Detecting stopping and spacing behavior in historical fertility transitions: A critical review of methods

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October 2002

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Abstract

Couples who want to limit their fertility can follow two strategies, known as birth spacing and stopping. This is a contribution to the reopened debate about the role of spacing behavior in the fertility transition. First, it reiterates briefly one important theoretical reason why spacing is expected to have played an important role during the modern European fertility transition. Second, it shows how research on the fertility transition has been methodologically incapable of detecting spacing in a convincing way, hence leading to an (as yet) undue emphasis on stopping as the major fertility control strategy. Finally, suggestions are made about what methods to use in future research in order to assess the role of spacing.

Detecting stopping and spacing behavior in historical fertility transitions: A critical review of methods

Couples who want to limit their fertility can follow two strategies, known as birth spacing and stopping (Knodel 1987; Okun 1995). Respectively, these strategies consist of increasing the intervals between subsequent births on the one hand, and on the other hand trying to prevent further reproduction after the maximum desired number of children has been born.

It has been widely accepted among scholars that stopping played a dominant role in the European historical fertility transition. If spacing played any role at all, it would have been a minor one. This paper tries to contribute to the reopened debate about the role of spacing behavior in the fertility transition (see Okun 1995; Friedlander, Okun & Segal 1999). First, it will reiterate briefly one important theoretical reason why spacing is expected to have played an important role during the modern European fertility transition. Second, it will show how research on the fertility transition has been methodologically incapable of detecting spacing, hence leading to an (as yet) undue emphasis on stopping as the major fertility control strategy. In conclusion, suggestions are made about what methods to use in future research in order to assess the role of spacing.

1. Working class spacing and 'bourgeois' stopping behavior?

The first phase of the family cycle could be very difficult economically for the 19th-century working class family budget: young dependent children were being born that, up to a certain age, could not yet contribute to the family income (Rowntree 1901 (2000); Tilly & Scott 1978; Seccombe 1993). This economic stress would become even greater when child mortality was on the decline, which was the case in most regions during the demographic transition. Hence, there would be a strong economic impetus to try to slow down fertility and try to delay yet another birth. This motive would presumably not be completely independent of parity, but it would certainly arise already in the early reproductive years, depending on the capacity of the budget to feed mouths. Therefore, the expected fertility control strategy would be sequential rather than target-oriented. Not the final family size would be important for the working class couple but rather the balance of dependent and economically contributing children in the household throughout the family life cycle. Therefore, we would expect spacing to be the typically working class strategy of fertility control and family planning.[i] This does not rule out the possibility that delaying the next birth could end up as stopping for many couples, deliberately or not.

This rationale is consistent with the argument given by Szreter (1996, 370-371):

> "In a relatively low-income context where effective forms of contraception were lacking, infant mortality high, margins above material subsistence relatively narrow, maternal health likely to be poor and endangered by confinements, and with illness or temporary disablement of either or both spouses a frequent occurrence, 'spacing' would have been an obvious – perhaps the only obvious – way for a couple to exert some helpful control over their personal Malthusian predicament."

Srzreter adds that working class mothers, by spacing birth, would try to keep their employment as well as to maintain their own strength. The idea of an ideal family size would not arise in a working class culture before the rise of the welfare state and before opportunities for upward intergenerational social mobility were increasing. Earlier, in a research about family-building strategies of 19th-century English textile workers, Garrett (1990) found that some extent of fertility decline was due to the longer spacing of births at the lowest parities. She emphasized that this may have been a result of non-volitional factors as well, but that it could reasonably have been achieved on purpose as well. She suggests that spacing may have made better sense than stopping for the working classes.

Alternatively, take a bourgeois couple without economic problems. The start of the family building process would not put it under great economic stress. Therefore, there would be no reason to try to delay childbirths. The expected birth control strategy would rather be target-oriented if the couple would like to invest in a few children in order to give them the means to rise on the social ladder. Such means could include a dowry for daughters or higher education for sons, and an accumulated family capital to inherit for both. A (petty) bourgeois couple would therefore rather try to stop childbearing after a certain number of children had been born. There would be no particular reason to control fertility early in the family life cycle.

To sum up, we would expect a sequential approach to family planning at the beginning of the fertility transition in the working classes, resulting in prolonged spacing from the beginning to the end of the family life cycle. Typical of the bourgeois classes would be a target-oriented approach to family planning, aimed at an ideal family size and resulting in a fertility pattern typical of stopping behavior.

However, there is hardly any evidence to find in the literature to support this hypothesis. If the theory outlined is true, there must be technical-methodological reasons for this lack of evidence. As long as these methodological problems are not solved, the logically plausible theory cannot be falsified.

2. Detecting stopping and spacing in research

There is hardly any historical demographic research that demonstrates that spacing played an important role in the European fertility transition. However, there is no evidence that shows the contrary neither.

In the first place, John Knodel (1987) points out that most historical demographic studies focus more on deliberate efforts to stop childbearing than on efforts to space children. The main reason is, he states, that deliberate stopping is much easier to detect than deliberate spacing. Indeed, if couples deliberately try to stop childbearing, there are clear expectations concerning the age pattern of marital fertility and the age at last childbearing. If no efforts are made to stop childbearing when a specific parity is reached, the age-specific marital fertility rates follow roughly a standard pattern first identified by Henry. This pattern largely reflects physiological sterility (Wilson, Oeppen & Pardoe 1988).[ii] There are no equivalent clear expectations concerning the fertility pattern in case of deliberate spacing. Interbirth intervals always vary very widely between populations even in the absence of deliberate spacing efforts. Many factors can be responsible. The most important factor is breastfeeding practices, which may or may not be used consciously to space births.

Secondly, and related to the point just made, it is now well known that indices of fertility control generally used are designed to detect stopping only; they are conceptually not meant to find spacing behavior (Wilson, Oeppen & Pardoe 1988). Meant here in the first place is the well-known *m*-parameter in the Coale-Trussell model (1974, 1978). It has been well established that this parameter, often interpreted as an 'index of fertility control', is designed to detect stopping behavior only. It fails to identify fertility control practiced by young couples at low parities (Blake 1985). Although Wilson, Oeppen & Pardoe (1988) suggest that the *M*-parameter in the same model could be interpreted as an approximate indicator of spacing behavior, it is much to crude to analyze spacing as a family limitation strategy. The reason is that it is the result of many underlying factors that may have nothing to do with fertility control. *M* reflects not only on the length of birth intervals but also the prevalence of both childlessness and one-child families (Ewbank 1989, 475).

Another index of fertility control often used is the mother's age at last childbearing. Although a declining age has generally been interpreted as reflecting stopping behavior, it has been established that increased spacing reduces age at last birth as well. This is because spacing increases birth intervals in general, including the last open interval. Although most agree on this, there has been some controversy regarding the magnitude of this effect (see Knodel 1987; Anderton 1989 and the response by McDonald & Anderton 1989). Simulation study suggests that the magnitude of the effect depends on the specific form of the spacing behavior (Okun 1995). Therefore, reductions in mean age at last birth cannot uncritically be interpreted as signs of stopping behavior only.

The same holds for increases in the length of the last closed birth interval. These have been interpreted as evidence of failed attempts to stop childbearing. However, spacing increases *all* interbirth intervals, including the last. Since the ultimate closed interval inflates with all forms of fertility limitation, research cannot differentiate between stopping and spacing by examining changes in the length of this interval (Okun 1995, 93-94).

The main argument I would like to make here is that the lack of conclusive evidence in favor or contra spacing behavior is also a consequence of the fact that many historical demographic analyses are carried out on a highly aggregated level. More specifically, research explicitly analyzing stopping and spacing has hardly ever differentiated between social status groups. If the hypothesis outlined above is true, lack of disaggregation into social status groups will amount to aggregating stopping and spacing couples. What are the consequences?

Parity progression schedules

A well-known, more elaborate method for detecting fertility inhibiting behavior consists of investigating the interbirth intervals by final number of children born for completed fertility histories (Knodel 1987; Anderton & Bean 1985). Some features of the pattern of interbirth intervals by final parity are true under conditions of natural fertility. First, the length of the intervals is negatively related to the final number of children born; couples who reach a higher family size, have on average shorter birth intervals. Second, within each final parity group, the length of the intervals increase with parity; the interval between the first and the second child is on average shorter than the one between the second and the third, and so on. This is probably basically a result of decreasing fecundity with age. Finally, the increase of length between the penultimate and the ultimate interval is interval is greater than the increase between successive intervals at lower parities. This is expected when couples try to stop childbearing but it holds as well under conditions of natural fertility. Probably it follows from an acceleration of the decline in fecundity preceding the onset of permanent sterility (Knodel 1987, 148-149).

An important point in the following argument is that this standard parity progression scheme changes in case of stopping but not in case of spacing behavior. Spacing will only be evident in a compositional shift. The following tries to clarify this.

Suppose that a sub-group of the population exhibits perfect stopping behavior. Other things remaining equal, this will result in a reduction of the average interval between confinements within final-parity groups. This is a compositional effect. The total group of couples achieving a particular final parity will be made up of two types: on the one hand those who did not control their fertility but reached that parity under conditions of natural fertility, and on the other hand those who would have reached a higher parity but chose to stop childbearing earlier. The last group of fertility controllers has on average shorter birth intervals than the first group (perhaps because of higher fecundability, and under condition that they do not exhibit spacing behavior), and hence, the mean birth interval with that final-parity group shortens (Knodel 1987, 150-151). In case of imperfect stopping behavior (imperfect for instance because of less effective contraception), the effect of failed truncation will be that the last and/or penultimate intervals are even longer than expected under natural fertility conditions.

Alternatively, suppose that a subgroup within the population starts to limit family size solely by longer spacing. This would leave the average interbirth interval within a group of couples with the same final number of confinements unchanged. By lengthening their interbirth interval, the fertility controllers would shift from a higher final parity group to a lower one, taking the same average interval length deliberately as the non-controllers were already having under conditions of natural fertility (Knodel 1987: 151). Hence, the interbirth intervals for the fertility controlling group cannot be distinguished from the natural fertility group. The parity progression schedule remains untouched. The only way to detect spacing behavior is to look at compositional shifts: if more people come to fall under the schedule of lower family sizes, this is evidence pro spacing behavior (see f.i. Bean, Mineau & Anderton 1990, 199-201). Of course, the overall mean interbirth interval (aggregated across all final parities) should rise in case of pure spacing.

When we make the plausible assumption that family limitation within the population is achieved by a mixture of spacing and stopping, only the latter behavior will be detected as a change in the parity progression scheme. If there is spacing *and* stopping, the compositional effect of the latter behavior towards shorter birth intervals (within final parity groups) will not be counterparted by an effect of the former. Hence, although shortening birth intervals within final parity groups may be an indication of stopping behavior, they do not rule out the possibility that some sections of the population practice deliberate spacing as well.

Things get even more difficult to interpret when the underlying level of fecundity is rising (as may have been the case during the 19th-century fertility transition). Higher fecundity leads to shorter birth intervals. This process may obscure efforts made to postpone a next birth (Knodel 1987, 153). In fact, it may even trigger these efforts. If couples, as a result of higher fecundity, are confronted with more babies coming in fewer years, this may well be a stimulus to cool down the tempo (for example by abstinence or by prolonged breastfeeding).

It should be added that when marriage duration or age at marriage are not taken into account, there is also a risk of unduely interpreting increasing birth intervals as a indication of spacing. This happens when the mean age at marriage is decreasing. Consider two women who eventually have 5 children within their only marriage that remained intact until the end of the reproductive period. Then the one who got married younger will have on average longer birth intervals than the woman who married later; she attained the same parity as the older marrying woman although the younger spent more years in marriage. Hence, if the average age at marriage within a population is decreasing, other things remaining equal, this will lead to longer birth intervals within final parity groups. Therefore, if marriage duration is not controlled for, the longer birth intervals (within final parity groups) may incorrectly be attributed to spacing behavior.

McDonald's model of starting, spacing and stopping

Another methodology sometimes used to distinguish spacing and stopping behavior, was developed by McDonald (1984). Starting from the fact that the average completed fertility of a group of ever-married women is a function of their starting, stopping and spacing behavior, he proposed the following equation as a tool to distinguish between the different components:

$$CEB = S(1 + ((L-M-F)/I))$$

The mean number of children ever born (CEB) is a function of:

S = the proportion of the group who have at least one child;

L = the mean age at last birth;

M = the mean age at marriage among women who ever have a birth;

F = the mean length of the interval between marriage and first birth;

I = the mean length of interbirth intervals (McDonald 1984: 25).

The purpose of the model is to find out what proportion of an observed change in CEB is due to starting, spacing and stopping respectively. Starting is represented by M and F, spacing by I, and stopping by L.

It has been noted that the interpretation of these indices in not unambiguous. As previously stated, L is not a pure measure of stopping behavior because it will to some extent be influenced by spacing as well. F may be inflated due to spacing behavior practiced from the beginning of marriage. I may be inflated by stopping behavior because failed attempts at stopping increase the ultimate and/or penultimate interval (Knodel 1987; Okun 1995). The last process would lead to an overestimation of the role of spacing. However, I believe a counteracting process has often been overlooked.

Although Knodel and Okun agree that effective stopping behavior would reduce the mean interbirth interval *within final parity groups*, Okun (1995, footnote 2) states that "it does not follow that the average interval over all final parities would decrease with stopping behavior". I would argue, on the contrary, that effective stopping can reduce the overall average interval as well. As stated before, it is well known that interbirth intervals at higher parities and at higher ages are longer than intervals at lower parities and ages. Hence, if people stop reproducing at lower ages and parities, fewer relatively long intervals contribute to the mean length while the shorter intervals at lower ages and parities will weigh more. In this way, the overall mean interval (I in McDonald's model) will be reduced. The more effective the stopping behavior, the higher the possible reduction of the mean interval length.

To clarify things, let's divide a population in pure spacers (f.i. the working classes) on the one hand and pure stoppers (f.i. the bourgeois) on the other. First, take the working class spacers. If their attempts to delay next births are not counterparted by increased fecundity, this will increase the mean length of interbirth intervals, being the indicator of spacing. However, their behavior will also reduce the mean age at last birth, thus contributing to the indicator of stopping. Hence, some effect of their spacing behavior will unduely be interpreted, according to the model, as stopping behavior. Alternatively, take the bourgeois stoppers. Their attempts to truncate childbearing before the onset of sterility will indeed reduce the mean age at last birth. However, it will also reduce the mean interbirth interval. We know that interbirth intervals at higher parities are longer than intervals at lower parities. If a subsection of the population does not advance to higher parities anymore, less people will contribute longer birth intervals typical of higher parities. They will only contribute the shorter intervals typical of lower parities. Therefore, increased stopping behavior will reduce the mean interbirth interval, which may obscure the spacing behavior of other subsections of the population.

In sum, some effect of spacing will unduely be interpreted as stopping, while some effects of stopping will to some extend counterpart the effects of spacing. On the other hand one should keep in mind that attempts to stop will increase last birth intervals and, hence, I. To what extent one effect is counterparted by the other remains to be seen.

Although Okun (1995) concluded from a simulation study that McDonald's technique can really differentiate between spacing and stopping behavior, I would argue that this is only the case when the population studied practices spacing *or* stopping but not both. Okun's simulation study indeed included only spacing *or* stopping conditions and no mixture condition. Future simulation study should clarify how accurate McDonald's model can detect a mixture of spacing and stopping.

3. New methods for investigating fertility limitation

It has become clear that it is not possible in historical demographic research to distinguish between spacing and stopping at high parities and high marriage durations (Ewbank 1989). As said before, in a context where highly efficient contraceptive means are not available, both spacing and stopping result in increases in the last closed *and* open birth intervals. Therefore, increases in the penultimate and ultimate birth intervals cannot be interpreted as signs of stopping behavior because they could be a result of parity-independent spacing as well (Okun 1995).

Operationally, then, a method for distinguishing spacing behavior in historical demographic research could consist of looking at birth intervals at low parities and low marriage durations. As a family limitation strategy, spacing differs from stopping in that it is practiced already at low parities and marriage durations. If interbirth intervals at low parities and marriage durations increase, this would suggest spacing behavior. If, on the other hand, intervals increase only at high parities and marriage durations, the population would seem to use stopping as a fertility control strategy only. In reality we would expect a mixture of both.

What methods, then, are available to historical research to tell stopping from spacing in a population that hypothetically practices both? I distinguish between two kinds of questions and data prerequisites. The first is a macro-question: to what extent is the observed fertility decline in a given population due to spacing and to what extent to stopping? The second question is on a micro-level: what elements can help to explain observed differences or increases, if any, in birth spacing irrespective of parity, and what elements can explain differences in stopping behavior? The second question, on the determinants of spacing and stopping, clearly calls for individual-level data and analysis. The macro-question can be tackled with aggregated data as well.

Macro-level analysis

For analysis with aggregated data, indirect measures of marital fertility control have been developed within two closely related conceptual frameworks. One extends the work on natural fertility by Henry and is based on age-specific marital fertility schedules. The other builds on the British research by Glass and Grebenik in the 1950s and proceeds from parity progression ratios. The 'new' methods proposed here are further extensions within these two basic frameworks.

1. Extensions of the Coale-Trussell model

Wilson, Oeppen and Pardoe (1988), in an examination of the Coale-Trussell model (*M* & *m*), stated that, while *m* can be interpreted as an index op stopping behavior, *M* could be read as indicating the extent of birth spacing, achieved through deliberate control or through non-volitional practices. However, this is not entirely true, because *M* is not only affected by the average interval between low-parity births (spacing) but also by the proportion of women who remain childless or stop childbearing after having only one child. Therefore, *M* could only be a reasonable indicator of child spacing if we assume that there is no excess sterility due to disease and, more importantly, "that all *volitional* childlessness and one-child families result from control that was used with the [virtual] intention of spacing" (Ewbank 1989, 475). The latter assumption is clearly unrealistic.

Noticing this severe bias, Ewbank (1989) developed a way to estimate the effect of childlessness and single-child fertility on *M*. Individual-level data are not necessary. What is needed to calculate the new indices are age-specific marital fertility rates (just like in the Coale-Trussell model, of which Ewbanks model is an extension) and the first two parity progression ratios, P_1 being the proportion of married women who have a first child, and P_2 the proportion of married mothers with one child that goes on to have a second child, respectively. These ratios could be calculated from a distribution of final parities.

The first step is to estimate the extent to which marital fertility is reduced by the prevalence of childlessness and one-child families (index I_p). The precise mathematical way in which this is done is not important for present purposes. Just one remark: in order to calculate the estimates, Ewbank introduces the simplifying assumption that all parity progression ratios after the second are equal to the observed value of P_2. Of course, this is unrealistic. A slightly more realistic assumption would be to equate all progression ratios after the second to P_3, but Ewbank states that the advantages of this simplification outweigh the loss in accuracy. The model is not designed to attain a very high degree of accuracy (which can only be attained using individual-level data), only to remove some of the bias in *M* in the Coale-Trussell model (Ewbank 1989, note 9).

If I_p measures the deflatory effect of childlessness and single-child fertility on the overall level of fertility, dividing M by this index I_p yields an estimate of how much larger *M* would be if all married women would eventually have at least two children. This estimate is called *M"* ($= M / I_p$). Two main factors that determine *M* are removed, namely P_1 and P_2. The result is a more accurate index of the average interval between low-parity births.

The Coale-Trussell model of total marital fertility (TMF) can now be rewritten as follows:

$$\text{TMF} = 5 \cdot \Sigma n(a) \cdot M'' \cdot I_p \cdot e^{m \cdot v(a)} = 8.995 \cdot M'' \cdot I_p \cdot e^{m \cdot v(a)}$$

In this equation:

$5 \cdot \Sigma n(a)$	equals 8.995, since five times the sum of Coale and Trussell natural fertility schedule equals this constant;
M''	represents the extent to which the difference between the observed TMF and 8.995 can be attributed to fertility limitation at lower parities; the lower the estimated value of M'', the larger early birth intervals will be;
I_p	indicates the degree in which childlessness and single-child fertility lower TMF;
$e^{m \cdot v(a)}$	indicates the extent to which fertility reduction is a result of lower than natural fertility at higher ages and parities.

I would argue that this model, as well as the original model by Coale & Trussell, is biased in favor of detecting stopping behavior, because spacing at high parities will be subsumed under the 'stopping' term ($e^{m \cdot v(a)}$); it will only affect m and not M. The major contribution of the model is to yield a version of M that is standardized from disturbances from childlessness and single-child fertility. It yields a less ambiguous index that can be used in a meaningful way in the spacing-stopping debate. If some subsections of a population started to space childbirths more widely at low parities, this will be detected in Ewbanks model by decreases of the M”-parameter.

2. Cohort Parity Analysis (CPA)

CPA has been developed by David and associates (1988a; 1988b) as a an indirect method for detecting fertility control on the basis of parity distributions. Essentially, the parity distribution of a *target cohort* is compared with the parity distribution of a culturally and biologically similar natural fertility cohort, called the *model cohort.* The model cohort is supposed not to exert fertility control. From differences in the parity distribution of the two cohorts, estimates are derived that represent upper and lower bounds of the extent of fertility control in the target cohort. In addition to providing estimates of the overall proportion practicing some form of effective fertility control, CPA provides information on the distribution of controllers by parity as well. Hence, CPA can be used in a meaningful way in the stopping-spacing debate.

I will not go into the details of the calculation procedure. Important here are the three basic assumptions underlying CPA.

1. The hardest assumption is that the target cohort would have the same parity distribution in the absence of fertility control; in other words: the targets cohort differs demographically from the model cohort only in that

the target cohort exerts fertility control. This implies, for example, that breastfeeding practices in both cohorts are the same.

2. For each age-at-marriage and marriage duration cohort, there exists an upper parity limit *k* (the cut-off parity) at which fertility controllers are never observed; in other words, any woman or couple observed at the cut-off parity or above is assumed not to have exerted effective fertility control; or, again in other words, effective fertility controllers never attain parity *k*.
3. CPA assumes that, if two women of the same age and marriage duration have reached a particular parity *x*, the one that starts subsequently to control fertility is not more nor less fecund than the one that does not (yet) start to control fertility. This is called the 'independence ' assumption.

If these assumptions are true, CPA yields efficient and unbiased estimates of the percentage of controllers at each parity below the cut-off parity – that is to say: upper and lower bounds for this percentage (David & Sanderson 1988b). Using Monte Carlo simulation, Barbara Okun (1994) investigated how well CPA performs under divergent fertility control situations. If the assumptions are not violated, the model performs very well. She also investigated how sensitive the CPA-model is to violations of the assumptions.

1. Results show that CPA is extremely sensitive to violations of the first assumption. That is: if there are differences in post-partum non-susceptible period between the two cohorts, CPA-estimates are biased.

Upwardly biased if the breastfeeding is more extensive in the target cohort than in the model cohort, and downwards if breastfeeding is less extensive in the target cohort.

2. CPA-estimates are less sensitive to violations of the second assumption and, moreover, the bias will always be downwards. That is to say, whether the cut-off parity *k* is fixed to high or to low, the number of fertility controllers will always be underestimated. In this respect, CPA provides conservative estimates of the extent of fertility control.
3. The same holds for violations of the third assumption. That is, if the independence assumption does not hold, CPA will never overestimate the extent of control. It can only slightly underestimate it.

In conclusion, CPA can be used in the spacing-stopping debate under the assumption that a correct natural fertility model cohort can be found with which the target cohort can be compared.

Individual level models

If the research question concerns the determinants of spacing and stopping patterns, one clearly needs individual-level data and analysis. Quite recently, event history models have become more popular in historical-demographic research (Guttman & Alter 1993). However, they have not been used to shed light on the spacing versus stopping patterns in the historical fertility transition.

At each attained parity, women can be divided into two groups: the ones that proceed to the next higher parity and the ones that stop at that parity. It is possible to model the probability that no higher parity will be attained, including the attained parity as one of the covariates, together with other relevant covariates. If a significant proportion of the population exhibits effective parity-dependent stopping behavior, the probability that there is no next birth should significantly depend on parity. For instance in a logistic regression model:

$$\text{Logit Prob(No next birth)} = \alpha + \beta_1(\text{Parity}) + \beta_2\,(\text{Age}) + \beta'X' + \varepsilon$$

Secondly, a duration model could be developed for all closed birth intervals, representing the determinants of birth spacing and again including age and attained parity as one of the covariates. If spacing is not parity dependent, the relevant parameter should not differ significantly from zero, after controlling for other relevant parameters like age and duration of marriage. This could, for instance, be implemented in a Cox regression model (Cox 1972):

$$\text{Log } h_t = \alpha_t + \beta_1(\text{Parity}) + \beta_2\,(\text{Age}) + \beta'X' + \varepsilon$$

This kind of models have been applied by Rodriguez & Cleland (1988), Trussell et al. (1985, 1992), Yamaguchi (1989; with Ferguson 1995), and Van Bavel (2002; 2003, forthcoming).

4. Conclusion

Although there are theoretical and historical reasons to expect that spacing has played an important role during the fertility transition in Europe, most evidence suggests that stopping played the most important role. This essay demonstrated that the methods commonly used in historical-demographic studies to measure stopping and spacing behavior, are inadequate to distinguish between both forms of fertility limitation. As long as these methodological difficulties are not solved, it cannot be ruled out that spacing did play a more important role than hitherto accepted. Therefore, the essay suggests some alternatives to be applied in later contributions.

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Notes

The author wishes to thank Ron Lesthaeghe, Koen Matthijs, and Frans van Poppel for comments on some of the arguments made in this paper. The paper was written as part of a research project, supported by the Flanders National Fund for Scientific Research (FWO – Vlaanderen).

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[i] Note that this rationale is the same as the arguments given for the highly spaced birth pattern in hunter-gatherer cultures (see Howell 1986).

[ii] It should be kept in mind that a variety of factors other than physiological sterility or deliberate stopping behavior can cause fertility to decline more rapidly with age than implied by the standard natural fertility schedule. "Social sanctions on older women's childbearing (the grandmother effect), declining coital frequency with the duration of marriage, the prevalence of pre-marital conceptions, the distribution of marriage by age and many other factors could all play roles" (Wilson, Oeppen & Pardoe 1988, 12). Hence, deviations from the standard age patterns can only be interpreted unequivocally as reflecting stopping behavior when alternative explanations can be ruled out.