Measuring the Unintended Components of Low fertility

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Cohort total fertility in most developed countries has not only been below replacement level since the 1980s, but also below the levels expressed as desirable by women in surveys. In fact replacement and desired fertility levels are generally close, so there is no apparent contradiction between what may be a political or macro objective and individual family projects. This low fertility has been often associated with the development of a second demographic transition characterized by late motherhood and unstable unions. The fall in fertility during the first demographic transition was the result of the use of contraception in order to limit or control family size: contraception was mainly used *after* the birth of first children. On the contrary, the second demographic transition is associated with the use of contraception *before* parenthood. As a result fertility rates in most developed countries have tended to decrease for women aged less than thirty years and increase after that age. This postponement of motherhood for several years after the start of sexual activity has displaced fertility into the age range of increasing permanent sterility and decreasing fecundability. This may put a higher proportion of women at risk of not achieving their desired fertility level. The biological consequences of postponement on fertility levels may also be compounded by changes in union formation patterns and the increase in the proportion of unions that end in separation that has also taken place over the last three decades.

In this paper we intend to measure the contribution of fertility postponement and changes in union formation and stability to the evolution of fertility in developed countries during the last 25 years. The main idea we will develop is that low fertility can be in great part be explained by the increase in the difference between desired and achieved fertility. Desired fertility has remained essentially constant in the last 25 years compared with the substantial drop in its observed level. We will measure the proportion of the difference between desired and achieved fertility that is due to postponement and changes in union formation and separation patterns, and in that sense we will be able to quantify the importance of the unintended components of contemporary low fertility in developed countries.

In order to evaluate the importance of these components, we will use a microsimulation model of fertility with a set of biological parameters with constant values and a set of family behaviours with either constant or variable values. The microsimulation model will include, as is customary, biological parameters like fecundability (varying by age and between women), temporal (amenorrhea) and permanent sterility, and intrauterine mortality. We will also model contraceptive use associated with the pursuit of a desired number of children. These parameters will have constant values. They will be associated with a model based on the changes in union formation and dissolution behaviours in the last 25 years. We will calculate fertility levels associated with a wide range of parameters for the distributions of

union formation and dissolution. To be more specific, we will proceed in three steps. First we will use the Coale-McNeill-Rodriguez-Trussell model of nuptiality to create various distributions of the rate of entry into union and of the start of the childbearing period. We will then run the microsimulation model for this large range of values of the mean age and standard deviation parameters of this nuptiality model, in order to simulate the changes that have taken place in developed countries in recent decades. This will allow us to measure the effects of parenthood postponement as well as the decrease in the proportion of persons entering a first union upon fertility levels. In a second step we will use models of separation and remarriage, and again will measure the effects of the change in their intensity upon fertility levels. In the last step we will let both the union formation patterns and the separation and remarriage patterns vary and will measure their total effects on fertility.

The simulated levels of fertility will then be compared with the simulated fertility levels associated with the family formation and dissolution patterns typical of developed countries in the 1960s in order to measure the effects of their evolution on fertility. This will allow us to quantify the importance of what we call the "unintended" components of fertility during the transition toward low fertility.

The simulated fertility will be calculated both at the total and at the birth order level. This will also allow us to gain insights in the recent increase in childlessness and to determine the importance of union formation and dissolution patterns on its evolution.

To be more specific, we will do the following:

1) Calculate by microsimulation the level of cohort fertility associated with a wide range of distributions of the process of entry into union and parenthood. We will assume that each union has a fertility target and use stopping contraception after they reach it. We will calculate the cohort fertility levels associated with mean age at entry into union varying from 22 to 32 years, with various values of the standard deviation for the distribution around the mean age. Comparing the level of fertility at various age of entry into union to the mean age typical of the 1960s, we will be able to quantify the unintended component of low fertility associated with postponement and the decrease in the intensity of first union formation.

2) We will do the same kind of simulation of fertility levels associated with a variation in separation rates and remarriage rates, for a fixed and low age at entry into first union, and again compare the cohort fertility levels obtained with the level associated with separation and remarriage patterns typical of the 1960s. This will allow us to measure the effects of the second unintended component of low fertility.

3) Finally we will run the simulation model with variable levels of both union formation and separation, again comparing the results with the fertility associated with patterns typical of the 1960s in order to calculate the total effects of the unintended components of low fertility.

We will present the results of the fertility simulation at the total level and for each birth order for women at the end of their childbearing years. We will focus our attention on cohort total fertility and the proportion childless and measure the percentage of decrease due to postponement and union separation relative to the simulated results that correspond to the situation typical of the 1960s in developed countries. We will then compare our results with the evolution of cohort fertility and childlessness in selected developed countries in order to quantify the importance of the unintended components in the decrease of fertility levels since the 1960s.