

Economic development, women’s education, and their fertility – a study across and within European countries

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Short abstract: Country-level contextual factors are proposed to affect the fertility behavior of women differently depending on their parity and educational level. Recent research documents variation in women's educational gradient in fertility across sub-national regions within countries in Europe, suggesting potentially differential responses by women also depending on the regional context in which they have lived over their reproductive lives. This study aims at bridging between the national and sub-national layer to enhance understanding of the susceptibility of women's childbearing to contextual conditions, particularly from the perspective of economic development. To assess this aim we harmonize register, census, and large-scale survey data from 15 European countries. We measure women's education, region of living linked to GDP, and parity-specific cohort fertility at the end of the reproductive career. An empirical Bayesian method is used to reduce uncertainty of the regional fertility rate estimates. Our findings show that, childlessness is higher among women living in sub-national regions of higher GDP, especially among the highly educated women. Further, conditional on having entered motherhood, fertility of the women with higher education associates less negatively with economic conditions at the country and sub-national regional level. To conclude, although the potential effects of sub-national migration or compositional factors cannot be entirely ruled out, and our results on higher parities could be affected by the selection into motherhood, it is plausible that economically well-developed country and sub-national contexts may be less detrimental to the continued childbearing of the more highly educated women.

Background and aim

Empirical research shows that fertility levels vary greatly across high-income countries, and differences in country-level contexts are understood to be the prime reason for such variation. The level of economic development is one source of variation: until recently fertility tended to be lower in countries with higher economic development (Bryant 2007, Lee 2003), while among the highly-developed countries this pattern has reversed (Myrskylä, Kohler, and Billari 2009, Luci-Greulich and Thévenon 2013). Economic levels of development have been suggested to affect fertility positively at the highest levels of development through more direct factors, such as more developed institutional support for work-family reconciliation and higher levels of gender equality (Myrskylä, Kohler, and Billari 2011, Luci-Greulich and Thévenon 2013). Similar arguments have been put forward for the changing association between female employment and fertility (Brewster and Rindfuss 2000, Ahn and Mira 2002, Matysiak and Vignoli 2008). While the main body of this line of research in contemporary societies has focused on variation at the country level, a more recent focus has emphasized differences in fertility levels according to economic development at the regional level, theorizing that changes in country-level family policies and the spatial organization of work may weaken the typically negative relationship between economic development and fertility also at the regional level (Fox, Klüsener, and Myrskylä 2019).

It has been proposed that institutional support for work-family reconciliation and higher levels of gender equality may benefit more the more highly educated women, who face higher opportunity costs to their childbearing (Esping-Andersen 2009, Cherlin 2016, Goldscheider, Bernhardt, and Lappegård 2015). This may have led to decreasing differences between educational groups of women in their fertility in some countries over time (Kravdal and Rindfuss 2008, Wood, Neels, and Kil 2014, Jalovaara et al. 2019). How women's educational level plays out in the association between economic development level and fertility across the high-income countries has not been thoroughly investigated. Given the arguments above, it is plausible that women with higher education may be better off in their childbearing in contexts of higher economic development. At the regional level, a recent study covering a large number of European countries showed variation in the educational gradient in fertility by the regional level of economic development, suggesting a differential response to regional conditions in fertility of women according to their education (Nisén et al. 2020). A recent in-depth case study on Belgium showed that regional income level affects the second birth progression negatively among the low- and medium-level educated women, but positively among the high-educated women (Wood et al. 2020).

The current study aims at bridging between two layers of analysis – the sub-national and national level – to enhance understanding of the susceptibility of fertility of women to conditions surrounding them.

The study focuses on two parity-specific fertility outcomes – the share of women remaining childless and the number of children per mother – since differential response to conditions by parity can be expected. While work-family reconciliation may be more crucial for higher-order birth progression (Bavel and Rózanska-Putek 2010, Klesment et al. 2014), becoming a parent as opposed to remaining childless may be more strongly affected by conditions affecting the changes of forming a partnership, such as local partner markets (Lainiala and Miettinen 2013, Van Bavel 2012). Our focus on economic development as a contextual condition is motivated by its broad impact on societies (Islam and Clarke 2002, Bongaarts and Watkins 1996), its changed relationship with fertility, and data availability.

Data and methods

The study is based on register, census, and large-scale survey data covering 15 countries: Austria, Belarus, Belgium, Finland, France, Germany, Greece, Hungary, Ireland, Lithuania, the Netherlands, Norway, Romania, Spain, and Sweden. We analyse native-born women born between 1964 and 1970. Cohort fertility, highest educational attainment, region of residence, and regional level of economic development are measured at the end of the reproductive career of women. In most countries, the data reflect the achieved fertility as of 2011. All women were aged 40 or older at the time of the measurement.

We measure regional development using GDP (purchasing power standardised gross domestic product per capita) in 2011 extracted from the Eurostat database (Eurostat 2018). In the measurement of education, we distinguish between low, medium, and high attainment following the International Standard Classification of Education (ISCED) (UNESCO 1999). High refers to education at the tertiary level (ISCED 1997 levels 5-6), including short-cycle tertiary level education. Medium refers to education at the higher secondary or post-secondary non-tertiary level (ISCED 1997 levels 3-4). Low refers to education at the lower secondary level or lower (ISCED 1997 levels 1-2). In Belarus, Greece, Ireland, and Romania, the classification is based on the standards used by IPUMS international (IPUMS 2018).

Cohort fertility is measured as the share of all women remaining childless, the average number of children per mother, and the average number of children per woman. These data are derived from self-reports in census or survey data and information on registered births in register data. The country-specific mean age at the measurement of fertility was at least 42 in all cases except Belgium, where it was 41. Thus, completed fertility is slightly underestimated, particularly in Belgium. Prior research indicates, however, that changes in the educational gradient of women are very small past this age (Andersson et al. 2009, Berrington, Stone, and Beaujouan 2015). In census data, women reporting unknown parity may cause small errors in the parity estimates (Sobotka 2017).

Fertility rates of women by education and region are subject to sampling variation in 9 out of the 15 countries for which full population data are not available. In order to document variation that reflects true heterogeneity rather than sampling noise, we use a standard method of small area estimation: the empirical Bayesian (EB) estimation (Assunção et al. 2005, Longford 1999, Rao 2014). In this method, statistical power is borrowed from other educational groups and regions in an attempt to limit noise in the fertility rate estimates. We assume that the fertility outcome in question (number of childless out of all women, number of children per mother/woman) follows a Poisson distribution, and borrow strength for each educational group (1) from other educational groups within the region, (2) from the same educational groups in other regions within the country, and (3) from regularities in education-specific fertility schedules within the country. Shrinkage of an estimate is stronger when the estimate is based on a smaller sample size and is stronger towards another estimate based on a larger sample size. Additionally, given a correlation between fertility rates and GDP within countries, larger weight is given in the estimation to regions that are more similar in terms of their GDP. We study the association of the EB fertility rates to the regional economic development level without and with including country-level fixed effects, which control for all country-level factors shared by regions within a country. We note that these results are almost identical when observed rates are used instead of the EB rates.

Results

Among female cohorts born in the late 1960s the cross-regional unweighted average share of childless women was .17, .15 and .20 among those educated to the low, medium and high level, respectively. As shown in Figure 1, the share of women remaining childless is larger both across regions of all countries (globally) as well across regions within countries at higher levels of economic development of the woman's region of living. This pattern is true for women irrespective of their educational level. There is a difference between the educational groups in the within-country pattern, i.e. when country-level factors have been controlled for, in that childlessness increases more pronouncedly among the low-educated than among the medium- and high- educated women (difference in slope between high and low education is significant at $p < .001$). A one-unit increase in the logged GDP is associated with an increase in the share childless between 0.05 (low-educated) to 0.07 (high-educated) units globally, and between 0.03 (low-educated) to 0.09 (high-educated) units within countries.

The cross-regional unweighted average number of children per mother was 2.38, 2.05 and 2.01 among women educated to the low, medium and high level, respectively. As shown in Figure 2, globally the number of children per mother decreases among the low-educated, but increases among the high- and medium-educated, at higher GDP levels of woman's region of living (difference in slope between high

and low education significant at $p < .001$). A one-unit increase in the logged GDP is associated with a decrease of .16 units among the low educated, while it is associated with an increase of .16 and .35 children among the medium- and high-educated mothers, respectively. Within countries, the number of children per mother decreases at higher levels of regional economic development irrespective of woman's educational level, but this negative relationship is less pronounced among the more highly-educated (difference in slope between high and low education is significant at $p < .001$). A one-unit increase in the logged GDP is associated with a decrease of the number of children amounting to .36, .21, and .10 among the low, medium, and high educated mothers, respectively.

The parity-specific results are reflected in the average numbers of children of women, shown in Figure 3. The cross-regional unweighted average number of children was 2.38, 2.05 and 2.01 among women educated to the low, medium and high level, respectively. Overall, higher development relates to lower fertility, but for the highly educated this tendency is weaker within countries and reversed globally.

Conclusion

This is a novel study to investigate women's cohort fertility according to their parity, education and region of living across and within a number of high-income European countries. Our findings covering women born in the late 1960s show that generally higher levels of female education as well as higher levels of economic development relate to lower numbers of children, but these two dimensions show notable interactions. Firstly, within countries the negative relationship between regional economic development and entry into motherhood is *stronger* among the women with higher education. Secondly, within countries the negative relationship between regional economic development and number of children is *weaker* among the women with higher education who have entered motherhood; across regions of all countries this relationship is positive for the highly educated women. These findings suggest that within countries the more selective entry into motherhood in well-developed regions may result in larger heterogeneity in fertility of the women with higher education. Alternatively, the less negative relationship of development with fertility among the mothers with higher education across and within countries may imply that developed European contexts bear a less detrimental effect on the continued childbearing of these women. At the country-level, family policies and gender equality could serve as contributing mechanisms, while within-country variation may involve additional explanations. The role of population compositional effects and internal migration across the reproductive life course for the current results requires attention. These findings are important in the light of the increasing weight of the highly educated women on fertility levels in high-income societies (Sobotka, Beaujouan, and Van Bavel 2017), suggesting that continued childbearing may balance high levels of childlessness.

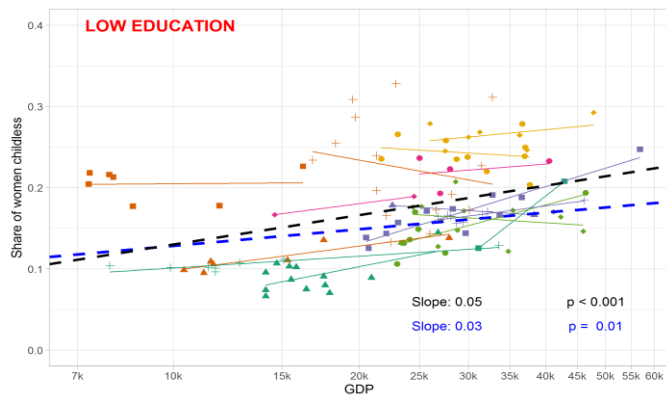
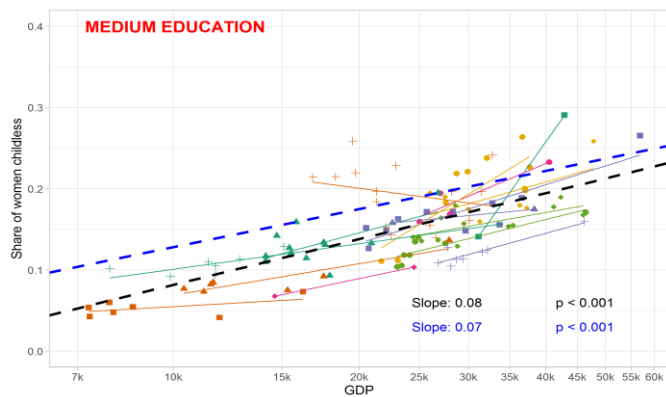
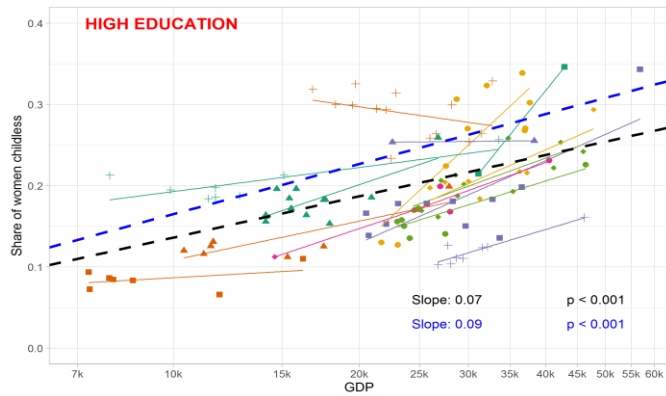


Figure 1. Share of women childless according to the economic development of her region of living: women educated to low, medium and high level in 15 European countries. Regression lines are fitted for the global trend without (black dashed line) and with (blue dashed line) country fixed effects, and for the within-country trends for each country separately (solid lines).

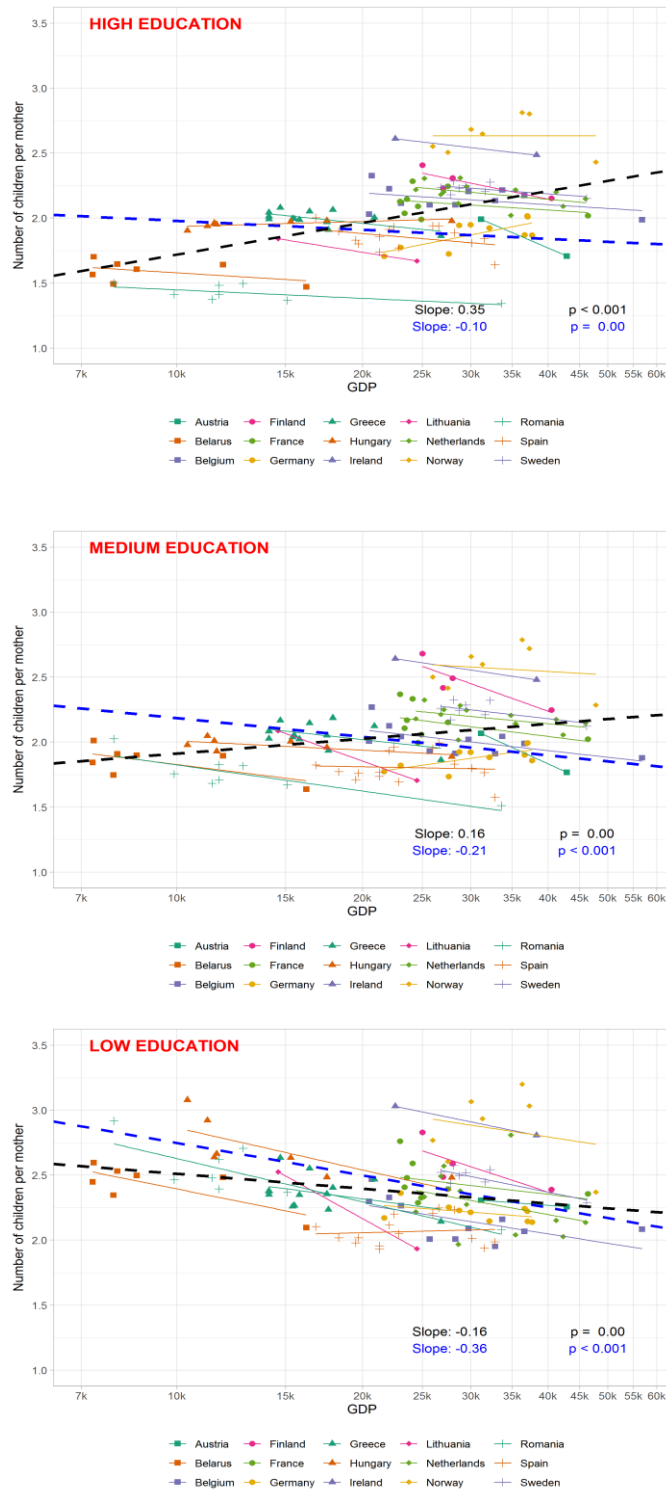


Figure 2. Number of children per mother according to the economic development of her region of living: women educated to low, medium and high level in 15 European countries. Regression lines are fitted for the global trend without (black dashed line) and with (blue dashed line) country fixed effects, and for the within-country trends for each country separately (solid lines).

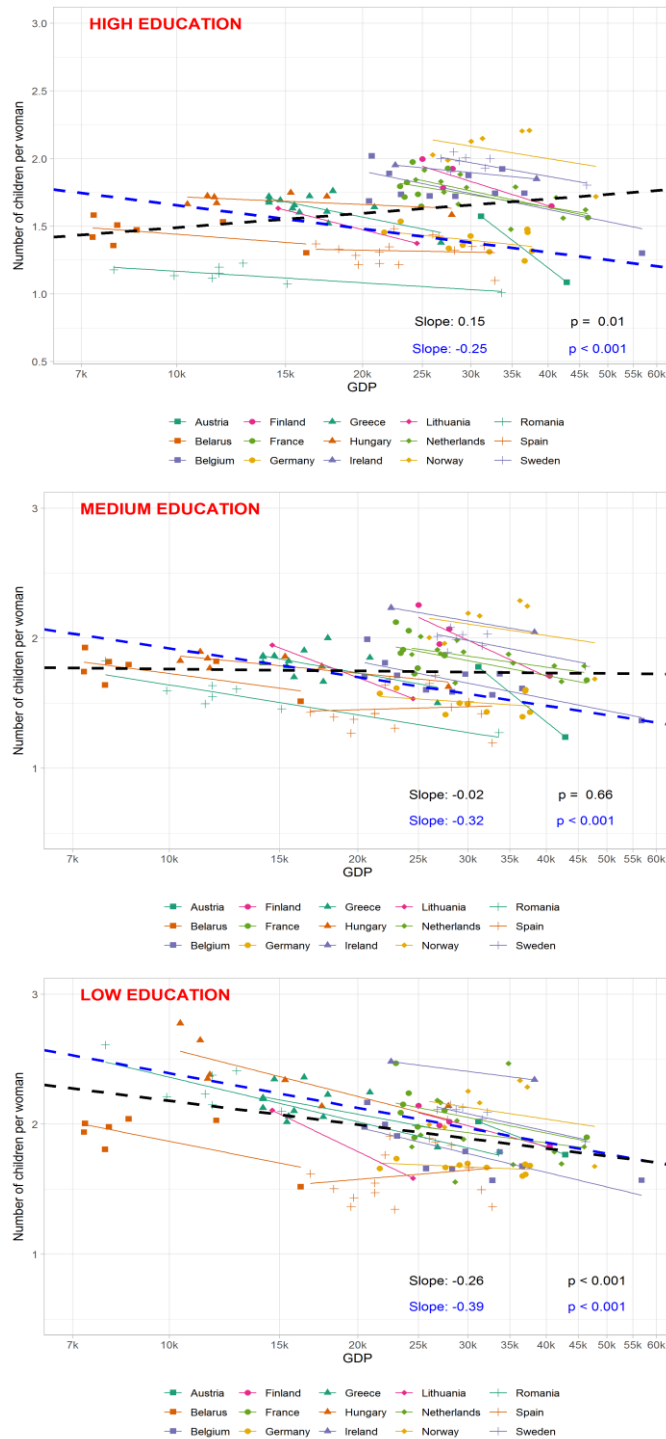


Figure 3. Number of children per woman according to the economic development of her region of living: women educated to low, medium and high level in 15 European countries. Regression lines are fitted for the global trend without (black dashed line) and with (blue dashed line) country fixed effects, and for the within-country trends for each country separately (solid lines).

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