

Childbearing and Well-being of Households: A Comparative Analysis Based on the European Community Household Panel

*Figli e Benessere delle Famiglie:
un'Analisi Comparativa sul Panel Europeo delle Famiglie*

Arnstein Aassve*, Stefano Mazzuco**, Letizia Mencarini***

*Department of Economics, University of Leicester, UK

**Department of Statistics, University of Padua, Italy

***Department of Statistics, University of Florence, Italy

Riassunto: In questo lavoro analizziamo l'impatto della nascita di un figlio sul benessere della famiglia, confrontando quattro gruppi di paesi europei. L'analisi è svolta utilizzando i dati dell'European Household Panel Survey (EHP), secondo più definizioni di *benessere*, basate sia sul reddito che su un indice relativo di deprivazione. Per valutare l'impatto dell'evento-nascita, si considerano le tecniche di *matching* secondo il *propensity score* applicate ad uno stimatore Difference-in-Differences. I risultati mostrano che, in generale, la nascita di un figlio porta un calo del reddito, con però significative differenze tra i vari regimi di *welfare*: stati di tipo liberale (Gran Bretagna e Irlanda) mostrano impatti più forti rispetto agli stati di tipo social-democratico (Danimarca, Finlandia e Paesi Bassi).

Keywords: Poverty, Deprivation indices, Childbearing, Difference-in-Difference Estimators, Propensity Score Matching, EHP.

1. Introduction

This paper analyses the impact of childbearing on the likelihood of entering poverty in different European countries. The extremely diverse pattern of both poverty and fertility rates in Europe is considered as a major challenge in the move towards a common public policy in the European Union. Here we use the European Community Household Panel (EHP) data to analyse the relationship between childbearing and poverty. A common, though serious, problem in this analysis is that childbearing events cannot be considered exogenous with respect to changes in poverty status. Such problems are in the empirical literature normally solved with the help of an *Instrumental Variable* regression. However, the EHP does not contain many variables that naturally lend themselves to be used as instruments. There is for instance very limited information of retrospective nature. Given these difficulties we develop instead a *Difference-in-Difference* estimator combined with *Propensity Score Matching* (DD-PSM). In this setting, changes in poverty status (or level of deprivation) are considered as the *outcome* variable whereas childbearing is considered as the endogenous *treatment* variable. Typically poverty status is defined by whether net equivalised household income falls below a certain threshold. However, this dichotomous measure of household well-being is both rather ad-hoc and crude. Increasingly researchers have started to develop poverty measures that go beyond such rather limited monetary measures. These new measures tend to

be multi-dimensional and may incorporate community variables and subjective measures of well-being - in addition to the monetary dimension. We supplement our analysis by using these deprivation indices¹ as the outcome variable in the propensity score estimation. We are therefore able to analyse the impact of childbearing on entering poverty – when poverty is either defined as a pure monetary measure and when it is defined as a multidimensional deprivation index.

2. Data and methods

Our analysis is based on data from the European Community Household Panel (ECHP), which is a multi-dimensional and multi-purpose survey centrally designed and coordinated by the Statistical Office of the European Community (EUROSTAT). Starting in 1994, the ECHP provides information from six waves for Denmark, Germany, The Netherlands, Belgium, Luxembourg, France, United Kingdom, Ireland, Greece, Italy, Spain and Portugal, and, starting from 1996, four waves are available for Austria and Finland. A great advantage of the ECHP is the scope for comparability among countries in the European Union, together with the fact that it provides up-to-date information.

Our statistical approach borrows heavily from the treatment effect literature, which is generally concerned with estimating the impact of treatments, such as labour market training, on the expected income. Here the idea is to consider the effect of a change in demographic status from time t to time $t+1$, on any change in poverty status in the same time period. Ideally we are interested in comparing women who experience a child birth – and their poverty outcome – with the *same* women in the case where they did not experience a child birth – and again check their poverty outcome. The latter case, which is known as the *counterfactual*, is obviously unobserved, but can be approximated by the use of Propensity Score Matching (PSM) techniques.

The use of PSM involves comparing the predicted probability of individuals having a child to the *most similar* individuals who *did not* have a child (Rosenbaum and Rubin, 1983). Consequently, individuals are divided into two types: those who experienced a childbirth ($D_i=1$) and those who do not ($D_i=0$). Individuals having children (the treated) are matched to those without (the comparison) by the means of the propensity score, which is based upon *observable* characteristics. The propensity score for individual i is defined as: $p(X_i)=Pr(D_i=1|X_i)$ where X_i is a vector of explanatory variables recorded prior to the childbearing event. In our case the propensity score is defined by age, number of children, work and health status, educational level, marital and cohabiting status of the adults. Moreover, we also include initial level of poverty and deprivation prior the childbearing event.

Rosenbaum and Rubin (1983) show that if exposure to treatment is random within each cell as defined by X_i , it will also be random within cells defined by the propensity score variable $p(X_i)$. The assumption underlying this approach is commonly referred to as *conditional independence* or *strong ignorability*. Mathematically the assumption states the following: $(Y_0, Y_1) \perp D | X$, which means that conditional on X the outcome Y is independent on assignment to treatment. The propensity score can be easily estimated by

¹ From ECHP we used 25 household's items or characteristics; we performed a factor analysis to identify five groups of variables, correlated within, but uncorrelated between: 1) affordability dimension, 2) housing deterioration, 3) environmental problems, 4) secondary deprivation, 5) essentials; then we synthesised a deprivation index based on the technical approach on “fuzzy systems”, following Betti and Verma (2002).

either a probit specification or a logit. Testing for the conditional independence assumption is then needed. Provided this assumption holds, one may proceed to compute the average effect of treatment on the treated, which is given by

$$E\{Y_{1i}-Y_{0i}|D_i=1\}=E[E\{Y_{1i}|D_i=1,p(X_i)\}-E\{Y_{0i}|D_i=0,p(X_i)\}|D_i=1]$$

where Y_{1i} and Y_{0i} denotes the possible outcomes in the two counterfactual situations of treatment and non-treatment and the outer expectation is over the distribution of $p(X_i)|D_i=1$ (see Becker & Ichino, 2002, for further details and references).

The fact that the variable $p(X_i)$ is continuous implies that the probability of observing two units with exactly the same propensity score is zero. Thus pairs cannot be matched by whether they have the same propensity score or not. However a range of procedures have been introduced to overcome this problem. Matching of pairs of individuals is based on *how close* the estimated propensity scores are across the two samples. Various estimators have been proposed for this purpose, here we use the *Nearest Neighbor* approach in which the closest match to the i^{th} treated individual is defined as the non-treated individuals that minimises $\|p_i - p_j\|$ (Becker and Ichino, 2002).

By using the Difference-in-Difference estimator we compare the mean change of Y from time t to $t+1$ of participants with the mean change of Y for the same time period for non-participant. Formally this estimator is expressed as: $(\bar{Y}_{1,t} - \bar{Y}_{0,t+1})_1 - (\bar{Y}_{0,t} - \bar{Y}_{0,t+1})_0$. An important advantage of the DD estimator is that it allows us to control for selection into the treatment group caused by unobserved heterogeneity provided it is time fixed. More specifically, provided unobserved heterogeneity can be captured by an additive time fixed error component, its effect will be netted out by taking first difference (Heckman et al, 1997).

3. Results

In our analysis we have clustered countries into four types of *welfare regimes* (Esping-Andersen, 1999): 1) the *Social Democratic*, (Denmark, Finland and the Netherlands), 2) the *Continental Conservative* (France, Austria, Belgium), 3) the *Liberal*, (Great Britain and Ireland), and 4) the *Mediterranean* (Spain, Italy, Portugal and Greece). The two first rows in Table 1 gives an indication of the income penalty from one period to another caused by the childbearing event. In general we find that the strongest "income penalty" appears among the conservative welfare states, followed by the Social Democratic, Liberal and the Mediterranean. The difference between Conservative and Social Democratic on one hand and the Mediterranean regimes on the other - is rather large. Next we turn to the impact on poverty status – again using the two versions of the equivalence scales. The poverty status parameters (rows 3 and 4) can be interpreted as the average change in entering poverty that is attributable to having a child. Thus, for the Social Democratic states, our estimates indicate an increase in entering poverty by 1.6 percent (or 1.1 % using the Fuchs scale), caused by having a (another) child. Looking across the welfare regimes we see that the effect on entering poverty is the lowest for Social Democratic welfare states. We find the strongest effect for Liberal Welfare regimes, whereas the effect for Mediterranean and Conservative welfare states is somewhere in between and similar. Interestingly the Social Democratic welfare states have the second largest income penalty of childbearing, but the lowest impact in terms of changes in entering poverty.

Next we turn to our estimates concerning the deprivation indices. Apart from the Conservative welfare regimes, “affordability” worsens significantly when a child is added to the household. Looking across welfare regimes we notice that the impacts on deprivation is not always consistent with the patterns found for the monetary measures reported above. For instance, worsening in affordability is stronger in Social Democratic states compared to Conservative states and also Mediterranean states, though the effect is still strongest for the Liberal welfare regimes. Considering the total deprivation index, which includes all deprivation items, we see that there is no difference between Social Democratic and Conservative regimes, whereas the impact on Liberal welfare states is now insignificant.

Table 1: *Effects of childbearing on Equivalent household income, poverty status, and deprivation indices, Women only.*

	Social Democratic Welf. Regime	Conservative Welfare Regime	Liberal Welfare Regime	Mediterranean Welfare Regime
Net Household income				
OECD Equivalence scale	-1976.592 (-4.375)	-2223.232 (-7.335)	-1708.986 (-4.982)	-1281.604 (-7.996)
Fuchs equivalence scale	-1622.736 (-4.122)	-1875.132 (-7.297)	-1373.534 (-4.673)	-1037.073 (-7.647)
Poverty status				
OECD equivalence scale	0.016 (1.246)	0.028 (3.169)	0.056 (3.773)	0.033 (4.062)
Fuchs equivalence scale	0.011 (1.903)	0.041 (4.178)	0.071 (4.552)	0.045 (5.308)
Deprivation index				
Affordability	0.003 (1.244)	0.008 (1.511)	0.023 (2.998)	0.011 (2.303)
Household Characteristics	0.009 (1.898)	0.008 (1.049)	-0.009 (-1.019)	0.015 (2.861)
Environmental	0.010 (1.809)	0.025 (2.471)	0.001 (0.095)	0.010 (1.318)
Luxuries & Durables	-0.001 (-0.068)	0.001 (0.121)	0.009 (0.814)	0.009 (1.392)
Essentials	-0.007 (-1.240)	-0.002 (-0.861)	0.006 (1.081)	0.006 (1.593)
Total deprivation index	0.003 (1.244)	0.006 (2.007)	0.004 (0.768)	0.011 (3.779)

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