Contribution of increasing education, adverse economic conditions and family policies to variation in Belgian period fertility, 1960-2000

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Fertility Postponement/Recovery: Relevant Factors?

• Reasons for postponement and decline of period fertility (Mills, Rindfuss, McDonald & te Velde 2011):
  - introduction/diffusion of contraceptive technology
  - rising enrollment and educational attainment
  - increasing female labour force participation
  - shift to an ‘individualistic family model’; changing role and position of children
  - rising gender equity in education and labour market under institutional constraints
  - variation in economic context and housing markets
  - changing partnership patterns
  - declining real wages

• Little quantitative evidence on the contribution of these potential causes to macro-level trends in fertility tempo (Ni Bhrolchain & Beaujouan 2012)
Fertility Postponement/Recovery: Relevant Factors?

- **Education and Fertility: Causal pathways**
  - Incarceration effect
  - Incompatibility student-parent roles
  - Increase in permanent income versus quality-quantity trade-off
  - Increasing bargaining power for women in households
  - Multiplier effect on household income through positive assortative mating
  - Knowledge of contraception and reproductive health
  - Reduction in reproductive life span after education

- **Recession induced postponement:**
  - prolonged enrolment in education
  - increasing unemployment, deteriorating job conditions and overeducation
  - reduced public expenditure (unemployment and parental leave benefits, childcare,…)
  - procyclical effect largely limited to younger age-groups and higher educated
Family Policies

- Increase in public spending on childcare after 1995, except CEE countries
- Childcare may mitigate opportunity cost, but typically small effects on fertility
- Population heterogeneity with respect to eligibility, uptake and effects has been largely neglected due to reliance on contextual data
- Differential uptake potentially relevant: opportunity costs differ strongly by level of education
- Belgium case in point: uptake among highest of OECD countries, but also among strongest socio-economic gradients

Research Questions

- Model aggregate trends from longitudinal microdata for 1960-2005
- Contribution of educational expansion, economic context and family policies to aggregate-level change in synthetic parity progression ratio to first births and mean age at first birth?
- Can these factors also explain shifts in higher-order births?
Data & Methods

- 2001 Belgian Census (N=3.500.000 women) (Deboosere & Willaert, 2004)
- Time frame: first and higher-order birth hazards between ages 15-50 in period 1960-2000

- Individual-level covariates:
  - age baseline (centered age 15, cubic effect) or duration since index birth
  - enrolment (time-varying) (Blossfeld et al. 2001, Black et al.)
  - educational level (Becker 1960)
  - duration since graduation (quadratic effect) (Skirbekk et al. 2004, Ni Bhrolchain et al. 2012)
  - education*baseline interaction
  - duration since first union (quadratic effect)

- Macro-level covariates:
  - annual unemployment rate (UR) & consumer price index (CPI)
  - lags of 1 year (postponement) and 10 years (recovery)
  - cross-level interaction age*unemployment lag 1
  - cross-level interaction education*unemployment lag 10
Methodology

• **Discrete-time hazard model** (logit) of first birth hazards:

\[
\ln \left( \frac{\hat{h}_i^t}{1 - \hat{h}_i^t} \right) = a + \sum bX \\
\hat{h}_i^t = \frac{e^{a+\sum bX}}{1 + e^{a+\sum bX}}
\]

• **Aggregate SPPR1 & MAC1-series** based on i) fitted hazards by age/year, or ii) simulated event occurrence evaluating fitted hazards against runiform(0,1):

\[
SPPR_1^t = 1 - \prod_{i=0}^{35} (1 - \hat{h}_i^t) \\
MAC_1^t = 14,5 + \sum_{i=0}^{35} \frac{(S_{i+1}^t - S_i^t)}{SPPR_1^t} (i + (i + 1))
\]

• **Assessing fit** between observed and simulated time-series:

- \( r \) zero-order correlation
- \( r_{\text{dif}} \) correlation between first-order differenced time-series
- \( |e| \) mean absolute deviation

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Educational Expansion & Aggregate-level Fertility Postponement

SPPR1 and MAC1:
Observed and Simulated Time-series

Model 1: Centred age (cubic specification)
Education (time-varying enrolment, level & duration since leaving quadratic)

**SPPR1 and MAC1 Observed & Simulated Time-series**

- **SPPR1**
  - **Model 1**: Centred age (cubic specification)
  - Education (time-varying enrolment, level & duration since leaving quadratic)

  - $R = 0.8694$
  - $R^2 = 0.7559$
  - $R_{dif} = 0.1039$
  - $|e| = 0.0211$ (0.0380 under Constant Schedule)

- **MAC1**
  - **Model 1**: Centred age (cubic specification)
  - Education (time-varying enrolment, level & duration since leaving quadratic)

  - $R = 0.9567$
  - $R^2 = 0.9152$
  - $R_{dif} = 0.3094$
  - $|e| = 0.5013$ (1.1247 under Constant Schedule)
Economic Context & Aggregate-level Fertility Postponement


All Women  None & Primary  Lower Secondary  Higher Secondary  Short Type Tertiary  Long Type Tertiary

First Births

Second Births

Third Births

Fourth Births
SPPR1 and MAC1: Observed and Simulated Time-series

Model 11:  
- Centred age (cubic specification)
- Education (time-varying enrolment, level & duration since leaving)
- Partnership (ever partnered, duration since first partnership)
- Unemployment Rate (lagged 1 & 10 years + Age*Unemployment Rate)

Observed & Simulated SPPR1

$R = 0.9586$
$R^2 = 0.9189$
$R_{dif} = 0.4715$
$|e| = 0.0095$

Observed & Simulated MAC1

$R = 0.9712$
$R^2 = 0.9432$
$R_{dif} = 0.4449$
$|e| = 0.2832$

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Cross-correlations CPI & SPPR1-4
First-order differencing, Lags [-7,+7]
SPPR2 and SPPR3
Observed and Simulated Time-series

Model 12: Time since index birth (linear discontinuity model)
Educational level (enrolment, level, time since graduation quadratic)
Age at index birth (quadratic)
Consumer Price Index (distributed lag)
Childcare coverage & Aggregate-level Fertility Recovery


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Linked Census & Register Data

2001 Census
(1 OCT 2001)

TIME

AGE

First birth
Second birth
Local Childcare coverage: contextual effects on birth hazards

Figure 3: Observed first, second and third birth hazard functions by childcare coverage, Belgium 2001-2004.
Childcare: uptake by education

Figure 3 Gross educational differentials in the uptake of formal and informal childcare arrangements after a first birth, women age 15-49 having one child.

Figure 1a Formal childcare: Crèche

Figure 1b Formal childcare: daymother
Childcare: effect on 2nd birth hazards

Figure 5. Differential effects (odds-ratios) of childcare strategy in 2001 on second birth hazards in 2001-2005 by mother’s level of education.
Decline of SPPR1 and postponement of parenthood: Educational Expansion under Adverse Economic Conditions

Educational expansion:
• requires joint consideration of:
  - enrolment
  - attainment
  - duration since leaving (quadratic) or ‘social age’

Economic Context:
• procyclical among women <30 years and counter-cyclical among women >30 years
• Unemployment rate accounts for period acceleration/deceleration in SPPR1/MAC1:
  - mean absolute deviation/year in SPPR1: < 1 percentage point
  - mean absolute deviation/year in MAC1: < 0.30 years
• Variation in purchasing power associated with variation in SPPR2/SPPR3

Childcare: strong positive educational gradient in uptake and effects

Current work:
• microsimulation model integrating effects of increasing enrolment, variation in economic context and municipality childcare coverage on subsequent birth-orders
• Census 2011 & Register 2005-2015
Thank you for your attention!

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