# The Causal Effect of Education on Female Age at Marriage and Marital Fertility: Evidence from Compulsory Schooling Reforms in England 

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#### Abstract

The negative association of female education and fertility, over time and between countries, is a central pillar of demography yet we have scant empirical evidence for whether this consistently observed correlation represents a causal effect. Using the universe of vital registration index data from England, 1912 to 2007, I first show that it is possible, using rare names, to construct a representative sample of women, and their first marriage and fertility. I then exploit the natural experiment of sharp discontinuities in who was affected by compulsory schooling law changes in 1947 and 1972, which exogenously raised the minimum school leaving age, to identify the causal effect of education on age at marriage and marital fertility. I find evidence that education raises age at marriage in 1972. However, I precisely estimate a zero education effect on fertility.


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## Simple Summary

1. Fertility and Education are strongly correlated. Many assume this is causal. I test this.
2. I show that a representative sample can be formed by linking registration data for females using rare names. This is possible in 20th century England due to the high level of population literacy and spelling consistency in records.
3. The sample is representative as it matches the age at first marriage and first marriage fertility, and age-specific fertility rates, for the general population
4. This is a good test as I do not match on age. Only names.
5. I then use the implementation of compulsory schooling laws in 1947 and 1972 in a RD design to estimate the causal effect of education on age at first marriage and first marriage fertility.
6. I find evidence that the 1972 reform did raise marriage age and this was causal.
7. I precisely estimate a zero effect of education on fertility.
8. The 1972 reform raised marriage age, age at first birth, age at last birth but also reduced the average birth interval. Women adjusted.
9. Education is not causal in reducing fertility. They are likely jointly determined by something else.

Table 0.1: Linking Stages Counts, Female Births to First Marriages

| Data | N |
| :--- | ---: |
| All Births | $125,005,217$ |
| Female Births | $58,353,842$ |
| Unique Female Births | $6,006,783$ |
|  |  |
| All Marriages | $47,082,406$ |
| Unique 1st Marriages | $4,418,288$ |
| Linked B- $>\mathrm{M}$ | $1,834,615$ |
| Notes: Unique: Based upon name. |  |



Figure 0.1: Singulate Age at First Marriage, Linked Sample v ONS
Source: Linked Birth-Marriage data and ONS 2014. 95\% confidence intervals are plotted for the linked data (mean age at first marriage).


Figure 0.2: Comparing Fertility Measures
Notes: I adjust the fertility measures from the linked data by adjusting the observed childlessness rate by a factor of 85 . The logic is that if the average migration rate in the second half if the 20 th century is about $.5 \%$ per annum (?), this will leave about $85 \%$ of those marrying in a given year still in England 30 years later. The value of 30 years is the approximate span from the average age at first marriage ( 24.05 from table X), to age 55 . The value of .85 is applied to the average childlessness rate from the linked data in 0.2 a above. Adjusted fertility $\left(F^{A}\right)$ is then calculated as $F^{A}=\bar{F}[F>0] *\left(1-.85 * \bar{D}_{\text {Childless }}\right.$ where $F$ is fertility and $D_{\text {Childness }}$ is an indicator variable for a women being recorded as childless. This is a crude adjustment so that the two estimates of childlessness can be broadly compared. Source for ONS data: ?.


Figure 0.3: Age Specific Marital Fertility Rates, Linked Women compared with ONS Statistics Notes: Fertility rates are age specific marital fertility rates per 1,000 women. Please see text and appendix figure X for details on how the ONS Age Specific Marital Fertility estimates were derived. An alternative comparison where Age range is presented on the X -axis is reported in appendix figure Y.


Figure 0.4: The Causal Effects of Education Reforms
Notes: Quarter $=0$ is the effective birth quarter date of the educational extension reform. Everyone born on or after this date is treated by the reform. For the 1947 reform, this added .521 of an extra year of schooling to the treated group. For the 1972 reform, this added .283 of an extra schooling year (see table ??).


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