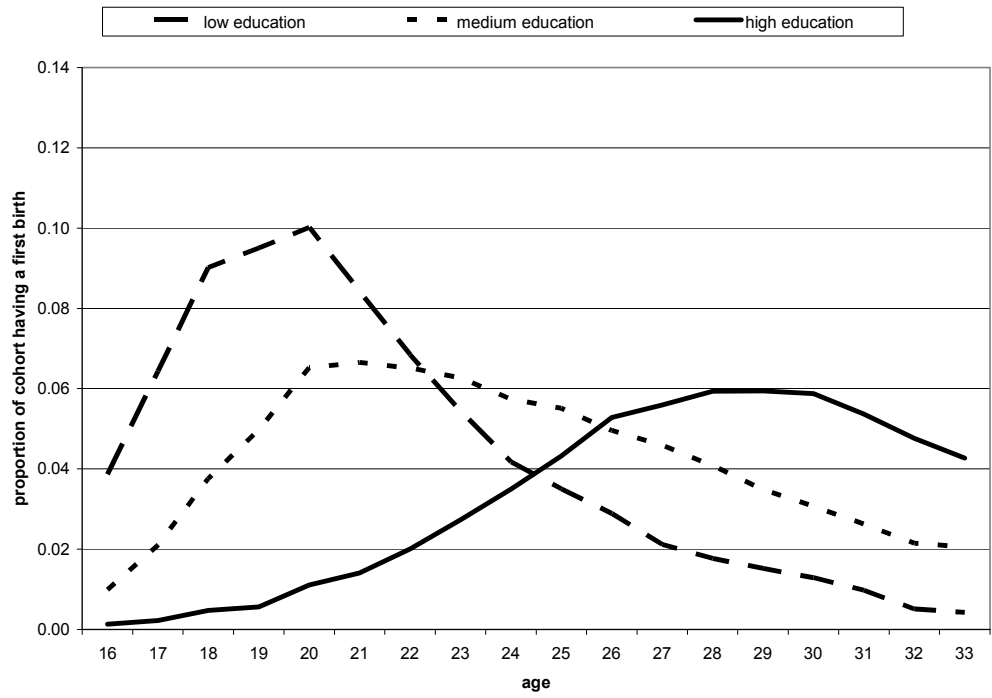**Figure 2f  Italy 1961-65 cohort**
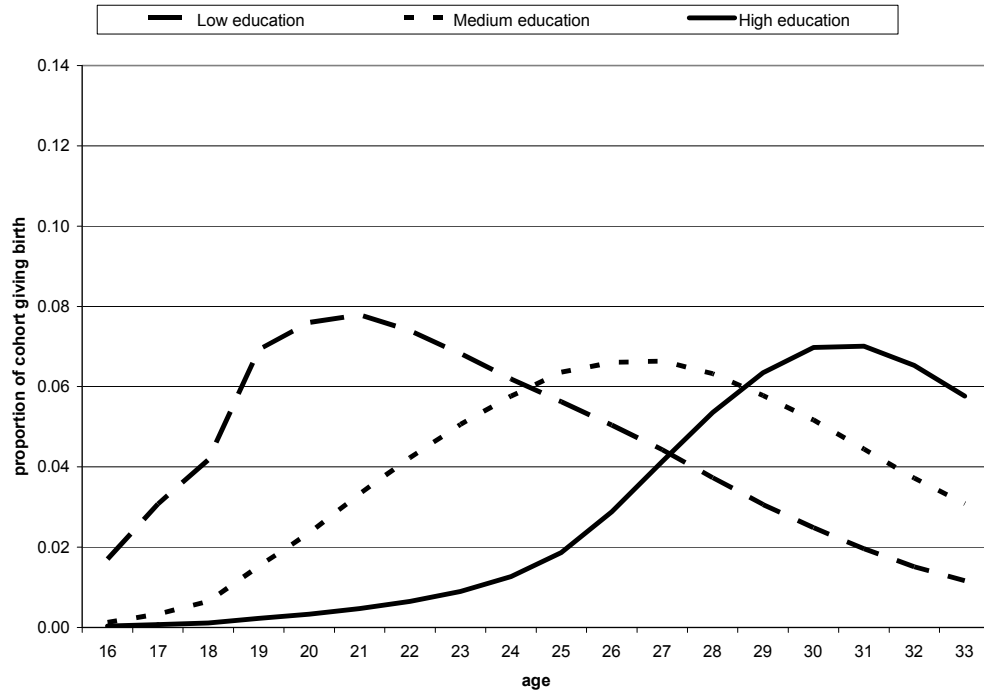
**Figure 2g  Spain 1961-65 cohort**
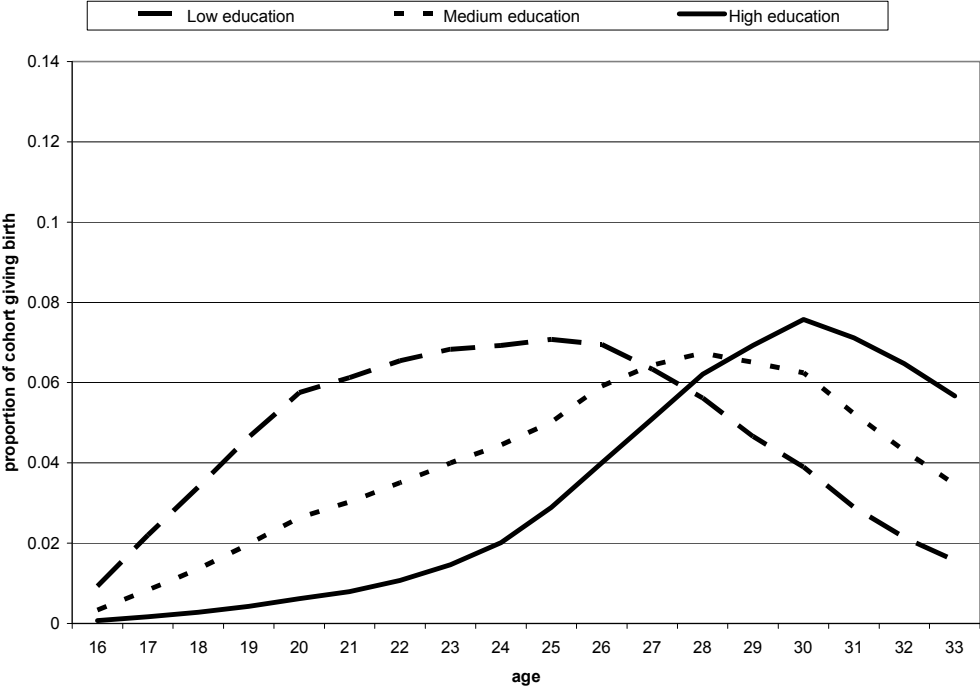
| Table 1 Distributions of ages at first birth by cohort and education | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1960s cohort | | | | 1950s cohort | | | | |
| A. Universalist Countries | < 20 | 21-25 | 26-33 | < 33 | < 20 | 21-25 | 26-33 | 34-43 | < 33 | < 43 |
| *France* | | | | | | | | | | |
| low | 24.7 | 38.1 | 21.3 | 84.2 | 29.1 | 41.3 | 18.1 | 2.6 | 88.5 | 91.1 |
| medium | 9.2 | 37.3 | 35.9 | 82.4 | 13.7 | 43.7 | 27.9 | 4.5 | 85.3 | 89.8 |
| high | 1.0 | 17.1 | 52.0 | 70.0 | 2.9 | 26.1 | 46.2 | 11.5 | 75.2 | 86.7 |
| *all* | 10.5 | 31.9 | 37.0 | 79.4 | 16.6 | 39.1 | 28.5 | 5.4 | 84.2 | 89.6 |
| *all (1950s cohort education distribution)* | 12.7 | 33.2 | 34.4 | 80.3 | | | | | | |
| *Norway* | | | | | | | | | | |
| low | 32.1 | 37.7 | 17.4 | 87.2 | 44.2 | 32.0 | 12.7 | 2.2 | 88.9 | 91.1 |
| medium | 13.9 | 39.1 | 30.7 | 83.7 | 22.1 | 38.4 | 24.9 | 4.5 | 85.4 | 89.9 |
| high | 3.2 | 18.8 | 51.1 | 73.1 | 7.1 | 25.5 | 44.8 | 9.6 | 77.4 | 87.0 |
| *all* | 11.3 | 31.8 | 37.1 | 80.2 | 20.5 | 33.8 | 29.1 | 5.7 | 83.5 | 89.2 |
| *all (1950s cohort education distribution)* | 13.1 | 33.0 | 35.0 | 81.0 | | | | | | |
| B. Anglo-American Countries | | | | | | | | | | |
| *U.K. (England and Wales)* | | | | | | | | | | |
| low | 34.0 | 33.2 | 15.1 | 82.3 | 34.9 | 31.8 | 17.8 | 2.9 | 84.4 | 87.3 |
| medium | 12.7 | 26.6 | 34.2 | 73.4 | 15.5 | 30.6 | 31.3 | 6.5 | 77.4 | 84.0 |
| high | 3.5 | 11.7 | 39.3 | 54.5 | 5.6 | 19.5 | 42.2 | 11.8 | 67.3 | 79.0 |
| *all* | 13.6 | 24.5 | 32.7 | 70.8 | 18.6 | 28.6 | 29.9 | 6.6 | 77.2 | 83.8 |
| *all (1950s cohort education distribution)* | 16.5 | 25.2 | 30.2 | 71.9 | | | | | | |
| *U.S.* | | | | | | | | | | |
| low | 52.8 | 22.3 | 10.8 | 85.9 | 54.3 | 22.0 | 10.7 | 4.0 | 86.9 | 90.9 |
| medium | 26.3 | 27.2 | 20.9 | 74.4 | 32.2 | 26.5 | 17.6 | 9.4 | 76.3 | 85.7 |
| high | 8.0 | 12.8 | 27.0 | 47.8 | 12.2 | 17.8 | 25.3 | 23.5 | 55.4 | 78.8 |
| *all* | 22.9 | 21.5 | 21.9 | 66.3 | 27.7 | 23.0 | 19.5 | 13.7 | 70.2 | 83.9 |
| *all (1950s cohort education distribution)* | 22.8 | 21.7 | 21.9 | 66.4 | | | | | | |
| | | 1960s cohort | | | | 1950s cohort | | | | |
| C. Southern European Countries | < 20 | 21-25 | 26-33 | < 33 | < 20 | 21-25 | 26-33 | 34-43 | < 33 | < 43 |
| *Greece* | | | | | | | | | | |
| low | 42.0 | 28.4 | 12.1 | 82.5 | 39.7 | 36.5 | 11.8 | 2.3 | 88.0 | 90.3 |
| medium | 19.2 | 30.7 | 27.0 | 76.9 | 19.7 | 40.4 | 22.6 | 5.2 | 82.7 | 87.9 |
| high | 2.8 | 14.0 | 43.0 | 59.7 | 4.2 | 25.2 | 40.3 | 11.7 | 69.7 | 81.5 |
| *all* | 17.9 | 24.8 | 29.6 | 72.3 | 24.7 | 35.7 | 21.8 | 5.4 | 82.3 | 87.6 |
| *all (1950s cohort education distribution)* | 25.2 | 26.4 | 24.1 | 75.7 | | | | | | |
| *Italy* | | | | | | | | | | |
| low | 23.5 | 28.2 | 21.9 | 73.5 | 25.8 | 39.2 | 20.2 | 6.4 | 85.3 | 91.7 |
| medium | 5.0 | 18.4 | 31.7 | 55.1 | 8.2 | 28.2 | 32.2 | 17.6 | 68.6 | 86.2 |
| high | 0.8 | 3.3 | 20.6 | 24.6 | 4.8 | 11.9 | 27.3 | 34.4 | 44.1 | 78.5 |
| *all* | 12.5 | 20.9 | 26.2 | 59.6 | 18.1 | 32.8 | 24.7 | 13.0 | 75.6 | 88.6 |
| *all (1950s cohort education distribution)* | 15.3 | 22.4 | 24.8 | 62.4 | | | | | | |
| *Spain* | | | | | | | | | | |
| low | 16.9 | 26.4 | 30.6 | 74.0 | 13.5 | 39.3 | 28.6 | 10.8 | 81.5 | 92.2 |
| medium | 7.1 | 15.0 | 30.6 | 52.7 | 9.1 | 29.3 | 28.7 | 17.2 | 67.0 | 84.3 |
| high | 1.6 | 5.3 | 25.1 | 32.0 | 5.7 | 24.1 | 35.5 | 21.3 | 65.3 | 86.6 |
| *all* | 11.9 | 19.9 | 29.4 | 61.2 | 11.9 | 36.1 | 29.6 | 12.9 | 77.6 | 90.5 |
| *all (1950s cohort education distribution)* | 13.7 | 22.2 | 29.9 | 65.8 | | | | | | |

**Data Sources:** French Demographic Panel (EDP); Norwegian population and education registers; ONS Longitudinal Study (England and Wales);
1995, 2002 U.S. National Survey of Family Growth, 1995 U.S. Current Population Survey, NCHS; 2001 Greek Census
1995 Italian Fertilty and Family Survey, 1998 Multipurpose Survey, Georgio (1993);
1995 Spanish Fertilty and Family Survey, 1999 Fertility Survey; INE.

**Table A1  Education Distributions and Sample Sizes by Country, Cohort, and Survey**

| | Italy | | | Spain | | | USA | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Cohort 1951-55* | Fertility and Family Survey (FFS) | Multiscopo | Pooled | FFS | Fertility Survey | Pooled | Current Population Survey | National Survey of Family Growth | | Pooled |
| *Education* | 1995 | 1998 | Surveys | 1995 | 1999 | Surveys | 1995 | 1995 | 2002 | Surveys |
| low | 58.6 | 57.9 | 58.1 | 77.7 | 73.1 | 74.7 | 10.7 | 11.3 | - | 10.8 |
| medium | 30.2 | 31.1 | 30.8 | 12.1 | 11.4 | 11.7 | 54.1 | 55.5 | - | 54.4 |
| high | 11.2 | 11.0 | 11.1 | 10.1 | 15.5 | 13.6 | 35.2 | 33.3 | - | 34.7 |
| *Sample N* | 944 | 2,098 | 3,042 | 539 | 1,051 | 1,590 | 5,729 | 1,970 | - | 7,699 |
| *Cohort 1961-65* | | | | | Fertility | | Current Population Survey | National Survey of Family Growth | | |
| *Education* | FFS 1995 | Multiscopo 1998 | Pooled Surveys | FFS 1995 | Survey 1999 | Pooled Surveys | 1995 | 1995 | 2002 | Pooled Surveys |
| low | 42.8 | 43.6 | 43.4 | 62.5 | 61.6 | 61.9 | 11.5 | 11.3 | 11.0 | 11.5 |
| medium | 45.6 | 45.3 | 45.4 | 17.6 | 14.5 | 15.5 | 52.9 | 55.5 | 49.3 | 53.2 |
| high | 11.6 | 11.2 | 11.3 | 19.9 | 24.0 | 22.6 | 35.6 | 33.3 | 39.7 | 35.3 |
| *Sample N* | 1,072 | 2,694 | 3,766 | 765 | 1,339 | 2,104 | 5,786 | 2,130 | 1,234 | 9,150 |