Education and fertility in low-fertility countries: A long-term perspective

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Achieved level of education increasingly recognised as a key stratifying covariate of demographic behaviour

- Health, life expectancy, fertility and family patterns. Projections


- Long-term gradient in education-fertility differentials documented among women (e.g. Skirbekk 2008), less clear relation among men
- Key role of education expansion in stimulating fertility postponement (Blossfeld & Huinink 1991, Ní Bhrolcháin and Beaujouan 2012)
- Education also affects fertility via differential marriage behaviour and union formation, sex-specific partnership & marriage preferences (van Bavel 2012), differential contraceptive use
EDUCATION-FERTILITY RELATIONSHIP: gaps in current research

Contemporary research on low-fertility settings often

- Focuses on individual countries, lacks broader comparative perspective (Andersson et al. 2009 among main exceptions)
- Uses period data that are often affected by *tempo effects* and suffers data mismatch between occurrences (birth data) and exposures (population data)
- Applies a short-term perspective
- Uses regression analysis, frequently with a focus on partnered women & single-parity transition

Debates on causality

→ *The “complete picture” is often lost*
EDUCATION-FERTILITY RELATIONSHIP: a broad view

Long-term transitions, trends and inter-country variation insufficiently mapped and analysed

→ Also lacking attention to cross-country variability in parity-specific patterns of family building (different pathways to low fertility, exceptions include Ekert-Jaffé et al. 2002)

→ Limited research on how education expansion affects overall fertility and the shifts to later timing of childbearing (“tempo transitions”) in different settings

→ Consequences: Long-term effects of differential fertility on reproduction of human capital, economy, productivity
OUTLINE of this talk

1 Why and how education affects fertility and family: Theories, mechanisms, pathways
2 Historical changes and institutional influences: Ideas, hypotheses
3 Empirical illustrations
   * Fertility level and differentials
   * Long-term changes
   * Parity-specific changes
   * Fertility timing
   * Fertility preferences
   * Other family-related behaviours
4 Discussion, future research agenda
Main focus (empirical illustrations)

- Low-fertility countries & countries in the last stage of the fertility transition
- Females, birth cohorts from ca. 1900 to ca. 1970
- Data over age 40 (45 for men) when both fertility and level of education essentially “completed”
- Complementary research on differentials in intended family size
DATA, INDICATORS, ANALYSES: Specific aims

Data sources

- Illustrations based on published research, mostly on cohort fertility
- Census data: retrospective information on CEB from recent and historical censuses
- Large-scale surveys (France, UK, Germany, US), considering also smaller data sets (GGS, FFS?)
- Register-based data

Main data limitations (census & surveys)

- No *tempo* information in most data
- *Selectivity* ignored: mortality, migration, changing meaning of education categories
- Possible *response biases*, handling of unknown and unreported cases
1 Why and how education affects fertility and family:
Theories, mechanisms, pathways
Population economics:

*Individuals maximising their “utility” from children and other “goods”*

- Income effect (*maximising fertility preferences*)
- Opportunity cost of childbearing (*minimising economic losses*)
- Quantity-quality tradeoff (also “*intensive parenting*”)

Also arguments about *role specialisation*

→ May lead to sex-specific, time-specific and context-specific predictions about education-fertility gradient

→ “Quality of children” orientation particularly pertinent in East Asia, where competition for best education most intense and contributes to very low fertility (children education key); Anderson and Kohler 2012
Sociology, social science, population studies

“Human Capital Accumulation” (e.g., Huinink and Blossfeld 1991)

*two components:*

- being in education increasingly incompatible with childrearing → later timing of births
- increasing career resources → lower fertility, higher childlessness

Value orientation, second demographic transition (e.g., Lesthaeghe and Surkyn 1988)

➢ Education-driven model of value changes

Education fostering secularisation, individualisation, and non-family values and preferences: non-conformist value orientation, accentuation of higher-order needs, acceptance of childlessness and new family forms, resistance to normative pressure, non-family interests

Thornton: “developmental idealism” – spread first in higher educated
Selected other arguments and theories

Knowledge, efficacy, control

Higher education fosters higher ability to gather information, plan for the future, use available resources and control one’s behaviour

- also in sexual & partnership behaviour, partnership instability, contraceptive use, unplanned pregnancies (e.g. Musick et al. 2009), or use of assisted reproduction

Evolutionary approaches: fitness maximisation (Fieder et al. 2005, Huber et al. 2010)

Higher social status implies higher reproductive success (or “output”)

Skirbekk 2008: social status positive in the past, but education always had a depressing effect

Choice of study discipline implies different income potential, different combination options, fosters different attitudes and may be an expression of underlying work or family orientation (Van Bavel 2010)
Field of education and completed fertility

Sweden, birth cohort 1955-59

Source: JM Hoem, G Neyer, G Andersson

Demographic Research 2006, vol. 14, article 16

→ Main differentiation through differential childlessness
Examples

Education level, social status $\rightarrow$ Marriage market, partnership options $\rightarrow$ Fertility

Education level $\rightarrow$ Lifestyle, health behaviour $\rightarrow$ Health, morbidity $\rightarrow$ Fertility

Higher education $\rightarrow$ Later family formation $\rightarrow$ Lower fertility ("tempo-quantum interaction")
INDIRECT PATHWAYS AND INFLUENCES

Mating / partnership preferences; marriage market
• different attractiveness on the marriage market → “unattractive matches” may be “shut” from reproduction, remain involuntary childless
• higher education implies stronger bargaining power within partnership
• changes in assortative mating from female hypergamy to homogamy
• lower educated men unattractive partners (Oppenheimer 1994)

Multiple partner fertility
• differential family instability and repartnering by education and sex
• more repartnering implies higher fertility?

Unplanned & unintended pregnancies
• Higher fertility of lower educated explained by extra unintended and unplanned pregnancies and births (Musick et al. 2009 for the US)

Size matters: very small groups and outliers might have very low fertility
Mistimed and unintended pregnancies by education

Completed fertility by level of education: US, white women aged 39-46 in 2004

Data source:
K Musick, P. England, S. Edgington, N. Kangas
FERTILITY TIMING

Education has a strong impact on the timing of births and pace of childbearing (birth intervals)

- Incompatibility between being a student and starting family (Blosfeld & Huinink 1991, Billari & Philipov 2004)

- *Opportunity costs of childbearing*, especially income loss, decline with time in employment among better educated (Joshi 2004)

- *Need to establish oneself in employment first*: Parental leave benefits often linked to work-related income (Bjorklund 2006)

- Prolonged partner search among better educated?

- Early childbearing and mistimed pregnancies typical of lower-educated

  → *Uncertainty reduction hypothesis* (Freedman et al. 1994)

- "Time squeeze", *biological clock*: a need to realise fertility intentions in a shorter time span among better educated (Kreyenfeld)
Earning loss to the mother by age at first birth in the UK

Source:
H JOSHI

Population and Development Review
2004 28(3): 445-474
CAUSALITY DISCUSSION

Is the observed link between education and fertility causal?

Endogeneity, selection:
Underlying traits, predispositions, abilities and preferences may determine both educational and fertility pathways
 observed association between education and fertility may be spurious

Reverse causation:
(Unplanned) early pregnancies and births may hinder further education
 Observed relationship due to early childbearing, not due to education
 Evidence from US, Norway (Cohen et al. 2011), Denmark (M. Gerster)

But also ample evidence of real causal relation
Strong & consistent empirical relationship, most plausible narrative (Lutz and Skirbekk forthcoming, Axinn and Barber 2001)
Causality in timing shifts (Skirbekk et al. 2004, Ní Bhrolcháin and Beaujouan 2012)
2 Analysing historical changes and institutional influences: ideas and hypotheses

This part based on the paper by T Sobotka, E. Beaujouan, R. Rindfuss, K. Neels and Z. Brzozozwska

“Exploring long-term changes in fertility differentials by level of education: Review and discussion of research issues”

IUSSP Conference, Busan, 30 August 2013
HISTORICAL AND INSTITUTIONAL INFLUENCES

Main “ingredients” influencing educational differences in fertility

- Size of education group
- Policies: childcare, work, status of women (Kravdal and Rindfuss 2008)
- Gender equality and education gradient
- Motherhood & parenting norms
- Social stratification and disparities
- Motherhood income penalty (Joshi 2004)
- Changes in assortative mating (van Bavel 2012)
- Employment uncertainty fosters postponement among better educated (Kreyenfeld 2009)

Sex-specific hypotheses: does education level matter more for men or for women

Parity-specific hypotheses
QUESTIONS, SELECTED HYPOTHESES (1):

Long-term patterns of cohort fertility change and variation:

- The role of education expansion in driving fertility decline to sub-replacement levels
- Gradual convergence in fertility by level of education, especially childlessness?
- Understanding baby booms and busts (also research by Jan van Bavel, David Reher et al.)
- How education-fertility relationship evolving in the late stage of demographic transition and in post-transitional settings?

Convergence expected especially in countries where women can achieve a good balance between career and family life

QUESTIONS, SELECTED HYPOTHESES (2):

**Parity-specific patterns:**

- Huge educational differentials in childlessness expected to decline across cohorts as higher education becomes more common.
- Childlessness explains most of the observed differences in completed fertility by level of education.
- In most countries, two-child family most common among all education groups in the cohorts born > 1945.

*Two-child family orientation emerged first among the highly educated women (with post-secondary education)*

*Progression to second birth remains most stable and least differentiated across cohorts and education groups*
3 Empirical illustrations
→ Fertility level and differentials
CURRENT DIFFERENTIALS AMONG WOMEN: low-fertility countries, F cohorts born ca. 1960

Data based on Basten, Sobotka and Zeman 2013; some of the data provided by Michaela Potančoková (VID / Wittgenstein Centre)
Strong convergence in women’s fertility by level of education: Belgium (native F), Nordic countries

Figure 12: Cohort total fertility at age 40, by educational level at age 30, female cohorts born in 1945–1959

Explanations (e.g., Kravdal & Rindfuss 2008)

- Policies, especially public childcare
- Gender equality, also at household level
- Mothers’ work widely accepted

Source:
G. Andersson et al.
*Demographic Research* 2009, vol. 20(article 14): 313-352
Persistent education-fertility differentials expressed via higher childlessness in better educated women

Fig. 11: Childlessness among tertiary-educated women born in the 1920s-1960s; Austria, Germany and Switzerland

Source: T. Sobotka
Comparative Pop. Studies 2011
Childlessness often “explains” most of the observed fertility gradient

Switzerland, women born 1955: completed fertility of all women and mothers by level of education

Data source: Population Census 2001
Childlessness often “explains” most of the observed fertility gradient

Switzerland, women born 1955: completed fertility of all women and mothers by level of education

Data source:
Population Census 2001
3 Empirical illustrations

→ Long-term changes
Do relative education-fertility differentials decline with overall fertility reduction?

Cohort fertility data for 9 European countries

Basten, Sobotka and Zeman: VID Working Paper (forthcoming), Figure 14
Does rapid expansion in high education drive overall fertility declines?

Time-specific and context-specific findings, also depends on the stage of education expansion and the pace of fertility decline

- Not in the case of very rapid fertility declines: East Asia, Iran
- Yes (to a large extent) in many countries of Latin America and in sub-Saharan Africa
- Mixed evidence in Europe
Convergence to low fertility in Korea

Source:
Sam Hyun Yoo (2013)

Was Fertility Decline in Korea Driven by Educational Expansion? A Cohort Analysis
PAA 2013
Decomposition of fertility decline in Iran

Table 5. Total fertility rates and decomposition of fertility by education, Iran, 1980-2000.

<table>
<thead>
<tr>
<th>Year</th>
<th>TFR</th>
<th>Constant ESASFR 1980, changing education distribution</th>
<th>Constant ESASFR 2000, changing education distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>6.96</td>
<td>6.96</td>
<td>2.28</td>
</tr>
<tr>
<td>1985</td>
<td>6.30</td>
<td>6.57</td>
<td>2.19</td>
</tr>
<tr>
<td>1990</td>
<td>5.32</td>
<td>6.16</td>
<td>2.10</td>
</tr>
<tr>
<td>1995</td>
<td>2.87</td>
<td>5.72</td>
<td>1.99</td>
</tr>
<tr>
<td>2000</td>
<td>2.17</td>
<td>5.44</td>
<td>1.93</td>
</tr>
<tr>
<td>2005</td>
<td>1.90</td>
<td>5.16</td>
<td>1.90</td>
</tr>
</tbody>
</table>

Source: M Jalal Abbasi-Shavazi et al. (2008)

*Education and the World’s most rapid fertility decline in Iran*

IIASA Interim Report 08-010
Completed fertility in Poland during state socialism

Source: Z Brzozowska (2013)

Was falling fertility in the Communist Poland driven by changes in women’s education? Working Papers, Inst. for Stat. and Dem., Wasraw School of Economics, 27/2013
Historical fertility change: Analysing baby boom in Belgium

Figure 4. Total number of live births by cohort and level of education, 1901-1940

Source: J. Van Bavel 2013
“Socio-economic differentials in the mid-twentith century baby boom”, Manuscript under review
Data based on 1981 Census
3 Empirical illustrations
→ Parity-specific changes
Share of women with post-secondary education who remained childless, cohorts 1900-1970, 5 countries

Data:
2001 census results
Sweden: register-based data
Share of women with two children (%) 
education category with the highest share in the cohorts born around 1930

Croatia: Lower secondary (small differences); Austria: lower and upper secondary almost equal
Croatia: Lower secondary (small differences); Austria: lower and upper secondary almost equal
Progression rate to second birth in France (PPR₁₂)

Parity progression ratio, F at parity 1

- Lower
- Medium
- Higher
- TOTAL

Years:
- 1920
- 1925
- 1930
- 1935
- 1940
- 1945
- 1950
- 1955
- 1960
- 1965
- 1970

Values:
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
3 Empirical illustrations
→ Fertility timing
Norway: Mean age at first birth by woman’s education


The multifaceted impact of education on entry into motherhood

France and UK: completing education and having first birth

Table: Change in the age at first birth and at completing education in Great Britain and in France

<table>
<thead>
<tr>
<th></th>
<th>Calendar period</th>
<th>Change 1980-84 to 1995-99</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age at first birth (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Britain</td>
<td>25.5</td>
<td>26.9</td>
</tr>
<tr>
<td>France</td>
<td>25.1</td>
<td>27.5</td>
</tr>
<tr>
<td><strong>Mean age at end of education and training (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Britain</td>
<td>18.3</td>
<td>19.7</td>
</tr>
<tr>
<td>France</td>
<td>19.8</td>
<td>21.6</td>
</tr>
<tr>
<td><strong>Mean time from end of education to first birth (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Britain</td>
<td>7.8</td>
<td>8.4</td>
</tr>
<tr>
<td>France</td>
<td>5.8</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Source: M Ní Bhrolcháin and É Beaujouan 2012.

Population & Societies 495 (December 2012)

Population Studies

Source: Ní Bhrolcháin and Beaujouan [1].

Note: the estimates are based on a period life table for each event (first birth, completing education).
3 Empirical illustrations
→ Fertility preferences
Mean intended family size in Europe, 1990s (FFS) and 2000s (GGS): no consistent education differentials

CHINA: Preferred family size by level of education, women, 2001: Is China the main exception?

Nat. Family Planning and RH Survey 2001, N= 39,344 F aged 15-49

Source: Based on Jian Ding and Hesketh, BMJ 2006, p. 372, Tab 3
3 Empirical illustrations

→ Other family related behaviours
Pronounced education gradients found in marriage, non-marital childbearing, multi-partner fertility, unplanned pregnancies, contraceptive sue, abortions, unintended births and many other family-related behaviours

(e.g. Carlson and England 2011: Social Class and Changing Families in an Unequal America)
Czech Republic: Extra-marital childbearing by education of mother (in %)

Own computations from vital statistics data
Czech Republic: Estimated share of single, unpartnered mothers by level of education

Figure 7.5. Proportion of unpartnered mothers by education, 2007-2010. Unmarried mothers, N= 461,272.

Source: M Šťípková, doctoral dissertation 2013 (Family Change and its Impact on the Health of Newborns in the Czech Republic)
Use of assisted reproduction

Denmark: Total ART fertility and the percentage of ART births by education, women born 1964

Source:
Own computations based on registry data
DISCUSSION
Selected key findings & patterns

Education affects broad array of family and fertility behaviours

- Multiple direct and indirect pathways
- To a large extent, likely to be causal
- *Childlessness* is often the main differentiating factor
- *Education expansion* main explanation of the observed shift to later timing of births
- Small differences in *reproductive preferences* in most countries
- The “*gap*” between preferences and realised fertility: institutional factors that “hinder” realisation of fertility plans among better-educated; unintended pregnancies boosting fertility of lower-educated
- *(Non)-marriage* key determinant in more traditional societies, e.g. East Asia and Iran
Comparative analysis: Usefulness of taking a long view at changes in cohort fertility and family size by education

- Continuities across cohorts
- Convergence vs. polarization
- Decomposition of fertility change across cohorts
- Looking at the role of institutional factors, gender differentials, regional transitions (post-communist Europe, East Asia), intended family size
Future research agenda

Diversity in education-fertility transitions: *disentangling tempo, quantum, parity*

Countries nearing the end of fertility transition: role of education expansion

Tempo effect in Latin America and parts of Asia might bring fertility to very low levels

Intergeneration transmission of human capital (Maralani 2013)

Links between social status inequalities and disadvantage, family and fertility

Links between economic recession and education-specific family responses

**Policy relevance:** huge education-fertility differentials typically unintended

India and other countries: reducing fertility through education expansion?
Future plans

- Establishing informal research collaboration on education differentials in cohort fertility; facilitating data and research exchange; link to the EURREP project

*Workshop in Vienna in December 2014??*

- Creating open-access database on completed fertility.
  - At present, zero trial version with datasets for two countries (Czech and Polish census data)
Acknowledgments

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