

## **On the predictive value of individual fertility preferences at the cohort macro-level**

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### **Short abstract (200 words)**

Establishing a link between fertility prospects and aggregate fertility is a widespread concern, with most of the literature dating from the 1970s-80s. Long time-series on fertility preferences are however scarce, and first attempts are made here of looking at the correlation between cohort aggregate preferences and actual cohort completed fertility on a series of definitions of fertility prospects (intended number of children, ideal and societal ideal family size). We use a set of French surveys: past surveys on demographic situation (Ined), more recent surveys on family (Ined/Insee/Inserm), and a yearly time-series of ideal family size (CREDOC). Mean "societal" ideals are found the closest to completed cohort fertility in terms of level. We use the only consistent time-series on ideals (CREDOC) in order to model the link more precisely. In terms of trends, it appears that completed fertility and ideal family size are quite linked together, while ideals do not predict accurately period total fertility rate.

## Introduction and research goal

The predictive power of fertility preferences (intended parity, ideal parity or expected parity) has often been debated. The domains widely explored are individual correlation between preferences and fertility, macro level correspondence between preferred and actual fertility, and usefulness for forecasting. We propose to explore here whether fertility preferences and total fertility have been moving together in time, either within cohorts, either across periods.

At the individual level, evidence is frequent of a decent improvement of the models predicting fertility when introducing a fertility intention variable (e.g. Schoen et al., 1999). Research and theories exist that rely on the predictability of actual fertility from fertility intentions at the individual level (Philipov, 2009; Spéder and Kapitány, 2009). However, though usually significantly explicative of fertility outcomes, they are in absolute terms poor predictors, as major inconsistencies remain (Ní Bhrolcháin and Beaujouan, 2011).

Forecasting was the original reason for asking women for their fertility intentions. In an assessment of the use of fertility expectations for projecting population, Long and Wetrogan (1981) found that they were performing very well. Nevertheless, while useful insights and inferences can be obtained from analysing aggregate changes in intentions across cohorts and over time, little direct use is actually done of them in forecasting (de Beer, 1991; Van Hoorn and Keilman, 1997).

Completed fertility is often found to depart from family size preferences at an aggregate level (Freedman et al., 1980; Morgan and Rackin, 2010; Smallwood and Jefferies, 2003). On the other hand, Morgan (2001) notes that the predictive validity of aggregate intentions appears relatively high for recent cohorts' fertility, despite its substantial variability. The fit at the aggregate level remains nevertheless uneven, unwanted births and people not having the expected children offsetting each other, notably among women with lower educational background.

After showing that life-time fertility intentions are causally prior to ideal parity, and also to desired parity, Ryder (1981) concluded that "questions concerning ideal and desired family size are pointless for the purpose of understanding or predicting fertility intentions". Yet, he did not look directly at the predictive validity of ideal family size. Also, we know that intentions change with age, time and family situation, and that in certain periods of life uncertainty is extremely spread (Ní Bhrolcháin and Beaujouan, 2011). By contrast, questions on ideals give no explicit reference to individual experience, which can be a good thing at the aggregate level. We thus argue that even if driven by norms (Trent, 1980), ideal family size could reflect well the "cohort" context in which people constructed their fertility intentions and later on their family, and that it could be a good predictor of final cohort fertility.

In this paper, we explore whether the difference between preferred (intentions/ideals/situated ideals) and realised fertility is systematic over time and cohorts. In a first part we expose together early life-time declaration regarding these indicators and life-time fertility of the same cohort, as well

as contemporaneous fertility rates. We then test the robustness of fertility prospects to predict cohort fertility, focussing on ideals.

At the aggregate level, short-term intentions have been said to reflect more the current conditions than the actual possibility to have a child (Westoff and Ryder, 1977). It is thus possible that time-series of fertility intentions/ideals will be correlated with period fertility. However, these insights are given in the short-term, but life-time estimations might not be highly related to the current fertility trends. We thus test a model in which both cohort and period fertility appear as covariates. The macro predictive power of fertility preferences depends on the stage in the life-course, including parity, partnership status and age (Quesnel-vallée and Morgan, 2003; Toulemon and Testa, 2005; Westoff and Ryder, 1977). Westoff and Ryder (1977) and Noack and Østby (2002) showed that within some subgroups the predictive power of preferences is much stronger. We include in our models age, partnership status, level of education and a range of other covariates.

Most comparable analyses have been done in times of decreasing cohort fertility (1960s to 1980s), while our period under study includes a period of stabilization (1990s and 2000s); we thus expect the results of our comparisons to give useful insights for forecasting.

## Data and method

### I – Data

#### Ined-Insee surveys

A collection of surveys including questions on fertility intentions or ideal family size has been made. This work is thus based on a range of French surveys that took place between 1955 and 2011. The content of the questionnaires differs depending on the survey, as follows:

Survey	Question on ideal and societal ideal	Question on fertility intentions
INED, Enquêtes conjoncture: 1955, 1967, 1976, 1978, 1982, 1987	X	
INED, Enquête intentions de fécondité: 1998-2001-2003 Panel study (three waves)	X	X
INED-INSERM, Enquête Fecond: 2011	X (only ideal)	X
INED, Enquête fécondité: 1988		X
INED, Enquête sur la famille et l'emploi (French FFS): 1994		X
Enquête sur les relations familiales et intergénérationnelles (French GGS): 2005-2008-2011 = Panel study (three waves)		X

The questions on ideal and societal ideal number of children do not vary much over time, the formulation being:

- (1) D'après vous, quel est le nombre idéal d'enfants dans une famille ? [What is in your view the ideal number of children in a family?]
- (2) Et en pensant spécialement aux personnes du même milieu que vous, et disposant des mêmes ressources, quel est le nombre idéal d'enfants dans une famille ? [And thinking especially to persons of your background, and with equivalent resources, what is the ideal number of children in a family?]

Ideal (1) thus relates to a family in general, while “situated” ideal (2) indicates the number of children the respondent thinks ideal in a family from the same *milieu*, with the same standard of living as him.

While questions on ideals refer to norms, questions on intentions are supposed to refer to actual future behaviour. The formulation of the question on number of children intended has not changed much per se:

- (3) Combien souhaitez-vous avoir d'enfants en tout, y compris ceux que vous avez déjà, et éventuellement celui que vous attendez ? [How many children do you wish to have overall, including the ones you already have, and if relevant the one you are currently expecting]

But the way to arrive the final question on number of children is almost never the same from one survey to the other. The selection of the respondents asked questions on intentions and then the filters between intentions and question on intended family size create some discrepancies, changing from one survey to the other (restriction to people living as a couple, not infecund, etc.). Notably, preliminary questions on duration, immediate projects, long-term projects, can be used as filter. Another example of these technical issues will be described by comparing the FFS and GGS answers on fertility intentions in Europe, at the 2013 GGP users meeting conference.

### **CRÉDOC surveys**

We mainly use a repeated survey on « *les Conditions de vie et les Aspirations des Français* », conducted every year by the CRÉDOC. At the beginning of each year, 2000 persons representative of the French population are interviewed on their living conditions and their main aspirations. It entails a number of socio-demographic variables like sex, age, marital status, diplomas and income. The question regarding ideals has not changed over the 35 years, and is the following:

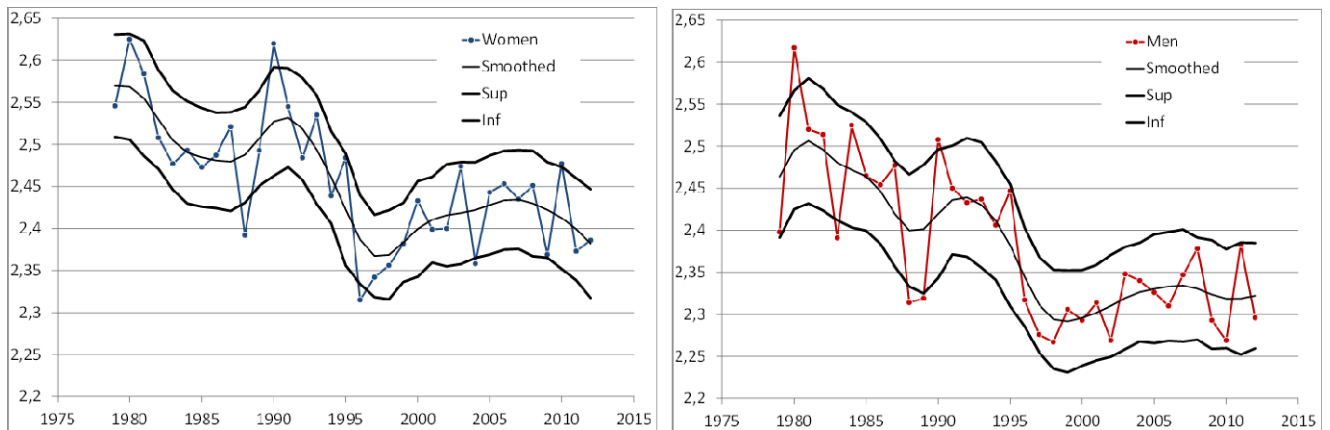
- (4) Quel est le nombre d'enfants que vous considérez actuellement comme idéal pour une famille en général ? [Which number of children do you currently consider as ideal for a family in general?]

The only change over time in the series holds to a change in the mode of interview. Paper questionnaires have been replaced by CAPI interviews on laptops in 1998, the interviews remaining however face-to-face. The questions asked before are general demographical questions and three questions on marriage and women's work and have not changed over time. Method of sampling (quotas), weighting and controls are unchanged. 1998 appears in a good continuity with the other

years, which suggests that the change in the mode of collect has not affected the variables we are studying. This is of utmost importance in the study of series data (Ní Bhrolcháin et al., 2011).

CREDOC yearly time series is very homogeneous, comprised in a 5% confidence interval around a smoothed curve (Figure 1).

**Figure 1 Mean ideal number of children from CREDOC surveys, at age 18-49. Smoothed estimates and yearly 5% confidence intervals. Left: men, right: women.**



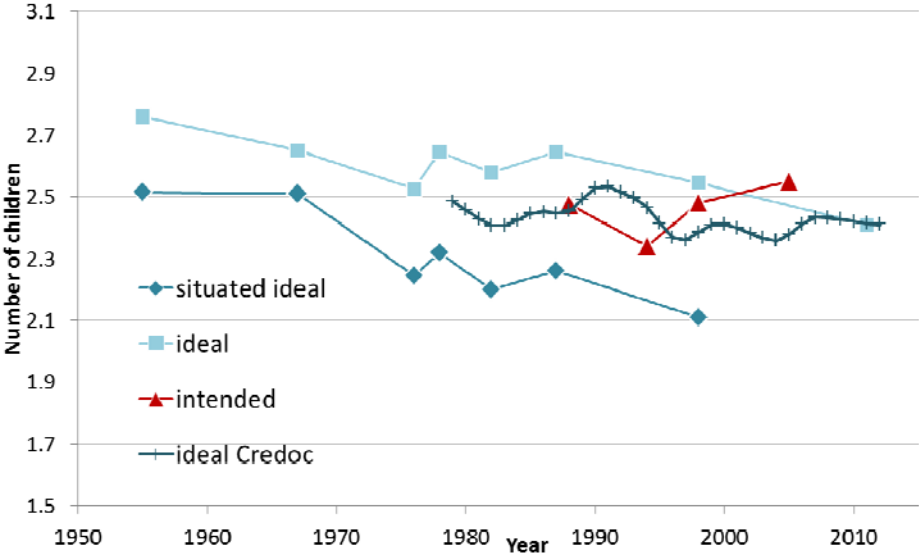
Source: CRÉDOC, « les Conditions de vie et les Aspirations des Français » annual Survey

### Ideals and intentions from the various surveys

Figure 2 shows the time series extracted from the various surveys described above. We can see that the number of points for each series is not very high. Moreover, the heterogeneity between the surveys and the low quality of some indicators show up here: for instance we know from further exploration that the point 1978 of the situated ideal and ideal series is not reliable, neither the point 2005 of the intentions series. Subsequently, these points should be suppressed in case of further studies, letting only very little data points for comparing preferences and actual fertility. The filters, (who is answering the question, who is considered as not concerned) are the main reason for these inconsistencies.

We notice that until the recent years, the CREDOC ideal number of children was positioned somewhere between the situated ideal and the ideal collected from other surveys. Question wording could be a reason for such observations, but also the survey design (quota) that differs quite from usual large sample surveys. Overall, the regularity in the surveys makes of this series a powerful tool.

**Figure 2 Mean ideal family size Credoc and mean contextual ideal, ideal and intended family size by year of survey for other French surveys, age 25-34**



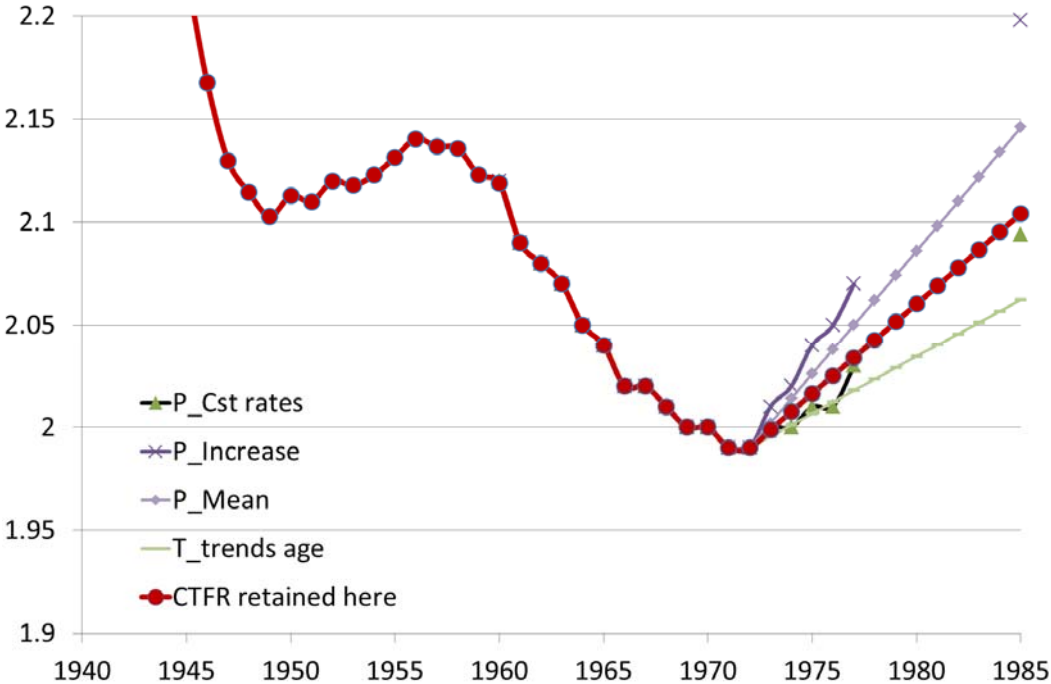
Sources: CRÉDOC annual Survey; INED, Enquêtes conjoncture 1955, 1967, 1976, 1978, 1982, 1987; INED, Enquête intentions de fécondité 1998; INED, Enquête fécondité 1988; INED, French FFS 1994 ; Ined-Insee French GGS 2005; INED-INSERM, Enquête Fecond: 2011

**Cohort total fertility rate (CTFR)**

The value of the cohort fertility rates are as calculated by Prioux from the vital registrations from 1945 to 1972.

The CTFR has been estimated from the 1973 up to the 1985 cohort. The estimation is based on several projections: an extrapolation up to 1985 of Prioux’ projections in table A.5 p. 641 (Prioux and Barbieri, 2012), called here P\_Cst rates (rates freeze) and P\_increase (tendency); and Toulemon’s projections in Figure 16 p. 635. In this case, the increase in the age specific rate (DF4), closest from the subsequent CTFR, has been extrapolated and applied from 1972 to obtain T\_trends age. From this, a conservative increase in the cohort total fertility has been calculated (CTFR retained here, which is the average of T\_trends age and P\_Cst rates), and P\_mean (the average of P\_Cst rates and P\_increase) is also retained for the high fertility scenario.

Figure 3 Forecast of cohort total fertility rates (CTFR), adapted from Prioux (P) and Toulemon (T)



Sources: Prioux and Barbieri (2012) and Toulemon and Mazuy (2001)

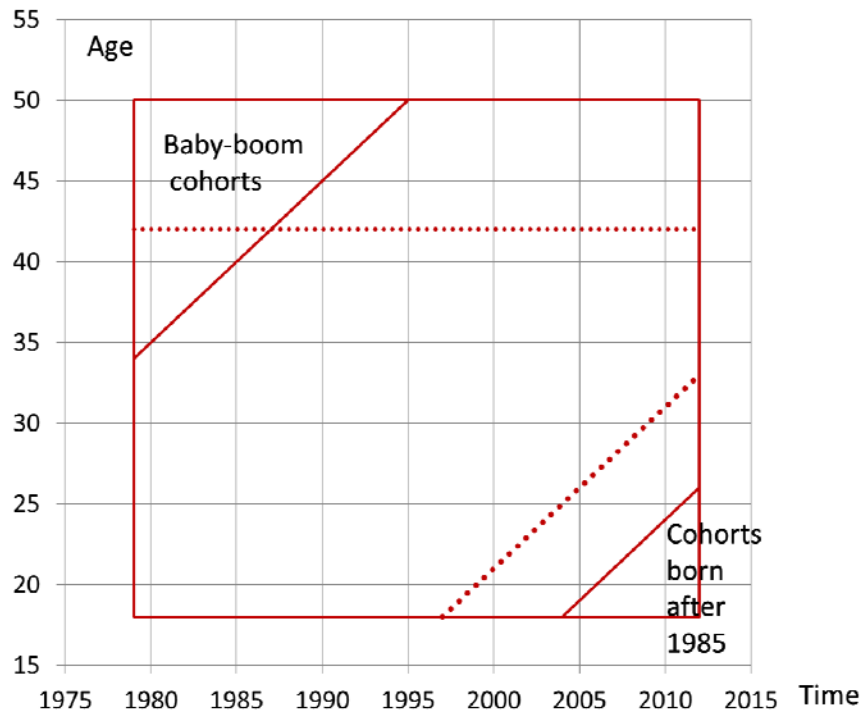
Additionally, final completed fertility has been calculated among women who have lived in a couple only, as the question on ideals asks about family size, underlying being at least in a couple. The curves are presented further on. They were deduced from the preceding curve by applying a coefficient of the proportion ever in a couple in each cohort calculated in the large-sample EFL survey (Family Survey 2011). In the most recent generations, 1975+, the proportion was considered as constant.

## II – Methodology

Our main question: is there any macro-level relation between Period fertility (PTFR), cohort fertility (CTFR) and answers on preferred number of children? This is treated using time-series and looking at their correlation over time. Predictive power is assessed at a macro scale, because we are interested in the context and in the effects at population scale. In this paper, the models consist in simple linear regressions.

We concentrate our analysis on the persons concerned by childbearing (men and women aged 20-49). The cohorts born before 1945 (baby boom cohorts) and the cohorts born after 1985 (no forecast of CTFR) are excluded. For the PTFR-CTFR comparison, we want to keep a symmetrical group: we can either keep only the cohorts 1945-1978 or people aged less than 42 (see Figure 4).

Figure 4 Diagram of Lexis



We decompose the main question into two sub-questions:

- a) Are ideals related to CTFR, when controlled for other covariates?
- b) Are ideals more correlated with PTFR or CTFR?

Concretely, we analyse the aggregate link between ideal family size at various ages in each cohort and completed family size at ages 40+ by cohort. The following set of models tests ideal number of children against cohort and period total fertility over time.

The dependent variable is the individual answers on ideal number of children in a family. We study each sex separately. We retain as covariates: for a), the CTFR and yearly dummies; for b), the CTFR and the PTFR; 5-year age groups and marital status are the main controls. Other controls include level of education, living in urban or rural area, social background and a range of variables on perception of the French context.

The models are thus as follow:

- a)  $\text{Ideal} = \alpha \text{CTFR} + \beta \text{age} + \gamma \text{marital} + \theta \text{year} + \delta \text{others} + \varepsilon$
- b)  $\text{Ideal} = \alpha \text{CTFR} + \beta \text{age} + \gamma \text{marital} + \theta \text{PTFR} + \delta \text{others} + \varepsilon$

Note that in model b), there is no time dummy, as the Period TFR is already a marker of time.

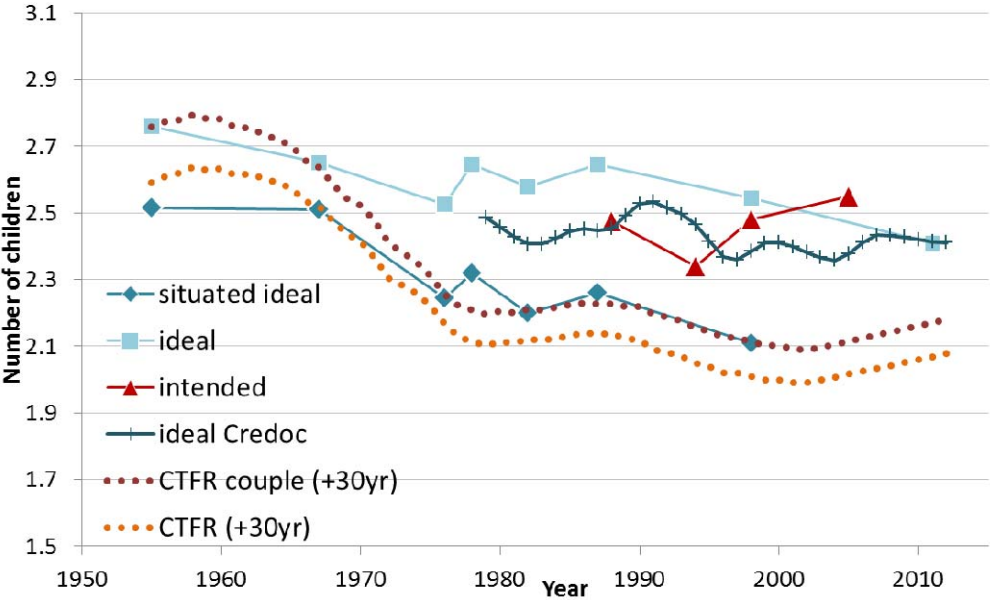


## Results

Figure 5 allows comparing the preferences of women when they are 25-34 with the cohort fertility of the same cohort. E.g. for year 2010, we look at CTFR of cohort 1980 which is actually 30 at that time: since these women are not yet 40, on these recent years we show the projected CTFR. The CTFR is in general below any preference indicator over time. It is also below intended fertility (0.2 to 0.4 children), which is consistent with other findings that systematically find that women tend to underestimate their future number of children. Only when fertility was still dropping, completed fertility was closer from the situated ideal and still below the ideal number of children. Intentions are not available in that period, so the comparison is not possible. We only know that in the period of fertility decrease, cohort fertility intentions and completed fertility were quite close in the US (Freedman et al., 1980).

The gap between situated ideal and ideal family size (from Ined/Insee surveys) has increased at the end of the 1970s, but overall the trends have been rather similar. However from that time, in terms of level, completed fertility for women in a couple has been very close from the ideal reported for people of similar life-standards. A new point in this series would be necessary, to see whether the situated ideal family size tends to increase like the CREDOC time-series or to decrease like the other surveys series.

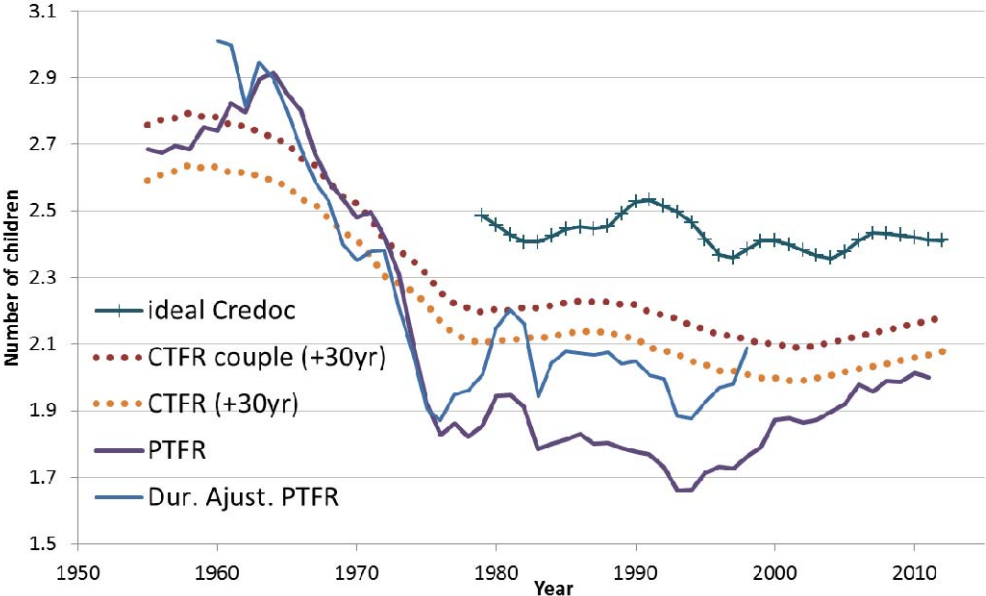
**Figure 5 Mean ideal family size Credoc and mean contextual ideal, ideal and intended family size by year of survey for other surveys, age 25-34; Cohort total fertility rate (for all women and for women ever in a couple)**



Sources: CRÉDOC annual Survey; INED, Enquêtes conjoncture 1955, 1967, 1976, 1978, 1982, 1987; INED, Enquête intentions de fécondité 1998; INED, Enquête fécondité 1988; INED, French FFS 1994 ; Ined-Insee French GGS 2005; INED-INSERM, Enquête Fecond: 2011

As a preliminary to the modelling, Figure 6 also shows together the CREDOC time-series of ideal family size, together with the completed fertility of the same cohort and with the period fertility rate. In terms of level, cohort fertility rate is overall closer than period fertility rate. The correlation between the curves (which is then studied with the models at a more global level) is less obvious to observe. It seems however that the CTFR curves and the ideal curve tend to move together, while the TFR sees bumps and trough that do not appear on the ideals curve. The duration adjusted TFR shows in fact a shape very close from the one of the TFR, not letting expect a much better fit.

**Figure 6 Mean ideal family size Credoc, age 25-34; cohort total fertility rate (for all women and for women ever in a couple); period total fertility rate (PTFR) and duration specific PTFR.**



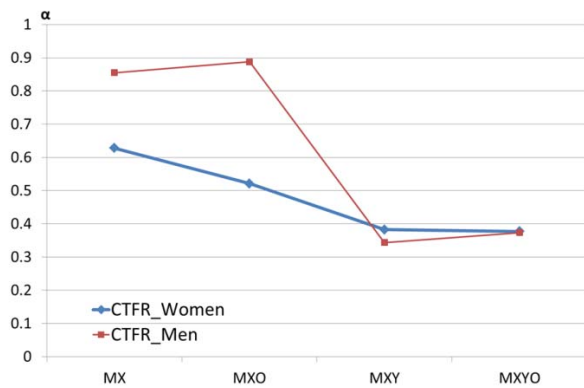
Sources: smoothed CRÉDOC annual Survey; CTFR including forecast; PTFR and duration specific PTFR

**Is ideal related to CTFR?**

Model a) shows quite a good correlation between ideals and CTFR when controlling only for age and marital status (MX):  $\alpha$  is close to 0.9 for men, and 0.6 for women (Figure 7).  $\alpha$  is close to 0.38 for both sexes, significant at 0.05, when adjusted for year. The other controls do not make any difference.

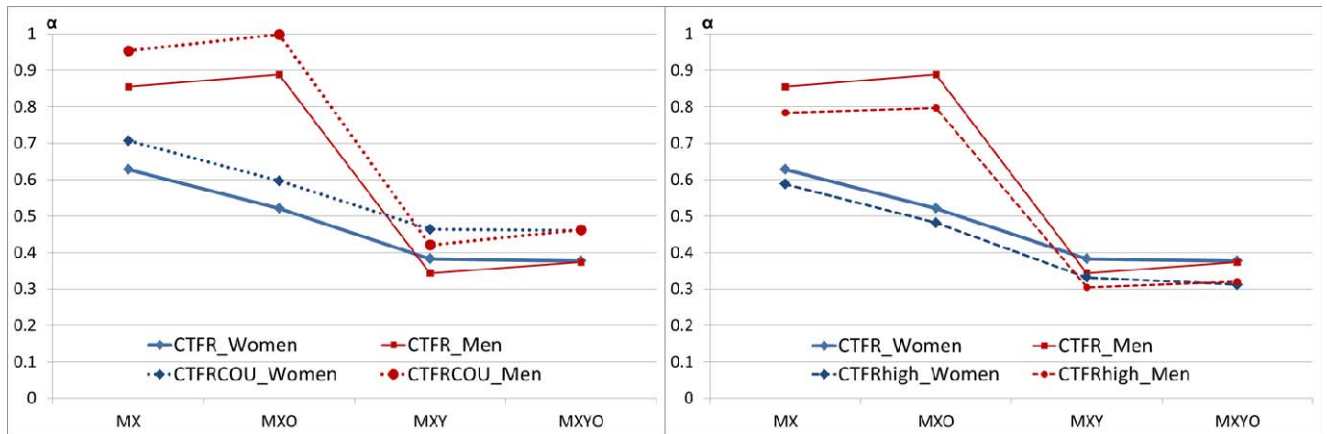
Controlling for CTFR of women ever in a couple instead of CTFR increases the correlation with ideals, while the higher version of the TFR decreases the correlation (Note: M=marital status, X=age, O=other controls, Y=year. Figure 8).

**Figure 7** Coefficients  $\alpha$  of the model estimating ideal family size against final cohort completed fertility.



Note: M=marital status, X=age, O=other controls, Y=year.

**Figure 8** Coefficients  $\alpha$  of the model estimating ideal family size against final cohort completed fertility; test of two alternative scenarii: CTFR only for women who have ever lived in a couple, and higher version of the TFR (given by P\_Mean)



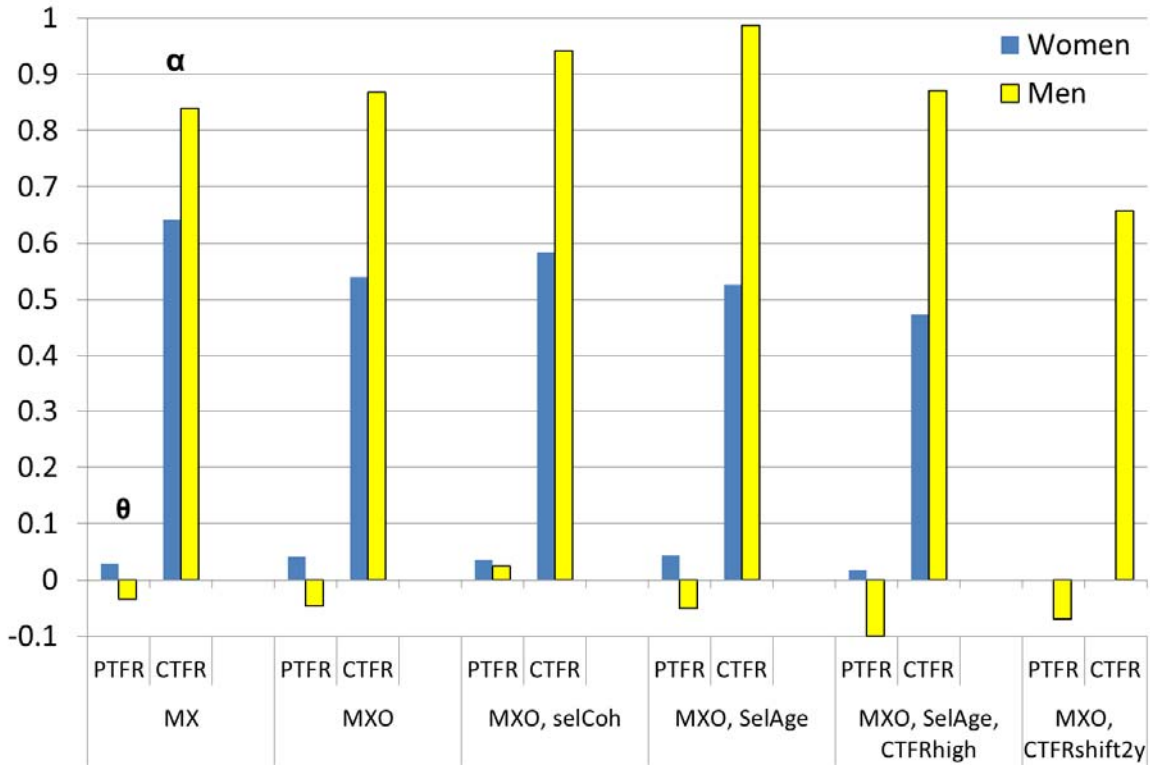
Note: M=marital status, X=age, O=other controls, Y=year; CTFRCOU=CTFR for persons ever in a couple; CTFRbis=high scenario of the CTFR.

Reading note:  $\alpha = 1$  if Ideal and CTFR move together;  $\alpha = 0$  if Ideal are non-informative for CTFR

**Is Ideal related to CTFR or PTFR?**

When adjusting for the PTFR (in place of time),  $\alpha$  is in the first place around 0.6 for women and 0.84 for men, but  $\theta$  is close to zero for both (MX in Figure 9). The results vary slightly depending on the scenario and on the sample selected, but overall it appears that the ideal number of children depends on CTFR, and not on PTFR.

**Figure 9** Coefficients  $\alpha$  of the model estimating ideal family size against final cohort completed fertility; test of two alternative scenarii: CTFR only for women who have ever lived in a couple, and higher version of the TFR (given by P\_Mean)



Note: M=marital status, X=age, O=other controls, Y=year; SelCoh: selection of cohorts born before 1978 (1945-77); SelAge: selection of ages below 42 (20-42); CTFRhigh=high scenario of the CTFR; CTFRshift2y=CTFR shifted of two years.

### Conclusion and discussion

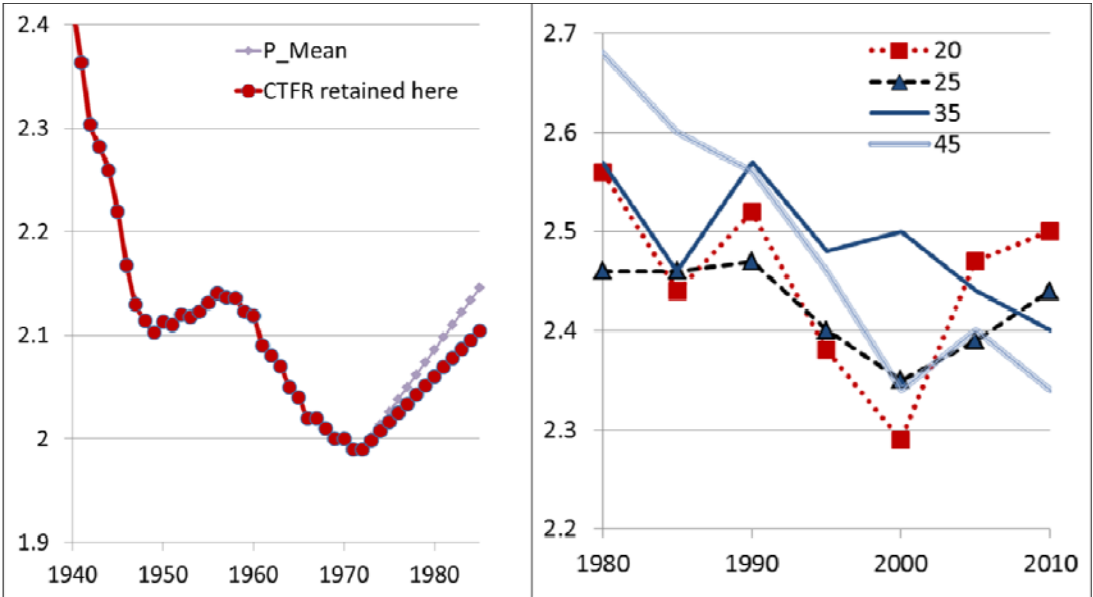
Ideal family size appears to be a good proxy for cohort total fertility rate (CTFR) in post-baby boom situations. Answers on Ideal number of children seem also more strongly related to CTFR than to PTFR among cohorts born after 1945 in France. The interest to study these links in the post-baby boom cohorts is twofold: these cohorts have grown in large families and so their future fertility might be quite over-estimated; in terms of modelling, the small variations in the trends can be linked to each other without being attributed to the strong downfall. In counterparty models are more difficult to identify as fertility is a bit “too” stable in France.

This study links long-term trends in fertility and in fertility prospects for the first time, and shows some potential in this direction. However, consistent series are scarce, and thus other such comparisons unlikely. It would notably be very useful to do the same with all the “preference” indicators – notably fertility intentions – in order to compare their efficiency in predicting fertility.

Regarding future improvements, we would like to test other indicators of fertility such as duration specific period fertility. Also, for forecasting aims, other authors show that partial-adjustments are possible that improve the consistency and predictive power of fertility expectations to predict fertility. Models can notably account for the decrease of expectations with age and its variation with marital status, parity, etc. So it would be interesting to proceed to some interactions and test the differences between groups (e.g. educational groups). This necessitates however to decompose completed fertility in subgroup, and to estimate and project it for the subgroups.

There are great prospects for the future of these previsions. We remind that the cohorts aged 20-29 in the very recent years had to be dropped because our projection of completed fertility was not going so far and/or for symmetry reasons. And we observe in Figure 10 that the mean ideal family size for these recent cohorts has increased recently, as has (and might continue) the CTFR. It appears thus possible that in a continuation of the time-series, models would get a stronger predictive power. This observation also cross-validates, in some way, the increase in completed fertility projected here.

**Figure 10 Projection of CTFR for recent cohorts (left hand side) and ideal number of children by age (right hand side)**



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## References

- De Beer, J. (1991). From birth expectations to birth forecasts: a partial-adjustment approach. *Mathematical population studies*, 3(2), 127–144.
- Freedman, R., Freedman, D. S., & Thornton, A. D. (1980). Changes in fertility expectations and preferences between 1962 and 1977: Their relation to final parity. *Demography*, 17(4), 365–378.
- Long, J. F., & Wetrogan, S. I. (1981). The utility of birth expectations in population projections. In G. E. Hendershot & P. J. Placek (Eds.), *Predicting fertility* (29–50 pp.). Lexington, Massachusetts/Toronto: Lexington Books, D.C. Heath and Company.
- Morgan, P. S. (2001). Should fertility intentions inform fertility forecasts? In *The Direction of Fertility in the United States* (153–178 pp.). Alexandria, Virginia: US Census Bureau Conference.
- Morgan, P. S., & Rackin, H. (2010). The correspondence between fertility intentions and behavior in the United States. *Population and Development Review*, 36(1), 91–118.
- Ní Bhrolcháin, M., & Beaujouan, É. (2011). Uncertainty in fertility intentions in Britain, 1979–2007. *Vienna Yearbook of Population Research*, 9, 99–129.
- Ní Bhrolcháin, M., Beaujouan, É., & Murphy, M. (2011). Sources of error in reported childlessness in a continuous British household survey. *Population Studies*, 65(3), 305–318.
- Noack, T., & Østby, L. (2002). Free to choose - but unable to stick to it? Norwegian fertility expectations and subsequent behaviour in the following 20 years. In E. Klijzing & M. Corijn (Eds.), *Dynamics of fertility and partnership in Europe : insights and lessons from comparative research* (103–116 pp.). New York and Geneva: United Nations.
- Philipov, D. (2009). Fertility Intentions and Outcomes: The Role of Policies to Close the Gap. *European Journal of Population - Revue Européenne de Démographie*, 25(4), 355–361.
- Prioux, F., & Barbieri, M. (2012). L'évolution démographique récente en France: une mortalité relativement faible aux grands âges. *Population*, 67(4), 597–656.
- Quesnel-vallée, A., & Morgan, P. S. (2003). Missing the target? Correspondence of fertility intentions and behavior in the US. *Population Research and Policy Review*, 22(5-6), 497–525.
- Ryder, N. B. (1981). Changes in parity orientation from 1970 to 1975. In G. E. Hendershot & P. J. Placek (Eds.), *Predicting Fertility* (101–128 pp.). Lexington, Massachusetts/Toronto: Lexington Books, D.C. Heath and Company.
- Schoen, R., Astone, N. M., Kim, Y. J., Nathanson, C. A., Fields, J. M., & Fields, M. (1999). Do fertility intentions affect fertility behavior? *Journal of Marriage and the Family*, 61(3), 790–799.
- Smallwood, S., & Jefferies, J. (2003). Family building intentions in England and Wales: trends, outcomes and interpretations. *Population Trends*, 112, 15–28.

- Spéder, Z., & Kapitány, B. (2009). How are Time-Dependent Childbearing Intentions Realized? Realization, Postponement, Abandonment, Bringing Forward. *European Journal of Population - Revue Européenne de Démographie*, 25(4), 503–523.
- Toulemon, L., & Mazuy, M. (2001). Les naissances sont retardées mais la fécondité est stable. *Population (French Edition)*, 56(4), 611–644.
- Toulemon, L., & Testa, M. R. (2005). Fertility intentions and actual fertility: A complex relationship. *Population and Societies*, (415), 2003–2006.
- Trent, R. B. (1980). Evidence bearing on the construct validity of “ideal family size.” *Population and Environment*, 3(3), 309–327.
- Van Hoorn, W., & Keilman, N. (1997). Births expectations and their use in fertility forecasting. *Eurostat Working Papers (Population and social conditions)*, (E4/1997-4).
- Westoff, C. F., & Ryder, N. B. (1977). The predictive validity of reproductive intentions. *Demography*, 14(4), 431–453.