A Meta-analysis of Fertility Trends by Social Status

(Short version)

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I investigate changes in the status-fertility relation over a time horizon spanning more than seven centuries, while earlier studies typically assume a fixed relation between status and fertility and usually limit their focus to a short time period. Second, this study consists of 879 samples, several times larger than any earlier studies[1]. Third, the included samples come from all world regions, while earlier investigations usually come from only one country or region. Fourth, the approach considers several status measures, including hierarchy position, land ownership and occupation, while other meta-analyses tend to consider only education or income.

[1] Castro and Juarez (1993) present data on the relation between education and fertility based on DHS data in 26 developing countries. Cochrane (1979) presents a broad discussion of education and fertility, based on 96 samples. Pérusse (1993) presents 11 studies on mostly tribal societies between various measures of social status and fertility. Jejeebhoy (1995), is the largest published study carried out to date on the relation between social status (education) and fertility. Jejeebhoy discusses a total of 134 samples, and provides a meta-analysis of 59 of the samples.

Status and fertility before the fertility decline

In historic societies where relevant censuses or surveys are not available; genetic evidence and studies on legal and social structures can provide relevant information. DNA analyses show that 0.5% of the current world population share a certain Y chromosome signature which Zerjal et al. (2003) believe come from one male ancestor in Eurasia around the 12th-13th century (who they speculate is Genghis Khan). Blood drawn from men in northwest Ireland (Moore et al. 2006) reveal that 20% of the population have a joint male ancestor, possibly a 5th century chieftain called Niall of the Nine Hostages (the Y chromose signature is also significantly more common among men with surnames genealogically linked to the last known relative of this chieftain's dynasty). This shows that a few men (regardless of whether they actually were the historical characters suggested), had very high number of children, which is likely to have occurred in social systems where high social rank was rewarded with sexual access to a large number of women. The positive correlation between social rank and sexual access to women has been reported for Celts, German tribes, Macedonians, Persians, Egyptians, African tribes, Mongolians, Chinese and Indians (Betzig 1986, Scheidel 2000).

Irons (1997) argues that since human status striving evolved in an environment featuring vast resource differences, polygamy, status-related health disparities and inefficient birth control, it was adaptive for men to strive for status, since it was bound to pay off reproductively. Status allowed better access to food, resources, and women.

Bardet (1983) studies the fertility of four social class groups during the period 1670 to 1789 in Rouen, France. The higher classes; the Notables and the Boutiquiers et employés, had more than 7 children in the beginning of this period, but by 1789 they only had around 4 children. The two lower classes, the Artisans and the Ouvriers, had 6 children in the beginning of the period, but decreased their fertility first from around 1730, ending at about 5 children in 1789. This is a rare example of a study documenting the reversal of the positive social status - fertility correlation, where childbearing patterns of identical status groups are followed over a long time period.

Fertility limitation among elites

Why would fertility decline first for high status groups? Several factors causing a reduction in fertility affected privileged groups before they had a similar impact on the rest of the population. Before the onset of fertility transition, which for the majority of European countries took place 1880-1910 (Coale and Watkins 1986), childbearing was generally regulated through the proportion that marries at a given age. The marriage age was high in European societies, substantial population shares did not marry and few had children out of marriage. Marital fertility, however, was to a large extent unregulated (Knodel 1983, Knodel 1988, Bongaarts and Menken 1983, Wilson 1984).

Knowledge and practice of traditional preventive checks (secure days and withdrawal, post-partum abstinence, long periods of breastfeeding) may have been higher among high status groups who were more educated, literate and more likely to be exposed to different ideas and practices (Cleland 2001). Traditional positive checks, such as infanticide, have been found to be particularly common among high-caste communities in northern India in the 1980s (Sudha and Rajan 1989). Kanazawa (2003) suggests that higher status groups have a higher sexual frequency, although more contraceptive prevents this from being translated into higher fertility.

Among the most important of the factors underlying fertility decline is the decrease in mortality rates. Before the fertility transition, mortality was generally probably not lower

among higher status groups, however, as mortality declined, a longer life expectancy among the higher social classes emerged and is still evident (Gadeyne 2006, Knodel 1984, Marmot 2004). To the extent that individuals have preferences for a given number of surviving children, those who first benefited from mortality decline were those most likely to restrict their fertility.

The fertility decline took place during a cultural and ideational transition, where secularization, individualization, rising material aspirations and changes in gender roles (Brown and Guinnane 2002, Caldwell 1999, Lesthaeghe and Meekers 1986). Religious intensity and type of religion group can strongly affect fertility (Schellekens and van Poppel 2006, Goujon et al. 2006). Highly educated individuals tend to have stronger secular beliefs and weaker religious beliefs (Banu 1992, Sacerdote and Glaeser 2001).

Technical innovations decreased the need for female labour at home and increased the opportunities for women in the working life. Higher social classes were exposed to such changes relatively early. For Bavaria 1880-1910, Brown and Guinnane find that fertility decreases substantially as female industrial employment increases. Female labour force participation has been shown to be negatively related to fertility also in contemporary societies (Engelhardt and Prskawetz 2004, Sathar and Kazi 1990).

Jones and Tertilt (2006) compare fertility for 10 income deciles among American women born 1826-1960 and find for all the birth cohorts a strong negative fertility-income relation exists, although the income-fertility gap narrows for the most recent cohorts. However, Essock-Vitale (1984) finds that among the 78 wealthiest women in the US (identified on Forbes 500) fertility is relatively high - these extremely wealthy women had 38% more children than the average white American woman.

If uncertainty is high, childbearing may be perceived as an old age insurance to reduce risk as the case is in many developing countries today, while having formal pension agreements could secure old age (Cain 1983). Higher status groups were early to secure their old age, and in high medieval Germany, monasteries received gifts from wealthier individuals and repaid the contributors by providing care and support in their old age (Lyon 2006), and coverage to modern old age security schemes was utilized earlier by the wealthier and better educated.

For parents, a process of industrialization and urbanization often implied that children started to represent net costs rather than net benefits (Caldwell 1982, Wrigley 1990). New technologies lowered the demand for child labor and laws made child labor illegal or limited. The perception that the number of children may be inversely related to their success, a quality-quantity-tradeoff, could further make it rational to decrease the number of children (Becker 1991, Black et al. 2005, Angrist et al. 2006). Ryan-Johansson (1997) suggests that the low fertility of European rulers 1500-1924 is liked to a perceived risk of wealth dillution and a reduction in social status following many children. *Attaining* status rather than *maintaining* status can relate to especially low fertility (Baltzell 1953, Røskraft et al. 1992, van Bavel 2006). van Bavel studies an urban Belgian population and find that individuals who reduced their fertility during the demographic transition increased their social status relatively more.

Declining fertility among both high and low status groups can lead to self-reinforcing effects. Lutz et al. (2006) argue that ideational/normative fertility preferences affect ideal family size, and if actual fertility for one generation is lower, the norms of the next generation will also be lower. Moreover, if material pre-requisites to establish a family increase over time, then fertility drops unless it is offset by strong real income gains. Increasing consumption aspirations caused by increasingly wealthy reference groups could imply that many will limit their fertility as the material losses derived from having children increase, raising children becomes increasingly expensive and help from a shrinking family is more limited. Moreover,

those with similar education and income tend increasingly to marry others with similar characteristics (Smits et al. 2000, Hout et al. 1993), which can further amplify these effects.

Data inclusion criteria

To be included in this analysis, studies had to meet these criteria: They need to include a measure of social status; education, occupation/social class (including caste and other measures that can be clearly ranked on a hierarchical scale), and income/wealth[2] and a measure of fertility.

Minimum two social status groups are required for the sample to be included in the analysis. I do not include findings where only the fertility of one high status group is reported without information on the fertility of other social groups. Every observation represents the average difference in fertility between high and low for one sample

Our *fertility* measure includes different indicators of childbearing. This includes TFR (Total Fertility Rate), birth rates, and CEB (Children Ever Born). CEB is the most commonly used indicator – it is used for 89% of the samples. If CEB is available for different age groups, only those aged 40+ are included. The fertility differentials we observe include the effect of any status-variation in children's survival. However, this effect could be small; Gadeyne (2006) concludes that high status mortality was consistently lower only after the onset of the demographic transition. If both gross and net fertility is described, only gross fertility is reported.

Several search procedures were used to retrieve studies describing the quantitative relation between social status and fertility. I gathered information from previous literature searches (Castro and Juarez 1993, Cochrane 1979, Jejeebhoy 1995, Jones 1982, Pérusse 1993). Second, I searched from the following databases: Popline, Medline, Scopus; JSTOR and huscholar.google. Keywords such as education and fertility, differential fertility, status and fertility, and fertility differences were searched for in each database. The following journals were manually searched: Demography, Population and Development Review, Population Studies, Journal of Biosocial Science, Studies in Family Planning and International Family Planning Perspectives. Data from the following international surveys were reports on each country has been published is taken into account: Demographic and Health Surveys (DHS), Family and Fertility Survey (FFS) and Reproductive Health Survey (RHS) as well as descriptive results from the World Value Survey (WVS). Finally, reference lists in the identified studies were examined for additional references. Studies published until 2006 were included.

For the few studies where data is reported for every 1- or 5-year period in a period spanning periods more than 20 years, fertility differences for cohorts born 20 years apart are reported starting from the earliest period. When data on period and cohort fertility exist and overlap, data on cohort fertility is included. If the same sample using the same status measure is considered in more than one study, only one sample is included. For the historical studies I report to the first year in the time range, while the period when the cohort turns 20 years old is used for cohort fertility.

[2] Some measures only predict social status in specific circumstances and for certain social reference groups. E.g., performing well in certain physical or mental skills will only imply high status in some settings. However, the measures we use of high social status are believed to be of a general nature, high wealth or income, high education or a general leading hierarchical position (e.g., tribe leader or having wealthy parents). A second possibly more relevant critique is whether the status measure is self-achieved or transmitted through parental status. Only a handful of the studies we include use parental status and a few more use status of the spouse (typically the husband) – the remaining studies use the individual in question's own children.

This procedure produces a database of 909 samples. I exclude 30 samples where only a coefficient on the fertility effect of education is available. The final data set consists of 879 samples from 131 sources. Status is predominantly own adult status (769 samples), followed by husband's status (102 samples) and a few cases parents' status (13 samples). The most common status measure is education (528 samples), income/wealth (243 samples) followed by occupation/social class (108 samples).

Several different fertility measures are included. Children Ever Born represents 782 of the cases, followed by Total Fertility Rate or Total Marital Fertility Rate (81 cases), births within a given duration (7 cases), Birth Rates (5 cases) and Live births (4 cases). 18 samples are from before year 1750, 37 samples from 1750 to 1900, 22 from the years 1901-1924, 32 from 1925-1949, 127 from 1950-1974, 192 from the 1975-1989 and 451 samples from 1990-2005. The samples from before 1800 are predominantly European, while more recent samples come from all world regions.

I divide the sample in two world regions: North America and Europe (where the fertility reduction, and possibly the change in the status-fertility relation, took place relatively early) and Asia, Africa, Latin-America and the Middle-East. There are 497 samples from North America and Europe and 382 samples from Asia, Africa, Latin-America and the Middle-East.

Number of status categories differed from 2 to 14 categories; 619 samples had 2-3 categories, 208 had 4-5 categories, 38 had 6-7 categories and only 19 samples had more than 8 categories. I report the highest and lowest status category for all samples. For the studies with 3 or more categories, I report the middle category. If there is an even number of categories, e.g. 4 or 8 categories, I define the middle group as upper middle, e.g. 3rd or 5th categories respectively.

In 858 samples, the fertility of women's, men's or couples in predominantly monogamous societies is reported and the joint fertility of the couple is reported. It is uncertain whether and to which extent the remaining 21 samples are polygamous.

The number of individuals in the sample is known in 715 samples. Sample size is not described for the remaining 164 samples. However following simple assumptions allows imputing the remaining sample sizes: a) population censuses are based on more than 10000 individuals, and b) samples based on specific surveys are of similar size to other known sample sizes from the same survey. Including the imputed estimates, 335 of the samples are below 500 individuals (69 of which are between 29 and 100), 87 samples consist of 501-2 000 individuals, 369 samples range from 2 001-10 000 individuals and 88 samples have more than 10 000 individuals.

Findings and conclusion

Figure 1 shows the relation between fertility and all status indicators for all countries. The vertical axis shows the relative percentage fertility gain for high status groups relative to low status groups: {[(Fertility High status)-(Fertility Low Status)]/(Fertility low status)}, e.g., "50" would mean that the highest status groups had 50% higher fertility than the lowest status group. Figure 1 indicates a shift from a positive relation to a negative relation from the 13th to the 21st century. The negative effects in recent periods are, however, small relative to the positive effects in earlier periods.

Figure 2 excludes education and looks at income/wealth and occupation/social class observations (all periods and all countries), and finds a shift from a positive to a negative

fertility-relation over time for occupation/social class and a close to zero fertility-effect for income/wealth.

Figures 3 and 4 disaggregate the development by region, where we separate the world in two broad regions, as Europe and North-America experienced the fertility reduction and potentially a change in the positive relation between childbearing and status (income, wealth and occupation/social class) before other parts of world. For Asia, Africa, Latin-America and the Middle-East (Figure 3), there is a tendency for the status-fertility relation to go from positive to a more negative one over time. Figure 4 shows that for Europe and North America, the occupation/social class trend is negative over time (but has a neutral fertility effect on average from 1750), while the income/wealth trend has a neutral effect for the entire period.

Education becomes a common status indicator early in the 20th century and bypasses income/wealth in the 1950-1974 period as the most common measure of status. The relation between fertility and individuals with the highest relative to lowest education is always negative, and depresses fertility by 26.5% on average for all periods. Figure 10 shows that education is related to fewer children for both genders, although the fertility depressing effect of schooling is stronger for women than for men. For both genders, there is a tendency that educational differences in fertility are becoming somewhat smaller over time, although the highly educated have much lower fertility also towards the end of the period.

The trend term of education is significantly positive (suggesting that the differences between longer and shorter education narrows over time, as shown in Figure 5). The occupation/social class trend term is significantly negative, which reflects the reversal in fertility over time for these variables. There is no significant effect of income over time.

The growing importance of new status indicators, particularly education, is increasingly important for social rank. Education is associated with clear reductions in fertility in contrast to inherited status determinants, such as social class or inherited wealth. Hence the overall negative relation between status and fertility over time is only partly caused a shift in the within-status group over time (which occurred significantly only for occupation/social class), but to a larger extent but to a larger extent a change in the respective definition/dimension of status.

Increased social mobility implies that parental status to a lesser extent guarantees ones own status. Education is increasingly an important link to maintain or attain social status and also to be competitive in marriage markets characterised by increased educational homogamy (Smits et al. 2000). As higher education depresses fertility more than other status indicators, a stronger importance of education in defining individual status implies that the status-fertility relation is becoming increasingly negative.

Haines (1992, p. 224) stated that: “fertility decline was ‘led’ by the middle and upper classes. Social elites apparently did act as leaders in modifying this most basic of activities – human reproduction. In contrast, the agrarian population was slower to change”. In sum, I find a) that high status was associated with high fertility, while now it is related to low fertility on average (although income, wealth now has a neutral fertility effect), b) I also find a weakening of the effect of status on fertility, the fertility differences between high and low status groups have converged over time, c) new measures of status, in particular education, which has a consistent strong negative effect on fertility, have become increasingly important during the 20th century, making the relation between status and fertility increasingly negative.

Figure 1. Percentage fertility difference, high relative to low status individuals. All countries, All Measures, All periods.

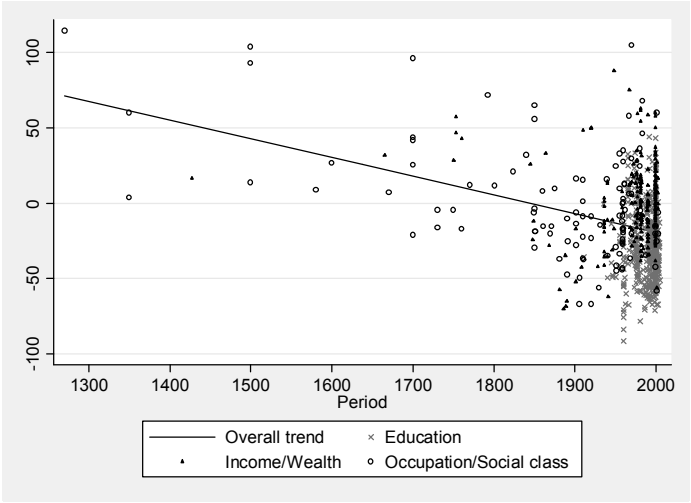


Figure 2. Percentage difference in fertility for high relative to low status individuals. All countries, Occupation/social class and Income/Wealth, All periods.

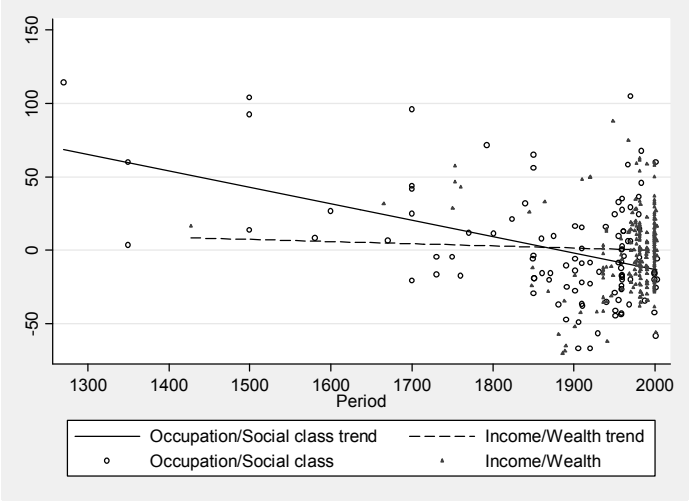


Figure 3. Percentage difference in fertility for high relative to low status individuals. Asia. Africa. Latin-America. Middle-East, Occupation/social class and Income/Wealth, All periods.

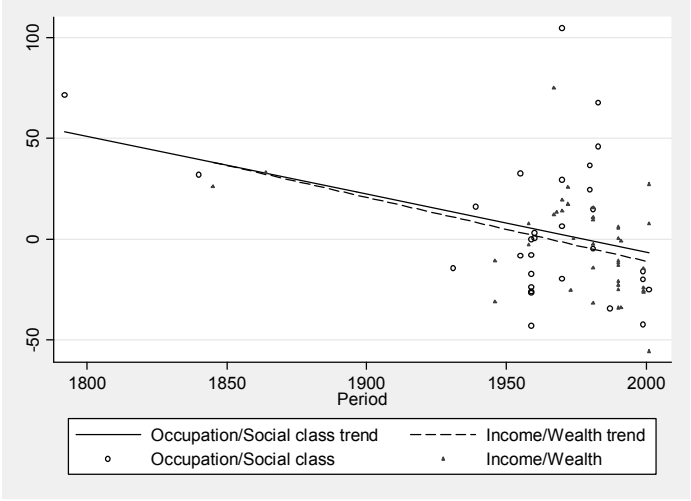
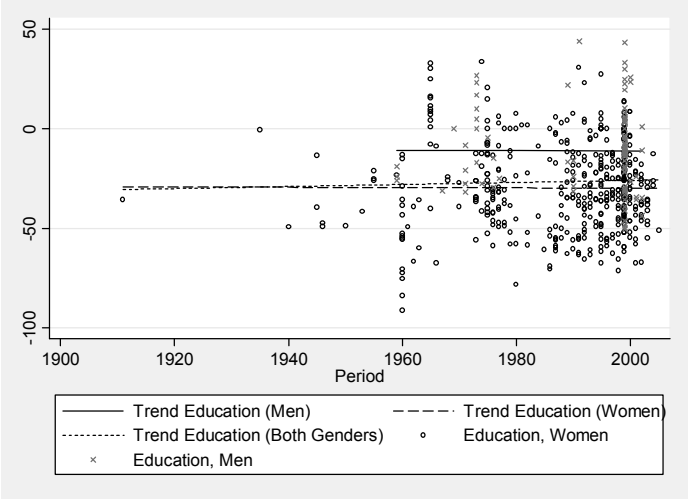


Figure 4. Percentage difference in fertility for high relative to low status individuals. Europe. North America, Occupation/social class and Income/Wealth, All periods.

Figure 5. Percentage difference in fertility for high relative to low status individuals. All countries, Education, All periods.



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