Micro-level determinants of childlessness in Italy:
a SEM approach

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EXTENDED ABSTRACT

INTRODUCTION

The prevalence of childlessness is now increasing in almost all European countries for birth cohorts born since 1945 to 1970. Italy represents an interesting case in this respect, as it is characterized by a rapid increase in the prevalence of both temporary and permanent childlessness, among men and women. For the cohort born in 1965 one of the highest proportion of childless individuals has been registered: respectively 21% of women and 28% of men. In such a demographic context characterized by low fertility and postponed childbearing, childlessness has become one of the most important elements to be studied for explaining fertility patterns and changes in family structures. Until few years ago, the proportion of infertile women was low and seemed to be mainly due to permanent celibacy and sterility, the traditional determinants of childlessness. Childlessness related factors did not attract the attention of scientific research, with the exception of Anglo Saxon countries characterized by a long tradition of studies on this topic (Hakim 2003, Abma & Martinez, 2002; Weston & Qu, 2001; Bachu, 1999; McAllister & Clark, 1999; Rowland 1998, Poston & Trent 1992, Kiernan, 1989; Bloom & Pebley 1982). In light of the rapid increase in childlessness among younger cohorts, growing attention has been recently paid in investigating on the micro-determinants of childlessness, also in Italy (Tanturri 2009).

A comprehensive theory of childlessness is not well-developed yet. Few theories comprehensively explain contemporary fertility behaviour and even fewer have direct overarching explanations for childlessness. There is a diversity of determinants proposed in the literature, most of them are often inter-related, so that their relative impact is difficult to distinguish, and thus, to quantify. These theories overlap, but are also distinguished by the relative emphasis toward individual agency and social structural processes. Childlessness review looks separately at cultural explanations, which mainly rely on post-materialist values (es. The Second Demographic Transition theory), but also includes preference theory (Hakim's theory), economic explanations which rely on a mix of rational choice or risk-aversion theory, explanations drawing on a gender perspective, such as gender equity theory (e.g. McDonald's theory), as well as evolutionary explanations studying fertility from a Darwinian, life history and mate choice perspective (Simpson, 2006; 2007). Researches focus on the link between life course circumstances and trajectories (partnership, education, employment and economic conditions) and fertility behaviors, but also on the role of social class and family of origin, that is, on social structural processes shaping an individual's values and preferences.

The aim of this paper is to study and identify micro-level determinants of childlessness in Italy, by analyzing changes in childlessness patterns over time, through a birth cohort approach, and by assuming a gender perspective, in order to give a contribution in the development of scientific research on childlessness also among men. Men's circumstances and attitudes are indeed likely to form an important part of the explanation for childlessness among women (Parr 2007), but only very few studies have been dedicated to investigate the profiles of childless men and sometimes only incidentally (Parr 2010, Weston & Qu, 2001 on Australia; Kiernan 1989, McAllister and Clark, 1999 on Britain, Tanturri 2010 in Italy, Waren & Pals 2013 for the US). A key question is whether the same characteristics may distinguish childless men and women respectively from fathers and mothers.

As childlessness is a phenomenon characterized by an inner complexity that need to be disentangled, a Structural Equation Models (SEM) approach will be used, in order to specify and assess causality networks among different childlessness-related dimensions and childlessness itself. The advantage of such a technique is that it makes possible, through a dynamic approach, to understand whether and to what extent each specified dimension and each hypothesized causal link contribute in determining the phenomenon under study.

METHOD

Micro-level determinants of childlessness will be studied by means of a Structural Equation Models (SEM) approach. SEM (Jöreskog, 1973; Bollen, 1989) is a statistical technique allowing to investigate complex cause effect relationships among variables. As a matter of fact it allows to study the real word complexity by taking into account a whole network of causal relationships among latent concepts - Latent Variables measured by several observed indicators usually defined as Manifest Variables - representing different aspects of a phenomenon.

The first step in a SEM analysis is the specification of a theoretical model, able to represent and well explain the main features of the phenomenon under study.

The model-building procedure can be thought of as the analysis of two conceptually different models. A measurement model specifying the relationship of the observed variables with their hypothesized underlying latent (exogenous or endogenous) constructs, and a structural model specifying the causal relationships among latent constructs, on the basis of the theoretical background driving the study.

By considering that such an approach is a novelty element in the study of childlessness, we will use both non-parametric and parametric SEM methods.

Our aim is to use non-parametric Partial Least Squares (PLS) techniques (Wold, 1979) in order to conduct preliminary, explorative analysis for testing the significance of both the structural and measurement relationships among the variables forming the model, thus understanding whether it is able to well explain childlessness causes and features.

The aim of the non-parametric approach to SEM is to provide an estimate of the latent variables in such a way that they are the most correlated with one another and the most representative of each corresponding block of manifest variables, without requiring any assumption (with respect to the distribution, the sample size and the measurement scale). The PLS algorithm attempts to obtain the best weight estimates for each block of indicators corresponding to each latent variable. The resulting component score of each latent variable, based on the estimated indicator weights, maximizes the explained variance for dependent variables.

We will then run SEM parametric – covariance based – analysis in a confirmative way, in order to test the validity of our model under some, more restrictive, conditions.

DATA AND DESCRIPTIVE RESULTS

Our study is based on data from the Multipurpose Italian survey, Family and Social Actors, carried out by the Italian National Institute of Statistics in 2009. Life cycles variables in the above mentioned cross-sectional data, allowed us to follow and manage individual histories in a longitudinal way, thus giving us the chance to analyze childlessness under a birth cohort perspective.

The focus is on the determinants of childlessness among men and women (around 30, 40 and 50 years old), belonging to different birth cohorts (born since 1949 to 1979), with the aim to depict changes over cohorts in childlessness patterns. We use variables related to the individuals family life propensity (civil status, cohabiting experiences, number of marriages), to their socio-economic status (education and work-related data), as well as to the features and resources of the family of origin (number of siblings, parents socio-economic status, parents civil status) to specify a theoretical model able to take into account, in an exhaustive way, not only the different elements affecting fertility choices, but also the causal relations linking those determinants. According to our survey data, in Italy childlessness among men aged around 40 years was 13% for the cohort born in the 40s and has doubled (30%) for the cohort born in 1970, for women the percentage has grown from 12% to 21%. The analysis of childlessness on men and women aged 30-34 and 40-44 years, belonging to birth cohorts going from 1935 to 1979, by educational level shows that temporary childlessness increase together with education, individuals (both men and women) with higher education attainments register higher level of childlessness. Men show childlessness levels higher than women. Moreover the most recent cohorts of women with secondary and tertiary education level aged 30-34 years show the strongest increase in childlessness levels.

Permanent childlessness varies (increases) across birth cohorts, both for women and for men. Men with primary and secondary education show similar trends, with childless levels increasing from about 10% for 1935-39 birth cohort to about 16% for the most recent cohorts; men with tertiary education show the highest childlessness levels. Women with primary and tertiary education show the highest childlessness levels growth across birth cohorts, childlessness for women with secondary education slightly vary across cohorts. By starting from the 1950-54 birth cohort women with tertiary education show the highest childlessness percentages.

The above presented descriptive results show that Italy is an interesting context for studying the determinants of childlessness, for analyzing how they vary across birth cohorts, and for detecting differences between men and women.

CHILDLESSNESS MODEL SPECIFICATION

Studying childlessness determinants by adopting a micro-level perspective implies focusing on the individual features as well as on the circumstances affecting fertility behavior.

As said before, a comprehensive theory of childlessness is not yet well-developed. There is a diversity of determinants proposed in the literature, with many factors mutually inter-related. Researches focus on the link between life course circumstances and trajectories (partnership, education, employment and economic conditions) and fertility behaviors, but also on the role of social class and family of origin, that is, on social structural processes shaping an individual's values and preferences.

A major difficulty in those studies is to correctly distinguish and quantify the impact of factors often inter-related and overlapping, as well as to establish causality among childlessness determinants.

The choice of a SEM approach allows us to try to overcome those issues, through the specification of a model (Table 1) taking into account different aspect determining childlessness and the causal, direct and indirect, relations among them.

The specified model is a MIMIC (Multiple Indicators and Multiple Causes) model in which the latent variables, caused by several manifest ones, in their turn have a causal effect on another manifest variable: childlessness.

We hypothesize childlessness to be – directly or indirectly – determined by three latent variables (family life propensity, socio-economic status and family of origin resources), causally linked among them, each measured by several observed variables.

We hypothesize that fertility behaviors can be determined by the socio-economic conditions of individuals, measured trough employment status, education and human capital related variables. The decision to have children is a rational process whereby couples evaluate the cost-benefit balance of becoming parents, by taking into account their level of income and their personal preferences (Becker, 1960, 1981). Childlessness depends on the impossibility to compensate direct and indirect economic costs of children. Indirect costs are particularly important for women, as childbearing compels them to withdraw temporarily from the labor market, with a short term loss of resources, and negative consequences on future earnings. This is strictly related to the link between education and childlessness: due to the accumulation of human capital, highly educated women are more likely to pursue careers and increase their earning power, thus postponing marriage and birth (Billari et al. 2002). As far as men are concerned, our hypothesis is that a higher socio-economic status is positively related to the probability of having children, given the emphasis of man's role as a provider.

Table 1. Childlessness model
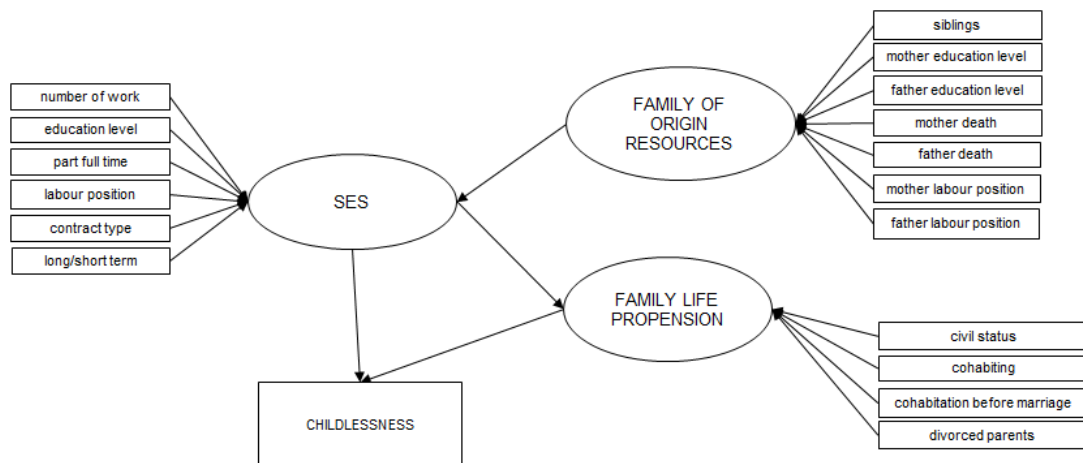
We are also interested in testing the effect the cultural-economic resources (measured taking into account both the mother's and father's education level and work-related variables, and the number of siblings) of the family of origin have on childlessness.

Individual coming from families with a high cultural-economic status generally tend to have good socio-economic conditions, as they try to reach the same status of their parents. Moreover, families with high socio-economic status invest in a consistent way in the human capital of children, and can guarantee them a solid socio-economic support when necessary. We expect that men from families with high socio-economic status are less likely to be childless, while women should be less likely to have child. As far as the number of sibling is concerned it may negatively act on the

socio-economic status of individuals, as people from numerous families have to share parents investments on human capital with the other family members (resources dilution), thus reducing the chance to reach high socio-economic status. Moreover, by basing on the hypothesis of similarities of fertility histories across successive generations (Barber, 2001; Steenhof and Liefbroer, 2008), driven by intra-familial transmission of values, preferences and attitudes, we use the number of siblings to take into account the reproductive and couple behavior of individual's parents. We hypothesize that the family cultural-economic resources affect childlessness only indirectly, trough the individual socio-economic status.

Moreover, we take into account the individuals *family life propensity* (measured taking into account the family formation experiences, the couple situation, the civil status, as well as previous couple experiences), hypothesizing that childlessness directly depends on the propensity toward family life, that is in its turn influenced by the individuals socio-economic status. Our hypothesis is that women with high socio-economic status have a scarce family life propensity; they are more career oriented and tend to be childless; men with high socio-economic status are instead expected to be more family oriented than men, and therefore more interested in fatherhood.

PRELIMINARY RESULTS

We have run a first, explorative, non-parametric analysis for testing the statistical suitability of our childlessness model, as well as for understanding, in a preliminary way, if the specified theoretical model is able to well reproduce the structure of causal links determining childlessness. The study has been conducted on a sample of 1714 women, aged between 40-44 years, belonging to the 1965-69 birth cohort.

We have run a SEM-PLS analysis on the childlessness MIMIC model showed in the previous section, in order to test the validity of the theoretical bases of the model by analyzing the statistical features of the structural models, that is, the causal link among latent variables, and to measure how much each manifest variable contribute in determining the latent construct it has been linked to (measurement model analysis).

As far as the measurement models are concerned, first results (Table 2) show that the latent construct representing the socio-economic status of women is determined in a significant way by variables measuring the education level and the professional condition of women. More specifically, as expected, having a high education level, and working as full-time employee, with a written, long-term contract has a positive impact on the socio-economic status. Conversely, low education levels and unemployment have negative effects on women socio-economic status.

The latent variable representing the cultural-economic resources of the family of origin is positively determined by high or medium level of education of both parents. As far as the professional position of parents is concerned, a positive, significant effect emerge for fathers fulfilling leading positions and mothers employed as white-collars. Moreover, as expected, family resources are negatively determined by high family sizes (more than 2 siblings), as well as by low education level of both parents.

The family life propensity latent variable is determined, to a great extent by the civil status (being married has a positive effect, while being unmarried has a negative effect). Cohabiting with the partner without marriage intentions has a negative effect on the family life propensity construct.

Table 2. Childlessness model estimates among cohorts born in 1965-69, at 40-44 years old.

Latent Variable	Manifest Variable	Standardized Loadings	Standard Error	Critical Ratio (CR)
SES	number of work 1	**0.164**	0.042	3.927
	number of work-more than four	**0.104**	0.038	2.716
	number of work-never worked	**-0.331**	0.062	-5.351
	number of work 2-4	**0.068**	0.034	2.010
	education level-high	**0.252**	0.051	4.940
	education level-low	**-0.389**	0.056	-6.984
	education level-medium	**0.244**	0.051	4.794
	full time	**0.533**	0.062	8.585
	part time	0.037	0.051	0.730
	labour position-employee	**0.500**	0.101	4.945
	labour position-unemployed	**-0.556**	0.089	-6.253
	labour position - self-employed	**0.089**	0.044	2.026
	labour position - work at home	0.000	0.033	-0.004
	labour position - project worker	0.014	0.031	0.461
	contract type-written	**0.496**	0.101	4.886
	contract type-no contract	0.032	0.027	1.186
	long term contract	**0.459**	0.095	4.829

	short term contract	**0.106**	0.040	2.648
	CHILDLESSNESS	**0.847**	0.050	17.034
Family Life Propensity	civil status - unmarried	**-0.768**	0.021	-36.046
	civil status - married	**0.492**	0.028	17.499
	civil status - separated	-0.025	0.029	-0.855
	civil status - divorced	-0.062	0.039	-1.615
	civil status - widowed	**0.095**	0.023	4.083
	civil status - married more than one time	**0.057**	0.020	2.880
	civil status - legally separated	**0.061**	0.025	2.440
	cohabiting	**-0.167**	0.056	-2.989
	cohabitation before marriage	0.036	0.042	0.848
	divorced parents	0.021	0.036	0.592
	CHILDLESSNESS	**-0.972**	0.003	-302.775
Family Of Origin Resources	brothers - 1	**0.409**	-0.070	5.871
	brothers - 0	**0.406**	-0.076	5.356
	brothers 2-4	**-0.224**	-0.074	-3.030
	brothers - more than four	**-0.492**	-0.067	-7.337
	mother education level - medium	**0.561**	-0.070	8.026
	mother education level - low	**-0.641**	-0.068	-9.391
	mother education level - high	**0.289**	-0.071	4.092
	father education level - high	**0.359**	-0.081	4.414
	father education level - low	**-0.599**	-0.069	-8.685
	father education level - medium	**0.461**	-0.071	6.481
	mother death	-0.098	-0.071	-1.380
	father death	-0.003	-0.062	-0.051
	mother labour position - unemployed	**-0.225**	-0.085	-2.631
	mother labour position - self-employed	0.104	-0.076	1.376
	mother labour position - working class	-0.110	-0.077	-1.424
	mother labour position - white collar	**0.462**	-0.073	6.346
	mother labour position - work at home	-0.029	-0.038	-0.764
	mother labour position - leading position	0.058	-0.074	0.781
	mother labour position - in training	-0.074	-0.040	-1.848
	mother labour position - manager	0.034	-0.074	0.462
	father labour position - leading position	**0.260**	-0.087	2.983
	father labour position - working class	**-0.426**	-0.078	-5.453
	father labour position - self-employed	0.115	-0.068	1.691
	father labour position - white collar	**0.378**	-0.080	4.743
	father labour position - unemployed	-0.124	-0.072	-1.714
	father labour position - manager	0.111	-0.072	1.543
	father labour position - in training	0.091	-0.063	1.443
	father labour position - work at home	0.074	-0.109	0.677

The analysis of the estimates of the structural link among latent variables confirm that the socio-economic status is positively determined by the cultural-economic resources of the family of origin (SES = 0.300*family resources, R^2=0.09). Moreover the socio-economic status have, in its turn, a negative effect on the family life propensity (family prop = -0.833*SES, R^2=0.694), thus confirming that women with high socio-economic status are less family oriented.

The most interesting and relevant result is the one related to the link between the latent variables socio-economic status and family life propensity to childlessness. As expected the socio-economic status is significantly and positively linked to childlessness. Women with high socio-economic conditions are less likely to be child-oriented then those with low socio-economic status. Moreover, the family life propensity variable has a strong, negative impact on the probability of having child.

The preliminary results showed above confirm that the theoretical model specified in order to describe the causal structure linking different aspect of individuals life to childlessness is able to well explain childlessness features and determinants. Direct and indirect relations linking the family life propensity, the socio-economic status and the family of origin cultural-economic resources variables to childlessness have been confirmed by the non-parametric analysis.

We will use the above presented model for studying childlessness in a gender perspective, by taking into account both men and women, with a birth cohort approach, in order to identify changes in the childlessness patterns over time.