Childbearing after separation:

Do second unions make up for earlier missing births? Evidence from France

Eva Beaujouan, Anne Solaz[*]

May 2008

Summary: Today, the childbearing process is no longer completed in one unique union but has to be analysed in terms of a succession of family steps since more and more people experience several partnerships in their life. This article aims to study fertility behaviour after the first union in terms of total fertility and also the timing of this fertility, by taking into account the fact that individuals in second unions may be racing against the biological clock since they form their union later. Using a French "one-percent" survey of Family History in 1999, results show that completed fertility in case of separation is generally reduced by 0.1 children for men and 0.15 for women. However, in the event of repartnering, men's fertility makes up for fertility of never separated men. Growing sterility with age affects step-fertility especially for women. The acceleration of the birth process for second unions in the hypothetical scenario of absence of sterility may be a proof of the couple's anticipation of fecundability decline with age.

Introduction

Today, in France, the fertility process is being affected by major family changes. With a high total divorce rate – 45% of the marriages beginning in 2004 (Prioux, 2007)–, and an even higher separation rate among cohabiting couples, the number of first union dissolutions is increasing, as is the number of second unions. For example, one quarter of first unions were disrupted by separation after ten years in the 1985-1994 partnering cohort. Among individuals separated between 1985 and 1994, around 45% were repartnered 5 years later (French GGS dataset, 2005). The fertility process is no longer included in one unique union but has to be analysed in terms of a succession of family steps. Linked to the increasing number of separations, more and more people repartner and have children in second unions. Indeed, in three out of four disrupted unions, the separation happened before age 35, when the individual is still able to form a new union and have children.

In the demographic literature, considerable attention has been paid to a potential link between delay in first union formation and involuntary childlessness (Beet 1995) or fertility decrease (Billari and Kohler, 2004; Bongaarts, 1998). At the beginning of the second demographic transition, a postponement of union formation was observed in many European countries, notably due to the lengthening of education, to delayed entry into the labour market, and to low housing availability. Some have advanced that this postponement puts upward pressure on period fertility and may be partly responsible for the permanent situation of low fertility. However, this assumption has been recently challenged. Indeed, delayed childbearing is widespread within Europe (Kohler and al 2005), but fertility levels vary widely across countries. France is the best counter-example. Thévenon (2008) has shown that even though France exhibits most of these delaying behaviours (longer studies, postponed entry into the labour market, delay in leaving parental home) French fertility remains at a high level relative to other European countries, approaching the replacement level (1.98 child per woman in 2006).

With the spread of second unions, the debate about the effects of late partnership on fertility levels could be reopened. The question raised by Beets (1995) can be restated in these terms "Does the later age of second unions lead to an increase in

involuntary childlessness?". Indeed, first union dissolution may interrupt the childbearing process. Second unions form at later ages after a possible period of celibacy, and the remaining fertile period is then shortened. This article aims to test (1) if individuals who experienced a separation reach a lower, the same or a higher fertility level than their fellows who did not (2) if people forming a second union have enough time to realise their childbearing desires or if they are subject to a "time-squeeze". If so, do they accelerate the fertility process?

Background

Various studies have already focused on childbearing after a first union, mainly in northern Europe (Buber and Fürnkranz-Prskawetz, 2000; Thomson et al., 2002; Toulemon and Knudsen, 2006). They mainly analyse the determinants of second union fertility. Thomson et alii distinguish three possible reasons for having children in a second partnership: a 'parental status effect', i.e. the individual desire to have at least one child in one's life, a 'commitment effect', induced by an inclination for shared children and a 'sibling effect', due to people wishing to give a full sibling to the first child in the current union. To measure the relative importance of each effect, they concentrate on the relation between births in second unions and previous births of children, which are closely linked. They find that stepfamily fertility is supported by two main factors: the 'commitment effect' and the 'sibling effect'. Toulemon and Knudsen's research discards the 'sibling effect', but confirms the 'commitment effect'. Vikat et alii (2003) have also shown that, at constant parity, couples are more fertile if the children are from a previous union. All these studies emphasize the importance of previous children. Various characteristics are tested: number of children from the previous union, age of the youngest child, their place of residence, parent who has custody (mother, father). Moreover, stepfamily fertility is higher when the previous children do not cohabit or are the father's offspring.

These articles focus on the determinants of second partnership fertility but do not take into account the specific constraints prevailing in this union. Our article aims to go further by taking into account the fact that individuals in second unions may be racing against the biological clock.

Unobserved heterogeneity and selection biases may influence the type of people forming a new union. It seems that people who do not want or cannot have a child are particularly liable to separate. Toulemon (1994) has shown that it is mainly during the ten first years of union that couples without children have a higher likelihood to separate. Even if most separate before they decide have a child, some separate because they cannot have a child. Sterility due to the individual him/herself, or to the combination of both partners, may be one cause of childlessness and separation. Couples can also come to an end because one partner wants a child while the other partner absolutely does not. So people who are especially unlikely to have children can be selected among separated individuals and, after that, among repartnered people. For example, Coppola and Dicesare (2008) have recently pointed out that unobserved characteristics simultaneously shape both the decision to end a relationship and the decision to have a further child (at least in Italy). They argue that people who separate may be less family oriented than people who do not, and their fertility intentions may thus be lower than others.

For these reasons, our hypothesis is the following:

H1: People who experience a break-up should have a lower overall fertility.

Beyond selection effects and social constraints, growing sterility with age may be of great importance with respect to childbearing during a second union. The biological clock may be a handicap for people who desire a child and reach sterile ages. Fecundability declines sharply with age, especially for women (Leridon, 2008) : 10% of couples are already sterile when the woman is 30 years old, 17% when she is 35 and 29% at age 40.

Childbearing after a separation is conditioned jointly by the wish for a child and the fecundability of the second union. Second relationships form at later ages. Mean age at second union formation is more than 35 for men and women. Figure 1 shows the age distribution of first and second partnering before age 45 and the proportion among them that will lead to fertile unions. We remark that second unionformation occurs at later ages than first unions, and that their age variance is much larger. Moreover, the probability that a second union will be fertile is highly dependant on the age at formation. Between ages 35 and 45, this is especially true for women.
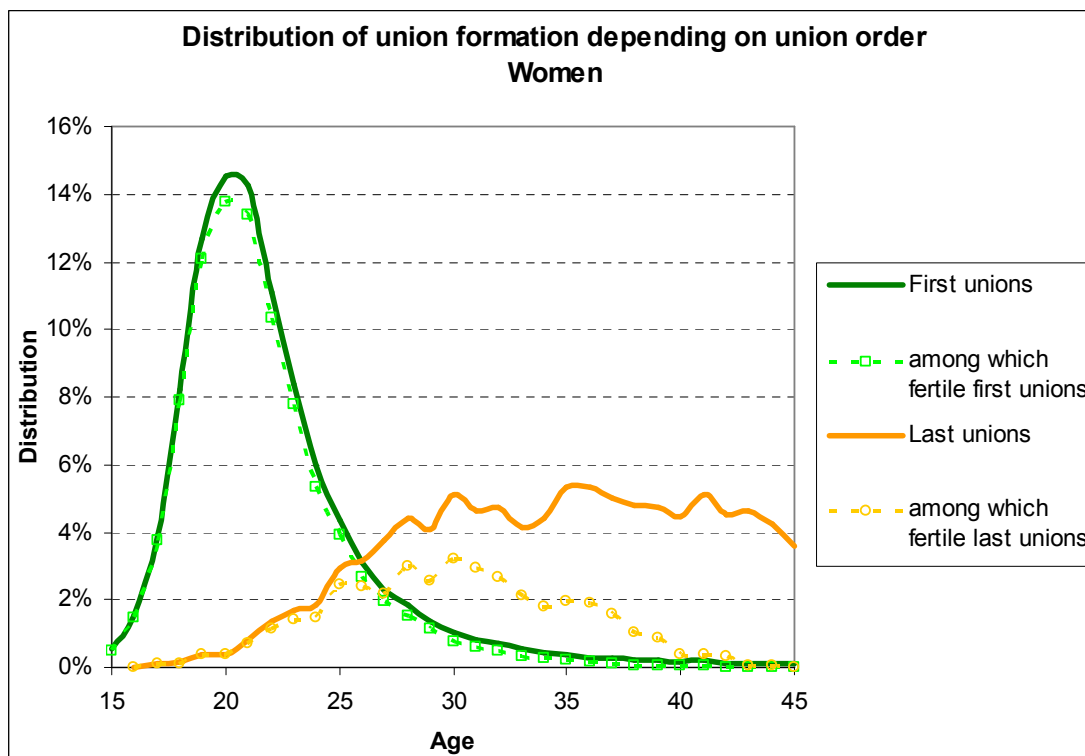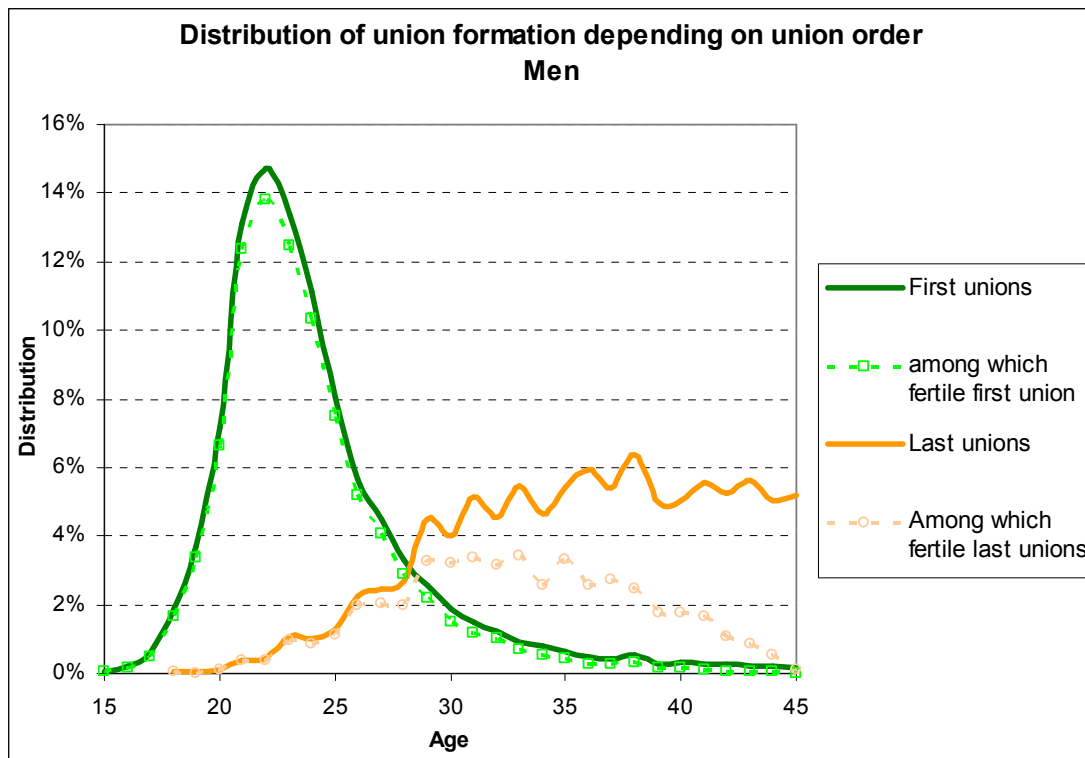
Figure 1: Union formation of men and women aged 45 to 60 at the time of interview
Source: Etude de l'histoire familiale (EHF), Insee, 1999

Thus people who want to have children in a second union have to face an unfavourable biological effect.

H2: If people are conscious of their biological limits during the second union, they should accelerate the fertility process as their age increases.

In order to test our hypotheses, we analyse both completed fertility and timing of childbearing in second unions. We proceed in two steps. Firstly, we examine whether total fertility is higher when people enter several unions. Observations are made on the completed fertility of people having formed two unions, and more precisely on the distribution of births across their unions. Secondly, we detail the probability of childbearing in second unions, and in particular, if the biological clock may be responsible for fewer children. After controlling for many covariates and introducing a fecundability control variable, we examine whether timing of births is accelerated or not by anticipation of sterility. We compare the effect of age without controlling for sterility and the 'net' effect of age when we control for it.

Data

Our results are based on a survey conducted in 1999 and linked to the General Population Census called Study of Family History ("Enquête sur les Histoires Familiales" EHF, Ined-Insee, 1999). It encompasses 380 000 individuals (one percent of the census) aged 18 and over. The questionnaire includes questions on first and last partnership and on childbearing history. Information on own children and on stepchildren (children from a spouse or a partner) is available for each union. The huge number of respondents makes this survey the only one currently available in France to analyse infrequent events such as childbearing in second union with a sufficient sample size. A union is defined as a relationship period with at least 6 months of cohabitation. Unfortunately, the survey does not distinguish between second and following unions. Respondents had to give information on the last union in case of two or more unions. In this special case, information on their last union is mixed in with the whole sample of second unions[1]. The French generation and gender

---

[1] Very few couples experience more than two such unions in the cohorts studied. Compared with GGS, it seems that people tend to under-report non fertile unions rather than fertile ones, which minimizes our possible bias.

survey (GGS, Ined-Insee, 2005) is more precise on certain questions and more recent, but with a smaller sample (10,000 individuals). It is used for verification and for some specific details.

Gender differences for completed fertility

Sample

In the descriptive study that follows, we limited the sample to the 45-60 age cohorts. Indeed, completed cohort fertility is defined as the number of children all the individuals in a cohort ever had during their fertile life divided by their number. In order to calculate this indicator, we decided to take 45 as an age limit for having children. This upper limit is fixed by looking at the share of total fertility reached at this age. According to studies on late fertility, in countries like France, 0.1% of children are born after age 45 for women and 4% for men (Prioux, 2005). These low rates at high ages are due both to biological constraints and social norms. We also want our population to be as young as possible in order to capture the most recent behaviours. Massive separation is quite a recent trend, and in 1999, significantly fewer people had already been in 2 unions than five years later. In these cohorts in EHF, around 14% of people had already been in at least two unions. The proportion was 22% five years later (French GGS). In addition to the behavioural change, we suspect there may be under-reporting of unions in the EHF self-administered questionnaires, leading to a lower number of people who report two unions (Mazuy and Toulemon, 2001). In total, 51,416 women and 33,610 men aged 45 to 60 were included in the descriptive review.

Results

Using our selected sample, we analyse the completed fertility of individuals and how it is affected by a separation. The total number of children is strongly determined by the proportion of people who have children in each union. We first describe it. Thereafter, we detail completed fertility by trajectories and by age and determine if in some conditions separated people catch up the fertility level of those who are not separated.

In general, few persons remain childless, but births do not always occur during a first union. Only 91% of women and men aged 45-60 today gave birth to at least one child in their first union (Table 1). Second union offers a second chance to be parent. Indeed, those who remain childless in first unions are more likely to have children in a second one. Finally, only 4.2 % of women and 4 % of men having had at least one union remain permanently childless.

Table 1: proportion of women/men having children born at each union order by number of unions

women	child in first union	child in second union	men	child in first union	child in second union
1 union	92.6	-	1 union	92.3	-
2 unions or more	78.0	34.3	2 unions or more	75.2	39.4
Total	90.6	4.6	Total	89.9	5.5

Table 2: Probability of having children during the second union depending on whether the first union was fertile or not.

Fertile second union?	women	Men
no birth in first union	48.2	55.2
birth in first union	30.4	34.3
Total	34.3	39.4

Source: Etude de l'histoire familiale (EHF), Insee, 1999

Fewer first unions produce a child when the individual has been in two unions or more (Table 1). The causality is probably double i.e.: there are no children because the union was disrupted, or the union was disrupted because there were no children born. Whatever the link, second unions that follow first sterile unions are always more likely to include a birth (Table 2). Childless women have a 48% chance of having a child in the second union against only 30% for mothers. The difference is even higher for men: 55% of second unions of childless men are fecund against 34% for men who are fathers.

We can explain the higher fertility of men in second unions by the fact that men more frequently repartner with women who never lived in a union than is the case for women with men (Bozon, 1990). Their new partner is also more often childless: in our population, 55% of men who form a new union before age 45 have a childless partner, versus 51% of women. Age difference between the partners is also higher, in favour of the man, in second than in first unions. This trend in age gap tends to accentuate the gender inequalities relating to the biological clock.

So, among women the fertility of first unions is slightly higher than among men, and the opposite for second unions. But finally, do individuals who experienced a separation have more or fewer children than people who do not?

Table 3: Women's completed fertility in each union depending on the number of unions, after age 45

	Child in U1		Child after U1		Total number of children	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
U1 not dissolved	2.25	0.7%	0	0.0%	2.25	0.7%
U1 dissolved , no U2	1.89	1.8%	0.13	0.7%	2.02	1.8%
U1 , U2	1.47	1.6%	0.7	1.3%	2.17	1.9%
U1 dissolved , all	1.7	1.2%	0.4	0.8%	2.09	1.3%
All	2.12	0.6%	0.1	0.2%	2.21	0.6%

Table 4: Men's completed fertility in each union depending on the number of unions, after age 45

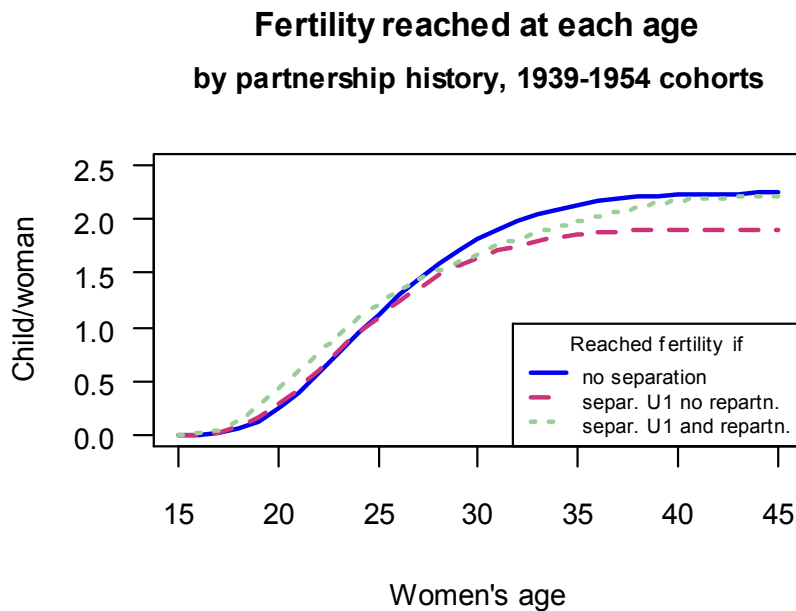|	Child in U1		Child after U1		Total number of children	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
U1 not dissolved	2.19	0.8%	0	0.0%	2.19	0.8%
U1 dissolved , no U2	1.66	2.8%	0.13	1.1%	1.8	2.9%
U1 dissolved , U2	1.4	2.1%	0.91	1.9%	2.31	2.5%
U1 dissolved , all	1.5	1.7%	0.61	1.4%	2.11	1.9%
All	2.06	0.7%	0.12	0.3%	2.17	0.7%

Source: Etude de l'histoire familiale (EHF), Insee, 1999

If the first union was not dissolved before age 45, the average number of children for a woman having reached the end of her reproductive life is 2.25 (Table 3). If the first union was dissolved and not followed by another cohabiting partnership, the completed fertility is substantially lower, 2.02 children per woman. However, with 2.17 children, women who formed more than one union almost catch up the fertility level of non-separated couples. Among these children, one third was born during the second union. Thus, in these cohorts, union dissolution lowers female completed fertility. Although childbearing in second union may make up for the deficit due to dissolution, a small gap still remains. This gap is greater for women who remain alone after separation.

Men's fertility increases when they have been in more than one union (Table 4). Second unions are also globally more fertile for men than for women. However, like for women, union dissolution has a negative impact on fertility if the man does not

enter a second union: his completed fertility is then lower than if the first union was not dissolved before age 45. If a man's first union was dissolved, his fertility in the first union is more affected than for a woman. He is also slightly less likely than a woman to have children in this first union (Table 1). Moreover, the total completed fertility of people who separated is the same for men and women: it reaches 2.1 children per person. Thus it remains slightly lower than the completed fertility of persons who did not separate.

To illustrate more precisely this phenomenon, we draw the cumulative fertility curves according the marital history (Figure 2).

Fertility reached at each age
by partnership history, 1939-1954 cohorts

Fertility reached at each age

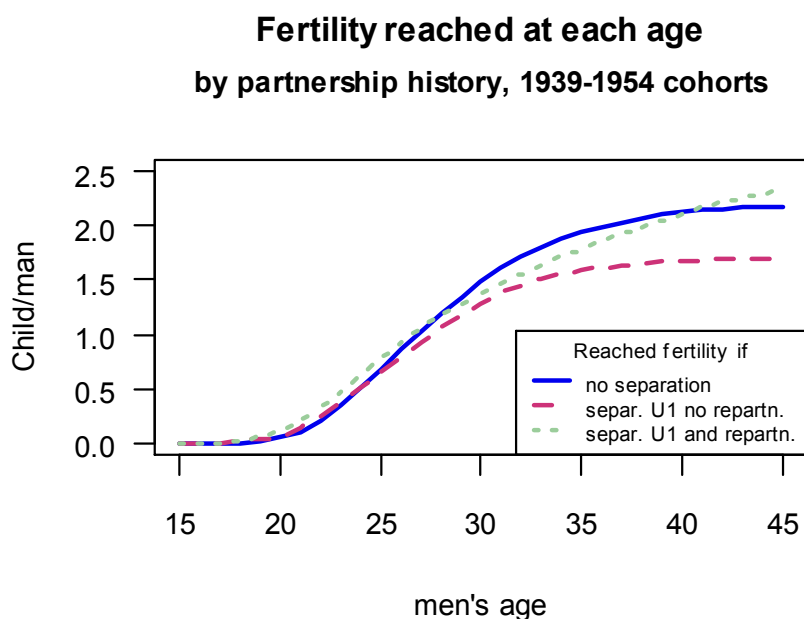## by partnership history, 1939-1954 cohorts

Figure 2: Total cumulative fertility of men and women aged 45 to 60 at the interview
Source: Etude de l'histoire familiale (EHF), Insee, 1999

Among women who did not separate, fertility slows down rapidly from age 37 (Figure 2). Women whose first union was disrupted had their children before the others. This can be linked to the fact that the younger the adults at first union, the more likely they are to separate. If they entered a second union, they were even more likely to have begun their reproductive life sooner. Moreover, they had their last children later, since the curve continues to rise after the others. Fertility of separated women slows down after age 25, mainly due to their separation. However, the ones who repartner almost totally compensate for their lower number of children in their 30s and 40s. We also remark that disrupted first unions not followed by a second one were more likely to be fertile. This may simply be due to a tempo effect: they dissolved later, so there was more time to have children, but less time to repartner before 45. It can also be related to the fact that women with children repartner more slowly, so we cannot observe them in a new union.

Concerning men, the observation differs substantially. Fertility in second union slows down less quickly for men than for women, and later than in first unions. Men who did not break up their first union have nearly completed their fertility at age 40 (Figure 2). While men not repartnered after dissolution have fewer children from age 35 and their cumulative fertility level remains very inferior to that of non-disrupted

unions, the cumulative fertility level of men who repartner reaches and exceeds (at age 41) that of not separated men. Completed fertility in the event of separation is reduced by 0.1 children for men and 0.15 for women (4 to 7%) in the 1939-1954 cohorts.

Men's fertility is less affected than women's because they repartner more and have more children in second unions. However, women have more children in their first unions than men. We have also shown that the completed fertility of men having several unions is higher than completed fertility of men having only one unbroken union, whereas the completed fertility of women is slightly lower in the second case. Men's fertility globally takes place later than for women, and they tend to form larger families.

The hypothesis that completed fertility may be lower for people experienced a break-up is verified. It may firstly be due to the absence of repartnering. Indeed, if they repartner after separation, men have a higher total number of children than those who never separated. This means that the selection of less "family oriented" individuals in second unions is not the principal factor affecting the fertility level. Of course a selection and/or a restriction effect may exist, since persons who enter a second union before age 45 without children are much less likely to bear children than people who enter their first union. But many men have children again during the second union, and this largely makes up for the loss of births due to separation and selection. Repartnered women's total fertility does not exceed that of women who remain in their first union. However, they are very close and, as is the case for men, childbearing by women who are already mothers seems to argue against selection in the second union of women less likely to have children.

Less opportunity to have children after separation

Different factors explain the chances of having children with the new partner, after forming a new couple. Notably, already having children, not wanting a child or being sterile are reasons for being selected in childless second unions.

Women after separation combine a double handicap. A substantial gender gap appears during this life period, especially a lower chance to form a new union for mothers. Various studies show that repartnering is not a random process (de Graaf and Kalmijn, 2003; Lampard and Peggs, 1999). For instance, separated men are more

likely to form a new couple than their female counterparts. One explanation advanced is that separated fathers less often have custody of children. It is also easier to form a new couple at a younger age and without (young) children (Cassan et al., 2001).

Moreover, in a new couple, women are less likely to have children than men.

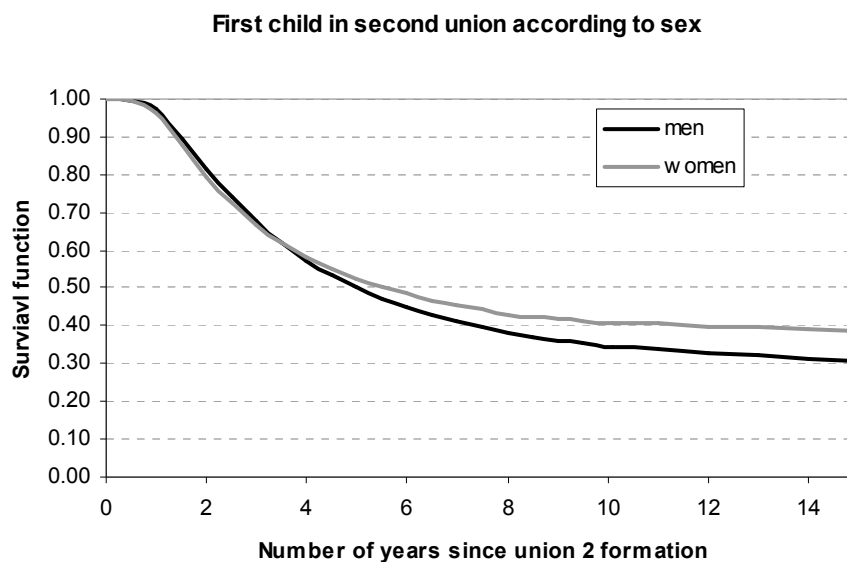**First child in second union according to sex**

Figure 3: Survival function: estimated proportion of persons who did not have a child yet in the second union since union formation, all people less than 45 years old
Source: Etude de l'histoire familiale (EHF), Insee, 1999

These results raise the question of the biological limit that individuals may encounter when they form a second union. Repartnering at later ages involves "having less time at one's disposal before reaching the biological limits of fertility". Such a time squeeze (as defined by Kreyenfeld (2002)) could accelerate fertility in second unions, first births and possibly following births. Having a child is the result of a combination of numerous desires and constraints. Among the various factors which could affect the decision to conceive, biological constraints may be an important one, rarely analysed in the literature on second union fertility. Indeed, a person can anticipate sterility and decide to bring forward a pregnancy. The question is: what would be the effect of age on fertility in second unions after controlling for increased sterility?

This part of the study estimates the risk of having children in a second union, and its determinants, after controlling for fertility decline. It uses a semi-parametric method of survival analysis, a Cox model (Courgeau and Lelièvre, 1989). The sample

used for estimation is composed of all women and men with at least one union dissolved by separation, divorce or partner's death, who repartnered and are still of childbearing age at this time (45 and under), i.e. 15193 women and 8364 men. The Cox model is completed with different variables of interest: type of first union (cohabitation or marriage), type of union termination (separation or widowhood), number and age of children from previous union, children with the partner. Other control variables like education, union cohort, interval between the end of the first union and the new partnership, age difference with the partner are also introduced.

Taking account of the sterility constraint

Sterility, defined as the state of being permanently unable to reproduce, is a specific factor preventing childbearing. Surpassing social and psychological factors, it very strongly limits fertility after a certain age (Prioux, 2005).

Under the hypothesis that people who desire children are conscious of this limitation, they may decide to accelerate their fertility process just before the time they think they could become sterile. One limit to this hypothesis is that it assumes that people apprehend the full complexity of sterility. Recent medical developments in the treatment of sterility may make people think that they will be able to conceive later.

Sterility is not gender equal and occurs differently for men and women, in the sense that it is certain for women but not for men. So women may have anticipation behaviours depending directly on their age, which we would like to control for. Concerning men, it is a little bit more subtle, and we will assume that anticipation depends mainly on their partner's age. But usually, estimations of sterility are performed for couples and are a function of female age. We will use the equation of couples' sterility established by Leridon (2002). It is estimated on married couples cohorts from the 18th century who were not regulating their fertility or were doing it with a limited efficiency. Different estimations on different countries and periods have been performed by different authors and are nearly converging. Two kinds of sterility have been differentiated. Primary sterility is calculated on newly married couples and reflects a pure age effect. Secondary sterility is the inability to achieve a successful pregnancy after having previous children. Only primary sterility is retained

here, since secondary sterility is nowadays negligible in France (compared with primary sterility).

$$ster\,(age) = 0.370\exp(0.109age)$$

Sterility is defined in this equation as not being able to give birth to live children, even if they were conceived. That is what we consider as the perception couples could have of their remaining "fertile period". To introduce the sterility equation into the men's model, the age of the partner was absolutely necessary. The date of birth was missing for around 8% of the partners, so we imputed it using a multiple imputation procedure[2].

In the general models, we estimate for each sex the risk of having children in a second union. We control for fecundability, which is the reverse of sterility, without taking into account the woman's parity. Controlling for fecundability amounts to the same thing as controlling for sterility, but the former control is more stable because it concerns a larger share of people forming a union before age 45.

Without taking into account the woman's parity, the probability for a couple of being fertile is given by $P_{fert}(age) = 1 - ster\,(age)\big/100$ where *age* is the current age of the woman. To give an idea, under this constraint, fertile life expectancy for the average woman when she forms a new union (at age 36) is 7 years.

In more precise models, we detail, for women only, the risk of having a first child in a second union, with fecundability depending on whether she already had children before or not. Indeed, if the woman already gave birth, her hazard of being sterile is lower. Toulemon (2002) has calculated additional curves that detail the probability of being sterile by age of the last child. They are calculated using the incidence curves of overall sterility. The older the last child, the more the sterility curve converges towards the overall curve (Figure 4).

---

[2] The "partner's date of birth" variable has a monotone missing pattern and we use a regression method for multiple imputations, with the respondent's date of birth and age at the beginning of the last union as control covariates.
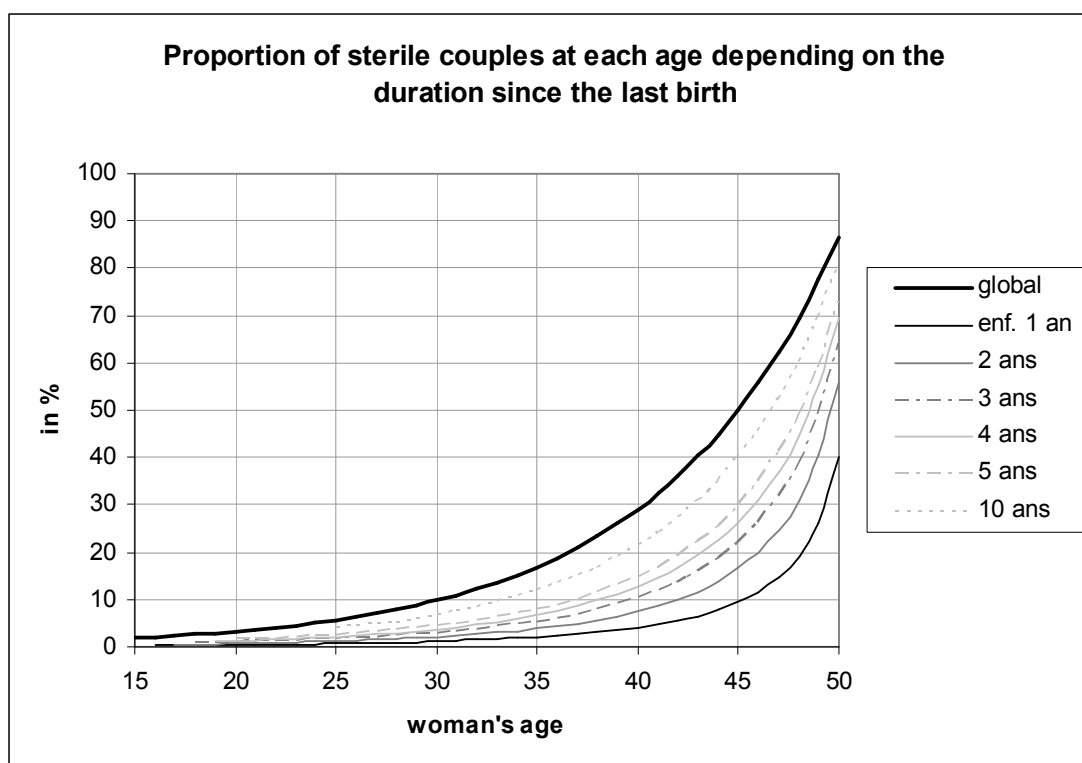
Figure 4: Proportion in % of sterile couples by female age ("overall" curve) and according to the age of their last child (other curves)
Source: Laurent Toulemon, 2002

We deduce from Toulemon's sterility equations the probability of a couple being fertile, expressed as a function of *age of the woman at birth of the last child* instead of *age of the last child*:

Equation of probability of being fertile at a given age, depending on the age at birth of the last child:

$$P_{fert}(age, agebirth) = \frac{1 - ster\ (age)/100}{1 - ster\ (agebirth)/100}$$

Where *age* = current age, *agebirth* = age of the mother at birth of the last child

In the case where we detailed by child parity, we decided to take the overall curve for childless women, which underestimates their sterility[3]. However for the model, if

---

[3] Concerning childless women, their probability of being sterile will be the same as the overall curve if they never tried to have a child, and higher if they already tried and did not have a child yet. Childless women who already tried to have children are more likely to be sterile, and their proportion is higher in second unions. It would be possible to estimate the sterility of childless women only by estimating this selection.

we find results with an underestimated sterility control, it can nonetheless be used, since controlling for the real sterility level of childless women would have an even stronger effect.

Results

Timing of births and effect of sterility

We first focus on the timing of childbearing in a second union since its beginning. Results are separated for men and women, and we introduce in each regression some partner characteristics and the other covariates commented below. In spite of the differences in structure of second unions for men and women, individual characteristics have very similar effects for both genders (Table 5).

Controlling for all covariates except sterility, the age effect takes the form of a reverse U-curve for men and women (Figure 5). The likelihood of having a child in a second union decreases with age from 31 years old for men and 29 years old for women. The decrease is larger for women than for men. This may partly be due to the fact that they become sterile at a younger age.

When controlling for fecundability (or sterility), the likelihood of having a child during a second union increases with age for women. Childbearing appears to accelerate as age increases, in anticipation of future sterility. This corroborates the time squeeze hypothesis for women. The woman's decreasing risk with age of having a child during a second union was thus more due to sterility than to a decreased desire for children.

For men, the decrease is much less pronounced after controlling for fecundability. Men resist the fecundity decline by accelerating, but not so clearly. We still observe a decrease from age 37. The fertility of older men tends to diminish with a second partner, and biological factors play a modest role. And indeed, the fecundability variable (time varying with age) has a greater effect for women than for men (Table 5).

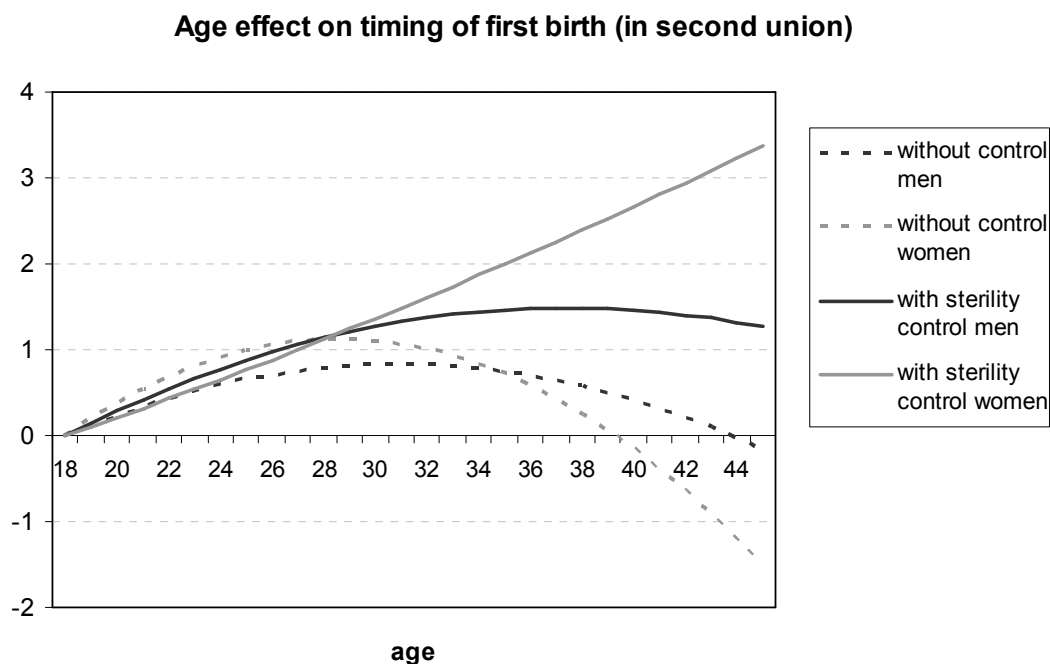**Age effect on timing of first birth (in second union)**

Figure 5: Quadratic age effect on timing of first birth during the second union, with or without sterility control; estimates from the Cox model
Source: Etude de l'histoire familiale (EHF), Insee, 1999

We control for the age difference between partners, since age difference is more heterogeneous in second unions than in first ones. The mean is 2.7 years more for the man. We classified couples into three groups: similar ages (equal age or with a difference of three years maximum), those in which the woman is older (more than three years) and those in which the man is older. After controlling for fecundability, the results show that if the woman is much older, the couple increases its likelihood of having children, whereas the reverse situation (male older) decreases it. Here is maybe a supplementary proof of the gender aspect of the biological clock: from the man's point of view, if he repartners with a younger woman, the couple can delay childbearing, whereas if she is older, they have to hurry up before she gets sterile.

Results on other covariates introduced show that marital status[4] of the second union has an impact. Being married instead of cohabitant increases the likelihood of having children for both men and women. This result is in line with the European results in first (Pinelli et al., 2002) as well as in second (Buber and Fürnkranz-Prskawetz, 2000) unions.

---

[4] also time varying since it could change during the partnership. However, we must be careful on introducing this time-varying covariate, because even if we make it time-dependent, the proportional assumption may not be verified on a variable so directly related to the modelled event .

Table 5: Estimates of the model, risk of first birth during the second union, since union formation

Variable	Women Estimate	s.e		Men Estimate	s.e	
cohabitation (versus marriage)	-0,773	0,026	***	-0,836	0,033	***
fecundability	0,128	0,022	***	0,059	0,003	***
Age	0,104	0,022	***	0,153	0,018	***
age2	0,001	0,002		-0,004	0,001	***
women younger (ref= equal age)	-0,076	0,028	***	-0,217	0,045	***
women older	0,136	0,032	***	0,301	0,078	***
1 child (ref=0 child)	-0,224	0,038	***	-0,175	0,048	***
2 children	-0,265	0,045	***	-0,263	0,058	***
3 children	-0,196	0,056	***	-0,393	0,076	***
partner has previous children	-0,297	0,030	***	-0,138	0,040	***
last child is under 6	0,267	0,037	***	0,169	0,048	***
no diploma (ref=medium)	0,132	0,035	***	0,159	0,049	***
Secondary	-0,081	0,036	**	-0,035	0,047	
Higher than secondary	-0,087	0,032	***	-0,043	0,040	
duration between union 1 and 2	0,004	0,005		0,011	0,006	**
widowhood	0,117	0,082		0,034	0,151	
union formed after 1990 (ref=before 1970)	0,266	0,041	***	0,186	0,061	***
union formed after 1980	0,259	0,041	***	0,211	0,061	***
union formed after 1970	-0,018	0,049		0,076	0,068	
N (event)	15193 (7396)			8364 (4204)		

Source: Etude de l'histoire familiale (EHF), Insee, 1999

Children from a previous union have a negative impact on second union fertility, as was found in Finland and Austria (Vikat et al., 2003). The more children the man has[5], the lower his likelihood of having others. This effect is not observed for women. One or two children have exactly the same impact on childbearing reduction. However, if they already have three children or more, there is a small threshold effect[6]: they seem to reduce their childbearing a little bit less.

To illustrate more fully the timing effects, we represent the age effect (after controlling for sterility) according to the woman's number of previous children (Figure 6). Results show that childbearing is only accelerated with age for childless women and mothers of one child, but there is a decrease in the propensity to give birth in second unions for oldest women if they already have two or more children.

---

[5] the number is only available for the respondent, for the partner, we only know if he or she already has children

[6] The parameters of two and three children are significantly different

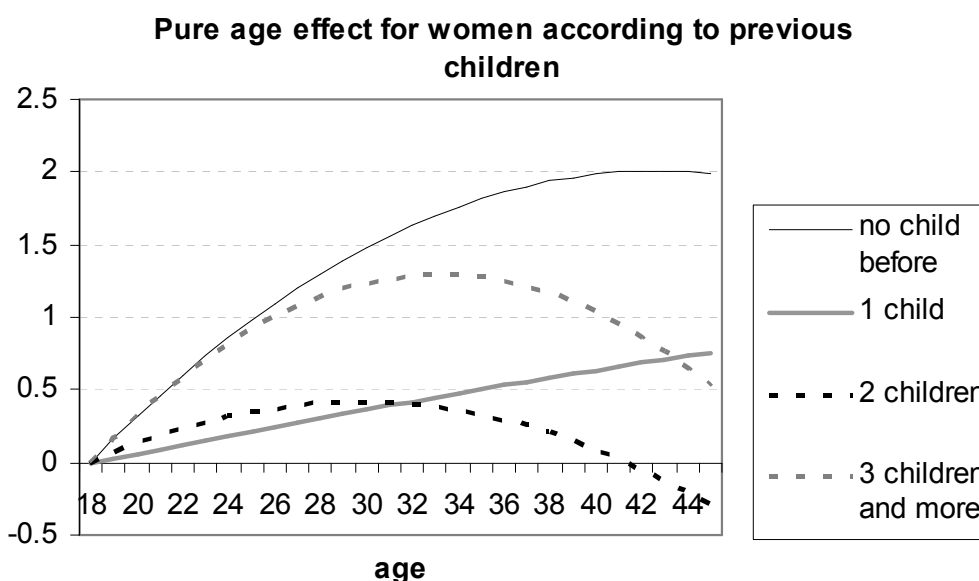**Pure age effect for women according to previous children**

Figure 6: Quadratic age effect on timing of woman's first birth during the second union; control for sterility by number of children she already has; estimates from the Cox model
Source: Etude de l'histoire familiale (EHF), Insee, 1999

If the partner already has children, the probability of having a fertile second union diminishes (Table 5). The effect is stronger for the man's children than for the woman's ones. Moreover, the age of the last child is important. Indeed, having a child under six at the start of the second union increases the chance of having a child in the new union. One argument is the wish to give to one's children siblings of similar age ("sibling effect").

Level of education acts as expected. No diploma increases the risk of having other children for both men and women. Highly educated women (higher than secondary) are less likely than others to have children in the second union.

We also introduce a covariate indicating how long the person waits before repartnering (duration between the end of the first union and the formation of the new one). This covariate may be an indicator of the quality of this second matching and such couples are more likely to have children. Many authors (Castro Martin and Bumpass, 1989; Villeneuve-Gokalp, 1994) have shown that marital dissolution diminishes with the age at first partnership. They often interpret this as a sign of a better match since the partner search was longer. For second unions, the best indicator of partner search time would be the interval between the two unions even if, in some

cases, they were acquainted before the end of the previous union. Results show that the probability of having children increases with this duration, others things being equal, but only for men. One explanation could be that the remarriage market is less constrained for men than for women. Since they less often have the custody of previous children, they can afford to be more selective. Those who take time to find their new partner are more likely to have children in this new union.

The way in which the first union ends is not significant. First union ending with the partner's death instead of separation has no impact on the risk of having (other) children in the second union for both sexes. For widows, the first step could be in repartnering (women are less likely to repartner after the death of the partner), but those who do repartner feel totally free to have children again.

Recent second union cohorts decide more quickly to have children but we observe no difference since the 1980s. This may be explained by the democratisation of divorce at that time, thus more legitimacy to form a new family and to have children in the new union.

Second child timing

We model in this part the risk of second child birth since the birth of the first child in second union. Without controlling for sterility, the likelihood of having a second child within a short interval diminishes dramatically with age, especially for women (Figure 7). After controlling for sterility, we no longer find an age effect for both sexes. Women have a slightly increasing risk of second birth in second union with age. The effect of sterility on the childbearing process is then not so marked for the second birth as for first. It is possible that some people forming a second union want at least one common child, and childbearing is accelerated for the first common child if women are reaching their fertility limit, but not so significantly for the second child.

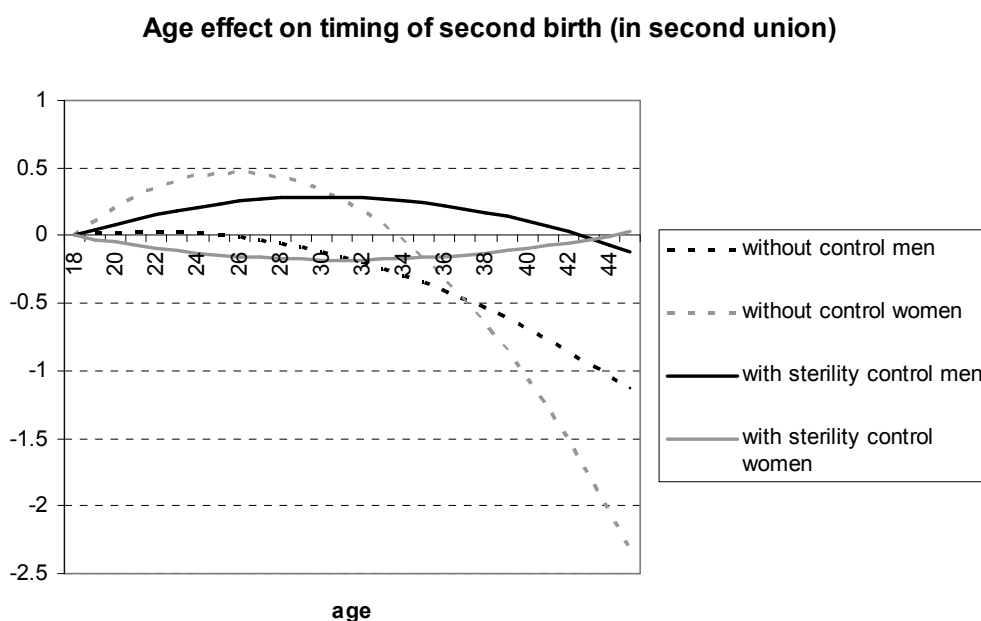**Age effect on timing of second birth (in second union)**

Figure 7: Quadratic age effect on timing of second birth after the first birth during the second union, with or without sterility control; estimates from the Cox model
Source: Etude de l'histoire familiale (EHF), Insee, 1999

Table 6: Estimates of the model, risk of second birth during the second union, since birth of the first child

Variable	Women			Men		
	Estimate	s.e		Estimate	s.e	
cohabitation (versus marriage)	-0,155	0,041	***	-0,155	0,051	***
fecundability	0,186	0,021	***	0,081	0,010	***
age	-0,028	0,027		0,047	0,031	
age2	0,001	0,001		-0,002	0,001	**
women younger (ref= equal age)	-0,026	0,044		-0,088	0,067	
women older	0,111	0,054	**	0,061	0,131	
1 child (ref=0 child)	-0,439	0,047		-0,364	0,058	***
2 children	-0,487	0,062	***	-0,271	0,073	***
3 children	-0,140	0,078	*	-0,253	0,105	**
partner has previous children	-0,260	0,050	***	-0,465	0,069	***
no diploma (ref=medium)	0,240	0,053	***	0,259	0,072	***
Secondary	-0,032	0,060		0,164	0,073	**
Higher than secondary	0,317	0,051	***	0,406	0,060	***
duration between union 2 and first child	-0,135	0,011	***	-0,022	0,018	
widowhood	0,089	0,120		0,099	0,223	
union formed after 1990 (ref=before 1970)	-0,197	0,063	***	-0,044	0,088	
union formed after 1980	-0,243	0,059	***	-0,009	0,082	
union formed after 1970	-0,356	0,071	***	-0,209	0,094	
N (event)	7396 (2897)			4204 (1837)		

For the second child, we introduced another duration covariate (time between union formation and arrival of first child). The longer this duration, the lower the likelihood of having a second child (Table 6). This effect is significant for women only. This time effect shows again that any delay after a break-up, whether in age at union formation or age in first birth, diminishes fertility. But delaying the first birth may also be a sign of couples with a lower desire of parenthood, especially for a second union, which explains they are less likely to have another child.

Conclusion and discussion

This article emphasizes the specific fertility process of second unions, in a context of new partnerships in which each characteristic of the partners plays a role (previous children, age), and in an environment possibly constrained by biological patterns. Results show that the completed fertility in the event of separation is generally reduced by 0.1 children for men and 0.15 for women, but not in the event of repartnering. Men's fertility is less affected than women's because they repartner more and have more children in second unions. Growing sterility with age seems to affect step-fertility especially for women, who tend to accelerate first childbearing in the new union.

The acceleration of the birth process for second unions in the hypothetical scenario of absence of sterility emphasized in this article may be a proof of the couple's anticipation of fecundability decline with age. This result was not self-evident, since the recent progress in the treatment of "treatable" sterility may have led people to believe that they would be able to have children whatever their age. It is a sign of their race against the biological clock.

However, we do not know if they estimate their sterility risk properly, and if they overestimate or underestimate their fecundability decline. Additional factors more difficult to capture may influence this acceleration. Social feeling about an ideal age for paternity and maternity not to be exceeded[7]; anticipation of health problems other than sterility that may affect people with age ; couples who may not feel up to have children later and want them when they are in a good shape. These others norms and

---

[7] As an illustration, in their conditions for adopting a child, some countries impose a maximum age gap of 45 years between the adoptive parent and the adopted child .

physiological factors are not introduced in the sterility equation but can of course influence childbearing choices.

Sterility cannot explain all childlessness in second unions. We have already mentioned the selection process of people less likely to have children in a second union. But some individuals do not have a desire for children, especially in stepfamilies. It is also possible that for some people, step-parenthood may be sufficient to compensate for biological child desire. We can also imagine that a minimal level of confidence in the new partner is required to plan to have a child together. The experience of first union dissolution may make people more careful and wait a 'reasonable' period of time before forming child intentions. This period, necessary for some couples, may postpone childbearing plans for so long that they are finally abandoned. But even if we considered that a share of the couples analysed do not have child desire, our acceleration effect, found for all the couples, would be even stronger.

Finally, this important process is taking place in a context of major changes. More and more people are entering a second union, and notably young people who have not had children yet. We find that recent second unions are more likely to produce children, for an equivalent number of previous children. Could the democratisation of second unions and of step-families be the reason for the increasing occurrence of births in second unions? With the transformation of the population entering second unions, notably their age structure, expectations for the future may be questioned.

References

Beltzer Nathalie, Bozon Michel. 2006. La vie sexuelle après une rupture conjugale. Les femmes et la contrainte de l'âge. *Population : Notes de recherche,* 61 (4), p. 533-552.

Billari Francesco C., Kohler Hans-Peter. 2004. Patterns of low and lowest-low fertility in Europe. *Population studies,* vol. 58, p. 161-176.

Bongaarts John. 1998. "Fertility and reproductive preferences in post-transitional societies." in *Policy research division working papers*. New York: Population council.

Bozon Michel. 1990. Les femmes et l'écart d'âge entre conjoints : une domination consentie . I , type d'union et attente en matière d'écart d'âge. *Population,* (2), p. 327-360.

Buber Isabella, Fürnkranz-Prskawetz Alexia. 2000. Fertility in second unions in Austria : findings from the Austrian FFS. *Demographic research,* 3. http://www.demographic-research.org

Cassan Francine, Mazuy Magali, Clanché François. 2001. Refaire sa vie de couple est plus fréquent pour les hommes. *INSEE Première,* 797.

Castro Martin Teresa, Bumpass Larry L. 1989. Recent trends in marital disruption. *Demography,* 26(1), p. 37-51, 14 p.

Courgeau Daniel, Lelièvre Eva. 1989. *Analyse démographique des biographies*. Paris, Institut national d'Etudes démographiques, 269 p.

de Graaf Paul M., Kalmijn Matthijs. 2003. Alternative routes in the marriage market: competing-risk analyses of union formation after divorce. *Social Forces,* 81 (4), p. 1459-1498.

Kreyenfeld Michaela. 2002. Time-squeeze, partner effect or self-selection? : an investigation into the positive effect of women's education on second birth risks in West Germany. *Demographic research,* 7, p. 15-47. http://www.demographic-research.org

Lampard Richard, Peggs Kay. 1999. Repartnering: the relevance of parenthood and gender to cohabitation and remarriage among the formerly married. *British Journal of Sociology,* 50 (3), p. 443-465.

Leridon Henri. 2002. Causes et traitements de la stérilité. In: *Démographie : analyse et synthèse. Volume 2, Les déterminants de la fécondité*. Paris, INED, p. 251-264. (Chap. 33).

Leridon Henri. 2008. A new estimate of permanent sterility by age: sterility defined as the inability to conceive. *Population Studies,* 62 (1), p. 15-24.

Mazuy Magali, Toulemon Laurent. 2001. *Etude de l'histoire familiale : premiers résultats de l'enquête en ménages*. Paris, Ined, 83 p. (Dossiers et recherches; 93). http://www.ined.fr/publications/collections/index.html

Pinelli Antonella, De Rose Alessandra, Di Giulio Paola, Rosina Alessandro. 2002. Interrelationships between partnership and fertility behaviour. In: KLIJZING Eric, CORIJN Martine (eds.), *Fertility and Partnership in Europe: Findings and Lessons from Comparative Research*. Geneva / New York, United Nations, vol. II, p. 87-99.

Prioux France. 2005. Late fertility in Europe : some comparative and historical data. *Revue d'épidémiologie et de santé publique,* vol. 53, p. 3-12.

Prioux France. 2007. Recent demographic developments in France : fertility at a more than 30-year high. *Population - E : English edition, revue de l'INED,* (3), p. 415-456.

Thomson Elizabeth, Hoem Britta, Vikat Andres, Fürnkranz-Prskawetz Alexia, Buber Isabella, Toulemon Laurent, Godecker Amy L., Kantorova Vladimira. 2002. Childbearing in stepfamilies : how parity matters. In: KLIJZING Eric, CORIJN Martine (eds.), *Fertility and Partnership in Europe: Findings and Lessons from Comparative Research*. Geneva / New York, United Nations, vol. II, p. 87-99.

Toulemon Laurent. 2002. La fécondité est-elle encore naturelle ? : application au retard des naissances et à son influence sur la descendance finale. In: *Entre nature et culture : quelle(s) démographie(s) ? / Actes de la [28e] Chaire Quetelet 2002, Louvain-la-Neuve, 22-25 octobre 2002. - Louvain-la-Neuve : Academia-Bruylant, 2006,* p. 15-42.

Toulemon Laurent. 1994. La Place des enfants dans l'histoire des couples. *Population,* 49 (6), p. 1321-1345.

Toulemon Laurent, Knudsen Lisbeth B. 2006. Stepfamilies in Denmark and France : Does the number of previous children from both partners and whether the previous children live with the couple influence fertility? European Population Conference : Population Challenges in Ageing Societies, Liverpool, UK, 21-24 June, 26 p.

Vikat Andres, Thomson Elizabeth, Prskawetz Alexia. 2003. Childrearing responsability and stepfamily fertility in Finland and Austria. *MPIDR working paper,* WP 2003-001. http://www.demogr.mpg.de

Villeneuve-Gokalp Catherine. 1994. Après la séparation : conséquences de la rupture et avenir conjugal. In: *Constance et inconstances de la famille : biographies familiales des couples et des enfants.- Paris : PUF ; INED - Travaux et Documents. Cahier n° 134.* p. 137-164.