Are late-entry-into-motherhood women responsible for fertility recuperation?

An application of a demographic portrait

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Abstract.

The idea of fertility recuperation emerged when demographers found that higher average age at first child (AFC) was not predicting lower completed fertility anymore. A common demographic portrayal of fertility recuperation is the comparison of age-specific fertility rates between two consecutive cohorts, which typically shows a "catching-up" dynamic. But that portrayal is mostly qualitative and does not define clear measures of postponing and recuperating. It does not tell, for example, whether recuperation is due to an increase of fertility among late AFC women, or is due to women of *any* AFC increasing their fertility. In both cases the "catching up" dynamics will be the same. This article A) elaborates on a quantitative portrait of fertility recuperation, based on AFC-conditional fertility rates, and B) performs an empirical application using European survey data, where it is found that cohorts where recuperation is first found are characterized by higher fertility of late AFC women; these women, in fact, entirely explain the appearance of the recuperation.

Key words: fertility recuperation, cohort fertility, demographic methods.

Introduction

During the last few decades, many developed countries have shown increasingly later ages of entry into motherhood and lower fertility rates, which has triggered a discussion about the complex relationship between them (Kohler et al. 2002a). Several papers argued about the influence of a wide range of factors that explain such associations, most notably, the continuous advance of women into the labor market, accompanied by higher education and a change in lifestyles (see Frejka et al. 2008 and Kohler et al. 2002a for a detailed discussion). Ages of entry into motherhood in several developed countries were supposed to keep rising (Lesthaeghe and Willems 1999, Frejka and Sardon 2004) and they are doing it[2], partially because of high youth unemployment rates and high housing prices (Adsera 2005). In sum, the extent to which age at childbearing, commonly regarded as a barometer for the overall situation of fertility, might also predict low levels of completed fertility is a priority topic among researchers and policy makers.

A milestone in this demographic literature emerged first among Nordic countries (Kohler et al. 2002b, Frejka and Calot 2001b) and France (Toulemon 2008), where no strong relationship between

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[2] Statistics about mean age of women at birth of first child can be found at United Nations Economic Commission for Europe (UNECE), http://w3.unece.org/pxweb/quickstatistics/readtable.asp?qs_id=34.

the average age at first birth and completed fertility was observed throughout the 1950s and 1960s birth cohorts. This absent or tenuous population-level association between early life fertility and complete fertility was coined, broadly, *fertility recuperation* (Lesthaeghe and Willems 1999).

But population-level quantitative assessments of fertility recuperation are scarce. A common demographic analysis of recuperation, based on comparing age-specific fertility rates between two cohorts, does not define a quantitative measure of the variables involved in a simple conceptual approach to the dynamics of fertility recuperation: the idea of postponing and recovering.

Postponing and recovering could be captured by demographic measures of A) time available to have kids and B) number of kids had during that time.

The first goal of this study is to emphasize the quantitative convenience of decomposing the completed fertility as the simple product of A) fertility rates conditional on age at first child (AFC) times B) the distribution of women by AFC. For example if changes in completed fertility across cohorts is decomposed as changes in A and B, the ratio of the latter over the former can work as an *index of recuperation*, where a value of "1" implies that changes in B exactly counteract changes in A. This analysis provides quantitative assessments of fertility recuperation. The use of AFC-conditional fertility was used in Andersson et al. (2009), though their focus is on differences *across education groups* while in this study the focus is on fertility recuperation as a phenomenon that takes place *across cohorts*.

The second goal of this study is to perform a particular empirical application. Although the natural way of thinking about fertility recuperation is that of a woman achieving her fertility goals despite entering into motherhood at a late age, the observed recuperation in some European countries can be the outcome of factors or policies that influence *all* kinds of women, not just the late-family-oriented ones (see a review of fertility policies in Neyer 2006 and Ronsen and Skrede 2010). The methodology for this empirical application is built upon the AFC-conditional framework, and the results are that late-entry-into-motherhood women, in particular, explain the vast majority of fertility recuperation, and therefore, given that this group of women is a complex outcome of selection and changes in behaviors, it could be helpful to focus on them for a better understanding of fertility recuperation.

Section 1: The fertility-by-age ratio

A common framework for portraying recuperation is the comparison of two cohorts in terms of their fertility rates by age (see for example Caltabiano et al. 2009). Call this the fertility by age ratio (FAR).

The FAR does not define measures of postponing and recuperation, so it does not directly provide a quantitative analysis. Although early fertility is a measure for postponing, and late fertility could be a measure for recuperation, in fact each fertility by age rate is itself the outcome of both postponing and recuperation at the same time. So additional analysis and concepts are needed. The FAR analysis can show that "births come later but finally come", though without precise measures it is hard to be conclusive regarding recuperation: two consecutive cohorts, whose mean ages at first child (AFC) are 20 and 21 years old, and whose complete fertility rates are 3.0 and 2.9, do show more recuperation than the other two consecutive cohorts, of 30 and 31 AFC and 2.0 and 1.9 fertility rates? Did any recuperation take place in these examples?

Whether fertility recuperation is due because of late-entry-into-motherhood women or because of all women, which is the second goal of this article, cannot be answered by means of the FAR.

Finally, postponing measures are hardly observable among childless women. The methodology used in this article does not include childless women. Notwithstanding, childless women are commonly included in the FAR. However, this practice could be mistaken. When childlessness is included, fertility rates are equivalent to "mother's fertility" times "proportion childless". Therefore, if early fertility is regarded as a measure of postponement, is childlessness a measure of postponement?, And if late fertility is regarded as a measure of recovering, is childlessness a measure of recovering?. Even the comparison of mean AFC versus percentage childless is complicated, because the former is a biased proxy for the childless women's postponement[3]. Indeed, empirically there is an unclear association between the childless percentage and average AFC (Kholer and Ortega 2002b)[4]. Besides, individual-level studies focus on either the mother's fertility or childlessness, using a substantially different conceptual framework.

For example, the comparison of early versus late fertility rates. Including or not childless women in the computation makes no difference in the comparison, since the childless percentage cancels itself out of the late-over-early ratio. It gets more complicated in a regression of late against early rates (using data for several cohorts, of course); if childless women are included in the regression, then both the Y and X variables are multiplied by the childless percentage, and the coefficient becomes a complex mix of correlations between childlessness percentage, mothers' early fertility and mothers' late fertility, from where it is very hard to derive any conclusions regarding fertility recuperation.

Section 2: The usefulness of AFC-conditional fertility rates

Fertility must be seen from the perspective of a dynamic chain of events throughout life, closely linked to the labor market, expectations about the future, the role of the state, the relative scarcity of mates, the role of women and many other factors. To study the final fertility of a woman requires complex data and complex models (See Arroyo and Zhang 1997 for a review). At a population-level, demographic models do not attempt to attain a unique interpretation from the individual behavior perspective, but instead provide an empirical description that can be fairly informative, simple and easy to compute.

In the last section it was argued that quantitative measures of postponement and recuperation are necessary for exploring the articulation of those variables.

As a postponement measure, a reasonable option is the age at first child (AFC). The first child is a key element in the transition into adulthood and family life (see Shanahan 2000 for a discussion about this process), subsequent births normally follow a fairly stable timing after the first one

[3] Childless woman are relatively not-family-oriented, and typically have a late AFC. Thus, increases in the childless proportion could imply decreases in the mean AFC. This selection mechanism, and its reverse causation bias, attenuates the observed recuperation. Say, fertility became harder and the childless proportion increases with respect to the previous cohort. Several otherwise-late AFC women go childless instead, and the *observed* change in the mean AFC becomes too small to be representative of the true postponement that takes place. An observer will then underestimate the amount of postponement.

[4] Kholer and Ortega (2002b) compute a tempo-adjusted measure and conclude that the most recent period fertility patterns do not imply substantial increases in childlessness, even in younger cohorts. Hoem et al. (2006a, page 1) conclude that *several factors, both intrinsic and extrinsic to an educational system, (such as its flexibility, its gender structure, and the manner in which education is hooked up to the labor market) may influence the relationship between education and childlessness, and we would not expect a simple, unidirectional relationship.* Van Bavel and Kok (2010) found that an important part of childlessness in the interwar period, among early XX century birth cohorts in the Netherlands, can be associated with a modern, individualized lifestyle, rather than an issue of over-postponing motherhood.

(Knodel 1987, Van Bavel 2004), the first birth apparently has more influence on a woman's wage (Loughran and Zissimopoulos 2009) and, probably, subsequent births demand less learning. Indeed, AFC is the most used variable to characterize the postponing of fertility across cohorts.

As a measure of recuperation, the corresponding measure is the total fertility achieved after the first child. From an individual behavior perspective, two key variables in a fertility recuperation analysis are age at the birth of the first child and final fertility, which can be interpreted as fertility conditional on the age at first childbirth. A demographic counterpart of this conceptual framework is the fertility *of a group of women* that has their first birth at a given AFC. The total fertility rate of a cohort can be easily decomposed along these lines, as the distribution of women by AFC multiplied by the fertility conditional on AFC rates (a vector of F_{AFC} rates). The parallel with a decomposition of individual-level behavior is straightforward[5].

This decomposition provides a quantitative framework for portraying recuperation, where changes in the distribution of women by AFC are labeled as postponing (or hastening) and changes in some or all AFC-conditional fertility rates are called recuperation (or lack of recuperation). This definition clearly narrows down the scope of the concept of recuperation, but it provides a starting point to quantitatively assess different issues. If no change in F_{AFC} is observed, then no recuperation is observed, although this does not mean that individual-level analysis could not uncover different recuperation behaviors. The definition of fertility recuperation in this study is thought to be used as a demographic portrait of fertility recuperation.

Finally, in the last section I discussed the complexities of including childlessness in the analysis. Indeed, only non-childless women are included in this study; further discussion can be found in the Discussion Section.

Section 3: The role of late-entry-into-motherhood women on fertility recuperation in European countries

From a demographic perspective, it is not clear whether recuperation took place by means of an overall rise in AFC-conditional fertility rates, or mostly because of changes in some AFC-conditional fertility rates, a central distinction for the understanding of fertility recuperation.

Indeed, the list of factors behind the occurrence of fertility recuperation includes public policies, such as the availability of childcare, child cash-benefits and parental leave[6]; the accommodation of family and careers, most notably through part-time work[7] and by waiting for "the end of the mother-

[5] Let f(F,AFC) be the joint likelihood of having a total of F children and having the first one at age AFC. f(F,AFC) can be decomposed as the product of f(F|AFC) * f(AFC), i.e., the conditional likelihood times the marginal likelihood.

[6] Neyer (2006) discusses the case of European countries. Rønsen and Skrede (2010) discuss the case of Nordic countries. Del Boca (2002) discusses the case of Italy.

[7] Adsera (2005), Adsera (2006), Neyer (2006). A very insightful discussion and empirical evidence is presented in Amuedo-Dorantes and Kimmel (2005) and Caldwell et al (2002).

gap"[8], the size of the public sector as an employer[9], the father's involvement in house work[10], and "stopping behaviors", i.e., the idea that most women attain their ultimate fertility shortly after their first birth[11]. Therefore the list of factors includes pathways that in principle influence all women and pathways that might be focused on women with certain characteristics.

Some pathways might be more intensive among mothers with late entry into motherhood. Education, for example, is articulated with several of the pathways just discussed, and educated women tend to become mothers at a relatively late age. Indeed, Hoem et al (2006a, 2006b) study Swedish women born in 1955-59 and emphasize the relatively high fertility of professional women oriented towards typically female occupations. Meanwhile, Sigle-Rushton (2008) argues that Britain´s relatively high fertility is likely to be limited to families on the lower end of the income scale, who usually show earlier AFCs. Ronsen (2004) studies Nordic countries and concludes that adverse macroeconomic conditions and rising unemployment exert a diminishing influence on fertility, typically mainly affecting women of relatively low education.

Some pathways might not be articulated with the age at entry into motherhood. Ekert-Jaffé et al (2002) emphasize social class, when concluding that France's family policy seems to erase fertility differentials by social class. Ronsen and Skrede (2008, 2010) point out that the relatively high and stable cohort fertility of the Nordic countries may to a large extent depend on a family-friendly, gender-segregated labor market with extensive part-time work (however, they also mention an underlying selection of family-oriented women with strong preferences for children that go into occupations in these sectors). Letablier (2003) discusses how France's family policy helps to alleviate the direct and indirect costs of children for families; it also helps to change the gender contract and the gender division of work, and in addition, it is conducive to maintaining family values by creating a child-friendly environment. Myrskyla et al (2009) note that advances in development reverse fertility declines.

It is important to identify the changes in AFC-conditional fertility rates, as efforts to understand the occurrence of recuperation (which normally involves dealing with a simultaneity of selection mechanisms and changes in behavior) could focus on women of certain AFC. In particular, given that the idea of recuperation is commonly understood as "postponing, which leaves less time for additional births", it is useful to explore whether fertility rates of women who choose a late AFC are the ones that are changing the most.

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[8] Amuedo-Dorantes and Kimmel (2005).

[9] Adsera (2006) discusses the case of Spain. Ronsen and Skrede (2010) discuss the case of Nordic countries.

[10] Mills et al. (2008).

[11] Under the idea of stopping behaviors (Knodel 1987, also see a recent analysis by Van Bavel 2004) the concept of fertility recuperation may seem irrelevant, but i) birth spacing is about 6 years, on average, for around 15% of mothers in the US (Anderton et al. 1997), ii) a substantial group of mothers do enter motherhood at a late age, thus facing a binding maximum age of fertility: between 20% and 40% of mothers born in different European countries around 1960 entered motherhood after 33 years of age, as shown in Rendall et al. (2010); Billari et al (2007, P. 166) noted that their *review of physiological factors related to late fertility indicates biological constraints on childbearing at advanced ages even in the presence of assisted reproductive technologies*, and iii) even in the presence of stopping behaviors, women still choose how many births to have, which might be associated with their age at first child. All these reasons indicate an association between age at first birth and completed fertility. And even in the case of "perfect" stopping behavior, an index of recuperation should reflect that exact recuperation takes place.

Data

Although only aggregated data is necessary for the analysis in this study, this data is rarely available to researchers. As such, this study relies on survey data. At a European level, two important publicly available surveys are the Generation and Gender Survey (GGS)[12] and the European Social Survey (ESS)[13]. The versions in this study were collected mostly in 2005 and 2006, respectively. Details about the data can be found in the Appendix. Sample sizes in the ESS do not appear to be sufficiently large to analyze country-specific AFC-conditional fertility rates across cohorts; therefore ESS data is collapsed on two groups: countries in Western Europe and countries in Eastern Europe. This classification follows the relevance of socialism on the economic and societal structure of countries[14].

The analysis is focused on the comparison of three generations, each of them defined by an interval of five births cohorts: (women born between 1936 and 1940), 1948 (1946-1950) and 1958 (1956-1960). These cohorts were chosen to explore a *pre-transition* cohort i.e., a cohort where substantial reductions in fertility were still observed; *a transition* cohort, i.e., a generation where labor participation was rising and several changes in the role of women took place, though fertility policies were not yet available in a widespread manner; and one *post-transition* cohort, where fertility recuperation is observed, as the first signs of recuperation, period-wise, emerge in the mid-eighties, i.e., the years where the 1958 cohort was at its fertility peak. A brief review of this generational change is provided in Tsuya (2003).

Results

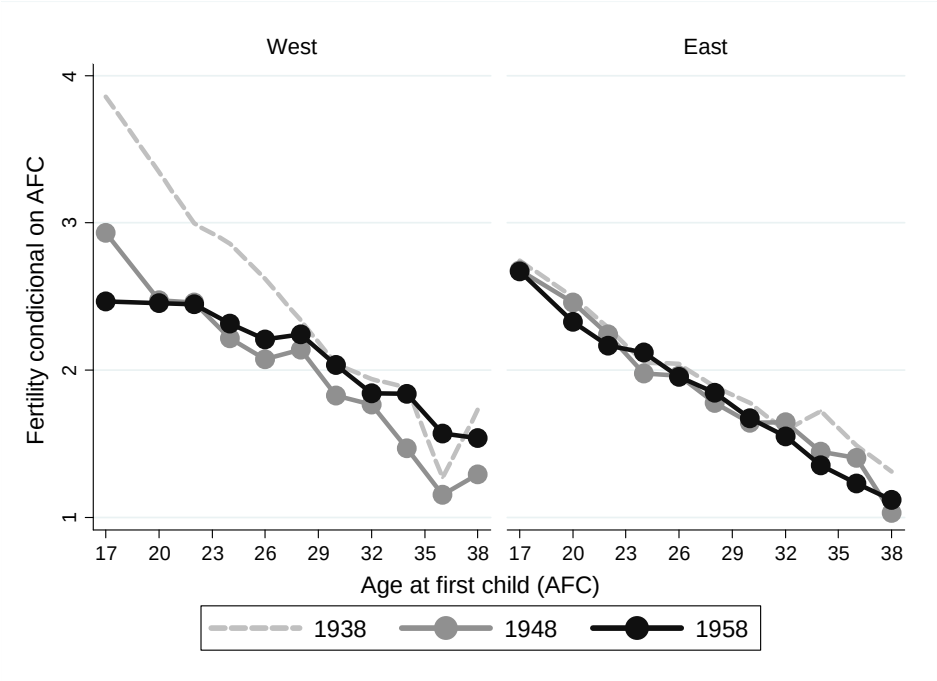
Figure 1 displays each of the F_{AFC} rates for all three cohorts in this study. Each F_{AFC} rate displayed in Figure 1 is the simple average across countries. It is highly aggregated data but it comprises the results of this study in a simple manner.

[12] More information available at http://www.Europeansocialsurvey.org.

[13] More information available at http://www.unece.org/pau/ggp.

[14] More on this topic in Kreyenfeld (2003) comparison of West and East Germany.

Figure 1 "Fertility rates conditional on age at first birth, by age at first birth and geographic zone"



Source: Author's calculation based on ESS and GSS surveys. *West* is the average across Western European countries, where the countries are those included in the GSS survey (France, Germany and the Netherlands), plus one extra country: the pooled sample of Western European countries in the ESS survey (which includes Austria, Belgium, Denmark, Finland, Norway, Portugal, Spain, Sweden and Switzerland). *East* is the average across Eastern European countries, where the countries are those included in the GSS survey (Bulgaria, Georgia, Hungary, Romania and Russia), plus one extra country: the pooled sample of Eastern European countries in the ESS survey (which includes Estonia, Poland, Slovakia, Slovenia and Ukraine).

The first point is the remarkably steady F_{AFC} rates in the *East* (eastern European countries). Countries in the *East* included in this study are all former socialist countries. All those countries had a distinctive economic organization until the early 90`s, where the post-transition generation in this study (1958 cohort) was still at a prime age for fertility. The average F_{AFC} rates across countries in the East show stable F_{AFC} values across the three generations in this study. Figure A in the Appendix contains country-level data, and the conclusions go along the same lines: none of the five *East* countries in the GGS survey in this study show an evolution in the F_{AFC} rates (Bulgaria, Georgia, Hungary, Romania and Russia), which is also the case with the extra "country" that arises from the pooled sample of the ESS survey (which includes observations from Estonia, Poland, Slovakia, Slovenia and Ukraine).

The second point is the evolution of F_{AFC} rates in the *West* (western European countries). The transition cohort (1948 cohort) shows smaller F_{AFC} rates than the pre-transition cohort at all values of AFC. The post-transition cohort, on the other hand, shows higher values of F_{AFC} among women who enter motherhood at a relatively late age. In fact, the F_{AFC} of those women are comparable to those observed in the pre-transition cohort. Conclusions from country-level data in Figure A of the Appendix go along the same lines, including GSS countries (France, Germany and the Netherlands), and the extra "country" from the pooled sample of the ESS survey (Austria, Belgium, Denmark, Norway, Finland, Portugal, Spain, Sweden and Switzerland).

As noted previously by Frejka and Calot (2001a), the difference between the *East* and the *West* is remarkable. The *East* shows virtually no recuperation, in the sense of recuperation as defined in this study. However, their mean AFC was decreasing across the cohorts in this study, which masks the absence of recuperation (given that earlier AFCs are closely link with higher fertility rates).

Section 4: Discussion

Populations that delay motherhood might, nevertheless, attain a relatively high fertility rate. There are successful cases, as the Nordic countries and France, and unsuccessful ones, such as Spain and Italy.

However, current measures of recuperation are mostly qualitative. Choosing precise measures of postponement and recuperation narrows down the flexibility of the analysis, but can be very helpful in exploring recuperation in more detail. The age at first child as a central measure of the time available provides a good reason for breaking fertility rates down in terms of age at first child and fertility thereafter. This decomposition can be interpreted in a straightforward manner.

Among the uses of such a framework, it is possible to assign a precise and interpretable number for the occurrence and extent of fertility recuperation. For example, as the change in fertility is decomposed as changes in A) the distribution of AFC and B) conditional fertility rates, a ratio of the latter over the former can work as an *index of recuperation*, where a value of "1" implies that changes in B exactly counteract changes in A.

Another use is to explore whether late-entry-into-motherhood women are responsible for the observed recuperation. Although those women are closely linked to the idea of recuperation, in principle any kind of women could be involved in the demographic process of fertility recuperation. So this is a central question for the understanding of fertility recuperation. Results from the empirical exercise in this study are that recuperation is found in Western European countries but not in Eastern European countries, and when it is found, fertility recuperation is due to late-entry-into-motherhood women. Although the data does not allow for a robust country-by-country comparison,

it is apparent that Nordic countries and France are the ones whose fertility rates of late-entry-into-motherhood women increased the most (see Figure A in the Appendix).

It is important to note that "late-entry-into-motherhood women" as a group are the outcome of selection and changes in behavior, as is the observed recuperation among those mothers. Once the fertility of this group is identified as the main component of fertility recuperation, it makes more sense to explore in detail the selection and behavioral components of this group.

The focus in this study is on comparing populations of women that had at least one child. This is because of several reasons. First, even though the comparison of early versus late fertility rates across cohorts, a common demographic tool to portray fertility recuperation, includes childlessness, this inclusion makes the interpretation too complex to gain any insight from it. Second, for a demographic analysis based on widely available measures of fertility is hard to obtain an unbiased measure of postponing among women who never have a child. In the data used in this study, in half of the cases where the mean AFC goes up, the childless percentage goes down. And third, in the individual-level literature childlessness is viewed as a very different process to that of having one or more children.

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Appendix: Tables and Figures

Table 1: Sample sizes by Country.

Country	Observations	Source	Country	Observations	Source
Bulgaria	2,923	GGS	Estonia	528	ESS
France	3,156	GGS	Finland	609	ESS
Georgia	3,131	GGS	Ireland	500	ESS
Germany	3,054	GGS	Norway	484	ESS
Hungary	4,561	GGS	Poland	492	ESS
Netherlands	2,537	GGS	Portugal	890	ESS
Romania	3,851	GGS	Slovaquia	440	ESS
Russia	4,255	GGS	Slovenia	498	ESS
Austria	696	ESS	Spain	537	ESS
Belgium	539	ESS	Sweden	578	ESS
Denmark	486	ESS	Switzerland	609	ESS
England	803	ESS	Ukraine	787	ESS

Source: Author's calculations based on survey data. Observations correspond to women that were included in this article, not to the overall size of the surveys.

Table 2: Sample sizes by cohort and region.

Cohort		West (Nordic)	West (not Nordic)	East
Label	Birth years			
13	1900 – 1915			
18	1916 – 1910	70	31	33
23	1921 – 1925	159	171	173
28	1926 – 1920	242	253	337
33	1931 – 1935	286	403	467
38	**1936 – 1930**	**369**	**374**	**599**
43	1941 – 1945	447	460	557
48	**1946 – 1940**	**536**	**494**	**610**
53	1951 – 1955	483	507	715
58	**1956 – 1950**	**535**	**535**	**691**
63	1961 – 1965	564	682	604

Source: Author's calculations based on survey data. "West (Nordic)" countries include Denmark, Germany, Finland, Netherlands, Norway and Sweden. "West (not Nordic)" countries include Austria, Belgium, Switzerland, France, Spain and Portugal. "East" countries include Bulgaria, Czech Republic, Estonia, Hungary, Poland, Russia, Slovenia, Slovakia and Ukraine. The United Kingdom and Ireland did not appear related to this classification of countries and were left out of the analysis of regions.

Figure A: "Fertilidades condicionales en la edad al primer parto, según edad al primer parto y zona geográfica"