‘Missing births’: Decomposing the declining numbers of births in Europe into tempo, quantum, and age structure components

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Introduction (1)

Demographers usually prefer to analyse trends in various fertility indicators rather than changes in the numbers of births

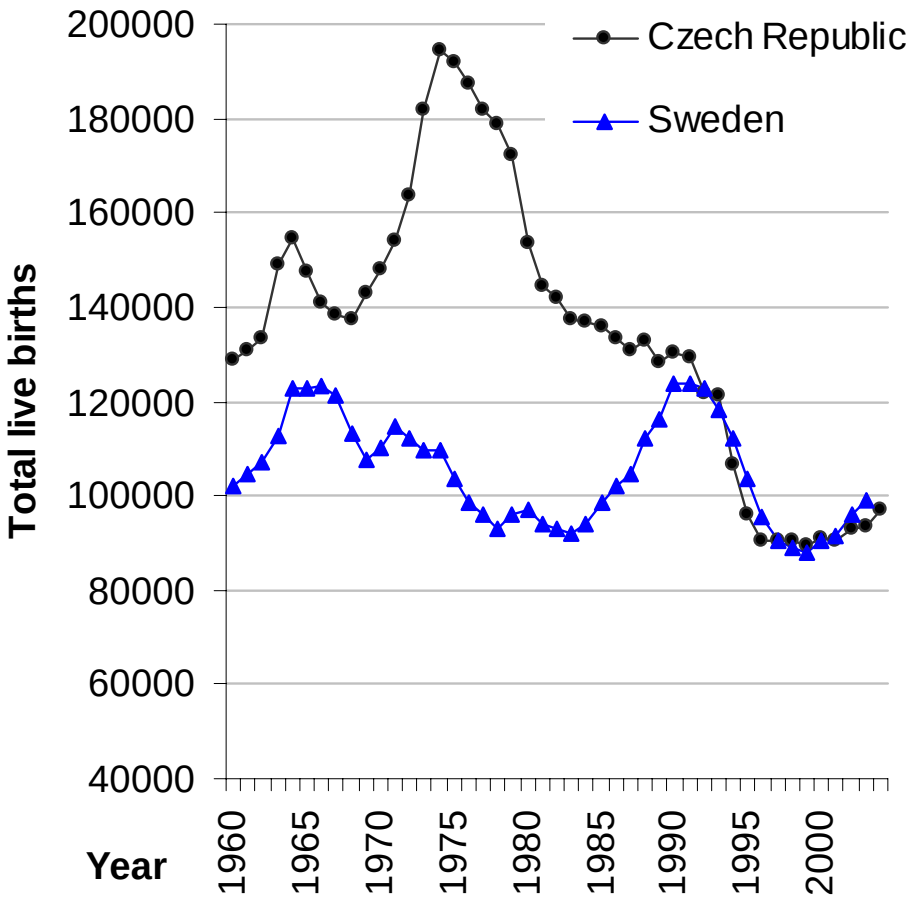
BUT…it is frequently the total number of births that matters for the future functioning of education, social security systems, or labour market

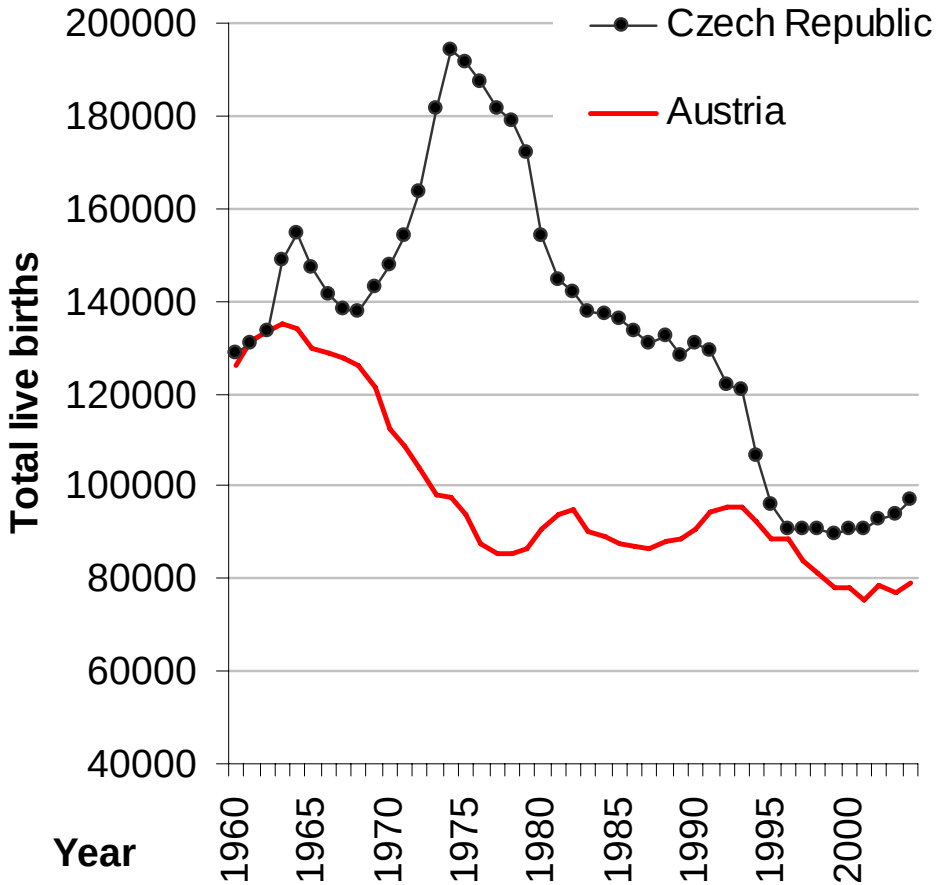
- shifts in numbers of births frequently have long-term consequences, including the "echoes" of baby booms and busts

EU (25): long-term decline in total births: 7.3 million in 1964 // 4.7 million in 2002

- cross-country differences
- which factors prominent?

Total births in Austria, the Czech Republic, and Sweden, 1960-2004





Introduction (2)

The goals of our study:

1) To discuss the decomposition of change in the numbers of births over time
   - Main focus: estimating the role of ‘tempo effects’ (increasing age at motherhood) in changing numbers of births
2) To analyse the role of three main factors—change in fertility ‘quantum’ (level), fertility ‘tempo’ (timing) and age structure of the female population (‘mean generation size’)—on shifts in births in different countries
   - Period: flexible reference year; start of fertility postponement
   - Estimating numbers of births “missing” due to fertility postponement and other factors
3) To illustrate how explicit assumptions on tempo effects may be incorporated into the projections of fertility & births
   - Illustration of different scenarios for Austria, Czech Republic, and Finland

Why tempo effects relevant?

Decomposition: Basic method (1)

We aim to distinguish the following effects:

- 1) change in the number of women in their prime childbearing years
- 2) change in fertility quantum (level)
- 3) distortions due to shifts in fertility tempo (timing)

Ad. 1) Calot's (1984) concept of the "mean generation size" *G* captures the number of women of childbearing age weighted by the age distribution of fertility schedule:

G = B / TFR, where B is the observed number of births and TFR is the period total fertility rate

-> change in G over time may occur

- due to the changes in the number of women at reproductive ages or
- due to the shifts in the relative distribution of fertility by age or
- due to the joint effect of both

We focus on changes between the reference year t_0 and any subsequent year t_1:

Index of change in time: $I_G(t_1) = G(t_1) / G(t_0)$

Decomposition: Basic method (2)

To distinguish the effects of changes in fertility tempo and quantum, we have to make explicit assumptions about calculating fertility quantum, free of tempo distortions:

- We employ a simplified version of Kohler & Ortega index of period fertility for birth order 1 & 2 combined with the ordinary TFR for orders 3+:

$$\text{adjPATFR} = \text{adjPATFR}_1 + \text{adjPATFR}_2 + \text{TFR}_{3+}$$

Then we derive the index of tempo distortion:

$$I_T(t1) = \text{TFR}(t_1) / \text{adjPATFR}(t_1)$$

-> captures to what extent is the period TFR in a given year affected by changes in the timing of childbearing

I_T can also be standardised to capture the change in the size of tempo effects from the reference year t_0:

$$I_{T(\text{STAND, t1})} = I_T(t_1) / I_T(t_0)$$

Decomposition: Basic method (3)

- Index of quantum change, I_Q, is based on changes in adjPATFR from the reference year t_0

$$I_Q(t_1) = \text{adjPATFR}(t_1) / \text{adjPATFR}(t_0)$$

Indexes I_G, I_T, and I_Q are used to decompose the change in total births B over time:

$$B(t_1) = B(t_0) \cdot I_G(t_1) \cdot I_Q(t_1) \cdot I_{T(STAND,\, t_1)}$$

  - when t0 taken as a benchmark, these indexes can serve for estimating how many births have been "missing" or "gained" due to changes in G, fertility tempo, quantum, and interaction of these changes in any subsequent period

ANALYSIS (1)

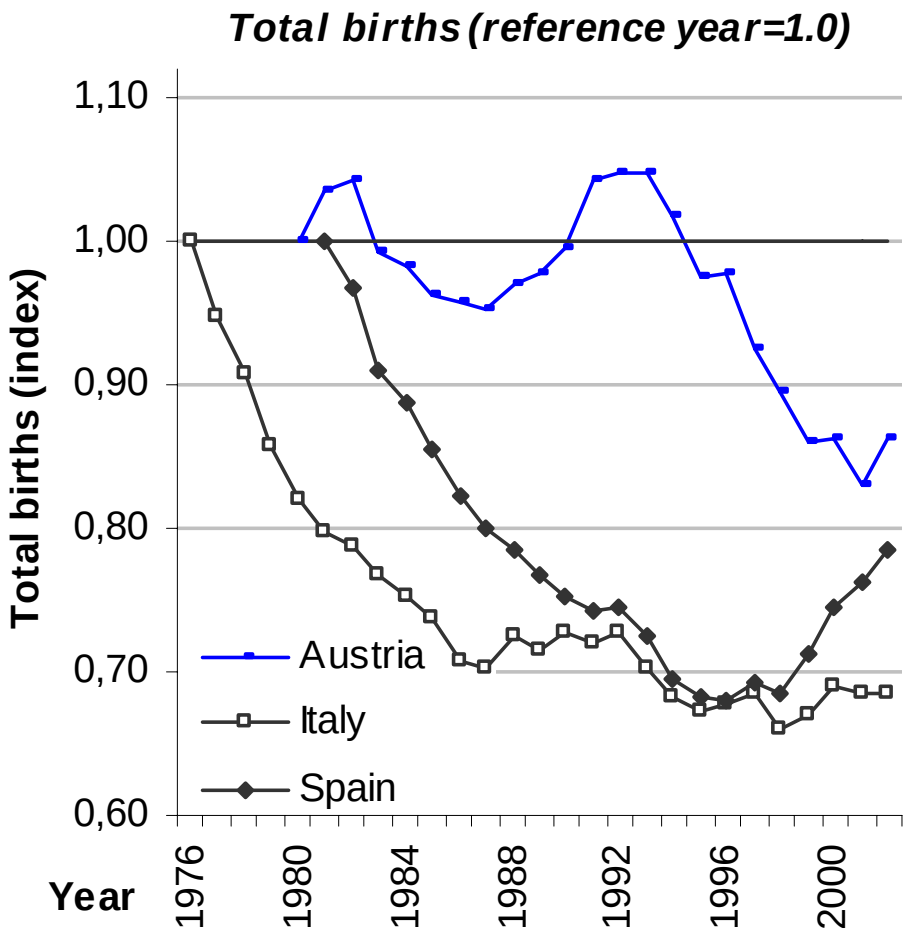
- Our analysis: numbers and proportion of births "gained" or "missing" due to different effects since the beginning of fertility postponement
  - How important was the shift to later childbearing in reducing the number of births?

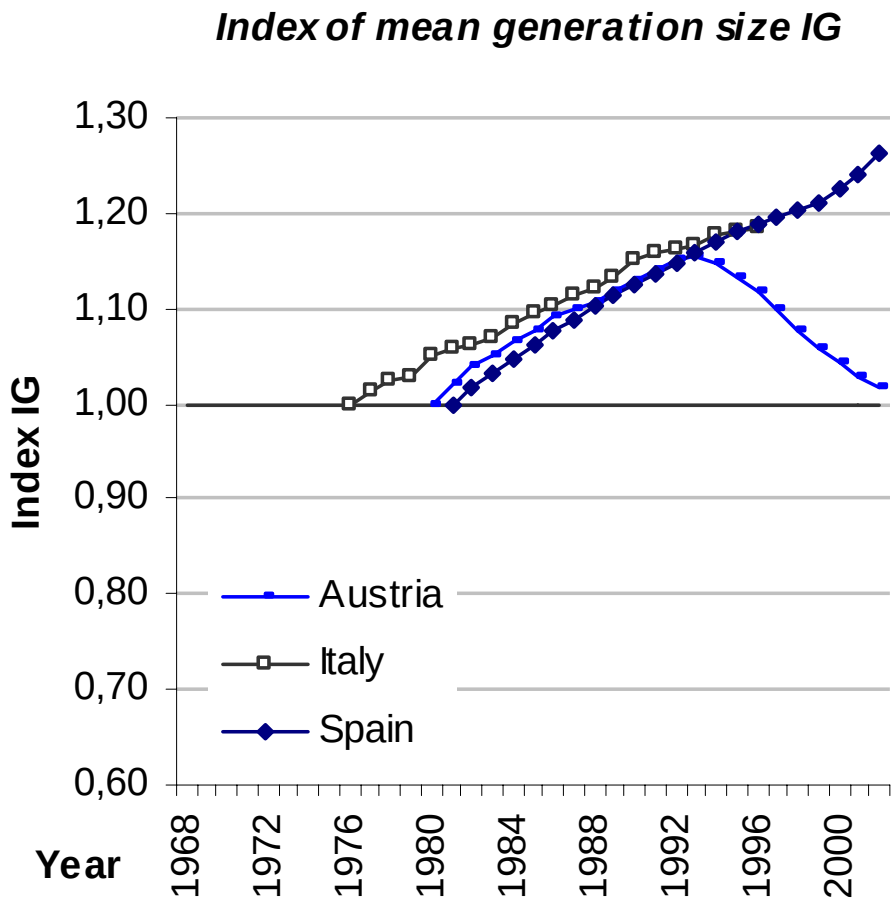
- 13 countries covering different regions (except the former Soviet Union)

- We present our detailed analysis for Austria, Italy, and Spain & main results for Denmark, Sweden, Poland, and the Czech Republic

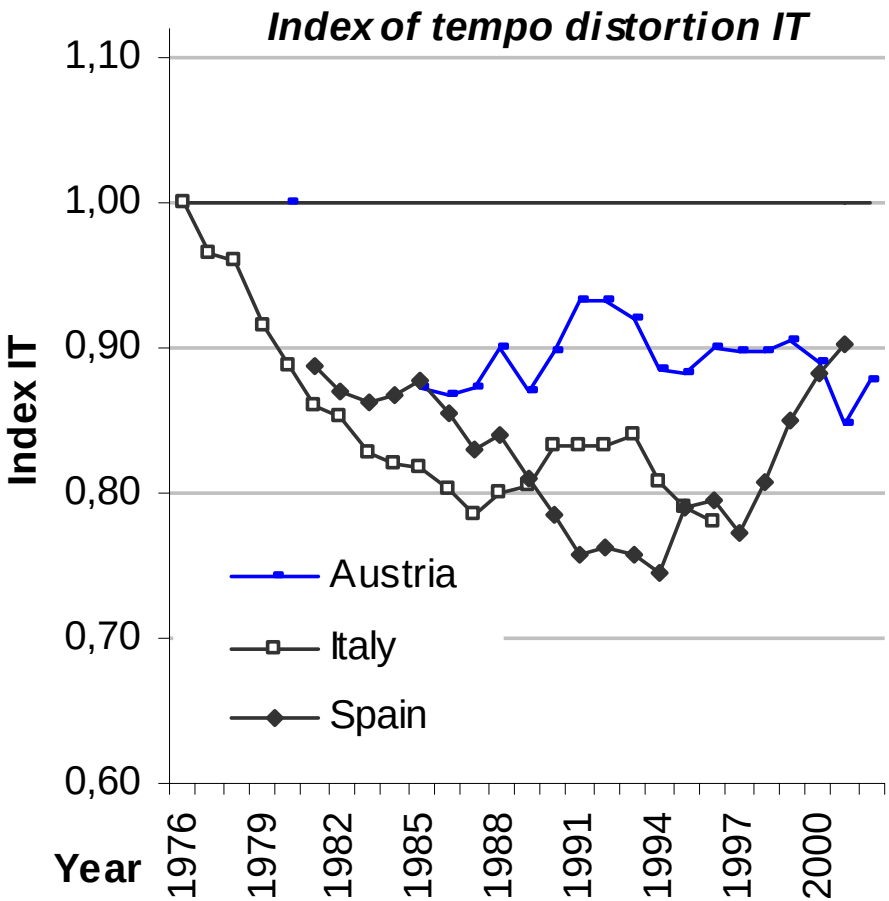
ANALYSIS: Austria, Italy, and Spain (1)

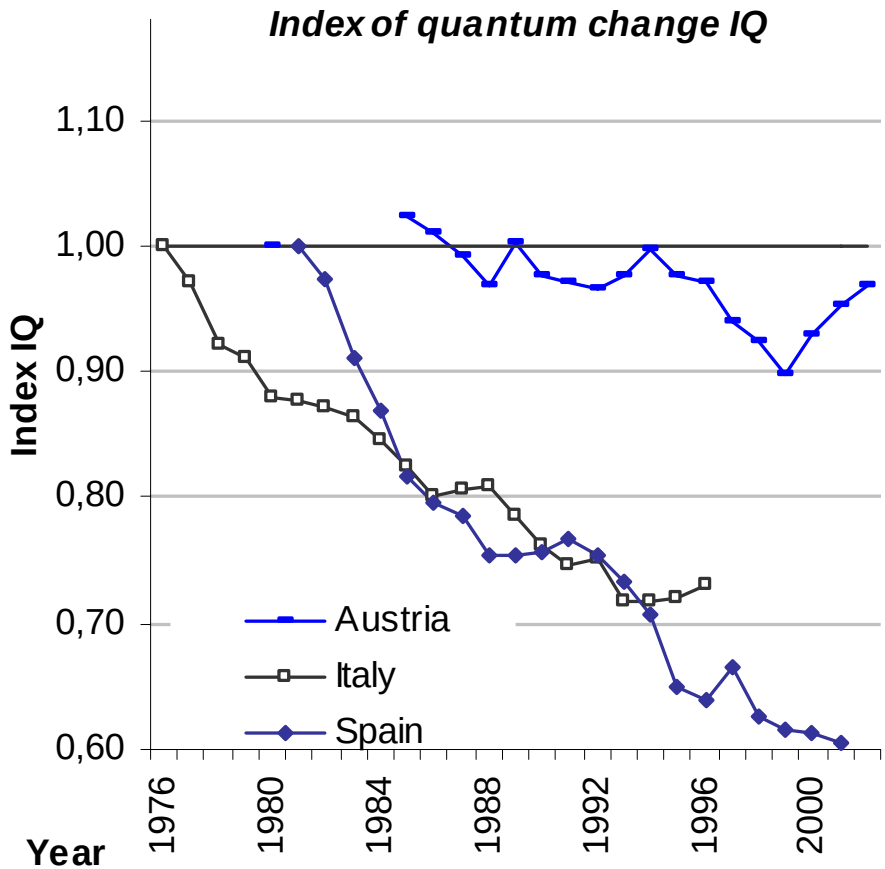
- Change in total births & the indexes I_G, I_T, and I_Q





ANALYSIS: Austria, Italy, and Spain (2)

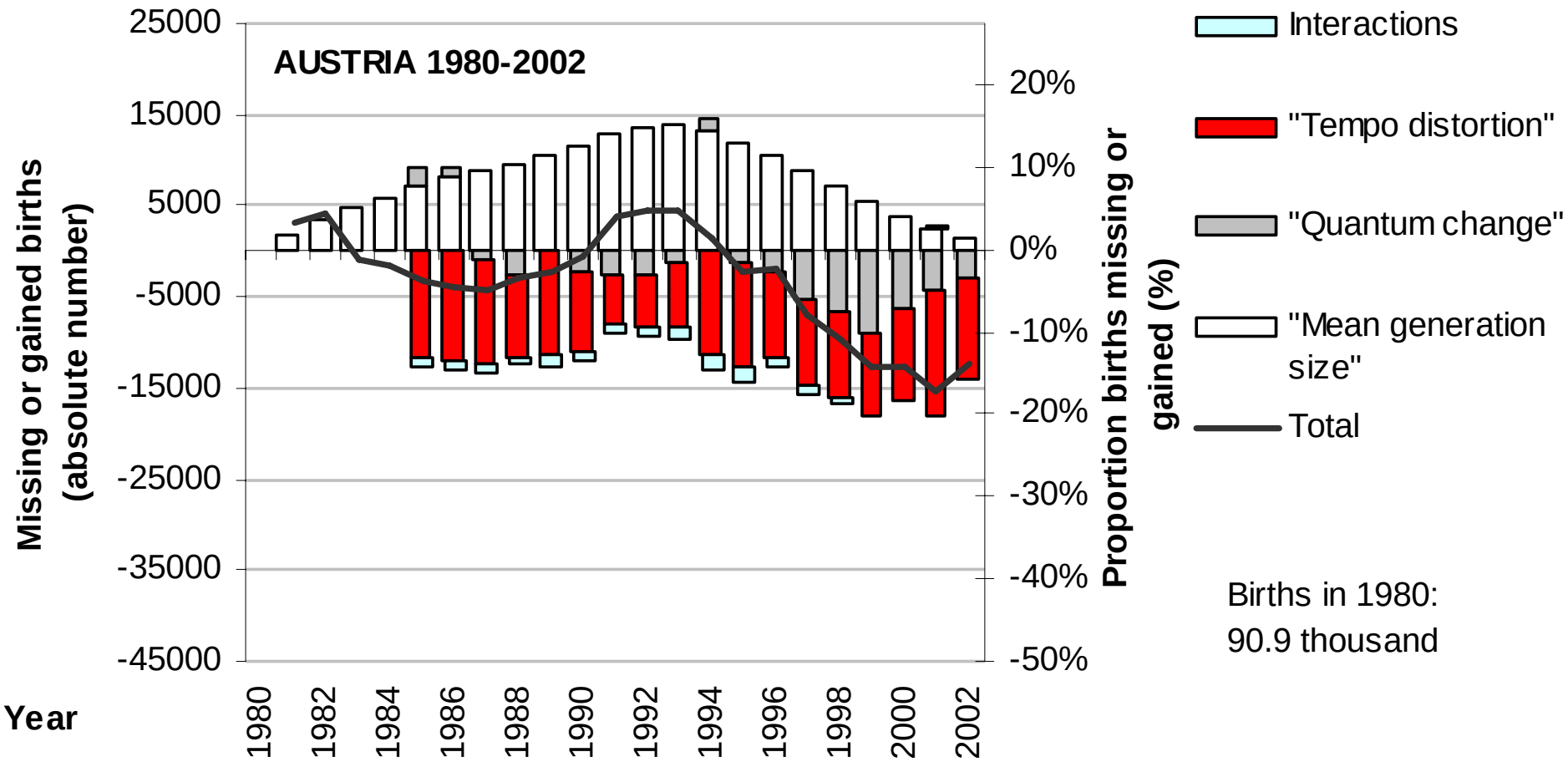




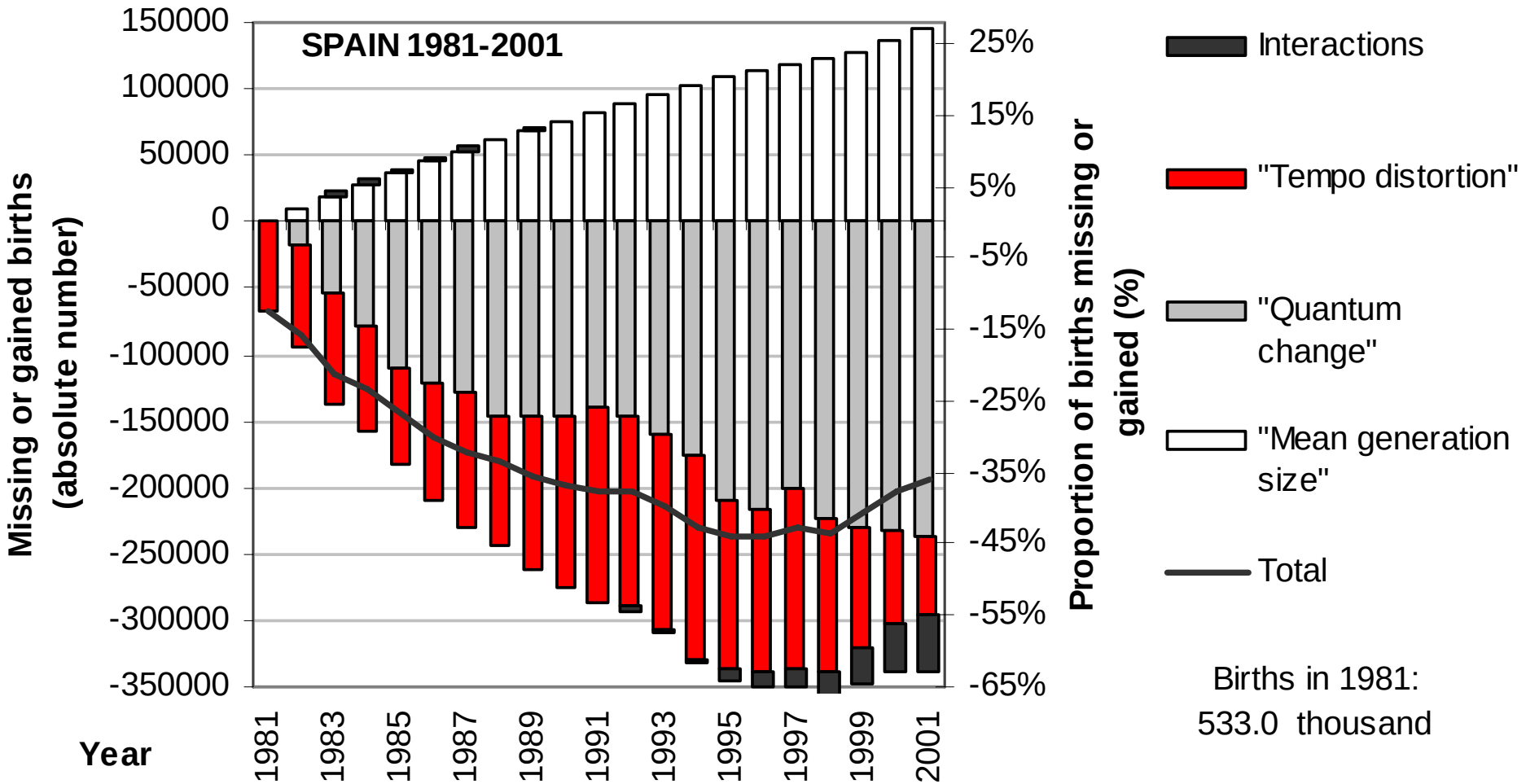
Austria, Italy, and Spain (3): Detailed decomposition

	Austria	Italy	Spain
Reference year t_0	1980	1976	1981
Analysed period t_1	1985-2002	1977-1996	1982-2001
Births in the reference year t_0	90.9	781.6	533.0
Hypothetical births in t_0 (without tempo effects)	90.9	781.3	599.9
Mean annual births in t_1	86.6	591.4	410.9
Mean annual "missing" or "gained" births in t_1	-4.3	-189.9	-189.0
Of which due to			
Tempo effects	-9.8	-124.6	-107.5
Quantum changes	-2.5	-144.0	-156.3
Mean gen. size G	9.0	83.6	82.0
Interaction	-0.8	-4.8	-7.2
Mean annual influence of different factors (relative to the hypothetical births in t_0)			
Tempo effects	-10.9%	-15.9%	-17.9%
Quantum changes	-2.8%	-18.4%	-26.1%
Mean gen. size G	9.9%	10.7%	13.7%
Interaction	-0.9%	-0.6%	-1.2%
Total births missing due to tempo effects			
Absolute	-177.5	-2492.1	-2150.0
Relative to births in 2000	2.3	4.6	5.4

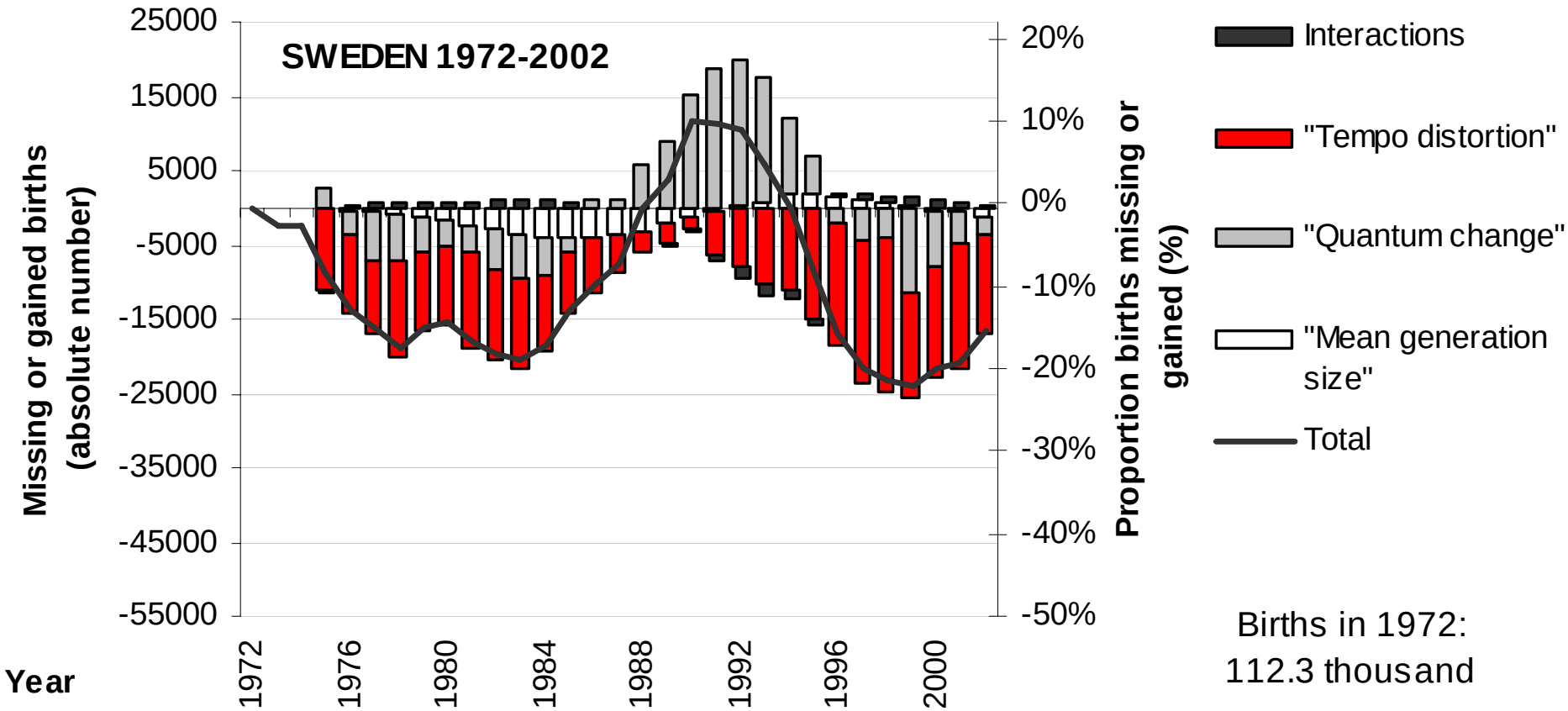
Analysis: “Missing” or “gained” births (Austria)



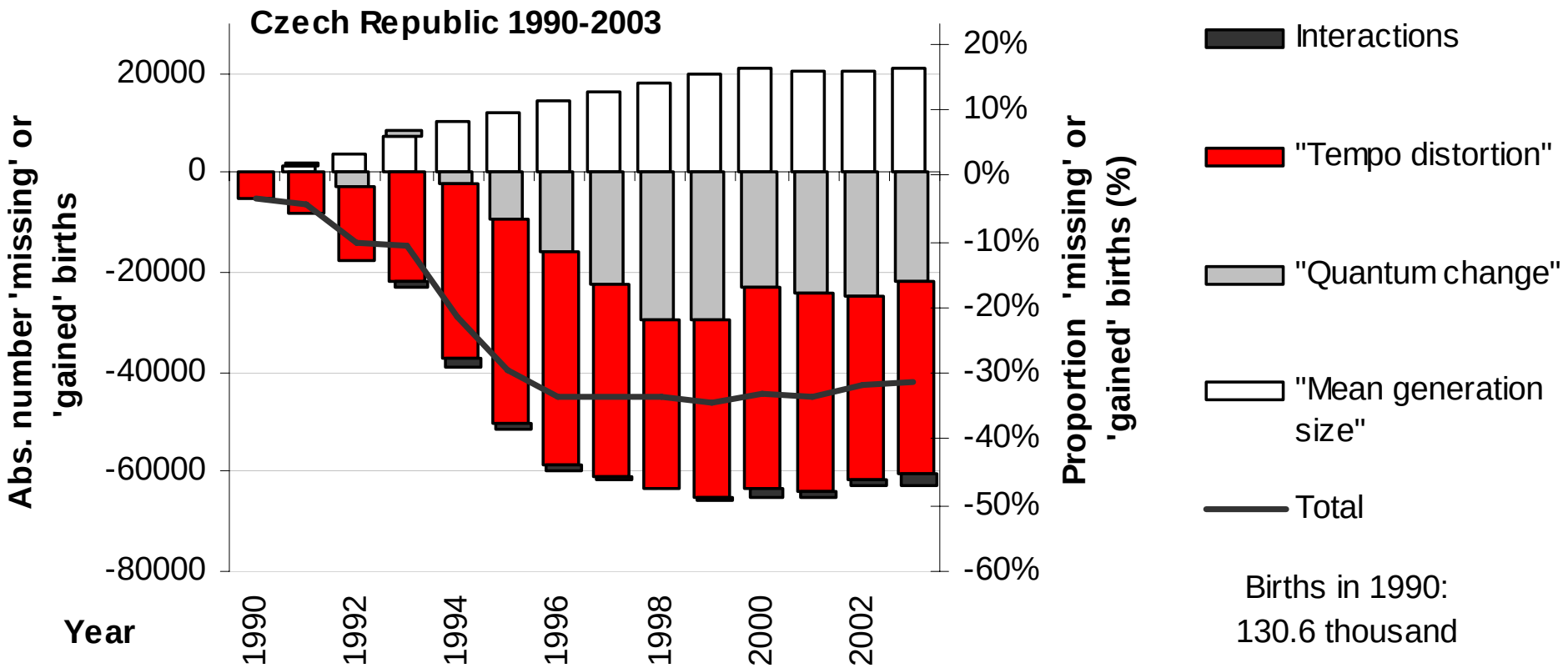
Analysis: “Missing” or “gained” births (Spain)



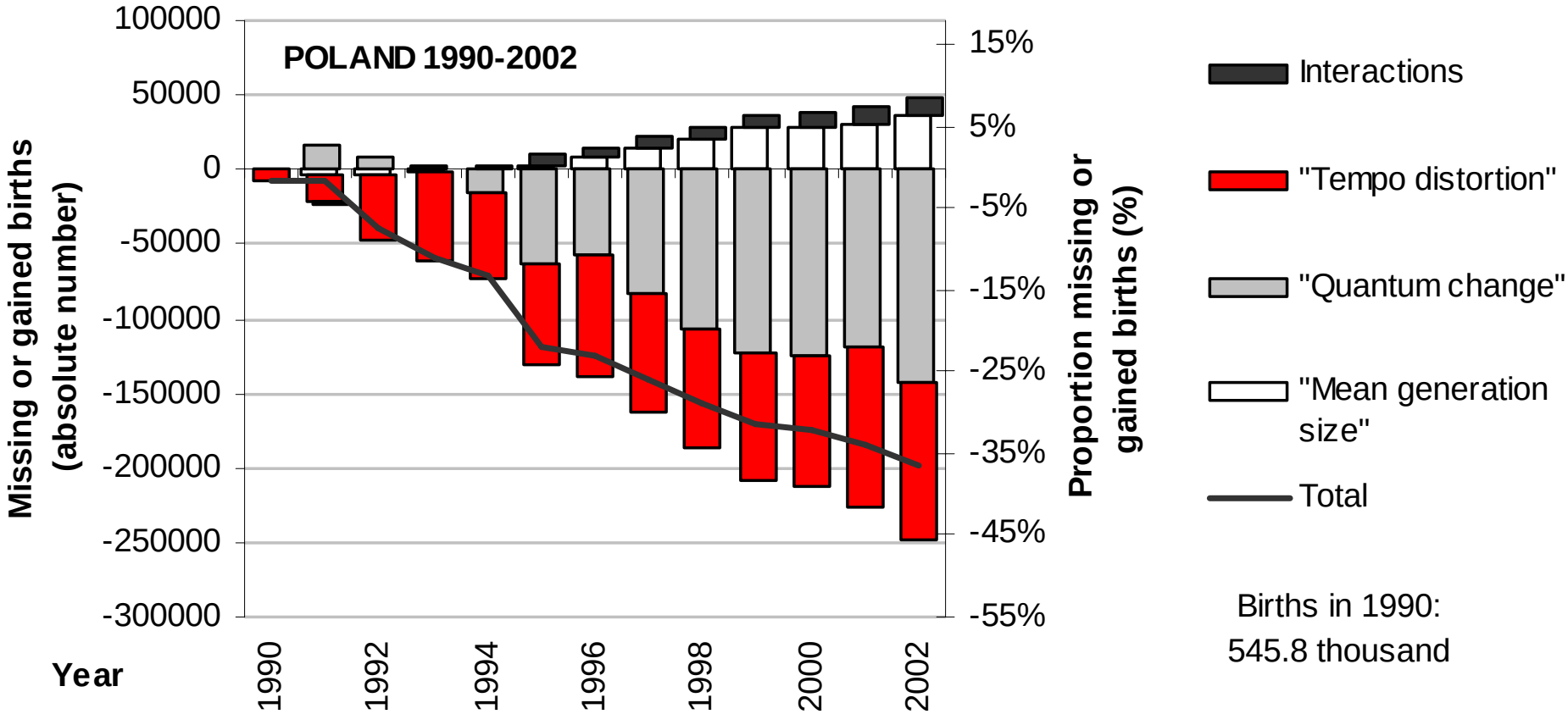
Analysis: “Missing” or “gained” births (Sweden)



Analysis: “Missing” or “gained” births (Czech Rep.)



Analysis: “Missing” or “gained” births (Poland)



PROJECTIONS (1)

- Insights based on past trends may be utilised for constructing projection scenarios
- ARGUMENT: projections of fertility and births may be improved by incorporating explicit assumptions of future changes in fertility timing
  - Two equally important aspects: expected duration of changes in fertility timing & the size of tempo effects
- Main assumption: net of other factors, ending of fertility postponement will be associated with an increase in the number of births
  - Other developments (intensifying pace of fertility delay, shift to a younger childbearing ages) imply substantially different consequences

Projections: Projection scenarios

We model future age-specific fertility rates and compute total numbers of births based on 3 main scenarios

Countries: Austria, the Czech Republic, Finland

Projection horizon: 2005-2025; EU median projected population used

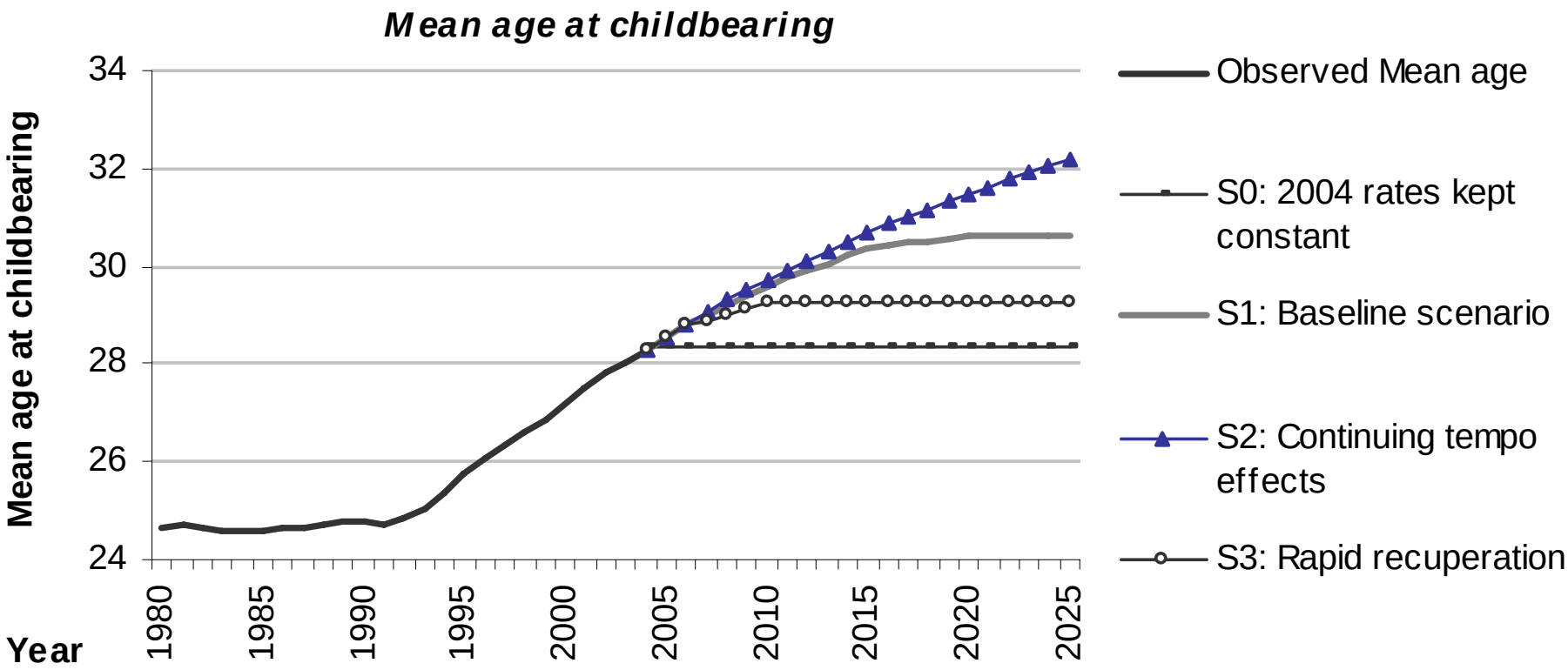
- 1) Baseline: fertility postponement continues until 2015 and gradually ends up until 2020
- 2) A ‘continuing postponement’ scenario: postponement continues throughout the projection period
- 3) A ‘rapid recuperation’ scenario: postponement stops in the near future; gradual ending of tempo effects during 2005-2010

Comparative scenario: keeping the most recent (2003-4) observed age-specific fertility constant

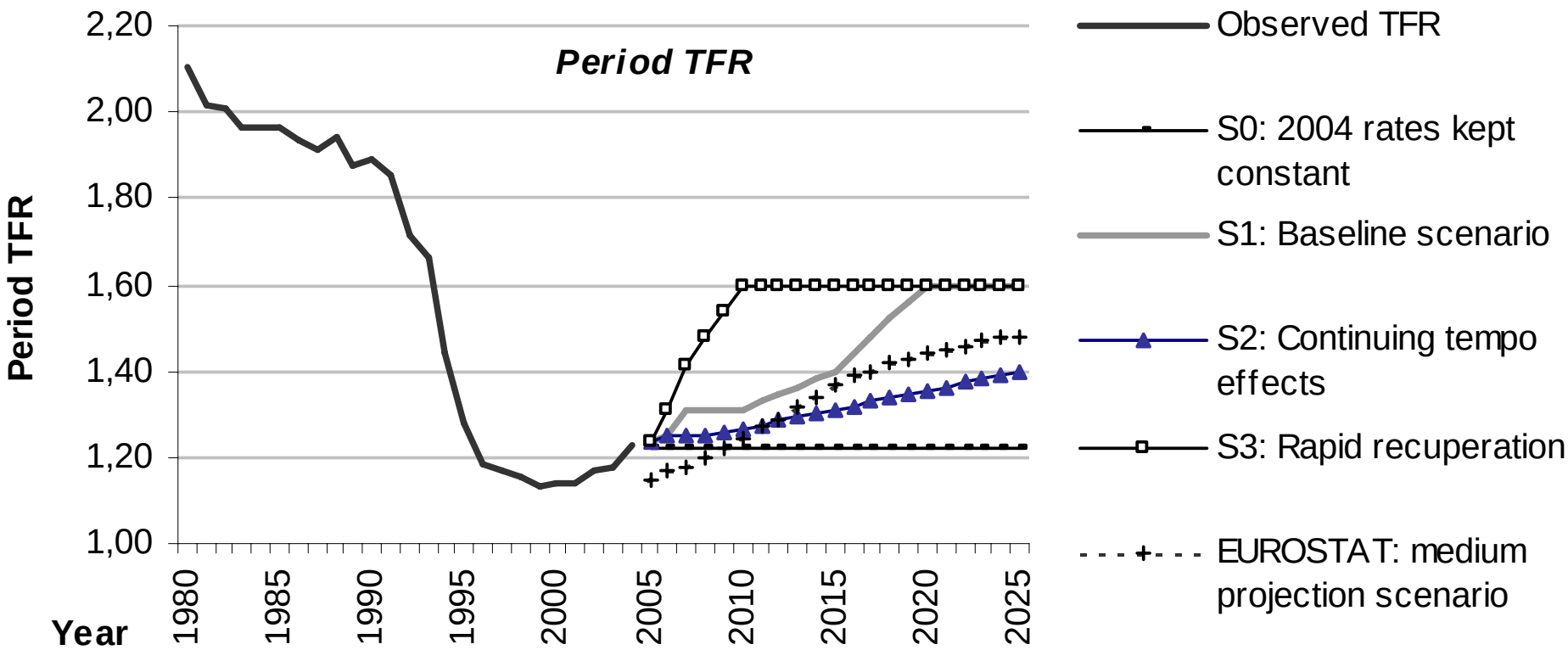
Keeping assumptions realistic: shape of fertility by age & limits to the mean age at childbearing (32 in the ‘postponement continues’ scenario)

Main interest in tempo effects; we disregard potential changes in fertility level

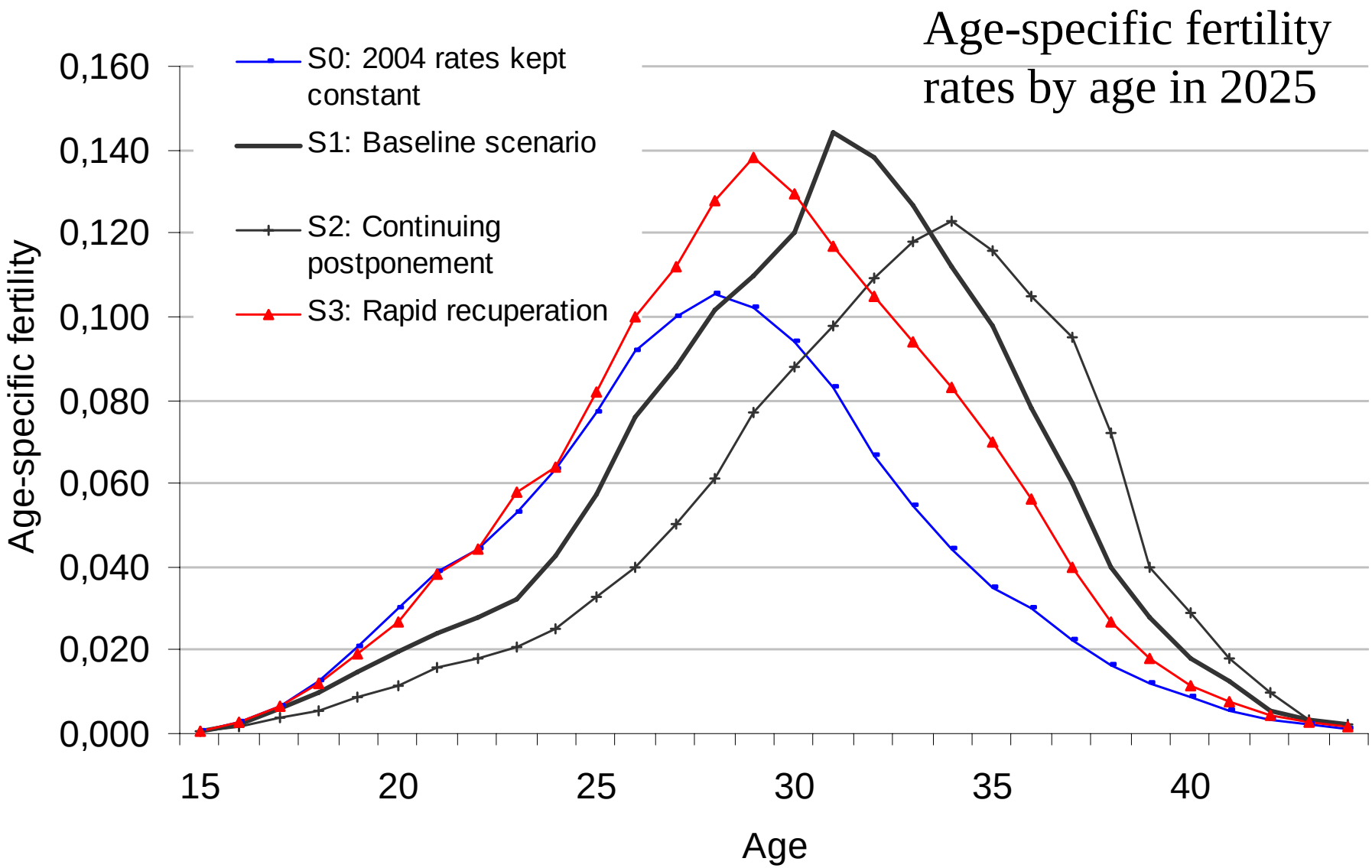
Projection parameters: Czech Republic (1)



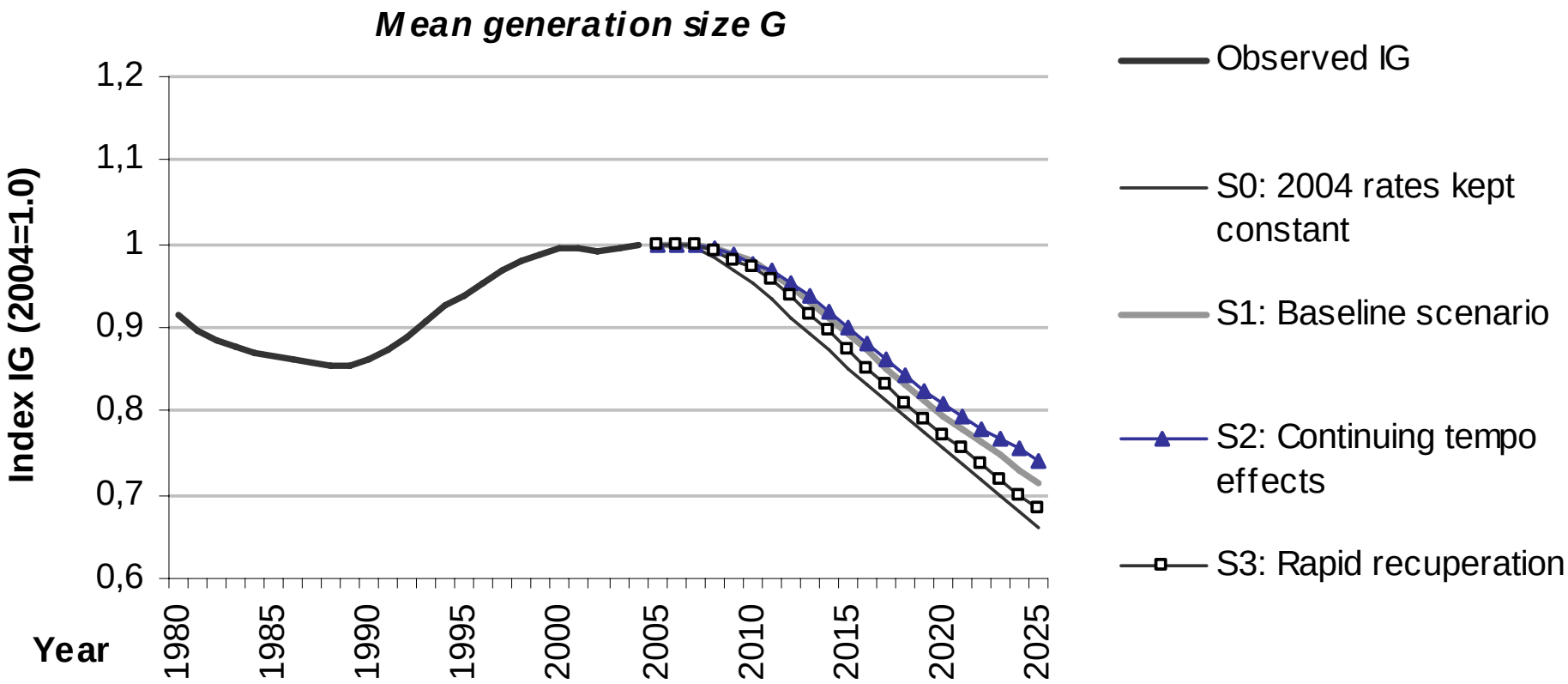
Projection parameters: Czech Republic (2)



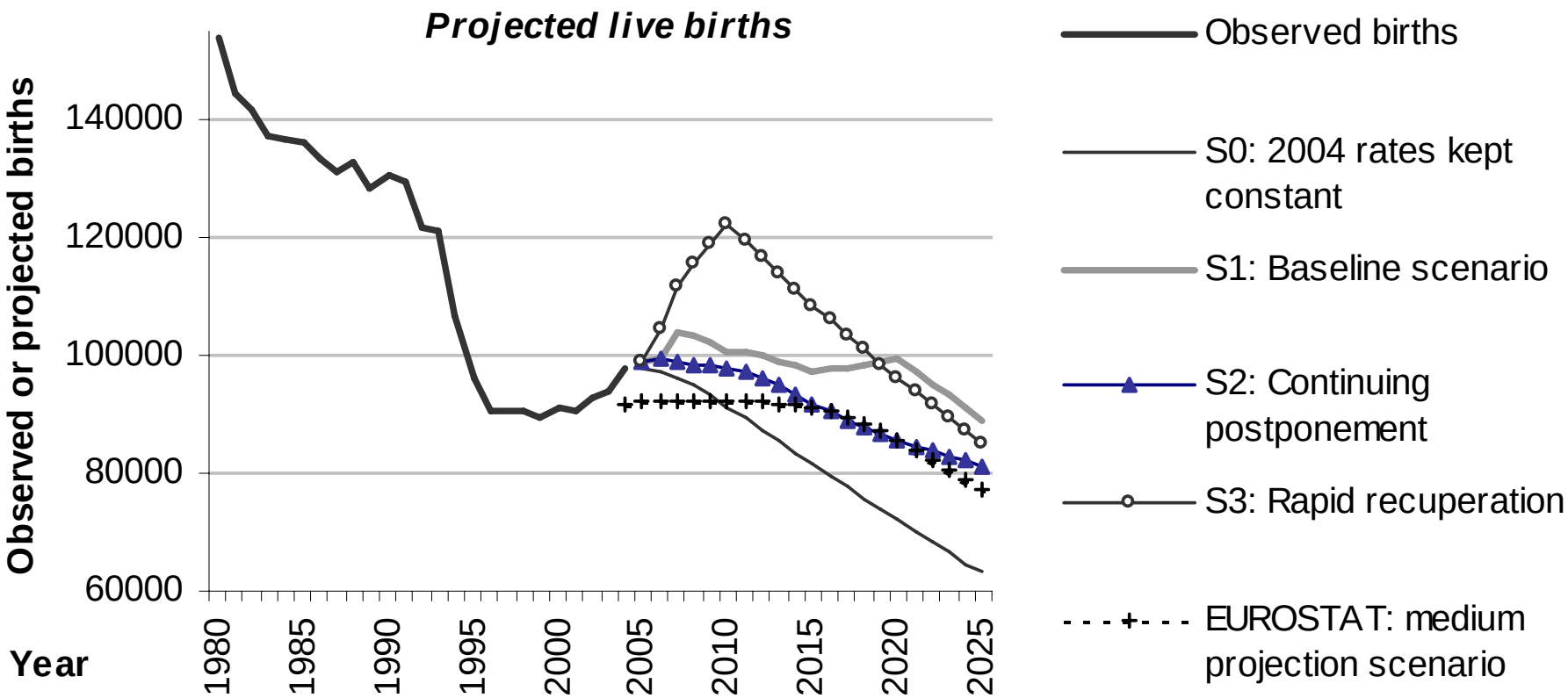
Projection parameters: Czech Republic (3)



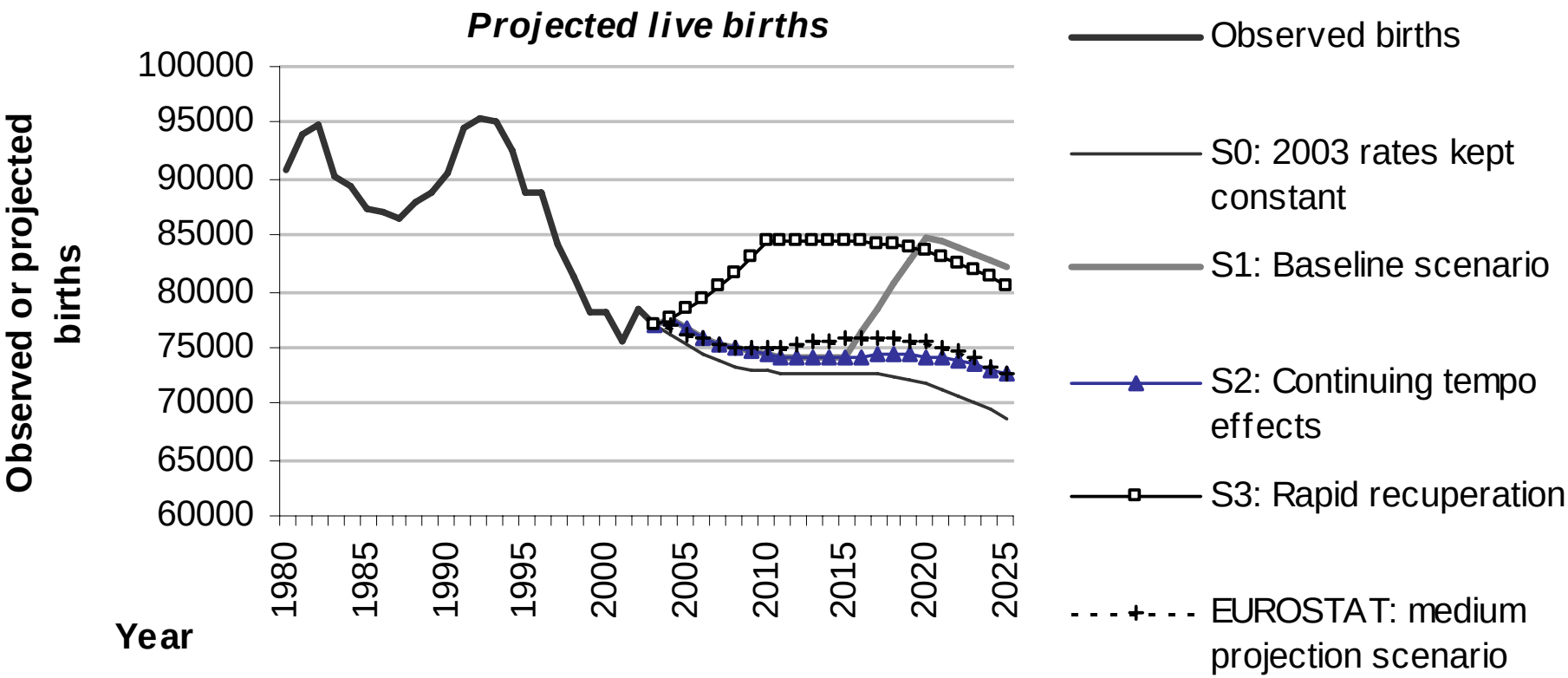
Projection parameters: Czech Republic (4)



Projection results (1): Czech Republic



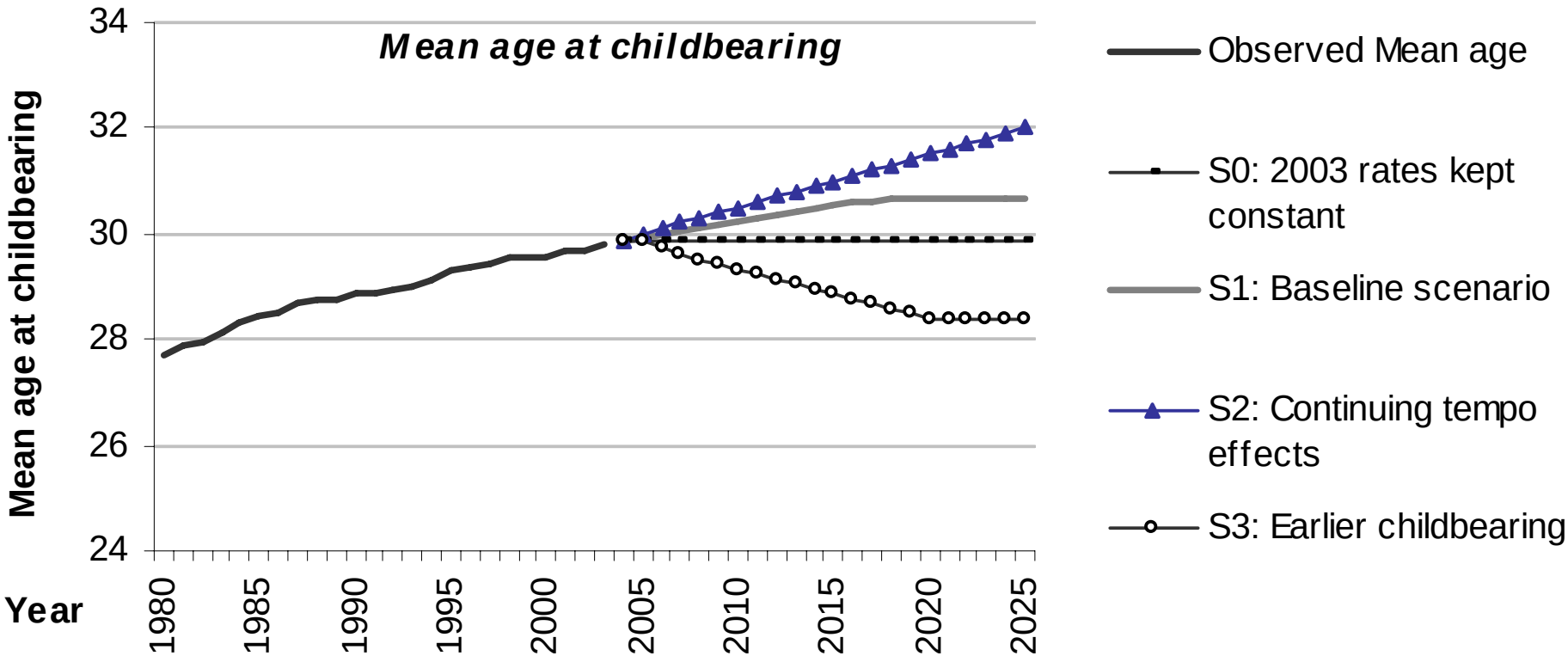
Projection results (2):Austria



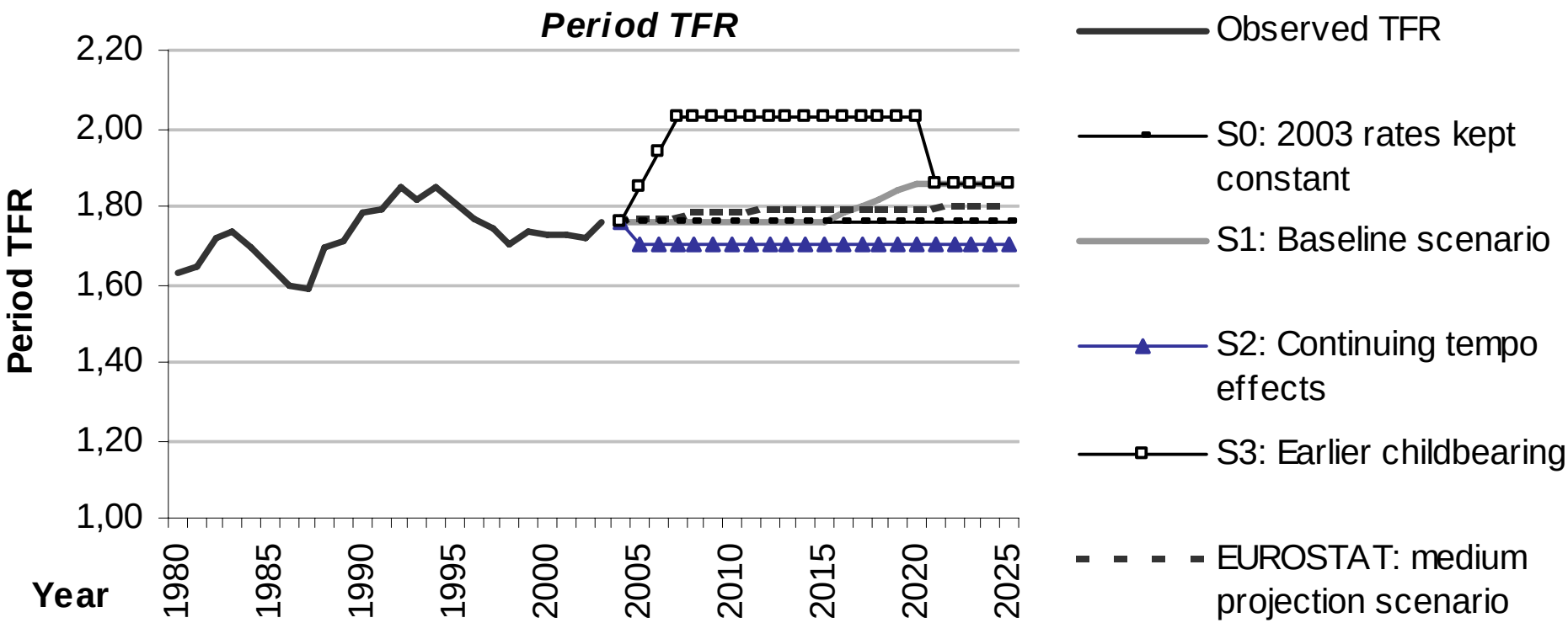
Projection: Finland (1)

- Family Federation of Finland proposed the following aims (Söderling 2005):
  - 1) increasing the period TFR from 1.8 (1.76 in 2003) to 1.9
  - 2) lowering the mean age of women at first birth from 28 to 26
- Our scenarios investigate possible consequences of attaining the latter goal for the number of births and demonstrate that:
  - The first goal can be merely reached by stabilising the current mean age at childbearing rather than decreasing it
  - The second goal would imply an increased TFR (probably above 2.0) and the number of births for an extended period of time

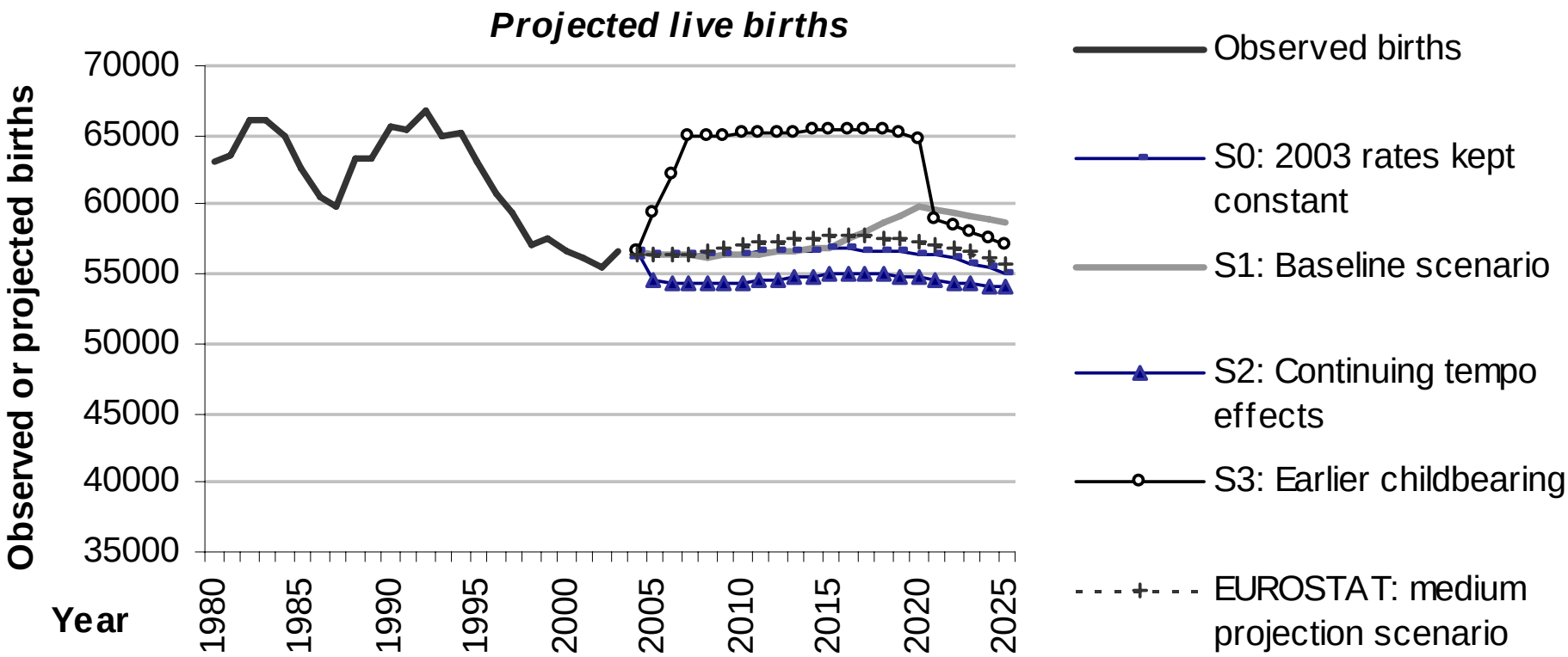
Projection: Finland (2)



Projection: Finland (3)



Projection: Finland (4)



Summary & conclusions (1)

Cross-country differences in the role of tempo effects in declining numbers of births:

- Delayed childbearing had some negative effects in all countries analysed
- In Austria, Denmark, Sweden, Czech Republic, Hungary, and Poland, fertility postponement was the major force affecting negatively numbers of births

In all countries except Hungary and Sweden: positive effect of the mean generation size of mothers helped to offset the negative effects of declining fertility tempo and quantum

Without fertility postponement, only Austria, Denmark, and Sweden would recently have similar numbers of births as at the start of postponement

Summary & conclusions (2)

Explicit incorporation of assumptions on future tempo distortions can make fertility projections more realistic & transparent (also easier to evaluate)

- Considerable differences in projected numbers of births under various scenarios
- Medium scenarios of the UN (2005) and EUROSTAT (2005) projections assume that fertility rates will eventually increase in the countries with very low fertility, but fail to specify why this should occur

Future: negative effects of changing mean generation size G can be partly counter-balanced by the ending fertility postponement

U.S.: long tradition of studies of long-term economic and social effects of baby booms and busts (Easterlin, Macunovich). In Europe, the possible effects of cohort size yet unexplored.

- More research needed!