

Online appendix II:

Annotated comparison Germany-Sweden 2010 and 2015;

Graphical illustration of Total birth intensities by education for 2005, 2010 and 2015 covering all available European countries

Availability of time series of the educational gradient of period fertility calculated with EU-SILC:

So far, we have computed the educational gradient of period fertility for three time periods: 2005, 2010 and 2015. This enables us a first analysis of time trends in Europe. We are currently computing (automatization with R) data on a yearly basis, covering the years from 2005 on, for 30 European countries.

An illustration of Total birth intensities by education for 2005, 2010 and 2015 covering all available European countries in EU-SILC can be found at the end of this document.

In this short overview, intended to illustrate the potential of our data, we use the example of Germany and Sweden and compare 2010 to 2015.

We first give an overview of the evolution of the educational gradient of period fertility levels between the years 2010 and 2015 and then analyze parity- and age-specific changes more in detail.

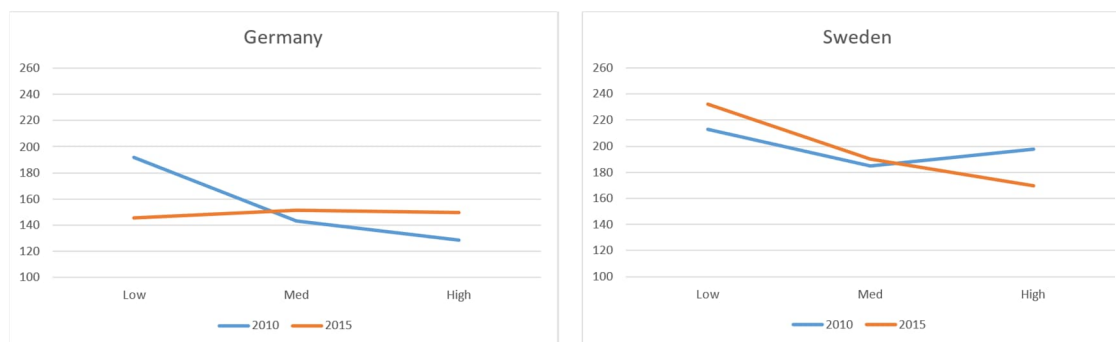
All education groups combined, the Total birth intensity for Germany in 2010 is 1.38 children per woman and increases to 1.50 children per woman in 2015 (the corresponding TFRs in Germany are 1.38 in 2010 and 1.52 in 2015). In Sweden, the Total birth intensity all education groups combined is 1.95 in 2010 and decreases to 1.81 in 2015 (TFRs 1.94 in 2010 and 1.86 in 2015). Germany reports thus an increase by 0.12 children, while Sweden reports a decrease by 0.14 children in terms of Total birth intensities between 2010 and 2015.

When looking at total birth intensities by education, we observe for Germany that in 2010, the educational fertility gradient is negative for Germany (Figure H.1, left panel). I.e., the total birth intensity at age 49 is higher for women with a low education level (1.92 children per woman), and lower for higher levels of education (1.43 for middle educated women and 1.28 for high educated women). However, the educational gradient is considerably different in 2015, as it is no longer negative: in 2015, the low educated women are those who show the lowest total birth intensity, at 1.45 children per woman, whereas the fertility level for middle and high educated women is respectively 1.52 and 1.50 children per woman. Therewith, the educational gradient in period fertility levels is negligible in Germany in 2015. The fertility increase from 2010 to 2015 in Germany can thus be attributed to a fertility increase for the high educated and, to a lesser extent to the middle-educated women. This increase counterbalances the fertility decrease for the low educated in Germany. This decrease is considerable, but does not much affect the overall birth intensity, as low educated women only present less than 10% of women aged 15 to 49 in Germany both in 2010 and in 2015.

When a similar look is given to Sweden, the opposite evolution can be observed in comparison to Germany. Indeed, in 2010, the period fertility-education gradient for Sweden presented in Figure H.1 (right panel) takes the form of a U-Shape, where low educated and high educated women report the highest levels of total birth intensity (2.13 for low educated and 1.98 for high educated women), while middle educated women report the lowest level (1.85 children per women). In 2015, however, the educational fertility gradient is clearly negative, with a lower total birth intensity for higher educated women. The overall decrease in period fertility levels from 2010 to 2015 in Sweden can be attributed

to a decrease in total birth intensities for highly educated women (only 1.69 children per woman in 2015), who represent more than 50% of women of childbearing age in both years in Sweden. Total birth intensities for women with middle education remain almost unchanged (1.90 children per woman in 2015), while they rise to 2.32 in 2015 for women with low education (who only represent below 10% of women of childbearing age in both years).

Figure H.1: Total birth intensity by women's education level



Births for 100 women.

Education: Low: pre-primary, primary, lower secondary; Middle: upper secondary, post-secondary; High: tertiary.

Data source: EU-SILC.

Observations for 2010: CS 2011-2013: childbirths observed in 2009, 2010 and 2011.

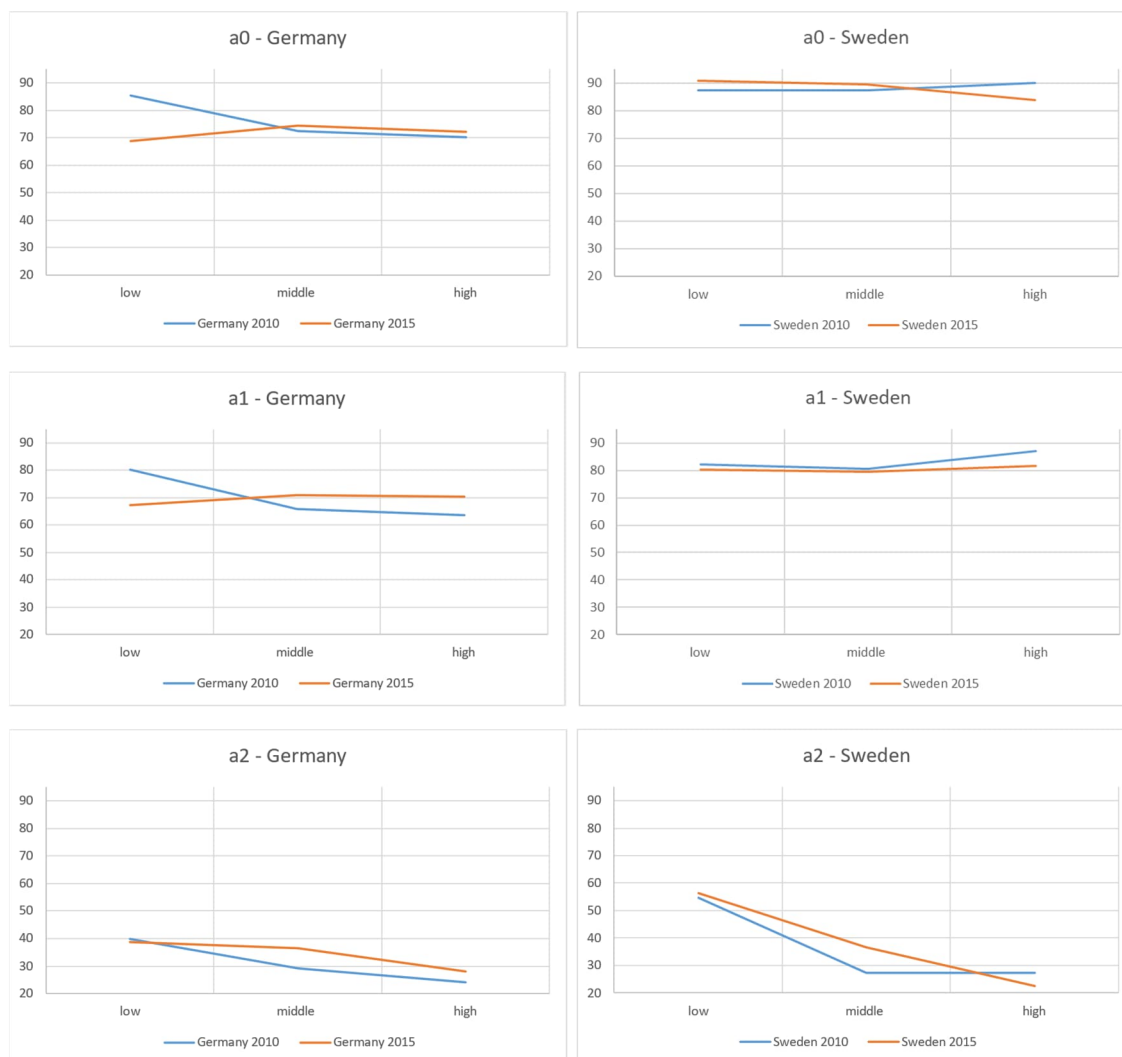
Observations for 2015: CS 2016-2018: childbirths observed in 2014, 2015 and 2016.

Women aged 15-49, semi-retrospective approach.

Parity-specific changes over time

Figure H.2 presents parity progression ratios (transition probability from one parity to the next) for 2010 and 2015 in Germany (left panel) and Sweden (right panel). They suggest that in Germany, the drop in total birth intensity for low educated women that happened between 2010 and 2015 can mainly be attributed to a drop in transitions to first births (a_0), which fell from 0.85 to 0.69 (20% decrease) for low educated women. Therewith, low educated women have the highest rate of childlessness in Germany in 2015 (0.31), whereas the childlessness rate was highest for highly educated women in 2010 (0.30). Transitions to second births (a_1) also fell considerably for low educated women in Germany, notably from 0.80 to 0.67 (16% decrease). For middle and high educated women on the contrary, the probability to have a first child remains stable, and the transitions to the second and third child (a_1 and a_2) increase from 2010 to 2015. The overall increase in period fertility in Germany between 2010 and 2015 is thus driven by more second and third childbirths for both middle and highly educated women. The highest percentage increase can indeed be reported for third childbirths (25% for middle and 16% for highly educated women), followed by second childbirths (8% for middle and 11% for highly educated women). More concretely, for high educated women, who have increased their total birth intensities from 1.28 to 1.50 between 2010 and 2015, 0.08 additional children can be attributed to more third childbirths, 0.06 additional children to more second childbirths, 0.05 to more childbirths of order 4 or more, and only 0.02 additional children to more first childbirths. For middle educated women, who have increased their total birth intensities from 1.43 to 1.50 between 2010 and 2015, 0.05 additional children can be attributed to more second and more third childbirths each and again only 0.02 additional children can be attributed to more first childbirths. The fertility increase in Germany is thus mainly caused by more births of higher order among higher educated women.

Figure H.2: Parity progression ratios by education



Education: Low: pre-primary, primary, lower secondary; Middle: upper secondary, post-secondary; High: tertiary.
 Data source: EU-SILC.

a_0 : progression ratio to a first childbirth: probability to have a first child, in percent.

a_1 : progression ratio to a second childbirth: probability to have a second child, among one hundred women with one child.

a_2 : progression ratio to a third childbirth: probability to have a third child, among one hundred women with two children.

Observations for 2010: CS 2011-2013: childbirths observed in 2009, 2010 and 2011.

Observations for 2015: CS 2016-2018: childbirths observed in 2014, 2015 and 2016.

Women aged 15-49, semi-retrospective approach.

In Sweden (Figure H.2, right panel), transitions to first births (a_0) fell from 0.90 to 0.84 (7% decrease) for high educated women, whereas they increased slightly for lower educated women (by 4% for low and by 2% for middle educated). Therewith, high educated women have the highest rate of childlessness in Sweden in 2015 (0.16), whereas the childlessness rate was highest for low and middle educated women in 2010 (0.13 each). Transitions to second births (a_1) also fell considerably for high educated women in Sweden, notably from 0.87 to 0.82 (6% decrease), whereas they dropped only slightly for middle and low educated women. In 2015, the progression from 1 to 2 children is almost the same in each educational groups. For transitions to third childbirth (a_2), again only educated women experience a drop from 2010 to 2015 (16% decrease). The transition to a third child increased for middle educated women by 34%, and for low educated women by 3%. For high educated women, who have decreased their total birth intensities from 1.98 to 1.69 between 2010 and 2015 in Sweden,

0.10 fewer children can be attributed to less second childbirths, 0.09 fewer children to less third childbirths, and 0.06 fewer children to less first childbirths. The fertility decrease in Sweden is thus mainly caused by fewer births among high educated women, for all birth orders.

Age-specific changes over time

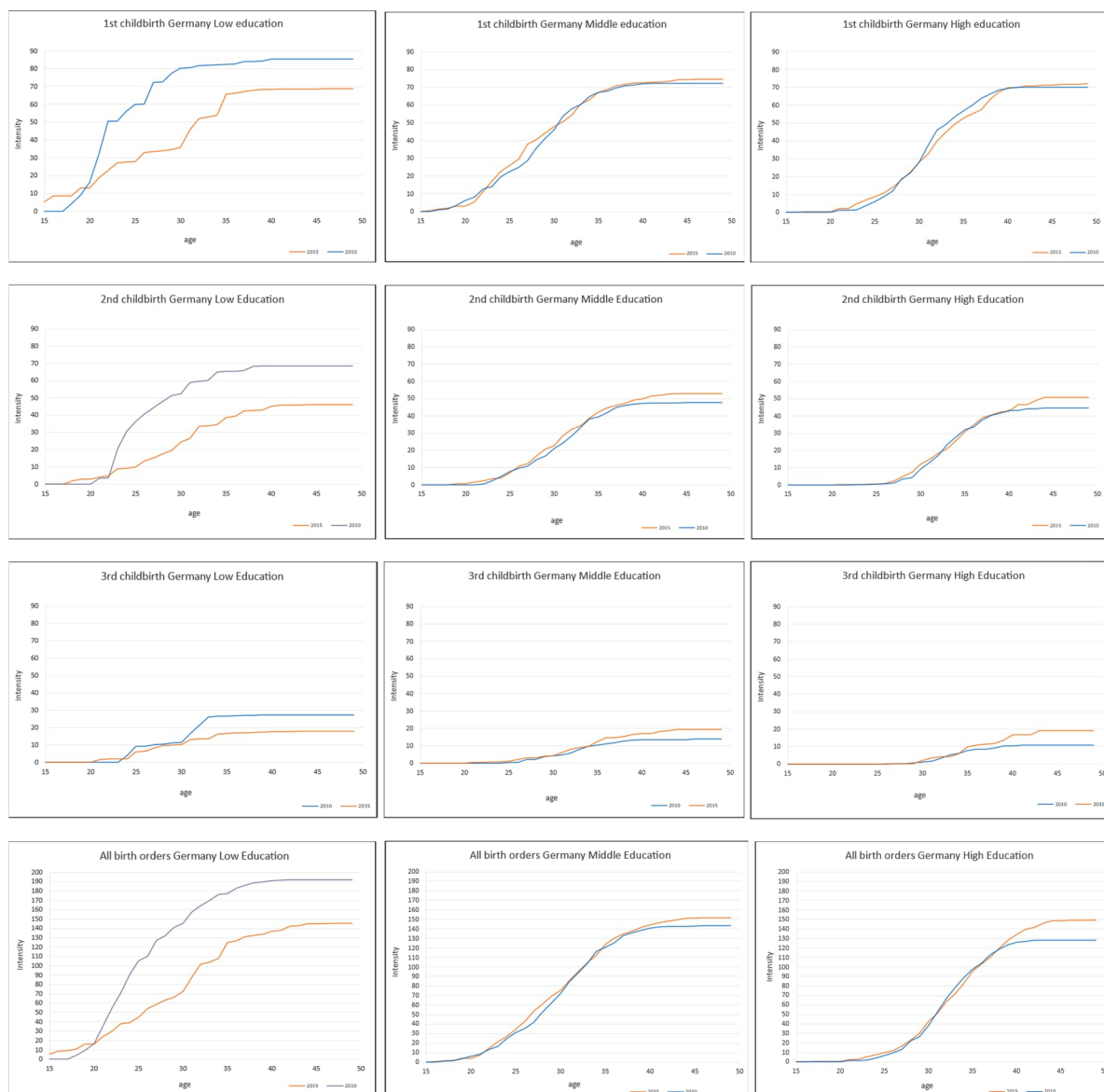
Figure H.3 presents birth intensities by age (cumulated events from age 15, for each birth order, from the fertility life table) for Germany, contrasting 2010 and 2015 and distinguishing between education groups and birth orders (left panel: low education, middle panel: middle education; right panel: high education; first line: first childbirths; second line: second childbirths; third line: third childbirths; fourth line: all birth orders combined).

The left panel illustrates that when comparing 2010 to 2015, low educated women in Germany tend to postpone first and second childbirths at younger ages (20 to 35), while women at later ages (35 to 40) also have fewer first and second child births. The picture is similar for third childbirths. All birth orders combined, low educated women tend to have their children considerably later in 2015 than in 2010 and end up with a lower number of children. Thus, both tempo and quantum effects seem to cumulate in lower birth intensities for low educated women.

Tempo effects seem to be less considerable for middle and high educated women in Germany, as the middle and right panel suggest. The timing of first, second and third childbirths seems to be rather unchanged for middle and high educated women when comparing 2010 and 2015, but birth intensities are higher for later ages (35+) for second and third childbirths. All birth orders combined, middle and high educated women do not tend to have their children earlier or later in 2015 in contrast to 2010, but Germany records more births of higher order for higher educated women aged 35+.

Figure H.4 presents birth intensities by age for Sweden, contrasting 2010 and 2015. The left panel illustrates that when comparing 2010 to 2015, low educated women tend to have more births, in particular first and 3rd births, for ages 30 to 35. Middle educated women postpone first childbirth between ages 25 and 35, but have somewhat more third childbirths from ages 35 on. High educated women postpone first childbirth (between ages 25 and 30), and only partially catch-up after age 40. Intensities decrease for second as well as for third childbirth (from age 33 on). This cumulates in lower total birth intensities at age 49 for high educated women in 2015.

Figure H.3: Birth intensities by age and education in Germany, 2010 and 2015



Children of each birth order born by woman's age, per one hundred women.

Education: Low: pre-primary, primary, lower secondary; Middle: upper secondary, post-secondary; High: tertiary.

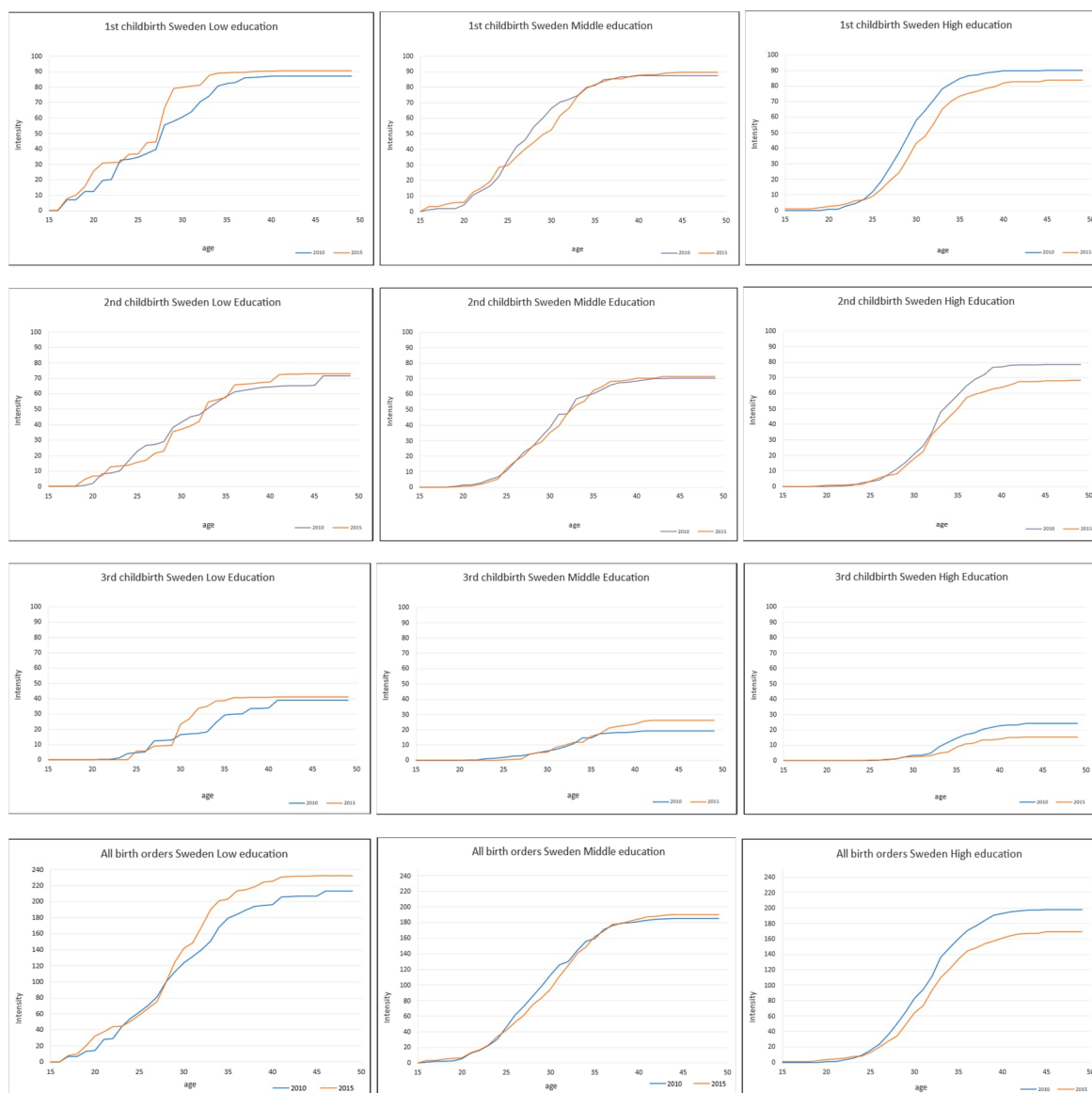
Data source: EU-SILC.

Observations for 2010: CS 2011-2013: childbirths observed in 2009, 2010 and 2011.

Observations for 2015: CS 2016-2018: childbirths observed in 2014, 2015 and 2016.

Women aged 15-49, semi-retrospective approach.

Figure H.4: Birth intensities by age and education in Sweden, 2010 and 2015



Children of each birth order born by woman's age, per one hundred women.

Education: Low: pre-primary, primary, lower secondary; Middle: upper secondary, post-secondary; High: tertiary.

Data source: EU-SILC.

Observations for 2010: CS 2011-2013: childbirths observed in 2009, 2010 and 2011.

Observations for 2015: CS 2016-2018: childbirths observed in 2014, 2015 and 2016.

Women aged 15-49, semi-retrospective approach.