Effects of Employment Instability on the Intensity and Timing of Fertility in France: An Application of Turbulence to Labor Market Trajectories

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Abstract

The emergence of new evidence suggesting a sign shift in the longstanding negative correlation between prosperity and fertility levels has sparked a renewed interest in understanding the relationship between economic conditions and fertility decisions. In this context, the notion of *uncertainty* has gained relevance in analyses of low fertility. So far, most studies have approached this notion using snapshot indicators like type of contract or employment situation. However, these types of measures seem to be falling short in capturing what is intrinsically a dynamic process. In this paper I develop an indicator of employment instability that considers the entire employment trajectory. Using sequence analysis I first classify trajectories based on their degree of *turbulence*, a measure that considers not only the amount of state-changes in a trajectory but also the time spent at each state. The result is then used as a time-varying covariate in a event history model of the risk of having a first child and later in a series of logistic regressions predicting the intensity of fertility at age 45+. Analyses are performed for French men and women using the first two waves of the *Etude des relations familiales et intergenerationnelles (ERFI)*. Although France is characterized by strong family policies and high and stable fertility levels, we find that employment instability not only has a strong and persistent negative effect on the final number of children for both men and women, but also contributes to fertility postponement in the case of men.

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1 Introduction

The first decade of the 21st century witnessed the emergence of a new narrative regarding the relationship between living standards and fertility outcomes. It was Myrskylä et al. (2009) who made the strongest, most explicit case for this regime-change hypothesis, showing how the historically negative correlation between development and fertility becomes positive after countries exceed a certain threshold of human development. This conclusion was supported by a series of papers published in the early and mid 2000s that showed how the correlation between women's labor force participation and fertility rates across countries had also reverted, and how countries with a higher share of women in the labor force also presented relatively higher fertility rates (Ahn and Mira, 2001; Adsera, 2004; Kohler et al., 2002).

Although the question remains whether or not these shifts in macro-level correlations can be also observed at the micro-level (Matysiak and Vignoli, 2008), one of the main implications of the adoption of this new narrative was the increased interest in the constraints and limitations surrounding fertility decisions in industrialized countries. In this context, the notion of *uncertainty* has regained its place in fertility analysis, becoming one of the most relevant factors to understand contemporary family dynamics in the region (Kreyenfeld et al., 2012).

Scholars have tried to approached the notion of economic uncertainty by the use of several indicators, both at the micro and macro levels. In this paper I try to capture the notion of economic uncertainty by looking at employment instability at the micro level. The novelty of the approach lies in the use of the entire sequence information instead of a single event (or characteristic) and in the consideration of both the number of transitions in and out of full-time employment and the *time* spent in these states. In addition, the paper provides one the first examples of the combination of Sequence Analysis with other methods, showing how employment instability leads to later and lower fertility, even in a relatively high fertility context.

1.1 Labor Market Reform and the De-standarization of the Life Course

Life course research has shown how the sequence of events that comprise individual biographies in contemporary societies has become less stable, more complex and less collectively determined. Behind this notion is the idea that 'traditional' biographies used to be significantly more stable, both in relation to work and family dynamics; a stability guaranteed by the action of strong collective institutions.

However, in the long run, this ideal type against which contemporary trajectories are measured was only dominant for a relatively short period of time (Brückner and Mayer, 2005). In fact, Fussell (2006) has shown how in the case of the United States the life course became *more* standardized during the first half of the 20th century, thanks to the expansion of primary and secondary education and the regulation of the labor market. After a couple decades (from the fifties to the seventies) of high institutionalization and standardization, individual biographies started to resemble less and less one another. This increased heterogeneity and complexity was generally interpreted as a result of four major processes originated in the second half of the 20th century: the expansion of tertiary education, the changes in women's roles, the emergence of post-material values and the deregulation/flexibilization of labor markets.

In the 1980's flexibilization became the keyword for governments and companies looking for a response to the increased external competition in the context of a rapid internationalization of markets (Bukodi et al., 2008). Since then, OECD countries have converged to less strict Employment Protection Legislation (EPL), the set of rules governing the hiring and firing process.

In this context the European Commission has favored the implementation of the so-called *flexicurity* approach: a combination of low EPL (to allow for market dynamism) with strong employment security (by means of active employment policies and high unemployment benefits). Although the theoretical advantages of this approach are still subject of debate[1], empirical analyses have shown that in practice most European countries have introduced labor market flexibility at the margin, easing the limitations on temporary forms of employment for labor market entrants, while leaving intact the regulation of permanent contracts. The average share of temporary employment on total dependent work for all workers in Europe (EU21) went from 5% in 1980 to 12% in 2012, with a similar increase but from significantly higher levels in the case of young workers (15-24), from 21% to 42% (OECD Employment Database 2013).

The result of this *partial and targeted* deregulation (Esping-Andersen and Regini, 2000) has been a deepening of the segmentation of labor markets between the so-called *insiders*, unionized workers, who held permanent (protected) jobs with higher benefits, and the *outsiders*, who spend a large fraction of their working life in precarious, unprotected positions. Young workers are over represented among those with precarious contracts and the unemployed, and have experienced the greater income losses as inequality increased in OECD countries in the last decades (Esping-Andersen, 2009).

[1] for a critique see: Burroni and Keune (2011)

1.2 Are Employment Trajectories Really More Unstable?

In the context of the deregulation process, the employment dimension of individual trajectories has received profuse attention in the media. A widespread belief exists that our relation with the labor market has changed dramatically, making stable jobs a memory of a distant past. Many prominent social theorists have reinforced the idea that *all that is solid melts into air*, identifying risk and uncertainty as one of the main features of contemporary societies.

In this context it comes as a surprise to find the lack of consensus among labor market researchers regarding this trends and the scarcity of empirical evidence that supports them.

Hollister (2011) presents an interesting review mostly of the US case, finding consistent evidence of a decline in long-term tenure rates (one of the most commonly used measures) for men in the private sector from the 1980s, but an increase in employment stability for women in the same period. Therefore, in spite of significant change, empirical trends in the US are far from matching public perceptions regarding employment instability. In Europe the situation is similar, with no *irrefutable stylized facts* brought to light after the publication of several studies since the mid-nineties (Aeberhardt and Marbot, 2013). However, using a 30 years long employer-employee matched dataset, Aeberhardt and Marbot (2013) find that in the case of France, the employment survival rates have decreased since the 1990's.

In a similar line, Mills and Blossfeld (2006) found that the career of men in some European countries have remained more stable than expected. However they also document the increasing economic uncertainty that young workers face in the labor market, reinforcing the idea of a strong insider/outsider divide (Blossfeld et al., 2005)

In sum, although no clear trend towards generalized instability has been empirically observed in Europe or the US, the picture that comes out from the literature, suggests that the negative consequences of deregulation on individual careers are particularly visible in certain segments of the population that remain in the periphery of the labor market.

In the next section we review the literature on how this increased economic uncertainty has affected the family formation process before we describe briefly the specificities of the French case.

1.3 Economic Uncertainty and Fertility

As mentioned before, both the shifts on historical demographic changes and the rapid transformations of the labor markets gave strength to the uncertainty hypothesis, with a series of papers produced in the last decade trying to identify the effects of economic uncertainty on

fertility both at the macro and the micro-level. Until now, the most consistent evidence of a depressing effect has been found using aggregate unemployment rates (Gutiérrez-Domènech, 2008; Adsera, 2011), although analyses using individual-level data have also found significant effects in the same direction. De la Rica and Iza (2005) argue, for example, that the labour market reform that introduced flexible employment contracts in 1984 is one of the main reasons why ages at first birth in Spain are among the highest in Europe.

Significant effects of economic uncertainty on fertility timing have also been found combining 'objective' measures (employment status, type of contract, income) with 'subjective' measures (self assessment of personal economic situation) (Kreyenfeld, 2005; Philipov et al., 2006). Blossfeld et al. (2005) provides extensive macro and micro-level evidence on how economic uncertainty negatively affects the family formation process, specially in the case of men in male breadwinner societies with weaker welfare systems.

Vignoli et al. (2012) have demonstrated that taking into account both members of the couple is key to understand the effect of uncertainty on fertility decisions. Analyzing data from Italy they show how stable work contracts are associated with higher fertility, but only when both partners work. This result is in line with the idea that the effects on the timing of motherhood differs not only by gender (Pailhé and Solaz, 2012) but also according to whether women are expected to be caregivers or household providers (Kreyenfeld, 2010). In fact, for women in male-breadwinner type of arrangements uncertainty regarding employment prospects may not be decisive, on the contrary, in most cases unstable employment trajectories might express the priority given to unpaid work.

1.4 The uncertainty-fertility link in France

France represents certainly a challenge for an analysis of the effects of uncertainty on fertility outcomes given its relatively strong family policies, which eases the difficulties to reconcile family and work most women found in other European countries. According to Toulemont et al. (2008) family policies implemented in the second half of the 20th century are the main reason why fertility rates have remained high in France while most European countries have seen their fertility fall way below replacement level.

However, and in spite of being less strong that in other contexts, delaying effects of economic uncertainty on family formation have been found in France. Kieffer et al. (2005) report delayed first births for women experiencing unemployment, a result that is consistent with Pailhé and Solaz (2012), which also finds *timming* effects, but no effects on complete cohort fertility levels.

These results suggest that the strength of family policies and programs in France is enough to alleviate but not to completely suppress the effects of economic uncertainty on the family formation process, at least in some segments of its population. This is not surprising taking into account the extent of the changes in the French labor market.

In 1980 the share of temporary employment on total dependent employment for young workers was about 13%, in 2012 was 55,5%, with very small differences between men and women (OECD Employment Database 2013). This has certainly had an impact on the experience of recurrent unemployment spells and in the duration of employment periods. We have mentioned already that a 30-year long analysis showed increased instability, which particularly affected the young, blue-collar and service workers (Aeberhardt and Marbot, 2013).

Our data also confirms this trend towards increased instability. Figures 1 to 6 show the proportion of individuals in each labor market/education status at each age for three different cohorts: Those entering the labor market between 1942 and 1956 (born 1926-40). Those that entered in 1962 to 1976 (born 1946-60) and 1980 to 1994 (born 1964-78).

As expected the *inactive* state gets a large proportion of women's trajectories (Figure 2) while it is marginal in the case of men (Figure 1). Another interesting element to notice is the clear delimitation of the *military service* period, which indicates a high degree of accuracy in the data.

Figure 1: Education-Employment trajectories Men 1942-1956 (born 1926-40) | France

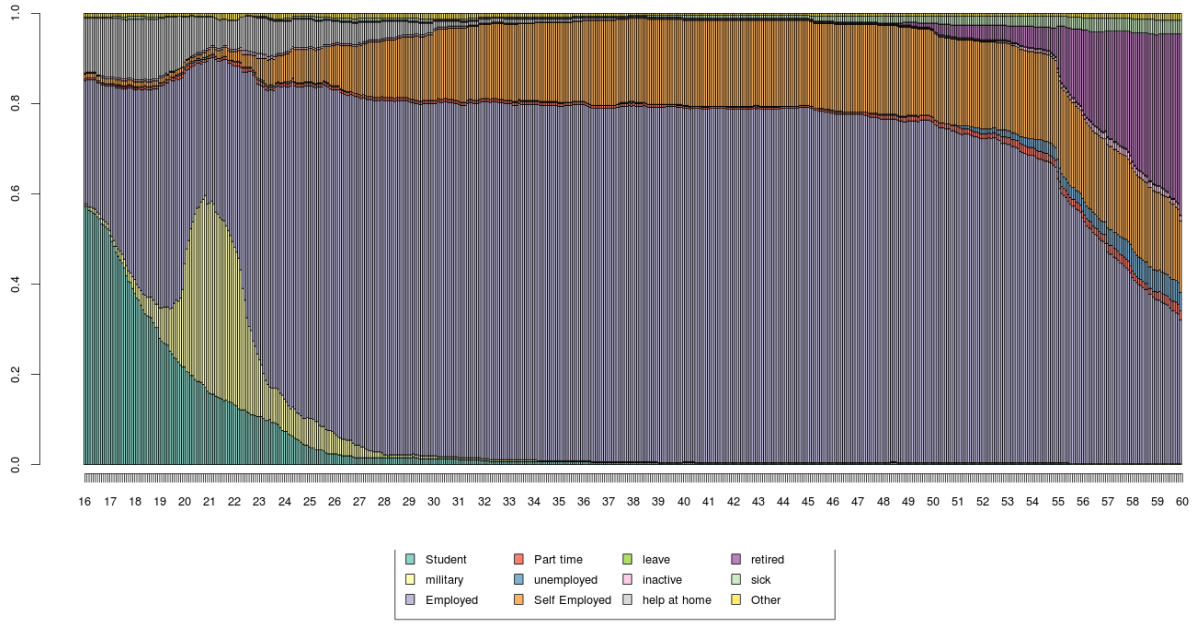
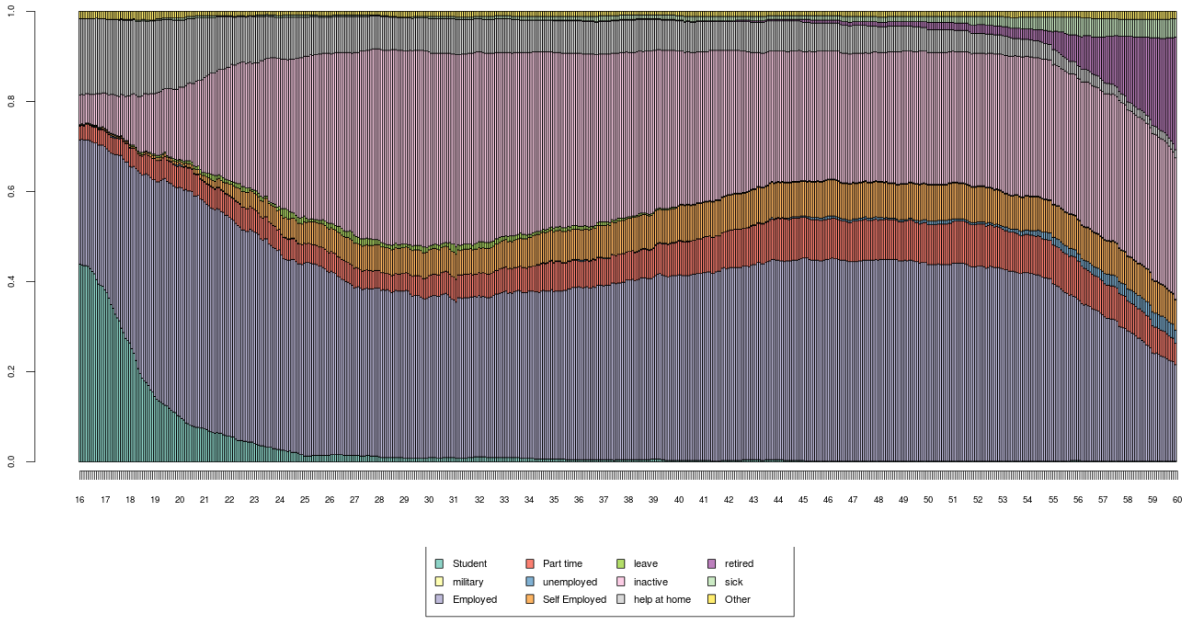


Figure 2: Education-Employment trajectories Women 1942-1956 (born 1926-40) | France



What stands out immediately for the second cohort is the high degree of stability of men's trajectories. States other than *employed* or *self-employed* are very infrequent. At the same time we see a convergence of women's trajectories towards men's trajectories, although they still present a higher proportion of *part-time employment* and *inactivity*.

Figure 3: Education-Employment trajectories Men 1962-1976 (born 1946-60) | France

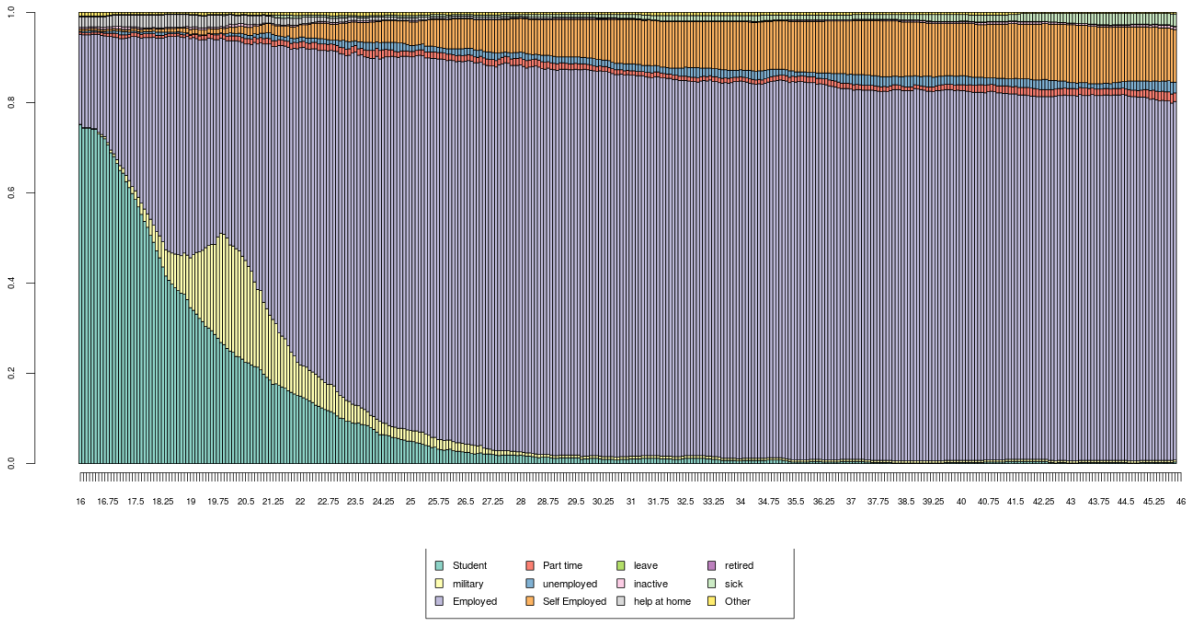
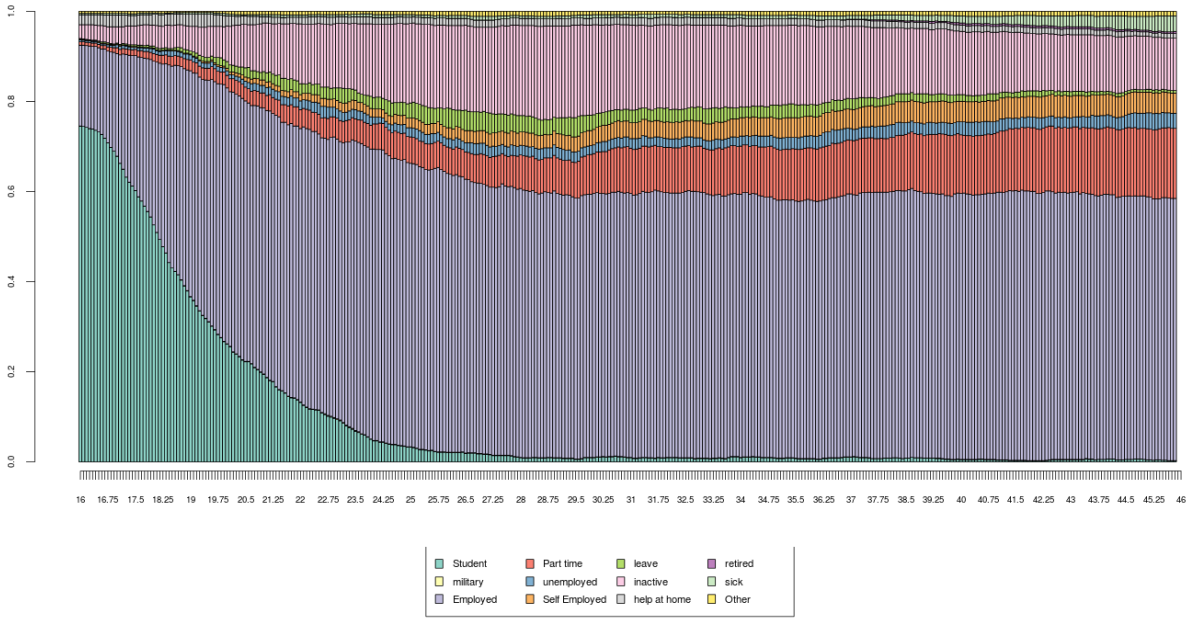


Figure 4: Education-Employment trajectories Women 1962-1976 (born 1946-60) | France



The most recent cohort shows exactly what was expected: *unemployment* and *part-time employment* proportions increase for both men and women, generating more instability when we consider individual trajectories. It is also interesting to notice, that most of the increase is concentrated at the begging of the employment trajectory, confirming also the stronger impact on labor market entrants.

Figure 5: Education-Employment trajectories Men 1980-1994 (born 1964-68) | France

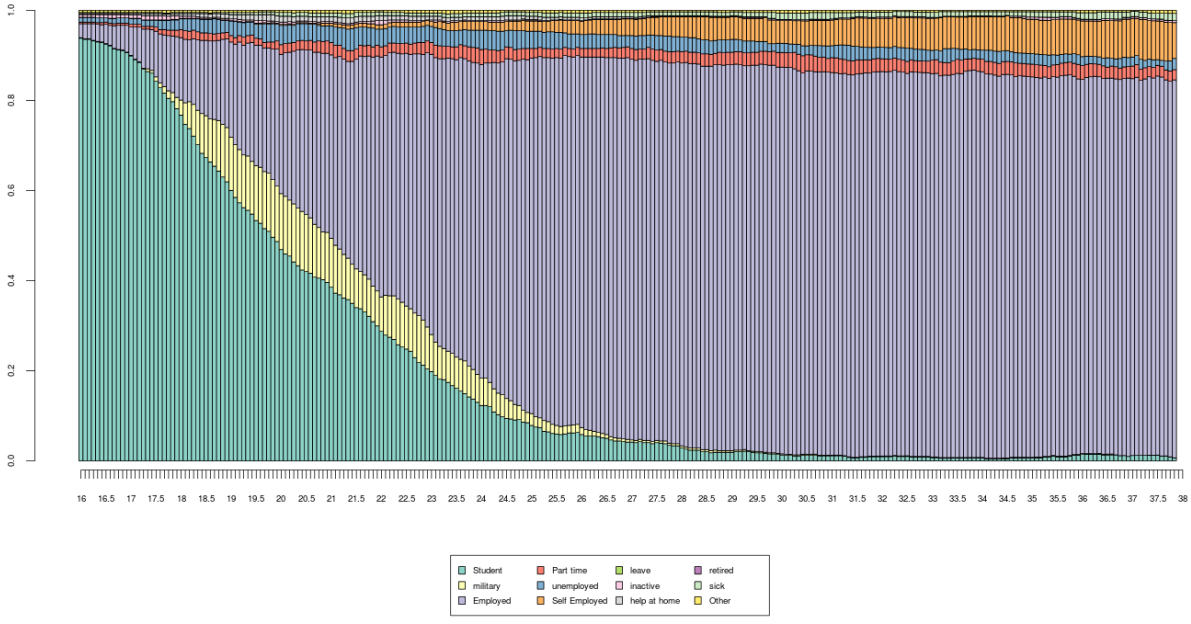
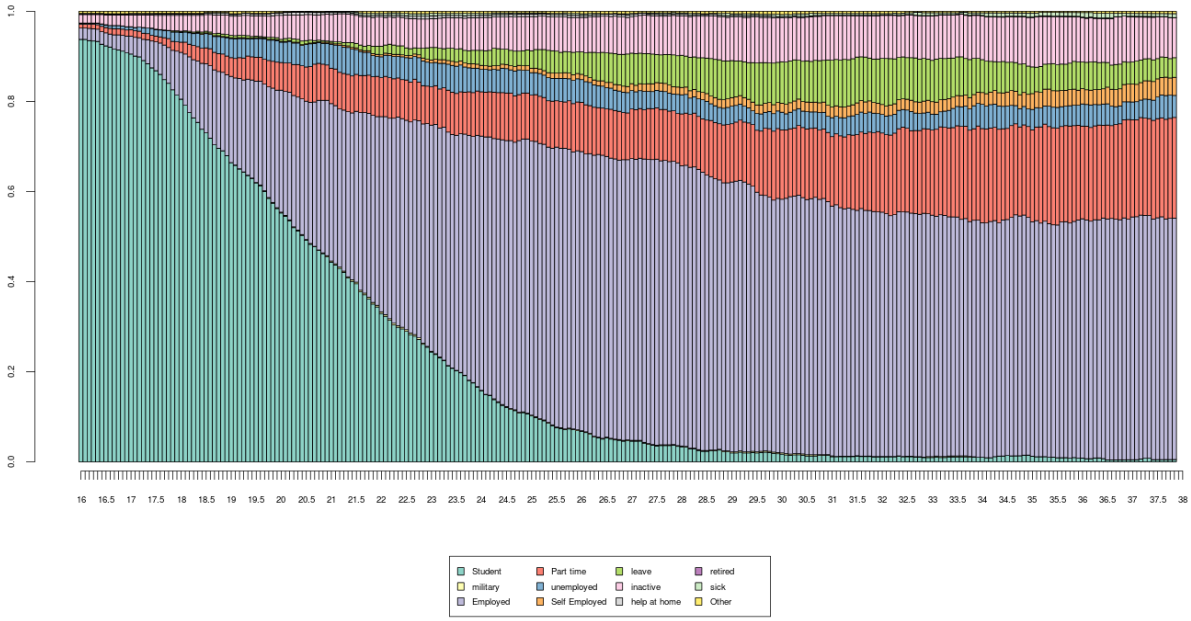


Figure 6: Education-Employment trajectories Women 1980-1994 (born 1964-68) | France



2 Questions and hypotheses

The main question we intend to answer in the next pages is: *What is the effect of employment instability on the timing and intensity of fertility in France?*

In spite of renewed interest in the effects of uncertainty on individual decisions, formalizations of the mechanisms involved are still limited. Most studies have adapted Becker's New Home Economics ideas about the effects of income on family dynamics to derive hypothesis on the links between uncertainty and fertility. According to Becker, an increase in household income can produce to opposite effects on the demand for children: an income effect or a substitution effect. An income increase will consequently increase the demand for children, but it also increases children's indirect costs in the form of income and careers opportunities parents have to give up in order to spend time with their children. An income effect is thus observed when the demand for children is positively affected by an increase on income and a substitution effect when the effect is negative.

Therefore, gender differences regarding the predominance of one effect over the other will largely depend on who pays the costs (direct and indirect) of children. In a male-breadwinner context an increase on men's economic uncertainty will likely produce an income effect, reducing the demand for children. For women, on the other hand, it is likely that the substitution effect will dominate as indirect costs decrease. In a context where the indirect costs of children are equally (or more equally) distributed, however, the differences between

men and women should be smaller.

Taking into account that women labor force participation is relatively high in France and that a part of the costs of childrearing are absorbed by the state via family policies. Our first hypothesis is:

H1: In the case of men we expect unstable employment trajectories to be generally associated with a higher age at first birth, a higher probability of remaining childless and a lower probability of achieving higher order parities. In the case of women, since we are not differentiating between those career-oriented and those family-oriented, we expect the effects to be less strong and less linear due to greater endogeneity of employment instability with respect to fertility.

We are also interested in the differences by educational levels, given that, as mentioned earlier, the low-skilled and blue-collar workers have have carried most of the weight of the deregulation process.

H2: We expect those men and women with low education to experience the longest delays in having a first birth and the higher probabilities of remaining childless.

3 Data and Methods

3.1 Data

The present study combines exploratory (Sequence Analysis) with confirmatory (Event History, Logistic Regression) methods to understand the relationship between early life course uncertainty and the timing and intensity of fertility in France. It takes advantage of the recent availability of complete employment histories in the *Etude des relations familiales et intergenerationnelles (ERFI)* a panel survey carried out by INED and INSEE which constitutes the base of the Generations and Gender Survey (GGS) in France. The panel includes a sample of 18 to 79 year old metropolitan France residents.

The first wave was carried out in 2005 including 10.079 men and women and is representative of the French population. The second wave consists of 6.534 interviews and due to the high attrition rate is no longer representative of the French population, for which the figures obtained with this sample are only valid for the 2005 French population after the application of weights. The survey contains not only detailed information on the reproductive history and fertility intentions of the interviewees, but also complete retrospective and prospective education-employment histories.

3.2 Outline of the study

In the first section I use sequence analysis techniques to quantify the degree of instability/uncertainty of employment trajectories. Sequence Analysis consists of a set of techniques originally developed by molecular biologists to find similar DNA patterns, introduced in the social sciences for the first time in the 1980s. These techniques are particularly useful for the study of life-courses because they provide a holistic understanding of individual trajectories, allowing for the combination of multiple dimensions of a biography in one sequence, which becomes the main unit of analysis.

In our case, the education - employment histories will be combined to obtain a unique sequence for each observation in the sample. In ERFI respondents are asked to provide information about the duration of each spell (of at least three months) in which they were: employed, in school, inactive, unemployed, etc. When respondents where simultaneously in two or more states (employed and studying for example), they were asked to choose the activity in which they spent most time. The possible states in the employment/education dimension are:

Student; Military Service; Employed; Self Employed; Part-Time Employed; Leave; Help at home; Unemployed; Retired; Inactive; Sick; Other.

After exploring the relevant changes in these trajectories over time I re-classify the sequence-states in order to obtain binary trajectories that represent the transitions from a state of *stability* to one of *instability* and vice versa. In the case of men the states included in the stable state are: *Student; Military Service; Employed; Self Employed; Leave; Help at home; Retired; Inactive; Sick; Other.* While *Part-Time Employed and Unemployed* comprise the unstable state. For women, however, we include only unemployment spells as instability given the fact that in a large number of cases part-time work is related to a decision of the individual or the household and not to an imposition of the labor market. In fact, the data used here shows that men working part time are approximately one fifth of the women with that type of work. Besides, 70% of these men doing are doing it involuntarily, while in the case of women these figure is about 50%.

This way, we avoid the incorrect classification of women's trajectories having a more stringent definition of instability. In the case of men that have a stable long term part-time attachment to the labor market, their trajectories will have none or few transitions in and out of states, hence, a low turbulence score (see definition below).

It could also be argued that being in state "sick" is also imposed, but there is a qualitative difference between the types of mechanisms imposing this state, which is why I decided not

to include it with unemployment and part-time. In any case the presence of the state is marginal in our sample (figures provided in Appendix A).

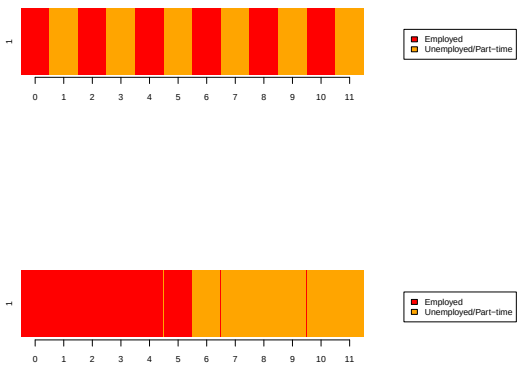
3.3 Definition of Turbulence

In order to measure the degree of instability of trajectories we use a slight variant of the *turbulence* indicator developed by Elzinga and Liefbroer (2007). The definition used here is as follows:

$$T(x) = log_2 \left(\Phi(x) \frac{(s_t^2, max(x) + 1) * 1/\bar{t}}{(s_t^2(x) + 1) * 1/\bar{t}} \right)$$

One important advantage of this indicator over similar measures (e.g. entropy) is that it takes into account not only the amount of state-changes in the trajectory (Φ) but also the time spent in each state, the smaller the variance of the time spent at each state (s_t^2) the more difficult is to predict in which state the individual is going to be at any particular time, hence the higher the turbulence. s_t^2, max is given by $(d-1)(1-\bar{t})^2$, where d is the number of distinct states[2] and $\bar{t}$ the mean consecutive time spent in each state.

Let's consider the following sequences:



The first hypothetical sequence is highly turbulent, it has 11 state changes and no variance in the time spent at each state. The second, has only 1 transition, which means this sequence will be considered as being fairly stable if we were only counting spells. Using Turbulence,

[2]In sequences analysis the number of distinct states of a sequence refers to the number of non-consecutive states. A sequence of the type: *in-in-out-in-out-out* has 4 distinct states.

however, this sequence is also classified as highly turbulent given that there is no variance between the time spent at each state (the unemployment spell is as long as the employment spell). For a more detailed discussion of the use of this indicator as a measure of employment instability see Appendix A.

The correction we applied to the original formula is the division of the numerator and denominator by $\bar{t}$ in order to avoid large differences between similar sequences of different length when s_t^2 is low or 0.

3.4 Timing: Event History Models

After trajectories are classified according to their level of turbulence the new variable obtained is introduced as a time-varying, cumulative covariate in a Cox Regression model predicting the timing of first births. Turbulence is computed for each trajectory *prior* to the exact age (months) at first birth and up to age 45 / age censored for those that have not experienced the event. The measure is taken cumulatively at each age (since age 17) and introduced as a categorical covariate that identifies those with *high*, *med* and *low* turbulence.

I present separate models for males and females, both including individuals from age 25 to age 50 given our focus on the labor market changes described in section 2.1, which particularly affect recent cohorts. Different models are also obtained given the educational level of respondents, classified in two categories: Low (up to secondary education) and High (tertiary education or more).

In the models we also control for the timing of first union formation, introduced as a time varying covariate with values 0 before and 1 after first cohabitation experience. The models are defined as follows:

$$h^{m,edu1}(t,x) = h_0(t) * exp(x\beta_{turb} + x\beta_{funion}) \tag{1}$$

$$h^{m,edu2}(t,x) = h_0(t) * exp(x\beta_{turb} + x\beta_{funion}) \tag{2}$$

$$h^{f,edu1}(t,x) = h_0(t) * exp(x\beta_{turb} + x\beta_{funion}) \tag{3}$$

$$h^{f,edu2}(t,x) = h_0(t) * exp(x\beta_{turb} + x\beta_{funion}) \tag{4}$$

Other relevant covariates were tested but not included in the final model:

* Nationality: European vs. Other.

* Values: Conservative, Center, Liberal. Built from a question regarding the need to give priority to men when jobs are scarce and another on the place of paid and unpaid work for women's realization.

* Religiosity: High, Medium, Low.

* Cohort: Born 1958-1972, 1973-1983.

And a third group of variables were also tested and although they might have shown significant effects, were ultimately excluded from the model given timing issues and/or their strong correlation with age:

* Type of current job: Public vs. Private.

* Type of current job: Temporary vs. Stable.

* Type of current job: Full Time vs. Part-time.

* Activity: Employed, Unemployed, At home, Inactive, Other.

* Total household income (per capita).

Observed and fitted survival curves are presented in the Results section and complete tables with model's results in Appendix B.

3.5 Intensity: Logistic Regression Models

To analyze the effects of employment instability on the intensity of fertility we run a series of logistic regression for which the outcome is the parity achieved by respondents at age 45 coded as four binary variables in the following manner: 0 vs 1+ children, 1- vs 2+, 2- vs 3+ and 3- vs 4+ children. In this case we consider the instability accumulated until the age of first birth or until the age at the survey for those with no children.

Four models are presented here for each binary outcome, according to sex and educational level (defined in the same way as in the Cox models).

The other covariates included the model are:

* Income < In three categories: Low, Medium, High, corresponding to the first the second and third and the fourth quartiles of the distribution respectively. * Ever had partner < Binary. * Nationality < European vs. Other.

In the Results section we present the predicted probabilities obtained for each of these models. The complete tables can be found in Appendix B.

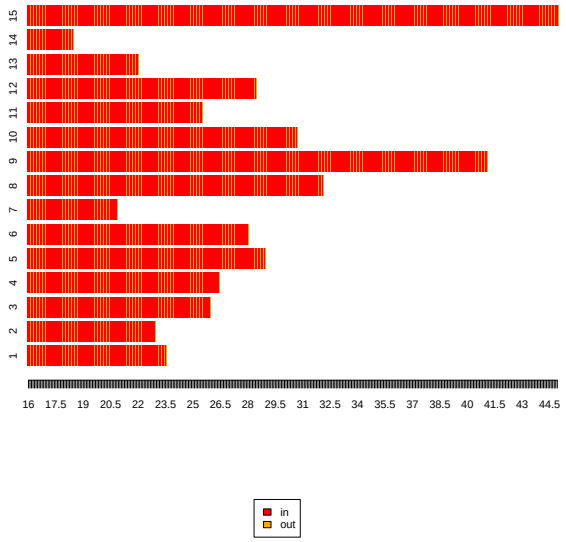
4 Results

4.1 Instability of current education-employment trajectories

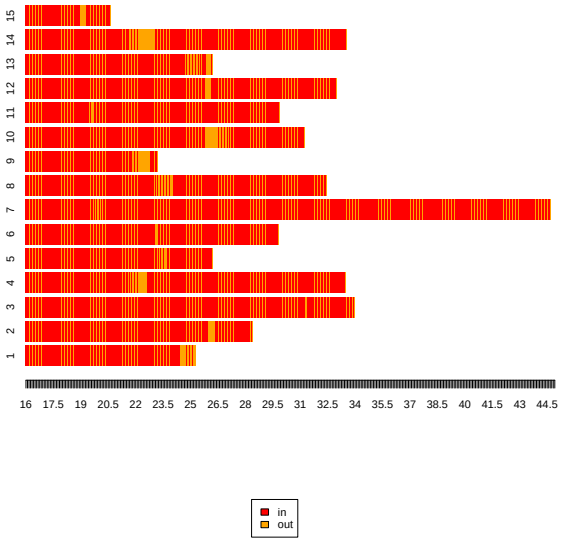
Figure 7 and figure 8 show 15 random sequences by turbulence level for women and men respectively. The group of *low turbulence* is composed of sequences with a turbulence between 0 and 1 while the sequences in the *med turbulence* have a score between 1 and 4.3. The group of *high turbulence* correspond to sequences with a score above 4.3 which are characterized by multiple transitions an long spells of unemployment for women and unemployment/part time employment in the case of men. These periods are labeled *out*, as in a transition out of a state of stability and depicted in orange in graphs.

The sequences classified as having a medium turbulence level are characterized by fewer or (proportionally) shorter instability periods, while most trajectories with low turbulence have no transitions between the two states.

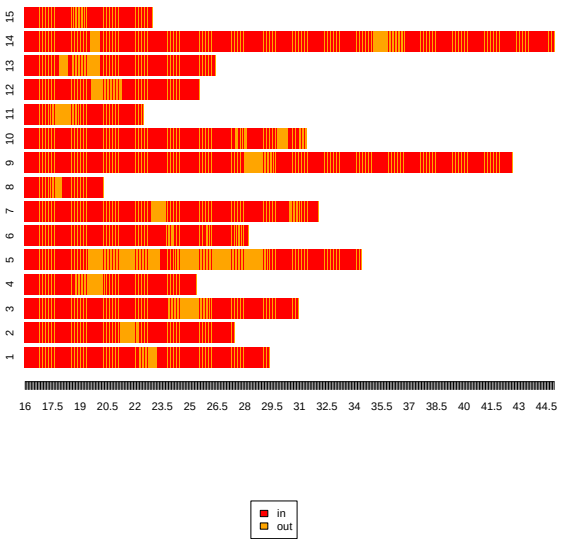
Figure 7: Initial 15 sequences by Turbulence level |Females 25 - 60 years old



(a) Low Turbulence

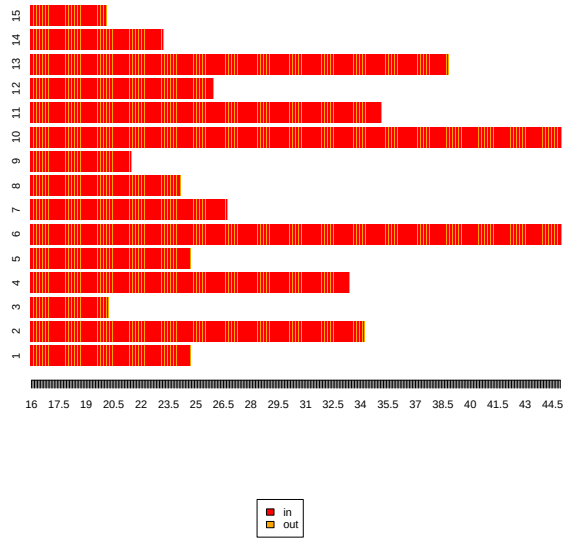


(b) Medium Turbulence

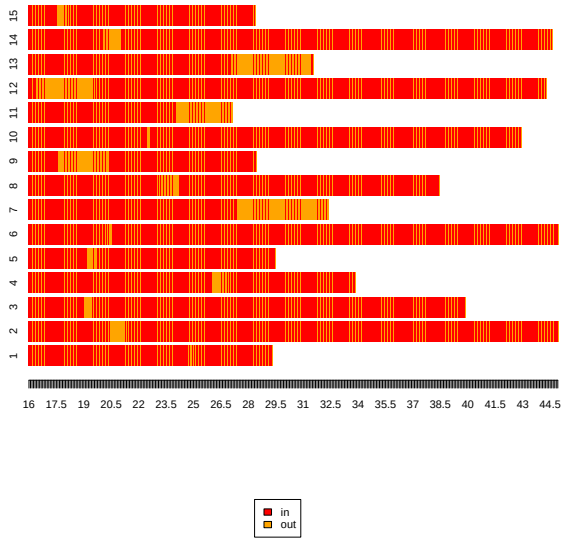


(c) High Turbulence

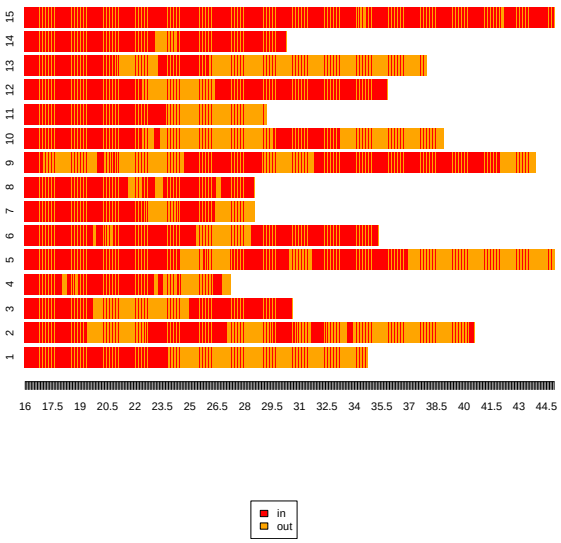
Figure 8: Initial 15 sequences by Turbulence level |Males 25 - 60 years old



(a) Low Turbulence



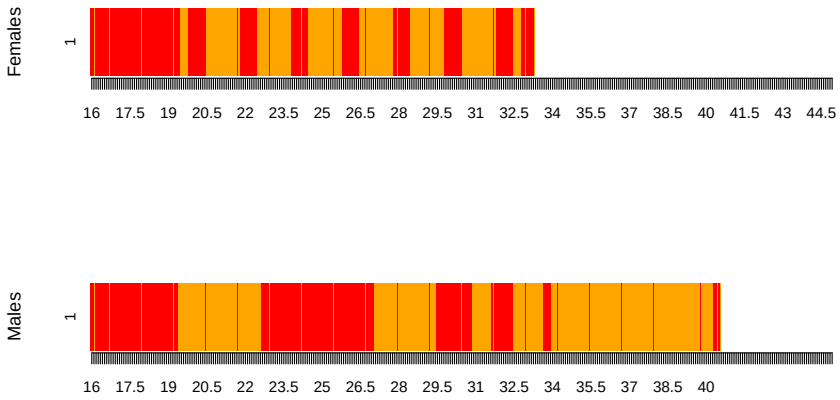
(b) Medium Turbulence



(c) High Turbulence

In figure 9 we present the most turbulent sequences for men and women. The most unstable trajectory among those of females presents 8 unemployment spells in 17 years (from age 16 to age 33) while the most turbulent trajectory among men has 5 unemployment/part time spells. In the second case the out spells are longer as well as the trajectory, which goes from age 15 to age 41.

Figure 9: Most Turbulent Sequences for Males and Females



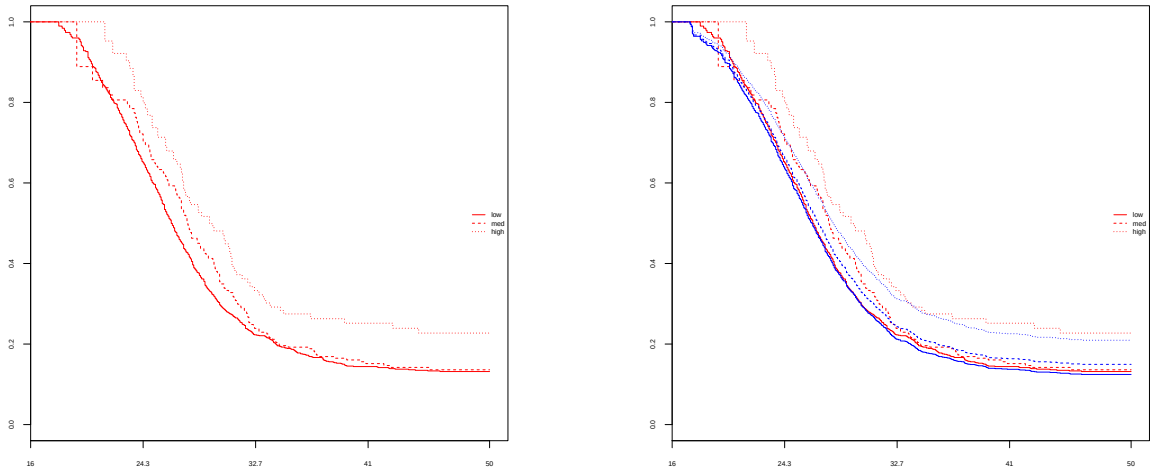
Although there might be a few trajectories for which it could be argued they do not belong to the group in which they are classified (see Appendix A), in general terms the scheme proposed seem to be doing a good job separating the most stable trajectories from the less stable.

4.2 Effects of employment instability on fertility: Timing

As mentioned before, to evaluate the effect of instability of employment trajectories on fertility timing we computed the cumulative turbulence at each age since age 17 to age 45. This variable is introduced in a Proportional Hazards Cox model as a predictor of the timing of first births. Four different models are obtained, one for each sex and education level.

Figure 10 shows observed and fitted survival curves by turbulence level for men with up to secondary education that had experience an union in the past. The most consistent result in this case is that those with highly unstable trajectories have lower risks of having a first birth at each age. In fact this is the only significant coefficient estimated by the model, which gives a 25% lower risk in relation to the reference category: low turbulence (see Appendix B).

Figure 10: Observed and Fitted Survival Curves by Instability Level and Partnership Status - Males, Secondary Education or Less, Who Have Been in a Union.

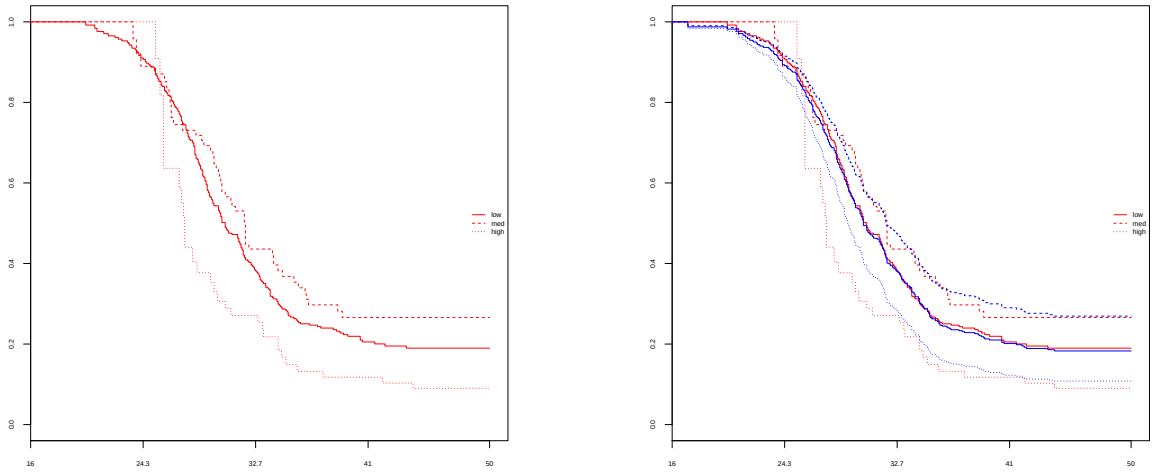


(a) Observed

(b) Observed + Fitted

In the case of those with tertiary education (Figure 11), we observe that the situation reverses and those with more unstable trajectories have a *higher* risk of having a first birth at least after age 26. Other than responding to the smaller number of observations in this category (difference is not statistically significant), this result suggests a different meaning of instability for this group. It might be the case that for highly educated individuals unemployment spells represent moments of transition to better positions in the labor market, instead of involuntary periods of economic uncertainty. Those with medium turbulence present a 23% reduction in their hazards with respect to those with low turbulence.

Figure 11: Observed and Fitted Survival Curves by Instability Level and Partnership Status - Males, Tertiary Education, Who Have Been in a Union.

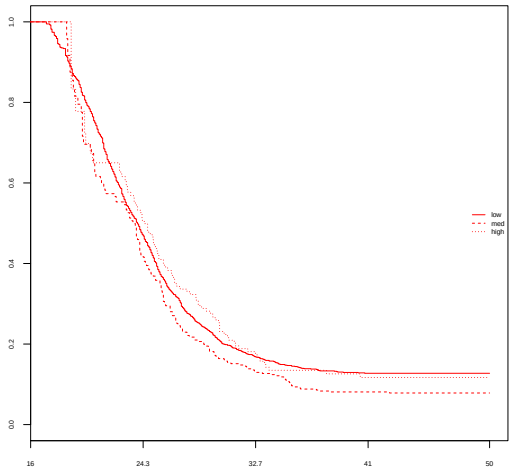


(a) Observed

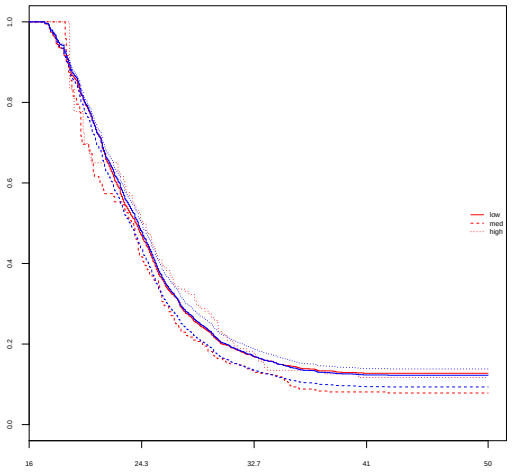
(b) Observed + Fitted

Figures 12 and 13 show the results for women. In this case we do not find significant differences for any of the groups. For those with tertiary education the pattern observed in the case of men repeats: after a period of postponement, which here is more marked than in the case of men, they catch up and end up having more first births than those with more stable trajectories. Again the results point to a different meaning or instability, which can also be related to a the possibility of having a looser attachment to the labor market when family/partner resources are available.

Figure 12: Observed and Fitted Survival Curves by Instability Level and Partnership Status - Females, Secondary Education or Less, Who Have Been in a Union.

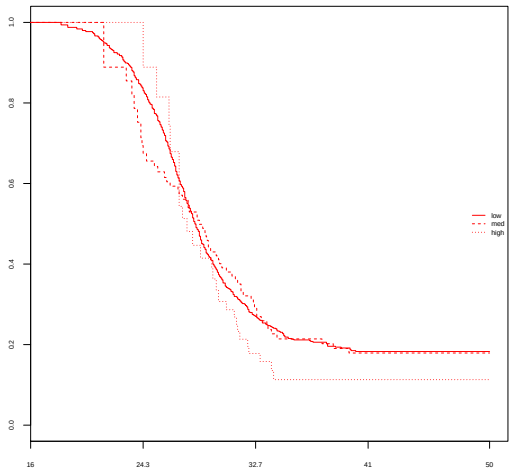


(a) Observed

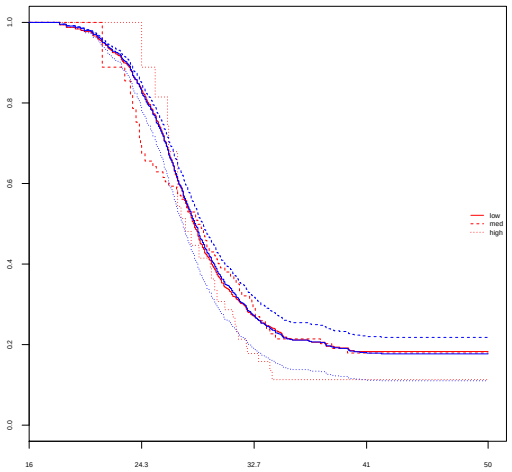


(b) Observed + Fitted

Figure 13: Observed and Fitted Survival Curves by Instability Level and Partnership Status - Females, Tertiary Education, Who Have Been in a Union.



(a) Observed

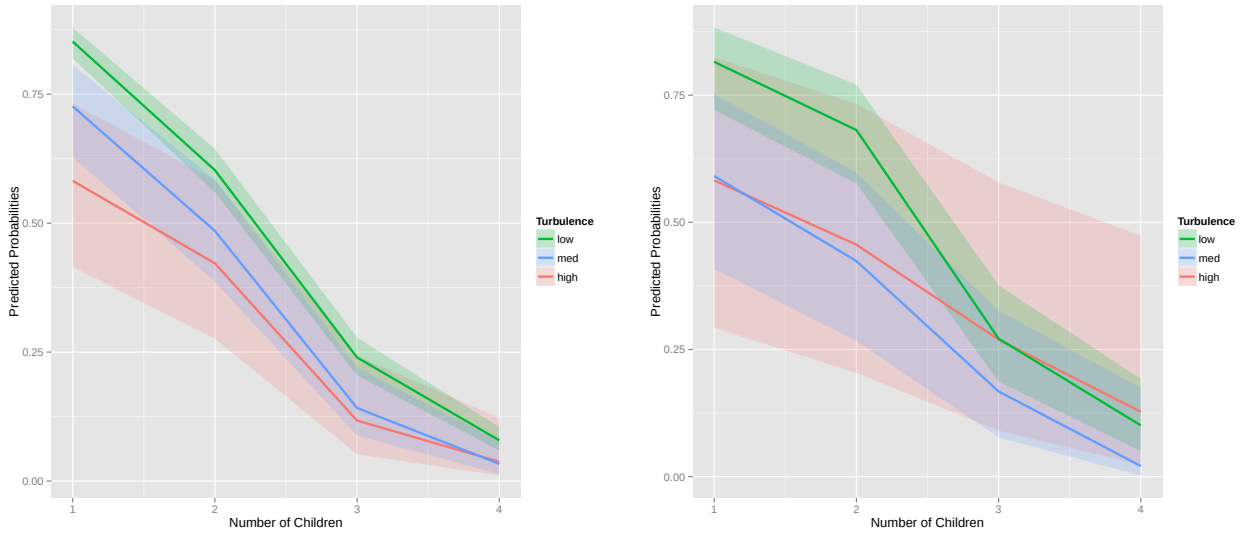


(b) Observed + Fitted

4.3 Effects of employment instability on fertility: Intensity

The analyzes of the effects of employment instability on the intensity were performed through a series of logistic regressions described in detail before. In Figure 14 and Figure 15 we present the predicted probabilities of having at least 1, at least 2, at least 3 and at least 4 children for men and women aged 45 or more by educational level. The results displayed are obtained when the control variables are hold at certain levels (see graph titles), which means the levels might vary but the distances between categories are the same for other characteristics.

Figure 14: Predicted Probabilities and Confidence Intervals from Logistic Regression Models, Number of Children by Education - Males, Age>= 45, Income=Mean, Nationality=European.

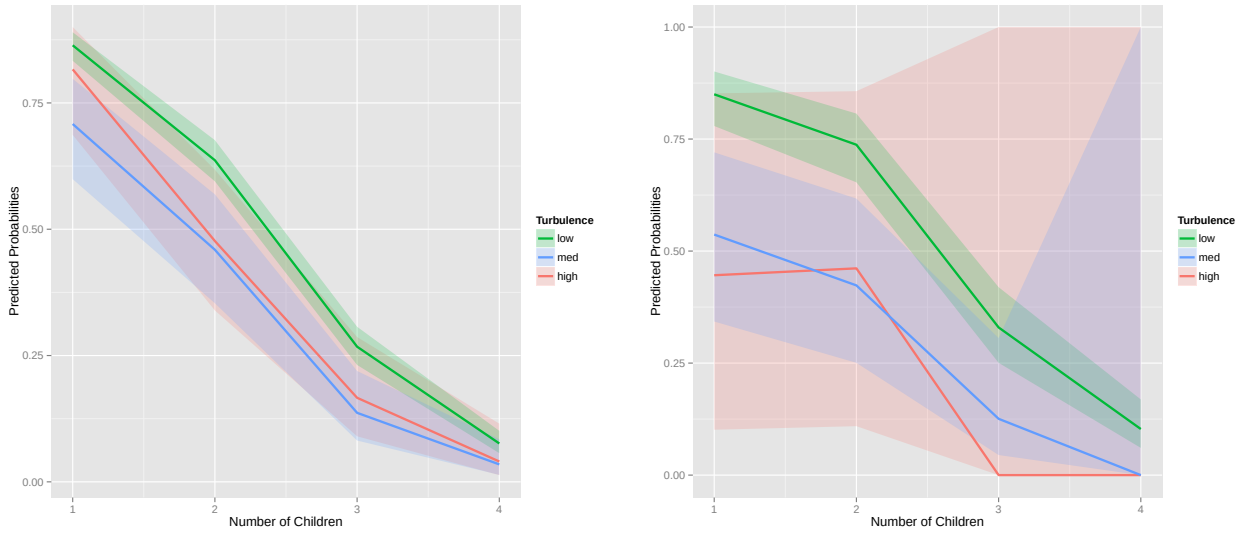


(a) Up to Secondary Education

(b) Tertiary Education

In the case of men in the two lower educational categories we find what we expected: Probabilities are higher for those with more stables sequences, specially in the first outcome, having at least one child. This is the same as saying that the probability of remaining childless is higher for those with the more unstable trajectories, which is not the case among those with tertiary education, where, again, highly unstable trajectories seem to be related to more fertility and no with less. In spite of the lack of precision of these estimates (wide confidence intervals), the results again suggest that the effects of instability are not linear for those with higher educational levels.

Figure 15: Predicted Probabilities and Confidence Intervals from Logistic Regression Models, Number of Children by Education - Females, Age>= 45, Income=Mean, Nationality=European.



(a) Up to Secondary Education

(b) Tertiary Education

For women, contrary to what we observed in the analyzes of timing, we find significant results in both groups between those with low instability and soem instability. The group with highest instability again appears associated with more and not with less fertility, at least in comparison with those with some instability, suggesting one more time a voluntary lose attachment to the labor market. The results observed for the other two groups suggest that among those women that choose to have a stronger attachment to the labor market, experiencing unemployment spells really has a negative effect on the final parity they will achieve.

5 Discussion

In the context of a remarkable shift in the longstanding negative correlation between economic prosperity and fertility levels, our study was set to analyze the effects of employment instability and the timing of fertility in France. The two main hypotheses we posed were partly confirmed by our results.

First, we showed how unemployment and part-time job episodes in individuals' biographies have increased over time, resulting in more complex and unstable trajectories. These results were obtained for men and women and we interpret them, at least partially, as the result of

the process of flexibilization of the French labor market, a process observed in most European countries in the last decades.

Our main objective was to assess the effects of this increased instability on the timing of first births and on the final number of children. These results present some differences by sex, but also some similarities. Among men, having unstable trajectory seems to lead to the postponement of first births. For both men and women with tertiary education, however, highly unstable trajectories seem to be associated to faster and not delayed transitions into parenthood, which points to a different meaning of instability among the more educated, more resourceful individuals.

In terms of the intensity of fertility, our results show that for both men and women with up to secondary education, having a stable trajectory is consistently associated with lower probabilities of remaining childless and higher probabilities of achieving higher order parities. For women, these effects are also significant in the tertiary education group. The estimations for those with most unstable trajectories present some limitations due to the small number of observations available.

In sum, and in spite of the lack or linearity we assumed, we can say that our hypotheses were mostly confirmed. Our results show that for those that have a disadvantaged position in the labor market, employment instability is associated with later (men) and lower (men and women) fertility.

Beyond our substantive conclusion, one of our primary goal was to develop an innovative and robust measure of employment instability over the life course, taking advantage of the potentialities of sequence analysis. The proposed measure has the advantage of incorporating the information contained in the entire education-employment trajectory of individuals, including the time spent in each state, if at the price of a less clear cut interpretation than more frequently used indicators.

Appendices

A

The indicator of Turbulence was originally developed as a measure of complexity, for sequences composed of multiple states. In this study we are trying to show that applied to a binary sequence this measure can be interpreted as an indicator of instability. When transitions between the two states are defined as transitions between a wanted, voluntarily chosen state, and a an unwanted, involuntary state. Like in our case the transition between full time employment and unemployment/part-time employment. This use, however, is only possible under the assumption that sequences are mostly composed of the first state with temporary periods, spells or the second.

If this is not the case a lower turbulence score could be the result of individuals spending more than half of the total length of their sequence in states representing *instability* (in this case, part-time and unemployed). The extreme cases being those in which the entire length of the sequence is spent in unemployment or part-time employment. Such cases, however, are very unlikely to be observed, specially a sequence uniquely composed of unemployment spells.

Table 1 presents the proportions of individuals at four intervals of time by state and sex. In the case of part-time employment a 98% (of males) and 89% (of females) spend less than 101 months in this state. Although the cases spending more than this time in part-time employment are a minority, in the case of women the figure is large enough to justify the adoption of a different definition of turbulence (including unemployment spells only). For *unemployment* the figures do not suggest any major issues, the vast majority of individuals (both males and females) spend less than 20 months of their trajectories unemployed.

Table 1: Proportion of Cases (Sequences) by Time Spent in Selected States

	Part Time		Unemployed	
	Males	Females	Males	Females
[0,20]	0.92	0.68	0.90	0.84
(20,100]	0.06	0.21	0.08	0.14
(100,247]	0.01	0.09	0.01	0.02
(247,347]	0.01	0.01	0.00	0.00

The states in which individuals spend more time are *employed* and *student* as can be seen in

Tables 2 and 3. As expected there are few or no retirees in our sample (including up to age 50) and the proportion of time spent *sick* is also marginal in our sample.

Table 2: Proportion of Cases (Sequences) by Time Spent in Selected States

	Student		Employed		Self Employed		Sick	
	Males	Females	Males	Females	Males	Females	Males	Females
[0,20]	0.20	0.15	0.08	0.14	0.90	0.96	0.98	0.98
(20,100]	0.71	0.73	0.17	0.31	0.05	0.03	0.02	0.01
(100,247]	0.09	0.12	0.47	0.41	0.04	0.01	0.01	0.01
(247,347]	0.00	0.00	0.28	0.14	0.01	0.00	0.00	0.00

Table 3: Proportion of Cases (Sequences) by Time Spent in Selected States

	Leave		Retired		Help at Home		Inactive	
	Males	Females	Males	Females	Males	Females	Males	Females
[0,20]	1.00	0.85	1.00	1.00	0.98	0.99	0.99	0.82
(20,100]	0.00	0.14	0.00	0.00	0.01	0.00	0.01	0.09
(100,247]	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07
(247,347]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01

B

Table 4: Cox Proportional Hazards Model Estimates | Males 25 to 50 by Education Level. Turbulence prior to first Child

	Secondary Edu or less	Tertiary Education or more
Med Turbulence	−0.09 (9%)	-0.26 (23%)*
High Turbulence	-0.29 (25%)**	0.27 (30%)
First Union - Yes	2.88 ($18t$)***	2.15 ($9t$)***
Num. events	883	341
Person-Years	18546	8808
Missings	0	0

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 5: Cox Proportional Hazards Model Estimates | Females 25 to 50 by Education Level. Turbulence prior to first Child

	Secondary Edu or less	Tertiary Education or more
Med Turbulence	0.12 (12%)	−0.13 (12%)
High Turbulence	−0.06 (6%)	0.24 (27%)
First Union - Yes	2.09 $(8t)^{***}$	2.58 $(13t)^{***}$
Num. events	1167	604
Num. obs.	17985	13576
Missings	0	0

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 6: Logistic Regression Models- Final Parity Achieved | Males 45+ Up to Secondary Education

	At least 1 Children	At least 2 Children	At least 3 Children	At least 4 Children
Intercept	−0.41 (0.21)$^{\cdot}$	−0.59 (0.21)**	−1.29 (0.25)***	−1.88 (0.32)***
Med Turbulence	−0.77 (0.23)***	−0.48 (0.21)*	−0.65 (0.27)*	−0.91 (0.45)*
High Turbulence	−1.42 (0.34)***	−0.73 (0.33)*	−0.86 (0.45)$^{\cdot}$	−0.79 (0.64)
First Union - Yes	1.56 (0.22)***	0.91 (0.21)***	0.58 (0.26)*	0.24 (0.33)
Med Income	0.60 (0.15)***	0.10 (0.13)	−0.45 (0.14)**	−0.82 (0.19)***
High Income	1.18 (0.32)***	−0.11 (0.21)	−0.90 (0.27)***	−1.58 (0.49)**
Nationality - Other	1.23 (0.38)**	1.21 (0.27)***	1.05 (0.22)***	1.13 (0.25)***
Num. obs.	1238	1238	1238	1238

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 7: Logistic Regression Models- Final Parity Achieved | Males 45+. Tertiary Education

	At least 1 Children	At least 2 Children	At least 3 Children	At least 4 Children
Intercept	−0.85 (0.58)	−1.34 (0.57)*	−2.73 (0.81)***	−2.87 (1.10)**
Med Turbulence	−1.12 (0.39)**	−1.07 (0.36)**	−0.62 (0.44)	−1.66 (1.17)
High Turbulence	−1.15 (0.63)$^{\cdot}$	−0.94 (0.61)	−0.01 (0.67)	0.26 (0.93)
First Union - Yes	1.55 (0.47)**	1.43 (0.47)**	1.29 (0.69)$^{\cdot}$	0.40 (0.88)
Med Income	0.79 (0.41)$^{\cdot}$	0.67 (0.38)$^{\cdot}$	0.45 (0.47)	0.28 (0.75)
High Income	1.53 (0.42)***	1.10 (0.37)**	0.91 (0.45)*	0.43 (0.72)
Nationality - Other	0.05 (0.39)	0.03 (0.33)	0.19 (0.33)	−0.12 (0.55)
Num. obs.	349	349	349	349

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Table 8: Logistic Regression Models- Final Parity Achieved | Females 45+. Up to secondary Education

	At least 1 Children	At least 2 Children	At least 3 Children	At least 4 Children
Intercept	0.42 (0.16)**	−0.14 (0.16)	−0.86 (0.18)***	−1.91 (0.24)***
Med Turbulence	−0.96 (0.25)***	−0.72 (0.22)**	−0.84 (0.29)**	−0.83 (0.47)·
High Turbulence	−0.36 (0.36)	−0.65 (0.29)*	−0.60 (0.35)·	−0.67 (0.57)
First Union - Yes	1.37 (0.18)***	0.74 (0.17)***	0.40 (0.19)*	0.22 (0.26)
Med Income	0.06 (0.15)	−0.05 (0.12)	−0.55 (0.12)***	−0.81 (0.18)***
High Income	0.06 (0.26)	0.21 (0.20)	−0.48 (0.20)*	−1.10 (0.35)**
Nationality - Other	0.10 (0.28)	0.54 (0.23)*	1.00 (0.21)***	1.26 (0.23)***
Num. obs.	1539	1539	1539	1539

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ·$p < 0.1$

Table 9: Logistic Regression Models- Final Parity Achieved | Females 45+. Tertiary Education

	At least 1 Children	At least 2 Children	At least 3 Children	At least 4 Children
Intercept	−1.04 (0.42)*	−1.61 (0.44)***	−2.24 (0.56)***	−3.02 (0.77)***
Med Turbulence	−1.59 (0.39)***	−1.34 (0.39)***	−1.23 (0.56)*	−16.23 (1043.35)
High Turbulence	−1.95 (1.00)·	−1.19 (0.99)	−14.32 (574.01)	−15.93 (2498.39)
First Union - Yes	1.77 (0.40)***	1.62 (0.42)***	0.89 (0.53)·	0.25 (0.71)
Med Income	1.00 (0.34)**	1.02 (0.31)**	0.64 (0.36)·	0.60 (0.57)
High Income	1.10 (0.33)**	0.80 (0.30)**	0.55 (0.35)	0.44 (0.56)
Nationality - Other	0.27 (0.56)	0.25 (0.45)	0.28 (0.42)	0.53 (0.56)
Num. obs.	422	422	422	422

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ·$p < 0.1$

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