

Using EU-SILC for demographic analysis in Europe
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Fertility Analysis with EU-SILC: A Quantification of Measurement Bias

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Context

- EU-SILC is increasingly used in demographic analysis
- For fertility analysis it allows:
 - A comparative analysis for a large international sample
 - Modelisation of individual and household characteristics and institutional determinants
 - Control for endogeneity (follow-up survey)

Context

- However, EU-SILC has not been designed to directly measure fertility indicators
- So far there exists no comprehensive analysis of the representativeness of fertility behavior reported by EU-SILC
- This research quantifies the quality of fertility measures in EU-SILC

Methodology

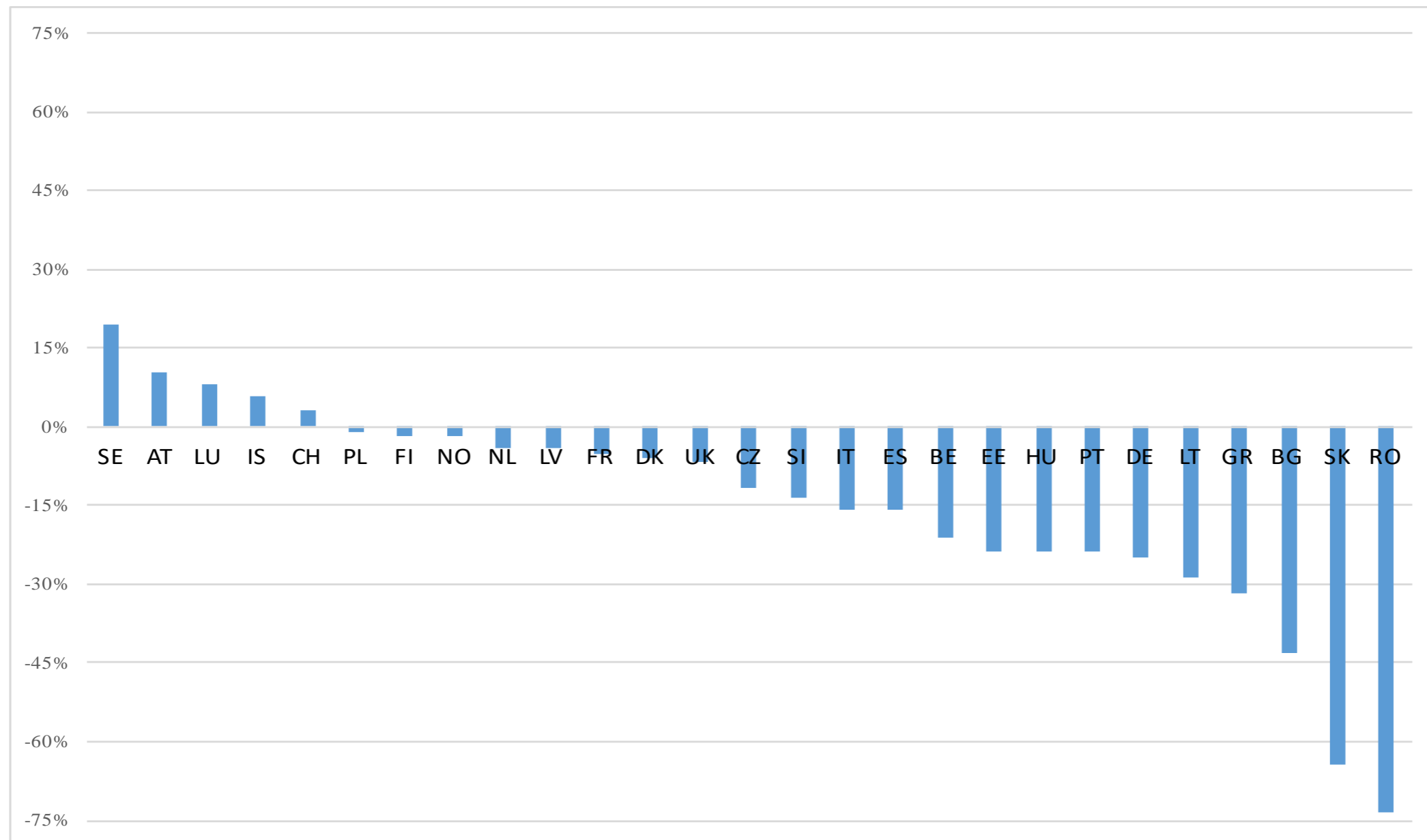
- A systematic comparison of fertility measures (TFR and CFR) between EU-SILC, Human Fertility Database (HFD) and World Bank World Development Indicators (WB WDI)
- Measurement of the TFR- and CFR-quality with SILC
- Implications of the differences for the research analysis
- Proposition to improve the fertility measures with EU-SILC

Methodology

- EU-SILC does not report information on the number of children directly
- However, children are observed with a proper identification number when living in their parents' households
- It is then possible to compute TFR and CFR with the 'own children method'

A systematic underestimation of TFR in EU-SILC

Relative difference between SILC and WB WDI measure



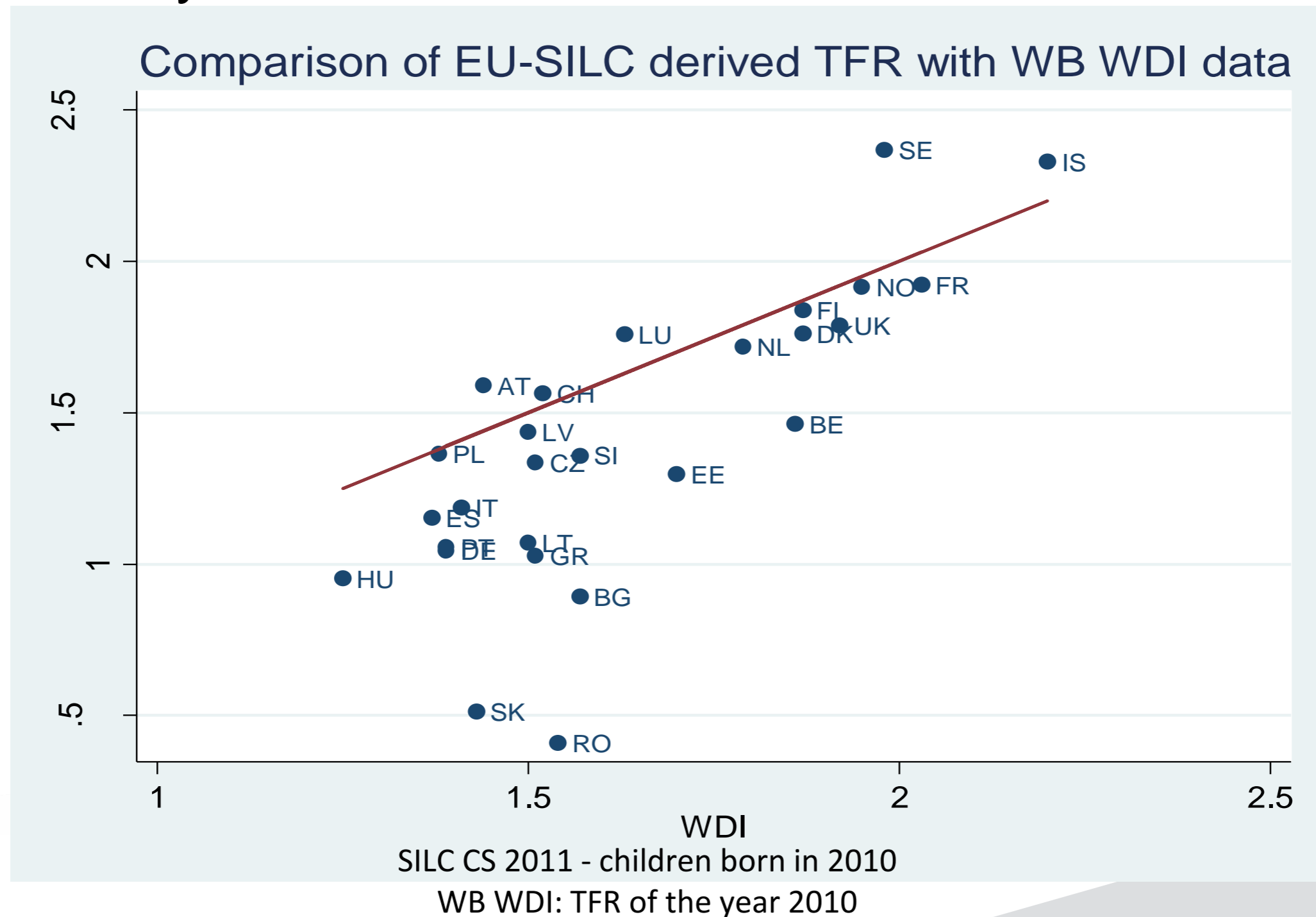
SILC CS 2011 - children born in 2010
WB WDI: TFR of the year 2010

A systematic underestimation of Fertility in EU-SILC

- Underestimation of TFR by 15% on average
- But bias quite heterogeneous between countries
- Countries with high fertility rates are not automatically the ones with the highest biases in SILC
- SILC identifies the same highest-high and lowest-low fertility countries as WB WDI

A systematic underestimation of fertility in EU-SILC

- SILC identifies the same highest-high and lowest-low fertility countries



How to explain this underestimation?

- The 'own children method', is known to underestimate TFR
- Between the date of birth and the time of the survey, some children may die and some children may no longer live with their mother/parents
- Omissions of new-born children by respondents can also lead to understating this measure
- However, the underestimation caused by these factors is known to be very low in European countries (5%)

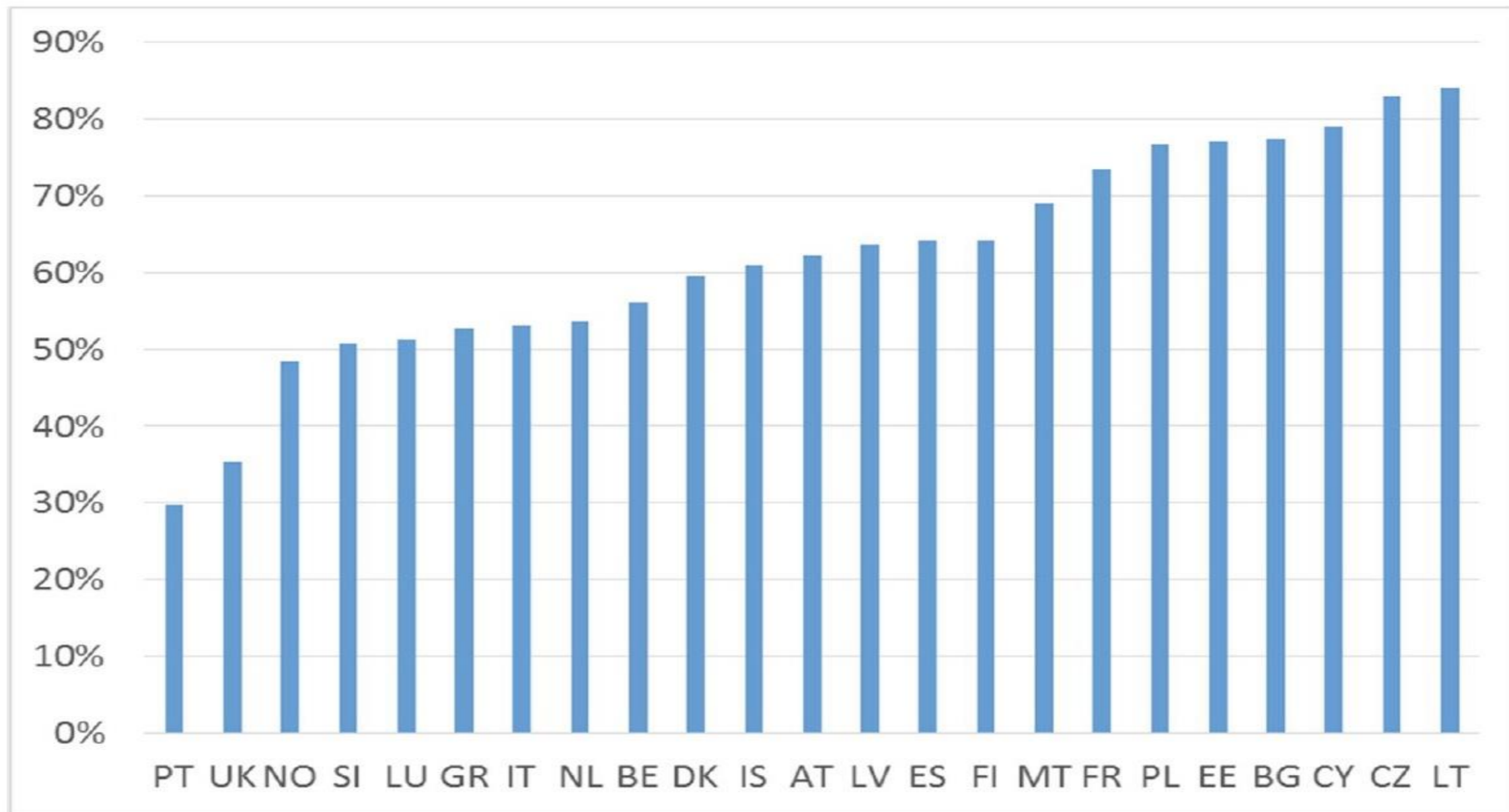
How to explain this underestimation?

- 1- Some parents do not declare having a new child shortly after childbirth, but provide information about their children with a certain time delay
- 2- Parents who just had a child, who are about to have children, or who are at least likely to have children, are underrepresented in the sample (sampling selection bias)
- 3- Parents who are planning to have a child, who are about to have a child, or who have just had a child might move due to this event, which would increase the risk of dropping out of the survey (sampling attrition bias)

How to explain this underestimation?

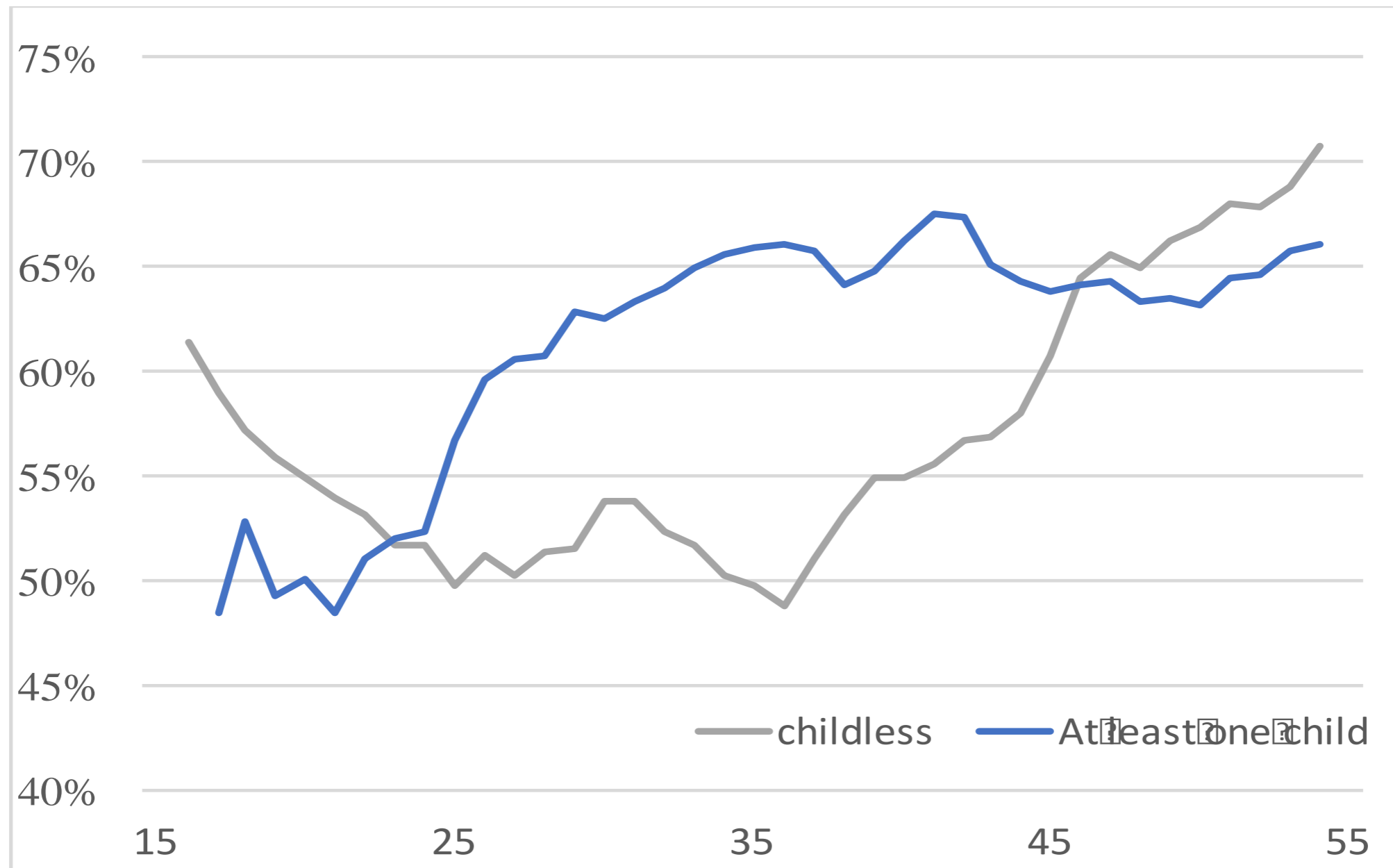
- On average for 23 European countries, 61% of women are followed up for four years.

Proportion of women being followed up for 4 years



How to explain this underestimation?

Proportion of women being followed up for 4 years, by age and number of children



SILC LT 2009-2012, women aged 15 to 55, 3 year MA
Weighted average of 23 European countries

Impact for Demographic analysis?

Table 1: Estimated coefficients for women being followed-up for four years, EU (23) (logit regression with robust standard errors)

| | Without country fixed effects | With country fixed effects |
|------------------------------------|-------------------------------|----------------------------|
| Household type | | |
| Single | -0.328*** | -0.273*** |
| Lone parent | -0.179*** | -0.192*** |
| Couple with children | Ref. | Ref. |
| Couple without children | -0.111** | -0.119** |
| Age | | |
| 15-17 | -0.130 | -0.255** |
| 18-21 | -0.275*** | -0.374*** |
| 22-25 | -0.391*** | -0.422*** |
| 26-29 | -0.314*** | -0.350*** |
| 30-34 | -0.130*** | -0.124** |
| 35+ | Ref. | Ref. |
| Household tenure status | | |
| Owner | Ref. | Ref. |
| Rent in market rate | -0.546*** | -0.456*** |
| Rent-subsidized | -0.189*** | -0.163** |
| Accommodation free | 0.0413 | -0.0633 |
| Degree of urbanisation | | |
| Densely populated area | Ref. | Ref. |
| Intermediate area | 0.0310 | 0.166*** |
| Thinly populated area | 0.439*** | 0.344*** |
| Education | | |
| Low | -0.166*** | -0.0531 |
| Middle (upper secondary) | | |
| High (tertiary) | -0.00854 | 0.0387 |
| Mother present in household | | |
| No | Ref. | Ref. |
| Yes | 0.0608 | 0.0153 |
| Activity status | | |
| Working | Ref. | Ref. |
| Unemployed | -0.0768 | -0.0906 |
| Inactive | -0.0342 | -0.0119 |
| Student | 0.176*** | 0.206*** |
| Country fixed effects | | |
| | no | yes |
| Constant | 0.753*** | 0.731*** |
| Pseudo R ² | 0.03 | 0.07 |
| Number of obs. | 32108 | 32108 |

- Demographic characteristics linked to fertility are highly related to attrition once socioeconomic characteristics and other side effects are controlled for
- Childless women aged 20 – 30 (who are ‘at risk’ of having a first child) have the highest dropout rates.
- No significant differences between employed, inactive, and unemployed women.
- No significant differences between education groups in the probability of being followed up for four years.

* p<0.05, **p<0.01, *** p<0.001

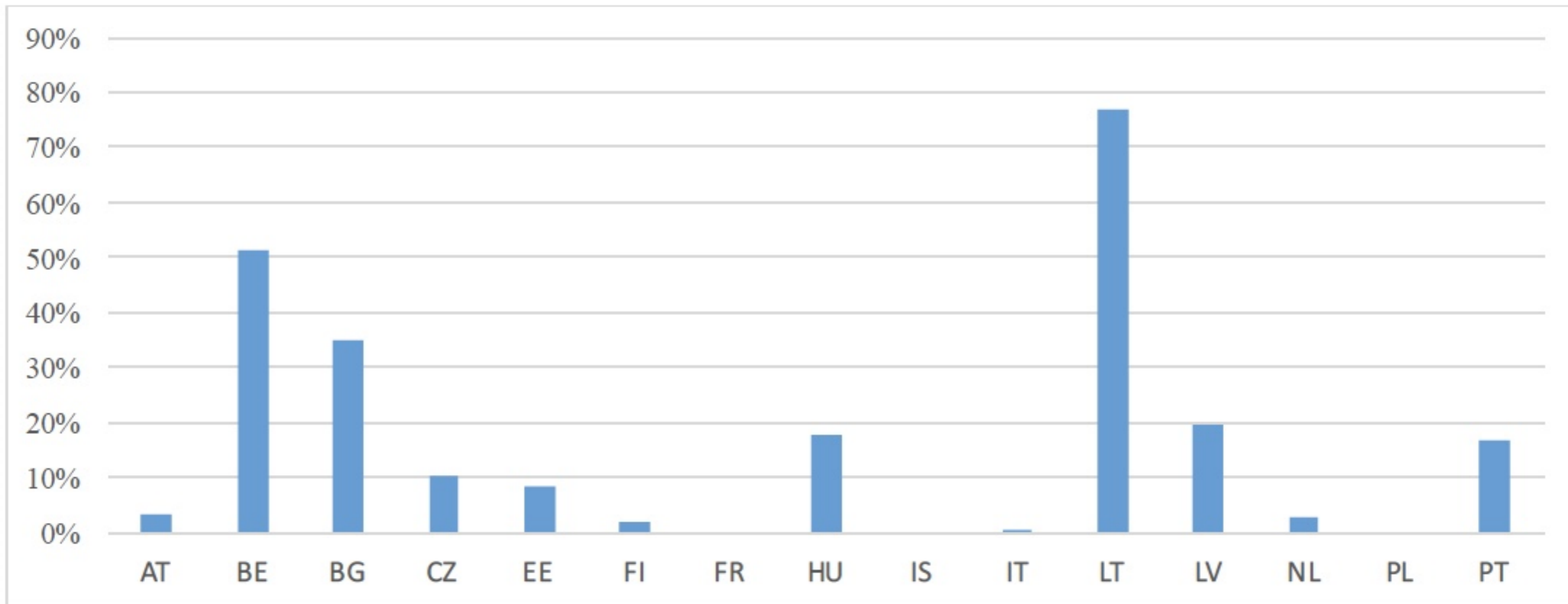
What can we do to improve fertility measures?

- Hypothesis: the downward bias in TFR in the cross-sectional database is linked to attrition
- Following the logic that childbirth causes attrition, total fertility rates should be lower for those rotation groups in the cross-sectional EU-SILC sample that contain individuals who have been observed for more than one wave.

What can we do to improve fertility measures?

1-Using the most recent rotational group

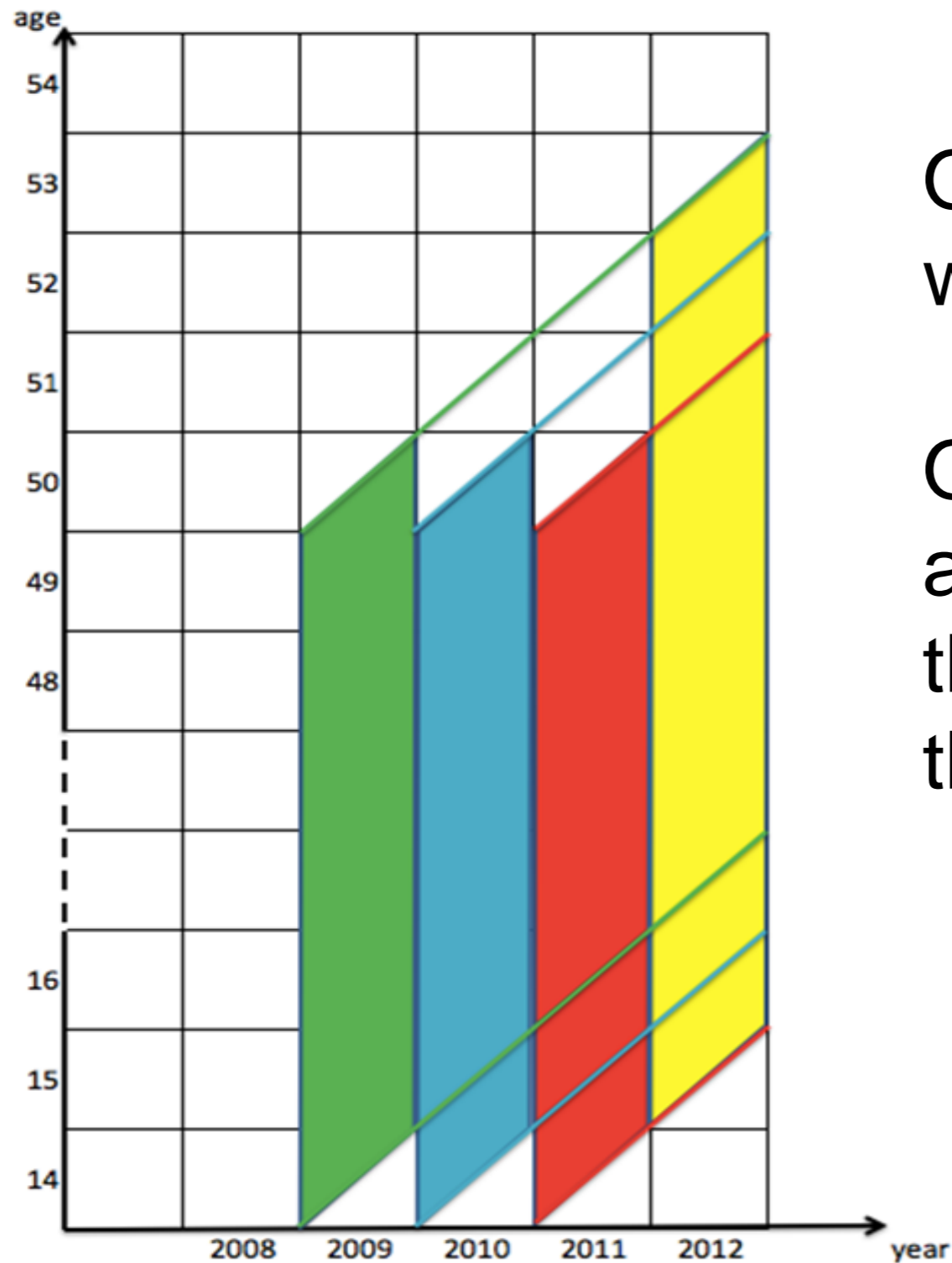
Figure 11: Relative difference in TFR for women who had just entered in 2012 and women observed since 2009, for each country



EU-SILC CS 2012, TFR 2008–2010.

Total fertility rates in EU-SILC

2-Using a retrospective approach

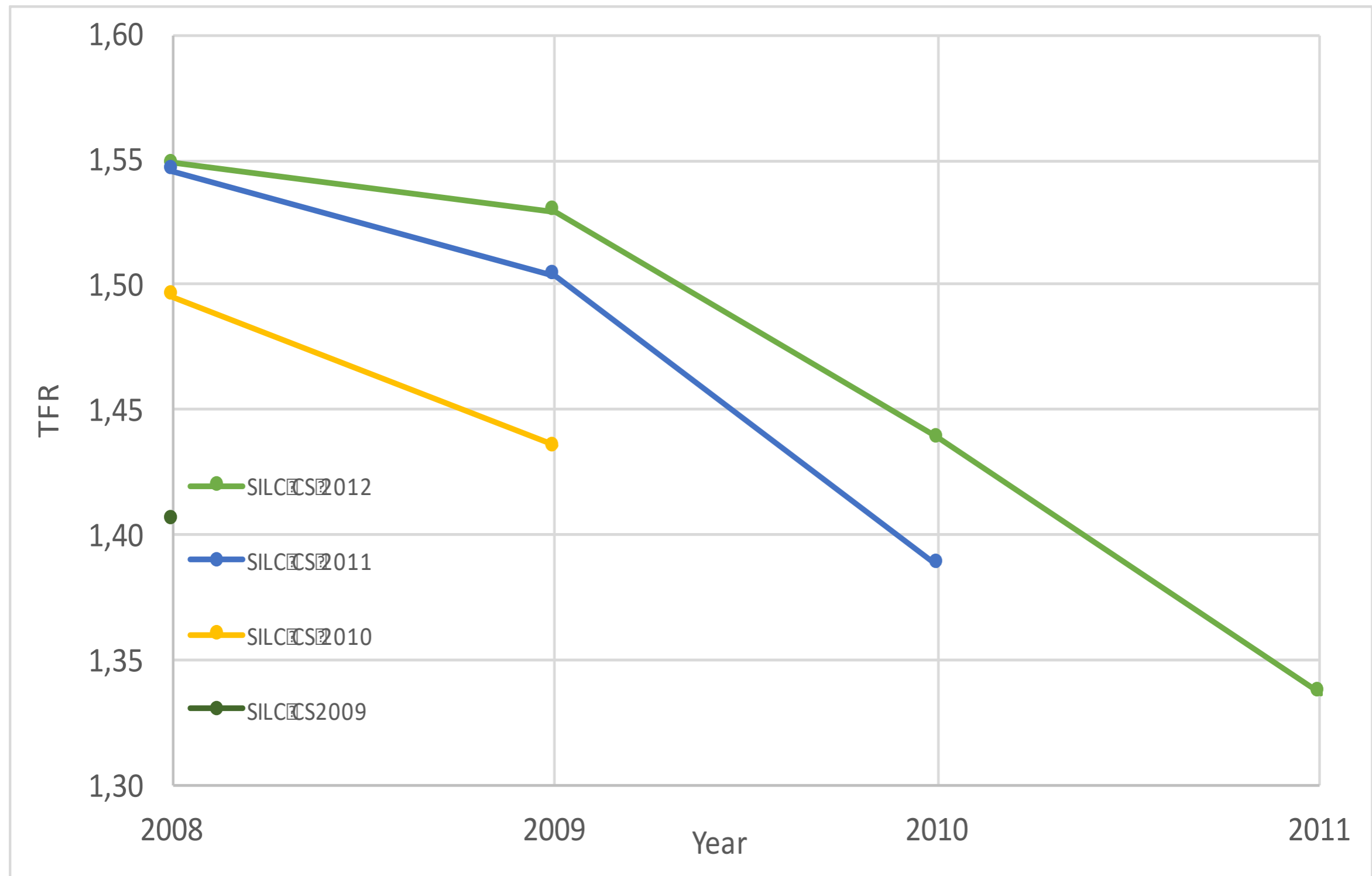


Objectives: Calculate the TFR with a time delay:

Once parents have moved and are settled with their children, they should be well represented the survey

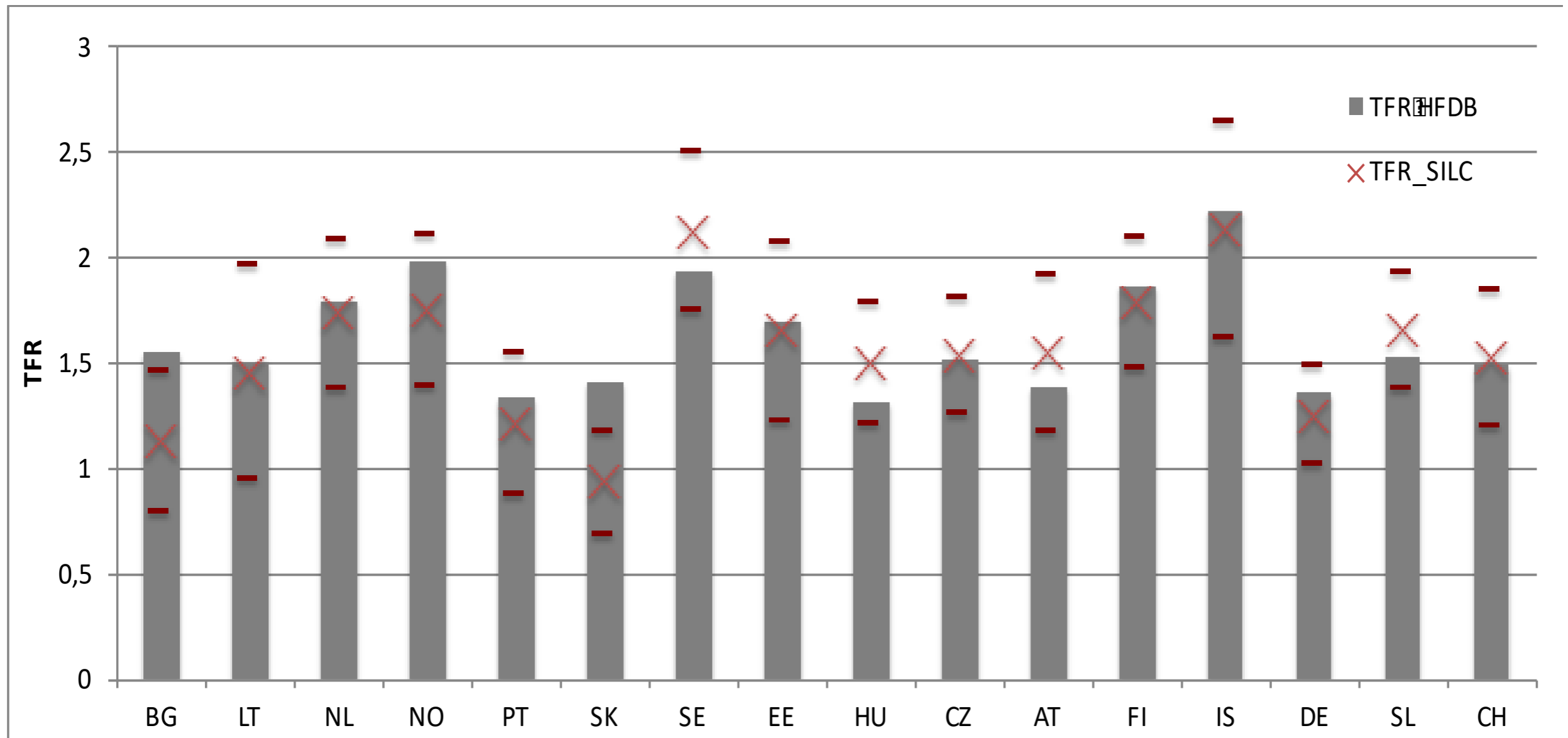
Total fertility rates in EU-SILC

TFR of the years 2008-2011 obtained with the cross-sectional databases of 2009-2012



Total fertility rates in EU-SILC

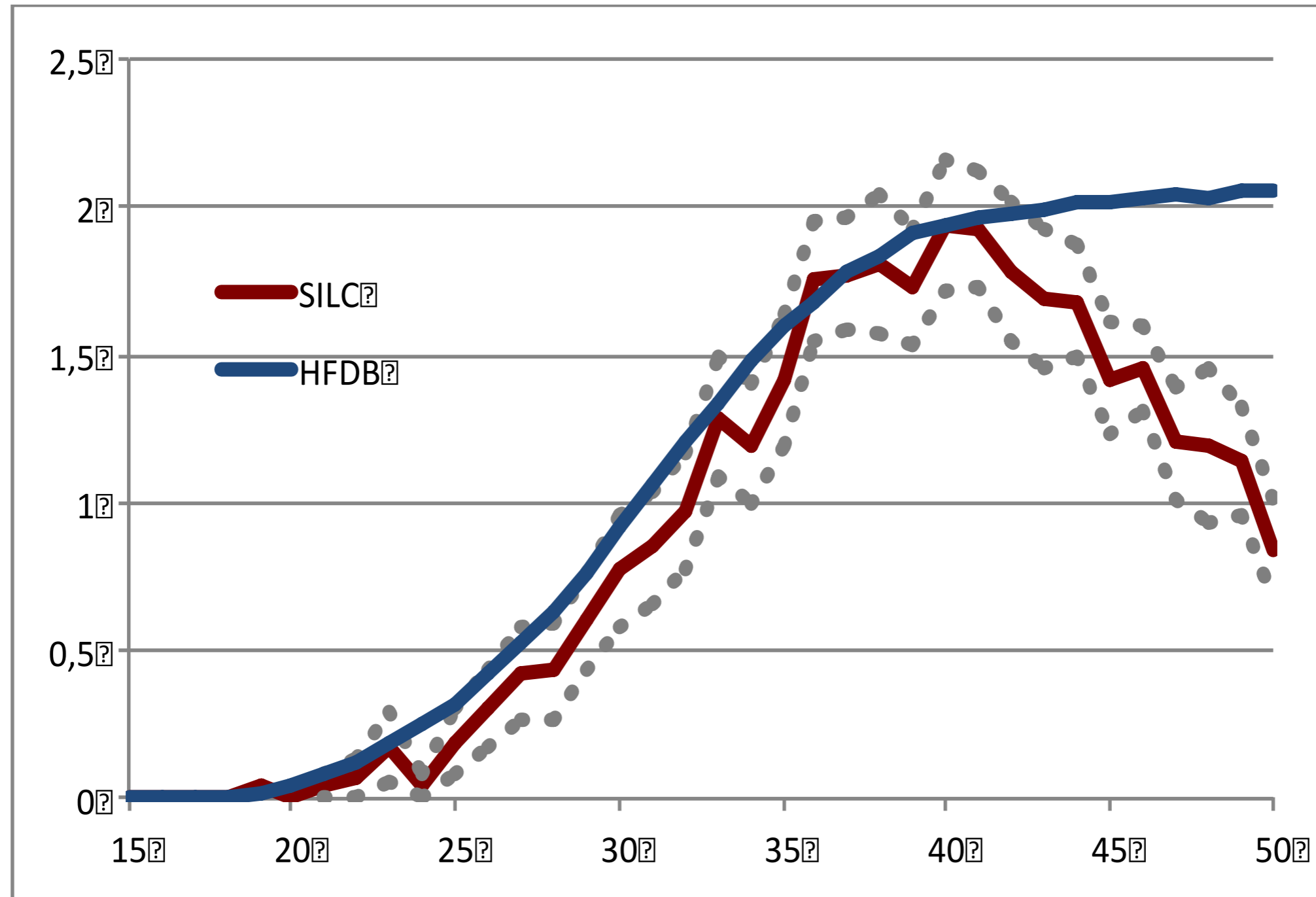
Retrospective approach of TFR calculation improve the quality for most of the countries



Conclusion

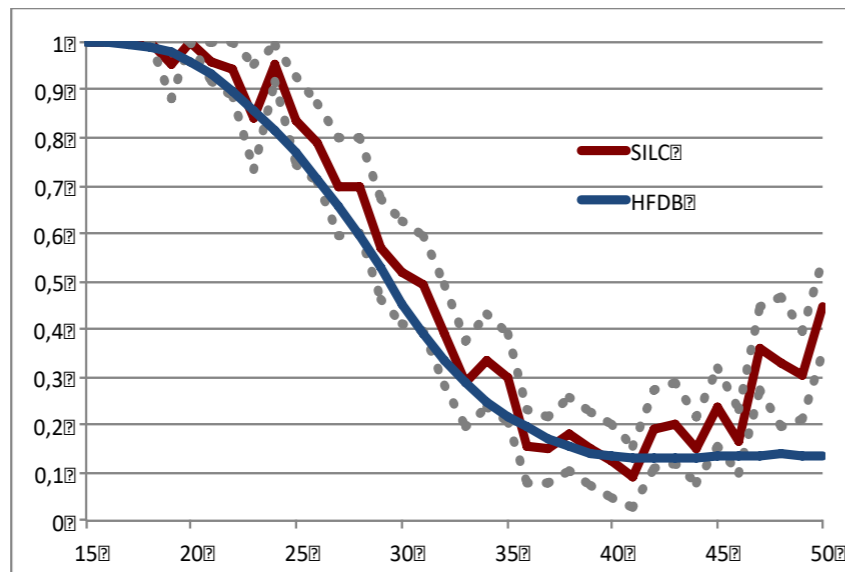
- Fertility-linked attrition leads to a downward bias in aggregate measures of period fertility.
- As attrition is not much linked to socioeconomic characteristics, the differences in TFR between socioeconomic groups will not necessarily be biased, but the fertility levels will be generally underestimated.
- TFR can be slightly improved by using the last rotative group of the panel or by using a retrospective approach

A short overview of CFR quality

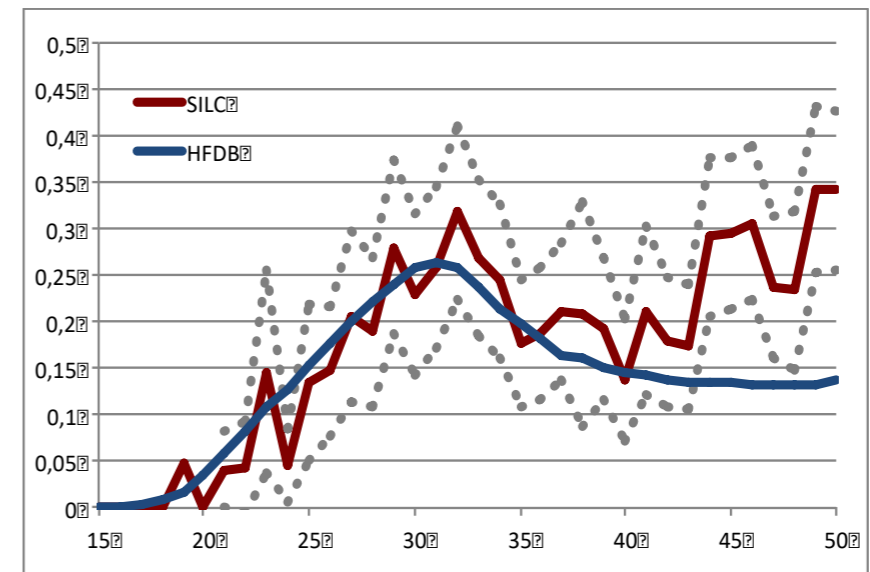


A short overview of CFR quality

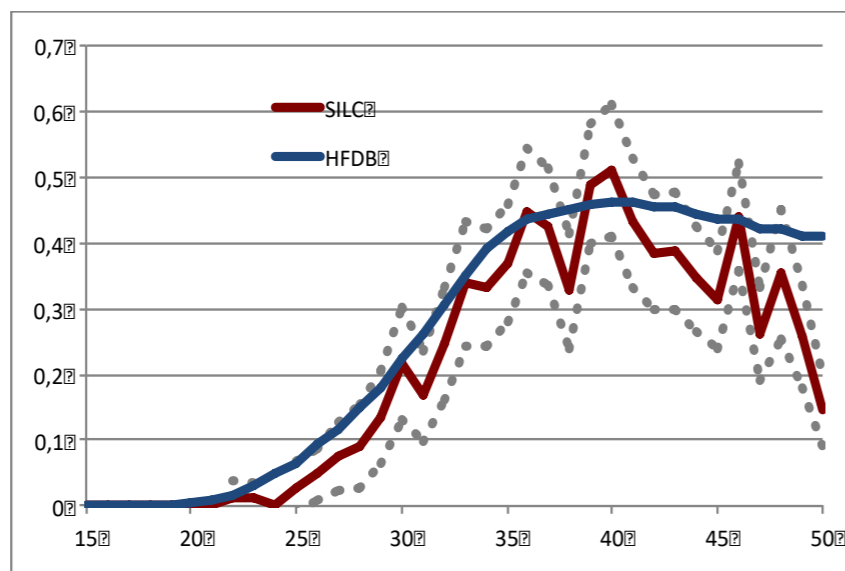
Childless



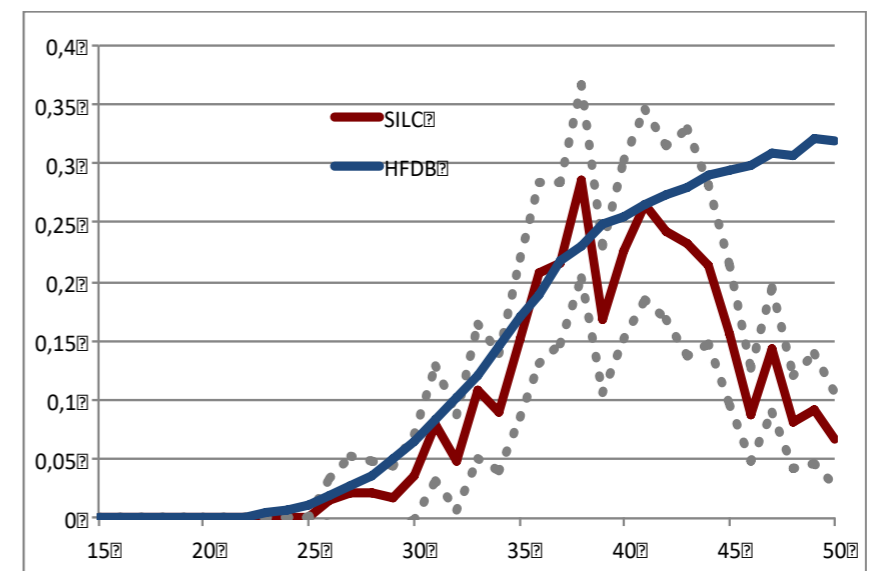
One Child



2 Children



3 + Children



For a complete overview of this work and more country specific details see:

For TFR analysis:

“The quality of periodic fertility measures in EU-SILC”,
Demographic Research, 2017

For CFR analysis:

“ Observing the number of children with EU-SILC
– a quantification of biases.”, *Population*, forthcoming