Disruptive Life-Course Events and Reproductive Choices: A Multiprocess Hazard Analysis of Italian Data

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Short Abstract

In recent decades, childlessness has increased sharply across Europe, with Italy experiencing one of the most pronounced rises. The decision to have children is nowadays deeply embedded in a matrix of interconnected life events and circumstances, making it far from straightforward. Employment stability, relationship dynamics, and broader societal transformations are key factors that intersect and significantly influence individuals' reproductive choices.

By focusing on Italy, where traditional patterns for family formation are shifting, our research seeks to explore how key disruptive life events, such as job loss or the breakdown of a relationship, contribute to individuals' reproductive decisions (specifically, to the decision to have the first child).

Using data from the 2016 Italian Multipurpose Household Survey, we employ multi-process hazard models to jointly analyse employment, union histories, and fertility, while accounting for unobserved factors that simultaneously shape these trajectories, thus offering a clearer understanding of the decision-making process behind childbearing.

Our results reveal significant gender differences: for women, employment reduces the likelihood of having a first child, while for men, it increases the probability of fatherhood. Union histories also play a critical role: being in a stable relationship, especially marriage, significantly increases the likelihood of parenthood for both sexes.

Introduction and Theoretical Background

In recent decades, there has been a sharp rise in the rate of childlessness in most European Countries, with the phenomenon being particularly pronounced in Italy, where increasing numbers of women are forgoing motherhood (Frejka and Calot, 2001; Frejka et al., 2004; Sardon, 2006; González and Jurado-Guerrero, 2006).

It is worth noticing that until a few years ago, childlessness was primarily caused by permanent celibacy or infertility (Tanturri and Mencarini, 2008). However, the marked increase in the phenomenon, observed among cohorts born from the 1950s onwards, reflects the emergence of "modern" motivations for childlessness.

The decision to have children, or not, is nowadays deeply embedded in a matrix of interconnected life events and circumstances, making it far from a straightforward process. Employment stability, relationship dynamics, and broader societal transformations are key factors that intersect and exert significant influence on an individual's reproductive choices.

Periods of unemployment, career interruptions, or transitions between jobs may disrupt long-term family plans, as individuals prioritize regaining financial and professional footing over starting or expanding a family. Similarly, relationship dynamics, including the formation and dissolution of partnerships, are critical factors in the decision to have children. The breakdown of a relationship can lead to delays in childbearing, as individuals often need time to emotionally and practically recover before forming new partnerships and considering having children.

These life-course events and their interplay (likely to generate feedback loops) often introduce a level of uncertainty, which can alter the trajectory of fertility decisions, particularly in societies, like Italy, where traditional timelines for family formation are shifting.

By focusing on women and men in Italy, our research seeks to explore how key disruptive life events, such as job loss or the breakdown of a relationship, contribute to individuals' reproductive decisions. Specifically, we focus on the role that instability in employment and unions may have in the decision to have the first child. We use multi-process hazard models, to capture the influence of unobserved factors that simultaneously shape fertility, employment, and union trajectories, offering a clearer understanding of the decision-making process behind childbearing.

By considering that these factors do not operate independently, but are interwoven in ways that collectively shape the timing, likelihood, and nature of parenthood, the central objective of this study is to shed light on the complex interactions between life-course events and reproductive choices, particularly in a social context, like Italy, where traditional family structures are evolving. Furthermore, we focus on the gendered dimensions of this process, examining how men and women may experience and respond to disruptions in employment and unions differently when considering parenthood.

Data and Methods

This work draws on data from the 2016 Italian Multipurpose Household Survey "Families, Social Subjects, and Lifecycle" (FSS) conducted by the Italian National Institute of Statistics (ISTAT).

We focus on individuals in their fertile life course, restricting the sample to women aged at least 45 and men aged at least 50 at the time of the survey (i.e., birth cohorts between 1913 and 1971). The final analytical sample consists of 14,363 individuals.

FSS data contain retrospective information allowing to adopt a longitudinal perspective that has been used to reconstruct individuals' histories of union formation/dissolution, employment and reproductive trajectories.

With the aim of examining the determinants of childlessness, we employ proportional hazard models and multi-process modelling. Specifically, we assess the impact of life course events related to both union history and employment history on the likelihood of having a first child. The use of retrospective data

allows for the precise sequencing of events, an essential consideration in multi-process modelling where the timing and interaction of life course transitions – such as childbearing, employment exits, and union dynamics – are crucial.

To account for the potential endogeneity between these processes, they are modelled jointly with the propensity to have a first child, ensuring that the sequencing of events and unobserved correlations between these processes are appropriately accounted for.

This methodology is particularly useful when one outcome may affect another, especially when the hazard of one process depends on the hazard of another process, or on the current state or prior outcomes of a related multi-episode process. In such cases, estimating a single model might not be sufficient, and it becomes necessary to consider the simultaneity of the events by correlating the unobserved heterogeneity of the different processes.

The model consists of three continuous-time event history equations: one for the conception of the first child, another for the termination of a job episode (prior to the birth of the first child), and a third for the termination of a relationship (also within the period preceding the birth of the first child). Time is measured in months to capture the detailed dynamics of these events. This approach allows for a comprehensive understanding of how unobserved factors may simultaneously shape fertility, employment, and union histories, offering insights that separate models could not provide.

Here are the log-hazard equations characterizing these three processes:

$$\ln h^C(t) = \alpha_0 + \alpha_1 Time(t) + \alpha_2 DurBirth(t) + \alpha_3 K^C(t) + \alpha_4 X^C + \varepsilon^C \tag{1}$$

$$\ln h_i^E(t) = \beta_0 + \beta_1 Time(t) + \beta_2 DurBirth(t) + \beta_3 DurEmpl_i(t) + \beta_4 X_i^E(t) + \varepsilon^E \tag{2}$$

$$\ln h_j^R(t) = \gamma_0 + \gamma_1 Time(t) + \gamma_2 DurBirth(t) + \gamma_3 DurRel_j(t) + \gamma_4 X_j^R(t) + \varepsilon^R \tag{3}$$

where i denotes the i-th job and j denotes the j-th relationship during the analyzed period. The variables used in the different equations are defined in detail in Table 1.

Each of the three equations also includes individual-specific unobserved heterogeneity terms, ε^C, ε^E and ε^R, which are assumed to follow a normal distribution with zero means and standard deviations $\sigma_{\varepsilon C}$, $\sigma_{\varepsilon E}$ and $\sigma_{\varepsilon R}$, respectively. These random terms are fixed over an individual's lifetime and represent individual-specific, time-constant, unobserved propensity terms for having the first child, exiting employment, and exiting a relationship.

All the models presented in this section were estimated separately for men and women and the equations were estimated using Full Information Maximum Likelihood (**?**).

Results

The results of the multi-process hazard models (Table 2) confirm that being in a relationship has a strong positive effect on the propensity to become parents, with the effect being stronger the more formal the type of relationship. In contrast, employment has different effects depending on gender. For women, working has a strong negative impact on the propensity to have the first child. Employed women have about a 20% lower risk of having their first child compared to non-employed women. For men, the situation is the opposite; employed men have a 12% higher risk of having their first child compared to non-employed men. From the model estimates, we observe that women living in the South or on the Islands with siblings have a higher propensity to have their first child, while women with higher education have a lower propensity. A lower propensity for the first child indicates that the birth of the firstborn is delayed over time, resulting

in women becoming mothers later or potentially ending their reproductive period remaining childless. Men with a higher propensity for the first child are those living in the South or on the Islands, with siblings, and with a low level of education. Men with no educational qualifications are also less likely to have their first child.

Moreover it is interesting to note how individuals' opinions influence their reproductive choices. For example, a woman who agrees with the statement "A woman is fulfilled only if she has children" has a significantly higher risk (by 13%) of having her first child compared to a woman who disagrees. Similarly, in the model for men, the opinion "A man is fulfilled only if he has children" is significant, and men who agree have a 19% higher risk compared to those who disagree.

The choice to jointly estimate the equations on conception, work, and relationships is supported by the significance of the estimated correlations between the three processes.

Specifically, the correlation between conception and employment exit, as well as between employment exit and relationship exit, is significant for both women and men. Notably, for both sexes, the unobserved heterogeneity term for the conception of the first child is positively correlated with the unobserved heterogeneity term for employment exit. This result implies that individuals with an above-average unobserved propensity to terminate employment also have an above-average propensity to have their first child. Thus, individuals more inclined toward childbearing are also likely to have a more variable employment history, characterized by multiple spells of employment.

Similarly, individuals with an above-average unobserved propensity to terminate employment also have an above-average propensity to terminate a relationship. In other words, those with a tendency toward shorter employment durations also tend to have less stable relationships.

After jointly estimating the three equations allowing for correlation across heterogeneity components, we further extend the analysis by trying to understand if the estimated risk associated with conception may directly influence the occurrence and timing of exit both from employment and relationship (**?**). Following this approach, the term $\ln h^C(t)$, representing the risk of (potential) conception of the first child, has been used as a covariate in equations (2) and (3) presented in the previous section, for understanding how it may impact the decision to end a job or a relationship. The hypothesis is that individuals with a strong inclination to have their first child might reduce the risk of ending a job or a union.

Results show that, for women, the effect of the hazard of first conception on employment exit hazard is weakly significant, whereas its effect on relationship exit hazard, is strongly significant. Hence, a high propensity for first childbirth exerts a more pronounced stabilizing effect on relationships rather than on employment. A woman with a higher inclination to have her first child experiences significantly delayed exits from employment and relationships. This indicates a less turbulent professional and romantic life with fewer transitions between jobs and partners (reduced hazard of employment exit and relationship exit).

For men, only the effect of the hazard of first conception on employment exit hazard is strongly significant.

Table 1: Time-constant and time-varying covariates of the equations for the conception of the first child, employment exit, and relationship exit.

Variable	Description	Conception $h^C(t)$	Employment exit $h_i^E(t)$	Relationship exit $h_j^R(t)$
Time-varing covariates (categorical):				
Emp	Employment	X		
Engag	Engagement	X		
Cohab	Cohabitation	X		
Mar	Marriage	X		
NumEmpl	Order of Employment spell		X	
NumRel	Order of Relationship spell			X
WorkExp	Work Experience		X	
WithEngag	Relationship spell with Engagement			X
WithCohab	Relationship spell with Cohabitation			X
WithMar	Relationship spell with Marriage			X
Time-costant covariates:				
Educ	Educational Level	X	X	X
Geo	Geographical Region	X	X	X
Siblings	Presence of brothers or sisters	X		
SepParents	Presence of parents' separation	X		
OpCohab	Opinion on cohabitation	X		
OpSingle	Opinion on single mother	X		
OpWomanAch	Opinion on children importance for women's fulfillment	X		
OpManAch	Opinion on children importance for men's fulfillment	X		

Table 2: Selected parameter estimates for conception, joint model for women and man.

Explanatory variable	Joint model for women $\rho_{\varepsilon^i \varepsilon^j}$ free $\lambda_i = 0$			Joint model for men $\rho_{\varepsilon^i \varepsilon^j}$ free $\lambda_i = 0$		
	Coeff.		SE	Coeff.		SE
Opinion on woman fulfillment *(ref: Disagree)*						
Agree	0.125	***	0.043	0.070		0.053
Opinion on man fulfillment *(ref: Disagree)*						
Agree	0.078		0.053	0.190	***	0.056
Indicator of being employed *(ref: No)*						
Yes	−0.208	***	0.036	0.133	**	0.057
Indicator of being engaged *(ref: No)*						
Yes	0.771	***	0.112	0.890	***	0.126
Indicator of being cohabiting *(ref: No)*						
Yes	3.510	***	0.113	3.425	***	0.128
Indicator of being married *(ref: No)*						
Yes	4.760	***	0.086	4.842	***	0.094

Statistical significance: *=10%; **=5%; ***=1%.