Childlessness and education: The case of Italy and Finland

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Contents

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Abstract: The aim of this paper is to study the role of education as a micro-level determinant of childlessness in Finland and Italy paying attention to the role of union formation. We start from the hypothesis that when modeling the relation between childlessness and education, selectivity processes have to be considered.

Our hypothesis is that education can affect childlessness, both directly, and indirectly, through its link with the union formation mechanisms; and that decisions on union formation and on parenthood can be considered as jointly determined. Thus, in order to understand how education can influence childlessness, it is important take into account the possible existence of common, unobserved factors that determine both processes simultaneously.

We use Bivariate Probit Models to simultaneously model both union formation and childlessness mechanisms, and to understand which is the role education play in determining such mechanisms.

We focus on Italy and Finland, which are characterized by very different institutional contexts, being at different development stages, but showing outstanding level of childlessness with a prevalence over 20% for the cohorts born in the sixties. The similar prevalence observed for the most recent cohort hides interesting differences in terms of childlessness path by education level: Italy shows a persistent positive educational gradient over birth cohort, while in Finland it has reversed, turning out to be negative among the most recent birth cohorts. In a comparative perspective, we are interested in understanding if the cultural and political-institutional context of countries can determine the way childlessness and education are related.

We use data from the Finnish Late Fertility Survey 2015 and from the 2009 Multipurpose Italian survey, Family and Social Subjects.

Results confirm that a positive education gradient in childlessness exists in Italy, even when taking into account the correlation between the preferences of women with respect to union formation and motherhood processes; while in Finland the negative education gradient reverses when controlling for this correlation as partnership market dynamics strongly influence the educational gradient in childlessness, whose existence is mostly due the difficulty low educated women encounter in finding a partner.

Keywords: Childlessness, Education, Union Formation, Selectivity processes, Bivariate Probit Model, Educational gradient, Italy, Finland

1. Introduction

The changing educational and career behavior of women and the gradual erosion of their traditional roles as housewives and mothers have been increasingly discussed in demographic research during the last decades, because of their important consequences on individual reproductive behaviors.

The women's empowerment process and their growing economic independence, originated by the increase of female education attainment, are important factors undermining the traditional male breadwinner model, and bringing to those who have been named 'less family' processes (Esping-Andersen and Billari, 2015): rise of delayed marriages, increasing marital instability, parenthood postponement, growing cohabitation, fertility decline, and increasing childlessness.

The interest toward the relationship between childlessness and female education has gradually increased, and education has been widely recognized as one of the most important determinants of individual choices on family formation processes.

But, when studying reproductive behaviors it is fundamental to take into account that educational career, union formation and parenthood represent three important processes characterizing the individual's transition to adulthood, and that choices on these processes are part of the individual's life course strategy: decisions affecting one path can potentially affect the others (Coppola, 2004). The study of the mechanisms determining different preferences and leading to different life paths is particularly important for understanding the demographic changes occurred during the last decades. The aim of this paper is to study the role of education as a micro-level determinant of childlessness, paying attention to the position union formation hold in influencing such a relation. We consider union formation and parenthood to be interrelated processes, both being influenced by education, and linked through a spurious dependence, due to the existence of common, unobservable factors, influencing it. The importance of subjective dimensions (value orientations, norms, and attitudes) will be highlighted for trying to 'account for individual tastes' (Vitali et al., 2009) in the study of the relation between childlessness and education.

The starting hypothesis at the base of this work is that individual choices on union formation and parenthood can be considered as jointly determined, or at least as influenced by common decisional mechanisms. We are specifically interested in and understanding which is the role education plays in those mechanisms, by also taking into account unobserved, common factors, that are hypothesized to simultaneously influence both processes.

2. Theoretical background

The impact of education on women's union formation and parenthood has long been studied in empirical analyses based both on economic and sociological theories.

According to the new home economics theory, the traditional sex-role differentiation can be considered as functional and advantageous for the stability of the family, because each individual in the couple has something different (and specific) to offer to and to gain from the partner (Becker, 1960).

When the gendered specialization of work and household tasks is threatened by the rise in the educational attainments of women, the female economic dependence from men decreases, together with the advantages coming from marriage and a family-centered life (Oppenheimer, 1994). As a consequence, women tend to delay or avoid marriage. The postponement effect is mainly due to a prolonged enrollment in education, which is generally considered to prevent individual from entering into union, because of economic uncertainty or financial dependence from the family of origin; and because of social norms expecting young people not to entry in union before the end of their education paths (Blossfeld and Huinink, 1991; Kravdal and

Rindfuss, 2008; Lappegård and Rønsen, 2005). The attempt to convert their training and education achievements into a suitable job also play a role in the female decision to postpone their entry into union.

Beyond couple formation choices, the economic cost-benefit analysis is expected to affect fertility behaviors of high educated women, as well.

Two mechanisms can come into play. On the one hand, educational attainment increases the female opportunity costs of having children: high educated women tend to postpone (or give up) motherhood as they are likely to face potential loss of career and future income perspectives of leaving the labour market to take care of children (Lappegård 2002; Sobotka 2004a, 2004b; Lappegård and Rønsen 2005). The postponement can then turn to be irreversible because of biological constraints on fecundability at older ages, thus increasing childlessness risks. On the other hand the 'income effect' generated by the likelihood more educated women have to earn higher incomes, gives them both the opportunity to cope with direct costs linked to childbearing, and the resources to deal with potential work-family conflicts, thus decreasing their likelihood to stay childless. However this effect could also positively act on childlessness as the new socio-economic condition of high educated women give them a greater 'bargaining power', so that they can successfully claim for their emancipation and their need of untraditional self-fulfillment.

The effect of education on childlessness strictly depends on the balance between opportunity costs and income effect, that is, in its turn, strongly dependent on the socio-economic and institutional context factors such as the employment rights of mothers, the public provision of childcare, and the public policies for families (Kravdal 1992; Wood et al., 2014).

Culture-based theories have also been used to explain the relationship between education and both delayed/avoided union formation and motherhood.

Education can be considered as a route to female emancipation. Due to a greater openness to value changes and individualistic preferences, high educated women are likely to develop alternative lifestyle choices and path, breaking out with the traditional wife/mother roles (van de Kaa 1994; Lesthaeghe 2010; Surkyn and Lesthaeghe 2002; Caltabiano, Castiglioni, and Rosina 2009); they are more likely to seek for self-realization through individualized choices, and no more trough family formation and children (like in the past) (Rindfuss et al. 1996). Childlessness can be seen as an extreme effort of emancipation from traditional roles.

It is important to remind the importance that individual value orientations have in determining individual behavior as they are likely to affect 'demographic' behaviors and to determine spurious relations among the processes under analysis. Value orientation, undoubtedly influenced by education, influences individual choices. Concerning family formation and investment in family life, women who make the transition to union formation can be considered as a selected group of more family-oriented and therefore more childbearing-prone individuals (Hakim, 2003). Education can play a role in determining those mechanisms: high educated women are more likely than traditionally oriented people, to behave in a more individualistic way once in a union, thus having a greater risk to be childless (Keizer, 2008).

Another possible cause behind the increased childlessness among highly educated women is their reluctance to take on a partner who is less educated than themselves. This higher partner selectivity leads to lower marriage and partnership rates and can subsequently lead to lower fertility rates and increased childlessness (even if high educated women are also more likely to accept and to be able to economically support single parenthood).

Changes in the educational composition of the female population may modify the educational assortative mating patterns, the partner selection processes, and the timing and quantum of entry in union (Van Bavel 2012; Schwartz and Han 2014). This may also influence childlessness as well as the relationship between childlessness and education. When the phenomenon of high female education is no more a specific trait of a highly selected group of women coming mostly from very specific families with substantial intellectual and economic

resources, but start spreading and expanding over female population the demographic equilibria seems to be broken, traditional family structures seem to be threatened and the educational gradient in childlessness can reverse.

All those elements taken into account, the 'family life propensity/aversion' (usually unobserved) can influence the decision making processes of individuals and this has to be taken into account in order to achieve unbiased results when analyzing the impact of education on childlessness.

Education is expected to influence childlessness both directly, and indirectly, through its link to union formation paths.

As said before, the growth in female education attainment and in female labor force participation, have been accompanied by lowest-low fertility, increased childlessness, and decreased marriage rates; in these contexts a positive educational gradient in childlessness has generally been registered, with high educated women showing higher childlessness levels with respect to the medium and low educated ones.

But this long-observed linkages are weakening and in some European countries the educational gradient is even reversing (Engelhardt and Prskawetz, 2004; Engelhardt, Kögel and Prskawetz, 2004; Matysiak and Vignoli, 2008; Matysiak and Vignoli, 2013; Andersson et al. 2009; Jalovaara et al. 2019).

Most argue that these reversals are likely to be linked with changing social norms, and also with public policies that provide support for families (Neyer, 2003), reducing work-family conflict for those with active parenting roles, by focusing primarily on women (e.g., McDonald, 2000; Hoem, 1993).

Beyond recognizing the importance of the extra-family supports that reduce work-family conflict, the growth in female education and in labor force participation has also be seen as the first half of a profound gender revolution. According to the gender theory during the transition phase, families are under threaten, as women increasingly try (sometimes with difficulty because both the macro and micro-level contexts are not ready to outright answer such rapidly changing needs) to equally share men's providing tasks in the public sphere, while men only marginally share women's caregiving and domestic tasks in the private sphere, putting great pressure on women, and thus on families structures and on family stability (Goldsheider et al. 2014). When men join women in the private sphere of the family and question the traditional division of 'household labour', the gender revolution is accomplished, thus increasing the likelihood of higher fertility and renewed forms of stable families.

And what about the educational gradient in childlessness? A negative gradient is expected to emerge in those countries (i.e. Northern Europe countries) where women have the same opportunities as men in education and in the labour market, where family policies aim at favoring active parenthood, both for mothers and for father, where women are empowered in their decision- making in relation to household management, and a de-gendered organization of the household labor is generally recognized.

While those countries (Southern European countries) characterized by low female participation in high education, by traditionally family-oriented institutional and normative context, lacking real, effective policies for sustaining gender equality, both in the public and in the private sphere, and where the male-breadwinner couples are still the prevailing model, considered the best one for childbearing, are expected to show negative educational gradient in childlessness. They are still in the first embryonal phase of the transition to the gender revolution, as the "familistic" cultural substratum is still too rooted for favoring profound de-gendering changes. This traditional male breadwinner model is reinforced by social and normative gender roles expectations. In societies where women are expected to take the larger share of domestic work, the educational gradient for union formation and fertility is assumed to be negative for women.

The aim of this paper is to study the role of education as a micro-level determinant of

childlessness in Finland and Italy paying attention to the role of union formation. We start from the hypothesis that when modeling the relation between childlessness and education, selectivity processes have to be considered.

Specifically, our hypothesis is that education can affect childlessness, both directly, and indirectly, through its link with the union formation mechanisms; and that decisions on union formation and on parenthood can be considered as jointly determined. Thus, in order to understand how education can influence childlessness, it is important take into account the possible existence of common, unobserved factors that determine both processes simultaneously.

We focus on Italy and Finland, which are characterized by very different institutional contexts, being at different development stages, but showing outstanding level of childlessness with a prevalence over 20% for the cohorts born in the sixties. The similar prevalence observed for the most recent cohort hide interesting differences in terms of childlessness path by education level: Italy shows a persistent positive educational gradient over birth cohort, while in Finland it has reversed, turning out to be negative among the most recent birth cohorts. In a comparative perspective, we are interested in understanding if the cultural and political-institutional context of countries can determine the way childlessness and education are related.

In the next sections a descriptive analysis on the socio-economic and demographic characteristics of the two countries will be presented, together with a first explorative analysis on the observed relation between education and childlessness.

3. Finland and Italy: demographic and socio-economic differences

The two countries under analysis are characterized by very similar levels of childlessness that however are the results of very different socio-economic, cultural and institutional conditions. Finland is among the countries leading the gender revolution. Institutions and social norms recognize the importance of de-gendered self-fulfillment and foster work-family life balance, thus guaranteeing both men and women to satisfy their families and career desires.
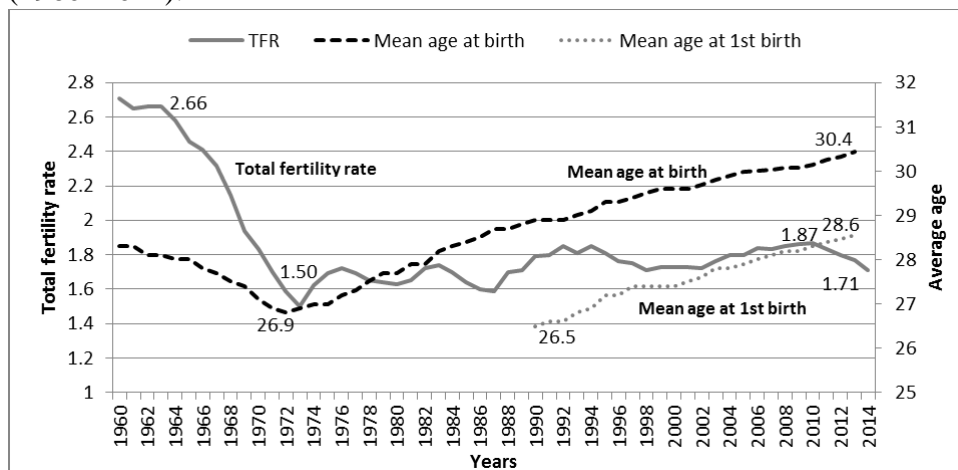
In Italy the gender revolution seems to be stalled: female education attainment is increasing, but the traditional male breadwinner model, even if questioned by the youngest generations, is still rooted. Social norms asking for traditional family forms and life path are accompanied by scarce policies for family support, and for female work-life balance.

3.1 Finland

Compared to many other countries in Europe, fertility in Finland as well as in the other Nordic countries has remained rather stable on a relatively high level. After the WWII and a short baby- boom period, fertility decline was rather steep, reaching the lowest level of 1.5 in 1973. Since that, fertility rose again, and stabilized at around 1.7-1.8 for over three decades. In 2010, fertility reached its highest level since the beginning of 1970s, being 1.87. Apparently, due to the economic crisis in 2008-09 and increasing unemployment and economic instability in the first half of 2010s, fertility has fallen and was 1.71 in 2014 (Statistics Finland 2015a).

The postponement of parenthood has been a prominent trend in the country, with the age at first birth rising from around 26 in the beginning of 1980s to 28.6 years in 2013. Among the highly educated women the age at first birth is even higher, around 30 years. Increasing age at first birth has meant that a considerable proportion of first births are to women aged 35 years or more. In 1985, less than 5 percent of first-time mothers were aged 35 or more, and the share of first-time mothers who were 40 or older was 0.5 percent. In 2013, mothers aged more than 35 years constituted 11.7 percent of all first-time mothers, and the share of more than 40-year old first-time mothers was 2 percent (Statistics Finland 2014).

Figure 1: Total fertility rate and average age at birth (all births), and at first birth in Finland (1960- 2014).

Source: Statistics Finland

The spreading of cohabitation has resulted in that a clear majority, nine out of ten unions, in Finland start today as a consensual union. Although cohabiting unions occur typically among the young adults, the proportion of persons living in a cohabiting union rather than in marriage has increased also among older persons. In 2013, almost 30 percent of 20-34-year-olds were cohabiting (and 22 percent were married); among 50-64-year olds, 11 percent lived in a consensual union, and 56 percent in marriage (Statistics Finland 2015c and 1992).

The proportion of children born to unmarried couples has increased over time, even if many marry after the birth of the first child, and most children live in a family with two married parents. Of all children (below 18 years), 65.5 percent live in a family with married parents, 17 percent in a family with cohabiting parents and 17.6 in a single-parent family (15.4 percent with single mother, and 2 percent with single father) (Statistics Finland 2015b).

Divorce is relatively common, and after a new legislation on marriage (and divorce) came into force in 1988, the number of divorces increased considerably. Total divorce rate rose to 0.50 and has remained around at that level – surpassing thus many other countries in Europe (Statistics Finland 2015).

Since mid-1970s, the labour force participation rate among Finnish women in age group 20-44- years has fluctuated around 80 percent. The employment patterns of men and women are very similar: women also tend to work full-time (with only slightly fewer hours per week than men do), and to stay in the labour force continuously until retirement age, just taking family leave when they have young children (Rissanen 2001). Maternal employment is on a higher level than European averages, although after the introduction of the Child Care Leave scheme at the beginning of 1990s (parent can stay at home to take care of a below-three-year-old child), maternal employment among women with less than 3-years-old children decreased. Maternal employment is also on a lower level in families with three or more children, yet still considerably above the OECD average. After parental leave period, majority of the Finnish women return to full-time work. Part-time work is still relatively rare, and only in 10 percent of families with children aged 3-14 years the mother is working part-time (OECD 2013a). Families usually are dual breadwinner households, in which partners are expected to share the provider and caretaker roles.

Table 1: Female employment (25-54) and maternal employment rates by number of children under 15 and by the age of the youngest, 2011.

	Female employment rate (25-54 age cohort)	Maternal employment rate - child under 15	Age of youngest child			Number of children		
			< 3	3-5	6-14	1	2	≥3
Finland	80.37	77.16	51.80	76.00	76.04	76.65	82.28	68.97
OECD average	70.67	65.23	52.16	65.65	72.58	69.16	65.63	50.52

Source: OECD - Family Database (around 2011)

As in the other Nordic welfare states, the public spending on families in Finland is considerable. In 2011, the government expenditure on families reached 3.2 percent of GDP (OECD-average 2.6%). Children's day care and preschool education, child protection and institutional care constitute a lion's share of the expenditure on services. Most important cash benefits in terms of total expenditure are child benefit, parental leave allowances, and benefits paid to single parents.

In Finland, the state promotes women's employment and provides family leaves, services and benefits to alleviate the double burden of parents. After the child birth, parents can stay on a paid parental leave until the child is about 11 months old. Large part of the leave can be shared between the parents as they wish, although mothers tend to use most of the leave. After the parental leave, or if the family takes (part or all of) child care leave, families have a right to a (full-time) day care place for their child, and to pre-school education for 6-year old children. Day care fees are heavily subsidized, and pre-school education is free. Due to the child care leave, the enrolment rate of 0-3- years-old children in public day care in Finland is less than 30 percent, clearly on a lower level than in the other Nordic countries, or EU27 average. Among 3-5-year-old children 75 percent are enrolled in public day care (OECD 2013).

Despite of the marked similarity of the educational and employment patterns among men and women, the division of unpaid work remains gendered in Finland: a larger share of the housework still falls on women (more than 60%, according to a recent Time Use Survey, Miettinen & Rotkirch 2012). Fathers' participation in child care has increased gradually although the majority of the parental leaves are still taken by the mother. During the past decade, however, the state has actively promoted fathers' uptake of leaves.

3.2 Italy

The Italian case has been amply studied in demographic literature, as a combination of very low and late fertility. After 1964, fertility started to decline and since mid-Seventies period total fertility rates have fallen below replacement level. Italy was one of the first country in the world to reach "lowest-low" levels (TFR=1.19) in the mid-nineties (Kohler et al., 2002). Since 2000, a slight recovery has brought the Italian TFR close to 1.46 children for woman. The scholars described it as a new spring for the Italian population (Billari and Dalla Zuanna 2008). However the economic recession after 2009 called a halt to this positive trend and fertility stalled around 1.4 children per woman in the last years, with a marked decrease in the number of births (Istat 2014a).
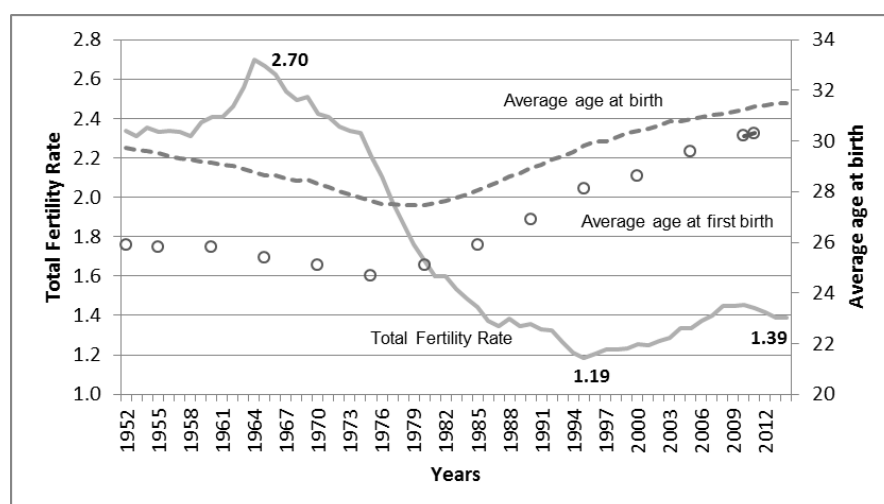
The postponement transition seems to be unstoppable and spread all over the country: the age at first birth is 32.1 among the Italian women (excluding the foreigners) and it has increased of 3 years in the last decade. The percentage of birth by over-30-year-old mothers, among the Italians, are close to 70% and among them 8.7% are born after the age of forty, percentage that has duplicated in only one decade.

In the last decade some signs of novelty in families structures have been also mirrored in the reproductive fields. The proportion of out-of-wedlock births has grown, in parallel with the diffusion of cohabitation *more uxorio*. In 1995 less than one birth out of ten was from unmarried parents, while in 2013 the proportion have triplicated, as more than one birth out of four is out-of- wedlock.

In Italy, low fertility interplays – to some extent paradoxically – with strong family ties and values (Reher 1998, Livi Bacci 2001), with familism and high parental investments in child quality (Dalla Zuanna 2001; Dalla Zuanna and Micheli 2004), and with women's scarce labour market participation (Del Boca et al. 2005).

The family as an institution seems to hold on the whole, differently from many other Western countries. Divorce rates – despite their increase in the last decade – are still among the lowest in Europe. Husband-wife constellations remain the predominant family forms and most of children under age 5 today are living with both parents (more than 94%). While 5.3% of them live with their mother either in a solo mother family or with other family members, solo father families are still very rare (less than 0.5%) (Ruspini and Tanturri 2015). Family structures have not changed significantly in the last decade, but marriage rates have been decreasing sharply and now are in line with those observed in close countries as France and Spain. Cohabitation and LAT are increasing their importance in the last decades.

Figure 2: Total Fertility rate and average age at birth in Italy (1962-2014)

Sources: ISTAT, Fertility database

In Italy, public support for families is very limited: in 2009 the State spent only 1.58% of GDP on family benefits, as compared to the OECD average of 2.61 (OECD 2014). In Italy, as well as in other southern countries, families are expected to support their own members (family responsibilities and obligations extend beyond the nuclear family) with only limited help from the state. The familistic character of the Italian welfare regime does not help to reduce child costs in terms of time for parents in general and for mothers in particular (Tanturri forthcoming). Accordingly, family policies are scarcely developed, in comparison with other European countries. Women's employment levels in Italy are among the lowest in the OECD countries (58.9% among women aged 20-54, see Tab. 2) and they are growing very slowly, compared to the rest of Europe. Most of working women have a full-time contract (67%), but on average women work fewer hours than men (33 hours per week). Maternal employment is even slightly lower for Italy and significantly lower than the OECD average (OECD Family database), but it does not change according to the age of the youngest child appreciably (Tab. 2). Conversely, it significantly decreases with the number of children: among mothers with three children the employment rate is 38.6%, about 20 percentage points less than among

mother of an only-child, and well below the average for the OECD countries. It is still common for working women (1 out of five) to exit the labour market after having given birth (Istat 2014), and this proportion has even increased in recent years. Therefore, the labour market penalties for the Italian working mothers are still remarkable (Del Boca et al. 2005; Pacelli et al. 2013).

Table 2: Female employment (25-54) and maternal employment rates by number of children under 15 and by the age of the youngest, Italy. 2011

	Female employment rate (25-54 age cohort)	Maternal employment rate - children under 15	Age of youngest child			Number of children		
			< 3	3-5	6-14	1	2	≥3
Italy	58.91	55.27	53.40	50.56	56.60	58.39	52.69	38.56
OECD average	70.67	65.23	52.16	65.65	72.58	69.16	65.63	50.52

Source: OECD - Family Database (around 2011)

Balancing childrearing and market work is really difficult in Italy due to the limited supply of public childcare for children younger than three, both in terms of availability and of the number of hours supplied on a day-to-day basis. The institutionalised care for children from ages three months to three years is mainly provided by child care centers that are not part of the public educational system. Among 0-2 year old children only 24.2% go to child care centers, while most of those aged 3 to 5 (95.7%) attend kindergarten (OECD 2013b). Only less than 12 per cent attend a public child care center and this percentage increased since 2004 only slightly (9%).
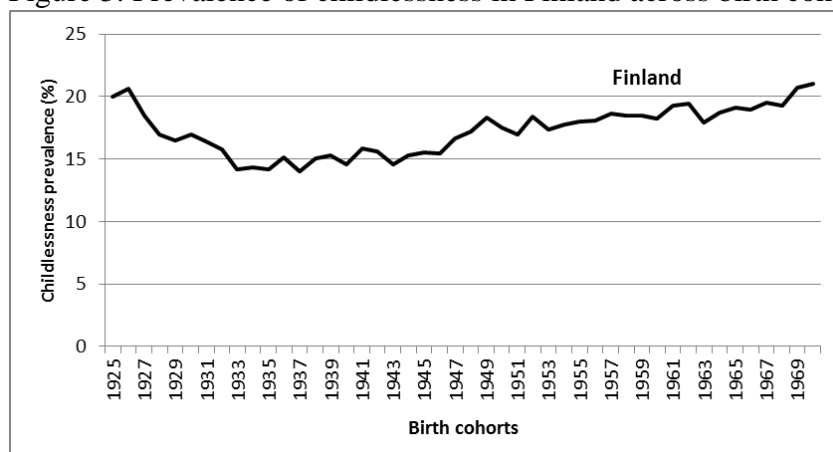
Women' employment levels and conditions confirm that gender roles are still shaped in a traditional ways in Italy (Anxo et al. 2011). In particular, women dedicate lot of their time to household unpaid work and they carry a high share of the childcare burden (Mills et al. 2008, Mencarini and Tanturri 2004). This situation is reinforced by strong family ties (Reher 1998) and by familism (Livi Bacci 2001, Dalla Zuanna and Micheli 2004), which is the strategy of protecting and transmitting the well-being of the family by having fewer children − in most instances only one − upon whom social expectations and family investment are concentrated.

4. Childlessness and education

4.1 Finland

Historically, childlessness is not a new phenomenon in Finland. In fact, it was rather common among women born in the beginning of the 20th century among who almost a fifth remained childless. In the cohorts born before and during the WWII the proportion of women who never had children was at its lowest, or at around 14-15 percent. These women reached their adulthood and lived most of their fertile years in 1950s and 1960s when the economy was rapidly growing and women started to enter higher education and paid employment. Childlessness started to increase already in the baby-boom cohorts born after the WWII, showing an upward trend since that. In the most recent cohorts, among women born around 1970, who have not yet finished their reproductive ages, 21 percent was still childless at age 40. Finland also stands out from the other Nordic countries in that childlessness is more common. Up until now, however, higher rates of childlessness have been combined with relatively high completed cohort fertility, which has even increased in cohorts born in the early 1960s (cohort fertility 1.95) as compared to cohorts born in 1950s (cohort fertility 1.85).

Figure 3: Prevalence of childlessness in Finland across birth cohorts (1925-1970).
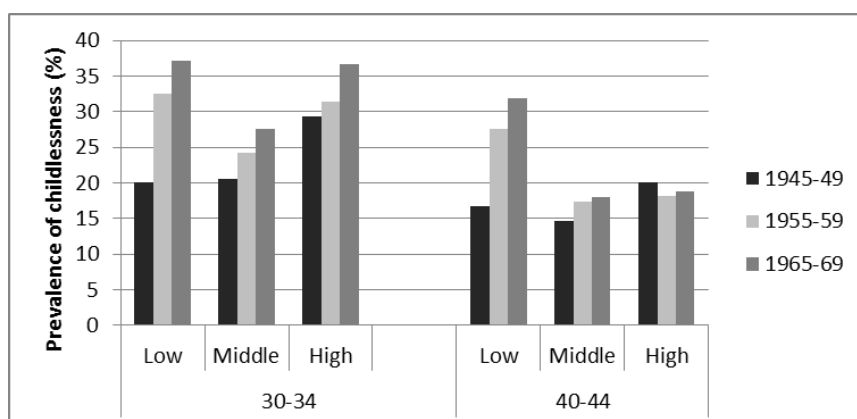

Source: Population Research Institute and Statistics Finland.

Postponement of parenthood has meant that the proportion of (still) childless adults is growing in each age group. For example, among 35-year-old Finnish women, the proportion of childless persons has increased from 20 percent in 1990 to 27 percent in 2013, and for men, from 32 percent to 41 percent. Although childlessness may be temporary, and many of them will still have children in the future, delaying of the parenthood can depress fertility in the long run, and increase the prevalence of life time childlessness in the young male and female cohorts.

Recent studies have showed that the prevalence of childlessness varies considerably between social classes and educational level in Finland (Nisén et al. 2014; Miettinen et al. 2015). While among men, the educational and social class gradient in childlessness appears to be negative (e.g. childlessness rates are lower among men in higher socio-economic groups), for women childlessness has until now been more common among the highly educated women. However, evidence from more recent cohorts points to changing fertility patterns in female educational groups, as women with only basic level education show the highest rates of childlessness (in 2010, prevalence of childlessness was greater than 30% among 40-44-year-old women with basic level education), and women with tertiary level education do not markedly differ from women with medium level education (19% and 18%) (Miettinen et al. 2015). Decreasing levels of childlessness among highly educated women suggest that policies which have promoted reconciliation of work and family appear to have been able to diminish the barriers to parenthood and childbearing among most women.

Figure 4: Prevalence of childlessness at age 30-34 and at age 40-44 by education level and birth cohort. Women.
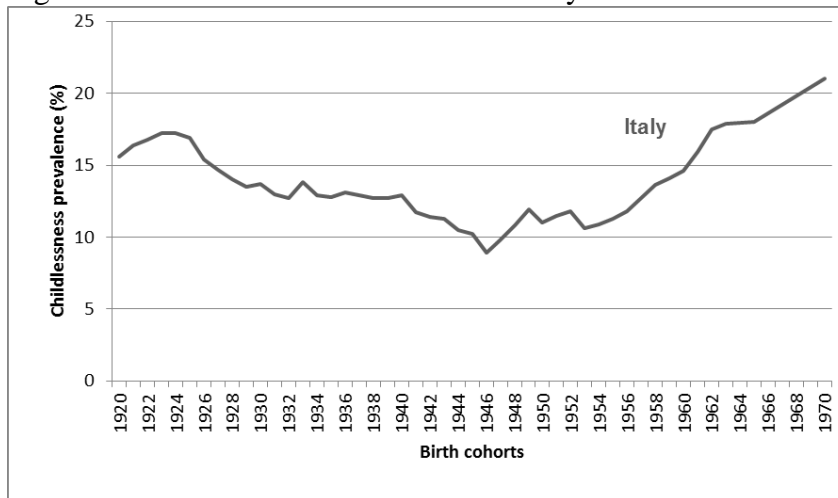

Source: Population Research Institute, Statistics Finland.

4.2 Italy

The parenthood delay process in Italy is associated, among other things, to a change in fertility pathways across generations: the proportion of high parity women in the cohorts born since the 1940s has fallen considerably, and the "norm" has gradually shifted from having "at least two children" to "no more than two" (Santini, 1995). The higher parities have been declining considerably since the cohort born in the Thirties, while the two-children model – although still prevailing – has been decreasing its importance since the cohort born in the Sixties. Among women born since 1950 around one woman out of four has only one child, while the prevalence of permanent childlessness is steeply increasing: from 13.4% for the cohort born in 1960 to 21% among women born in 1970 (ISTAT 2014b) (Fig. 5).

Figure 5: Prevalence of childlessness in Italy across birth cohort (1920-1970).
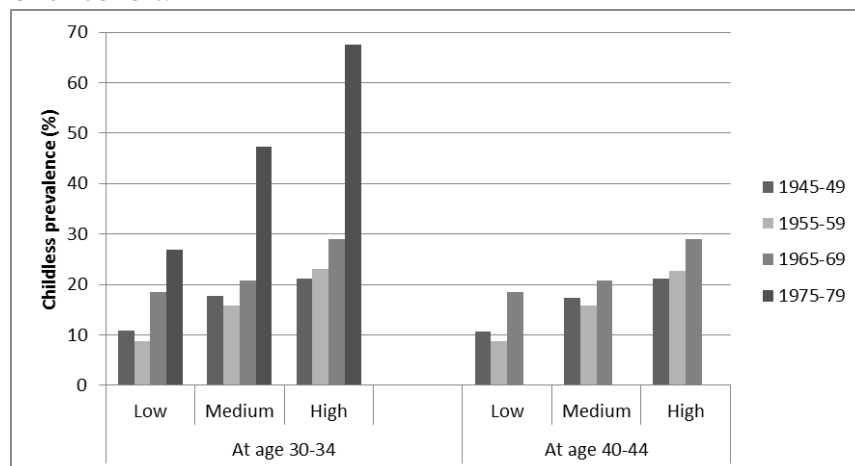

Source: ISTAT

The dramatic increase in the prevalence of childlessness, both temporary and permanent, has become a peculiar facet of the Italian low fertility regime, differently for instance from other Mediterranean Countries, like Spain where the childless prevalence is almost stable across cohorts (Miettinen et al. 2015). A pioneer survey carried out in Italy - although limited to selected Italian urban areas - reveals that as many as a third of the women interviewees in their forties, who live with a partner and do not suffer from any particular physical impediment, are voluntary childless (Tanturri and Mencarini 2008). The same research evidences that in several other cases, childlessness is the unintended outcome of delayed decision to have a child or the result of adverse circumstances (i.e. fragility of partnership).

If one assumes that the proportion of childless women is the same as observed in the five cities examined in that study and it is the same of the cohort of 1960, it is conceivable that around 8% of the cohorts born around 1965 would deliberately reject motherhood. This is in stark contrast to the percentage of 1.5% characterizing the generations born just one or two decades before (Bonarini et al., 1999).

Recent studies shows that the prevalence of childlessness in Italy has increased either among men and women, and across social classes (Fig. 6).

Although the prevalence of childlessness at 40-44 years old is still much more important among the most educated women, and still increasing (up to about 30% for high educated women born in 1965-69), a remarkable spread of the phenomenon has been observed also among women only with primary education or less (18% for less educated women born in 1965-69) (Fig. 6).

Figure 6: Prevalence of childlessness at age 30-34 and at age 40-44 by education level and birth cohort.

We can therefore argue that childlessness in Italy it is not only a matter of prolonged education or women's career aspiration, but other difficulties seems to arise for all women.

5. Data and methods

In this paper we focus our attention on two countries: Finland and Italy. For Finland, data by cohorts (1940-1969) for descriptive analysis was drawn from population registers by Statistics Finland. Data for multivariate analyses come from Finnish Late Fertility Survey 2015, collected by TNS Gallup & Population Research Institute in February 2015 on 1,051 men and 2,122 women aged 20-50 years, childless or with one, two or three children. Due to the sampling procedure, response rate could not be estimated. Data were weighted according to age, gender, number of children, education and place of residence to adjust for bias in survey sample.

For Italy data from the 2009 Multipurpose Italian survey, Family and Social Subjects, have been analysed. It is a retrospective survey carried out by the National Institute of Statistics (ISTAT) in 2009 on a sample of 17,788 households, for a total of 43,850 individuals. Information on individual background, family of origin, union history, fertility, fertility intentions have been collected, but unfortunately neither information on values and attitudes, nor on religion have been gathered in 2009.

The focus of the study is on 30-49 years old childless women; the choice of such an age span would allow us to study micro-level determinants of both temporary and permanent childlessness.

To this end we select from disposable data sources, common and comparable variables. Specifically, we take into account the following individual aspects:

- Union status has been then codified as a dummy variable (to be included as a dependent variable in the bivariate probit model) indicating whether women have ever be in union or not. So, in the ever in union category married, separated/divorced, never married, ever in couple (cohabiting) women have been included. This classification could in some way smooth the important differences characterizing union formation behaviors and patterns in the two countries under analysis. However in this work we are not interested in understanding how the probability to be childless differs depending on the kind of union women live in, but we are only interested in understanding if being or ever been in a presumably stable union is, together with preferences on motherhood, the result of choices influenced by a latent, underlying variable making the two processes be highly correlated.
- Education level is classified into three groups: low, medium, and high educational level,

based on the ISCED classification. We want to test the hypothesis that education (perceived as an attribute shaping an individual's human, economic, and cultural capital) contribute in determining individuals' likelihood to be childless and to be in union. Moreover we want to understand if significant differences exist in the educational gradient in childlessness between the two countries.

- Sibling size is classified by a three-categories variable indicating whether the woman is only child, if she has one or two sibling, or if she has more than two sibling, for testing the hypothesis of intergenerational transmission of reproductive choices, that is, individuals coming from numerous families are less likely to be childless than those who have no sibling, as they inherit fertility behaviours from their own parents (as a result of early life socialization processes).
- Health status, measured by a dummy variable indicating whether the individual has or not chronical diseases that could affect the probability to postpone or even renounce to have children;
- Parents couple disruption dummy variable, for understanding if and to what extent womens' parents separation/divorce events can influence their motherhood preferences.

As said before, the processes determining individual choices on union formation and parenthood can be considered as driven by the same underlying mechanism; that is, they can be seen as different manifestations of a unique mechanism, driving individual preferences with respect to demographic behaviours. Under this hypothesis, we want to consider childlessness and union status variables, not linked by a direct causal relations, but high correlated as a consequence of the effect of a latent, unobserved variable, that can be for example the family-life propensity/aversion, that make them co-vary. The effect of education on childlessness can thus be considered as the result of a twofold effect: direct, and indirect, through the selection process of women who decide to form a union, and that should be hypothesize to be most family-oriented.

We use bivariate probit models. The two equation probit model in its general form can be specified as follows:

$$y_1^* = x_1'\beta_1 + \varepsilon_1, \qquad y_1 = 1 \text{ if } y_1^* > 0, 0 \text{ otherwise}$$

$$y_2^* = x_2'\beta_2 + \varepsilon_2, \qquad y_2 = 1 \text{ if } y_2^* > 0, 0 \text{ otherwise}$$

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \end{pmatrix} \Big| x_1, x_2 \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right]$$

In our study y_1^* is the propensity toward motherhood, while y_2^* is the propensity toward couple life. Specifically childlessness (y_1) is a dummy variable indicating whether women have children (0) or not (1), and union status (y_2) is a dummy variable indicating whether women have ever been in couple (1) or not (0).

The bivariate probit model is an interesting tool for modeling the joint determination of two variables, and it also provide the framework for modeling endogenous influence taking place in binary choices contexts.

The model parameters are estimated by maximum likelihood. The existence/absence of disturbances correlation in the model is carried out through the Likelihood Ratio or Wald test. Under the null hypothesis that ρ equals zero, the model consists of independent probit equations, which can be estimated separately, without the use of bivariate models.

Once parameter estimates are obtained, a natural next step is to consider the marginal effects (Greene, 1996) of the covariates in the conditional distributions, studying the probability to be childless conditioned to the probability to be in union, by also taking into account the correlation between the error terms in the two equation, that is, by also taking into account the existence of unobservable elements that make the two processes correlate.

To this end it is important to underline that the bivariate model used in this work do not model the dependence between the two binary outcomes directly, although dependence between the structural errors obviously affects that relation.

6. Results

We first estimate the bivariate probit models separately, for Italy and Finland, in order to explore the relation between childlessness and education in the two countries, and to envisage, if existing after controlling for other factors, possible differences in the mechanisms determining this relation. In a second phase we pool the two countries related data together to test if differences between the two countries in the relation between childlessness and education are significant. As said before the two equation composing the bivariate probit model aim at simultaneously studying the women's preferences with respect to union formation and parenthood processes, that we hypothesize to be not directly causally correlated, but to co-vary as the result of the effect of a spurious relation with a latent variable, representing the individuals family-life propensity.

The use of bivariate probit model will help us test the hypothesis of zero correlation between the error terms (ρ) of the two equation.

Table 3. Bivariate probit model coefficients and disturbances correlation estimates.

		CHILDLESSNESS	
		FINLAND	ITALY
Siblings	No Sibling	0.219[**]	0.214[***]
(Ref. 1 Sibling)		(-0.079)	(0.063)
	>2 Siblings	-0.06	-0.216[***]
		(0.057)	(0.043)
Chronical Disease	Yes	0.211[*]	0.196[***]
(Ref. No)		(0.092)	(0.061)
Family of origin disruption	No	-0.137[*]	-0.101
(Ref. Yes)		(0.063)	(0.085)
Education	Medium	-0.06	-0.238[***]
(Ref. High)		(0.06)	(0.052)
	Low	0.218	-0.286[***]
		(0.122)	(0.055)
Age	30-39	0 .268[***]	0.332[***]
(Ref. 40-49)		(0.053)	(0.04)
Constant		-0.35[***]	-0.619[***]
		(0.052)	(0.052)

		UNION STATUS	
		FINLAND	ITALY
Siblings	No Sibling	-0.071	-0.164[**]
(Ref. 1 Sibling)		(0.085)	(0.065)
	>2 Siblings	0.055	0.152[***]
		(0.061)	(0.045)
Chronical Disease	Yes	0.003	-0.182[*]
(Ref. No)		(0.067)	(0.084)
Family of origin disruption	No	-0.309[***]	-0.174[**]
(Ref. Yes)		(0.094)	(0.064)
Education	Medium	-0.108[*]	0.181[***]
(Ref. High)		(0.063)	(0.055)
	Low	-0.509[***]	0.208[***]
		(0.126)	(0.059)

Age	30-39	-0.13[*]	-0.349[***]
(Ref. 40-49)		(0.057)	(0.042)
Constant		0.838[***]	0.917[***]
		(0.056)	(0.056)
	/athrho	-1.07[***]	-1.314[***]
		(0.049)	(0.04)
	rho	**-0.789**	**-0.865**
		(0.018)	(0.01)

[*] $p < 0.05$, [**] $p < 0.01$, [***] $p < 0.001$

The results obtained by separately running the bivariate probit models for the two countries under analysis show that ρ has a negative, significant (Wald test) value (-0.86 in Italy, -0.79 in Finland).

This first result confirm that our models provides more reliable estimates than a single equation model. We can thus go on with the idea an unobserved mechanism, including those elements governing the individuals' family life propensity, that influences choices on the union formation as well as on the motherhood preferences exists.

We will specifically analyze marginal effects as they are more easily interpretable with respect to the models' coefficients estimates. We present unconditional marginal effect for analyzing union formation and childlessness separately, and, most important, we show the conditional marginal effects in the childlessness equation, that take into account the correlation between marital status and childlessness in the estimation process, thus representing the result of both direct and indirect effects of the common variables in the two models on childlessness.

When analyzing marginal effects in the equation modeling the probability to be in union, in a comparative perspective, it emerges that Finnish low educated women have a significant lower probability (-17%) to form a union, with respect to the most educated ones, while women with a medium educational level do not significantly differ from the reference group. A first difference emerge with respect to Italy, where both medium and low educated women have an higher probability to be in union with respect to the high educated ones.

This opposite effect is probably due to the different phase these countries occupy in the path toward the gender revolution accomplishment. In Finland, the expansion of tertiary level education has concerned particularly women in the younger cohorts and, consequently, low educated women are less and less numerous and are becoming a very selected group, which is likely to show very specific family formation behaviors, also due to the changed 'partnering market' rules that make very difficult for low educated women to be in union. Instead, in Italy, a country still far from being ready to embrace the untraditional aspiration of women, high educated women are still a restricted group, characterized by a great selectivity in union formation, obviously decreasing their chances to find a suitable partner, but also experiencing great opportunity costs of family formation.

As far as the other variables in the models are concerned, being 30-39 years old reduce the likelihood to be (or have been) in union, thus confirming that the phenomenon of family formation postponement is strongly spread, both in Italy and in Finland and appears to concern also partnership behaviors, not only childbearing.

Having chronical disease reduces the chances to be in union, in both countries.

The number of siblings and the variable indicating whether the women's parents experienced couple disruption events, are considered as a proxy of the family formation preferences of the family of origin, that could help testing the hypothesis of intergenerational transmission of demographic behaviors. However, they did not prove to be significant in Finland, thus highlighting another important difference between Finland and Italy: it could be that family ties are so strong, in Italy, that women inherit (even unconsciously) their parents demographic behaviors, while in Finland they more easily cut loose from their families of origins habits.

This is true if referred, for example, to the meaning cohabitation assumes in the two countries: in Italy,

cohabiting – un untraditional couple formation form – is still considered mainly as precursor of marriage, thus representing only an intermediate step toward the formation of a traditional family, that reproduces the behavioral model inherited from the family of origin; while in Finland, cohabitation is widely spread among the young generations, and not so likely to lead to marriage, thus representing a less traditional family formation path.

Table 4. Unconditional marginal effects for union status equation. Pr(Union Status=1)

		FINLAND	ITALY
Siblings	No Sibling	-0.022	-0.046**
(Ref. 1 Sibling)		(0.027)	(0.019)
	>2 Siblings	0.017	0.037***
		(0.019)	(0.011)
Chronical Disease	Yes	-0.103**	-0.045**
(Ref. No)		(0.033)	(0.018)
Family of origin disruption	No	0.001	-0.048*
(Ref. Yes)		(0.021)	(0.024)
Education	Medium	-0.034	0.047**
(Ref. High)		(0.02)	(0.015)
	Low	-0.176***	0.054***
		(0.048)	(0.016)
Age	30-39	-0.04**	-0.089***
(Ref. 40-49)		(0.018)	(0.011)

$^{*} p < 0.05,$ $^{**} p < 0.01,$ $^{***} p < 0.001$
Note: dy/dx for factor levels is the discrete change from the base level.

When we consider the marginal effect in the childlessness equation, that is when no information on the union formation process is considered, the different educational gradient in childlessness between the two countries emerges. Low and medium educated Italian women have a lower probability to be childless, with respect to the high educated ones, while in Finland low educated women show a significant higher probability to be without children, with respect to the reference group. No significant differences emerges when comparing the medium and high educated women's probability to have no children.
Few relevant differences emerge when analyzing the marginal effects of the other covariates in the model.
In Italy coming from a family where parents have experienced couple disruption events do not significantly influence the probability to be childless, while the effect is significant, and negative, in Finland. This result is connected to the previous finding on the different effects on the parent's family life on young generations' family formation behaviors in the two countries: it could be that in Finland childhood family exerts almost no effect on union formation patterns but the effect is more notable when we look at childbearing which can be considered as a more decisive stepping stone into adulthood. Instead, in Italy, union formation has kept its traditional place as a rite to adulthood, and parent's family behaviors have a high weight in determining union formation, instead of parenthood choices.

Table 5. Unconditional marginal effects for childlessness equation. Pr(childless=1)

		FINLAND	ITALY
Siblings	No Sibling	0.085^*	0.07^{***}
(Ref. 1 Sibling)		(0.031)	(0.021)
	>2 Siblings	-0.023^*	-0.061^{***}
		(0.022)	(0.012)
Chronical Disease	Yes	0.082	0.059^{**}
(Ref. No)		(0.036)	(0.019)
Family of origin disruption	No	-0.052	-0.028
(Ref. Yes)		(0.024)	(0.023)
Education	Medium	-0.023^*	-0.073^{***}
(Ref. High)		(0.023)	(0.017)
	Low	0.084^{**}	-0.087^{***}
		(0.048)	(0.017)
Age	30-39	0.102	0.099^{***}
(Ref. 40-49)		(0.02)	(0.012)

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

Note: dy/dx for factor levels is the discrete change from the base level.

When the marginal effects modeling the probability to be childless, conditioned to the probability to be in union (thus taking into account the correlation ρ among the disturbances in the two equation) are considered, both in Italy and in Finland a positive educational gradient emerges (Table 6). The negative gradient observed when considering the unconditional marginal effects in the Finnish model reverses. In both countries, high educated women have an higher probability to be childless with respect to the medium educated ones. Low educated women show the lowest probability to be without children (with a significant difference with respect to high educated women) in Italy, while low educated Finnish women do not significantly differ from the high educated ones.

The reversal of the negative educational gradient in Finland is observed because low educated women are a selected group, generally more likely to be childless due to the fact that they are more likely not to find a partner; but when they are in union, they show a greater probability to have children than women with higher education.

It is reasonable to think that low educated women are less likely to be in couple as some 'social obstacles' exist, hindering their willingness to form a family, thus making them more childless; but, when controlling for unobserved factors influencing the processes under analysis, that is, when women in union, and with the same 'family life propensity' are compared, it emerges that low educated women experience a lower risk to be childless with respect to the high educated ones, as they have lower opportunity costs of having children; moreover, the timing effect emerges, making women with high education levels more likely to be childless, due to the motherhood postponement effect. Beyond the postponement effect it could be that highly educated women are more likely to be voluntary childless than low-educated women who may have more traditional values.

The models analyzed above confirmed that a positive education gradient in childlessness exists in Italy, even when taking into account the correlation between the preferences of women with respect to union formation and motherhood processes; while in Finland the negative education gradient reverses when controlling for this correlation: it is thus reasonable to think that in Finland the partnership market dynamics strongly influence the educational gradient in childlessness, whose existence is mostly due the difficulty low educated women encounter in finding a partner, even if they have a high family life propensity, that clearly emerges when they succeed in forming a union, and translates in being more likely than high educated in union women to have children. In Italy, even if the mechanisms of union formation and parenthood are correlate, some structural hindrances seem to exist, making high

educated women more likely to be childless.

Table 6. Conditional marginal effects for childlessness equation. Pr(childless=1|union status=1)

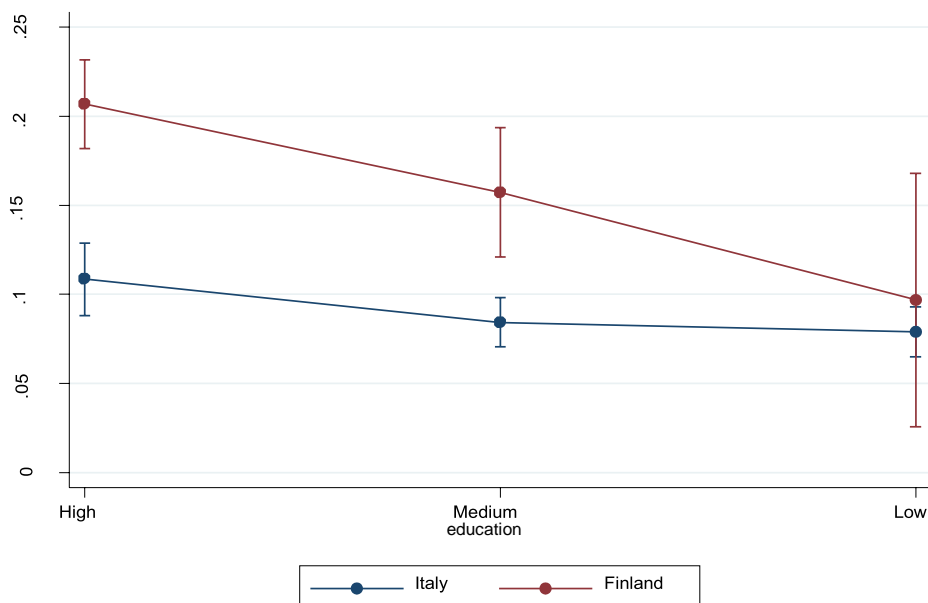|		FINLAND	ITALY
Siblings	No Sibling	0.08**	0.039**
(Ref. 1 Sibling)		(0.029)	(0.016)
	>2 Siblings	-0.014	-0.034***
		(0.019)	(0.009)
Chronical Disease	Yes	0.029	0.028*
(Ref. No)		(0.034)	(0.013)
Family of origin disruption	No	-0.053**	-0.045***
(Ref. Yes)		(0.021)	(0.014)
Education	Medium	-0.043*	-0.04***
(Ref. High)		(0.02)	(0.012)
	Low	-0.01	-0.048***
		(0.047)	(0.012)
Age	30-39	0.086***	0.039***
(Ref. 40-49)		(0.019)	(0.009)

$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Note: dy/dx for factor levels is the discrete change from the base level.

Next, we test if the differences between the two countries are statistically significant, by analyzing interaction effects in the bivariate probit model run by pooling together the two countries. Model estimates show that the correlation among the disturbances in the two equations is still significant (Wald test), and negative (-0.834).

We thus analyse the marginal effect of education on the joint probability to be childless and to be in union, by comparing the two countries. A positive educational gradient emerges both in Italy and in Finland, and differences in the childlessness level are significant only for high and medium educated women, with Finnish women showing a greater probability to be childless (Fig. 7).
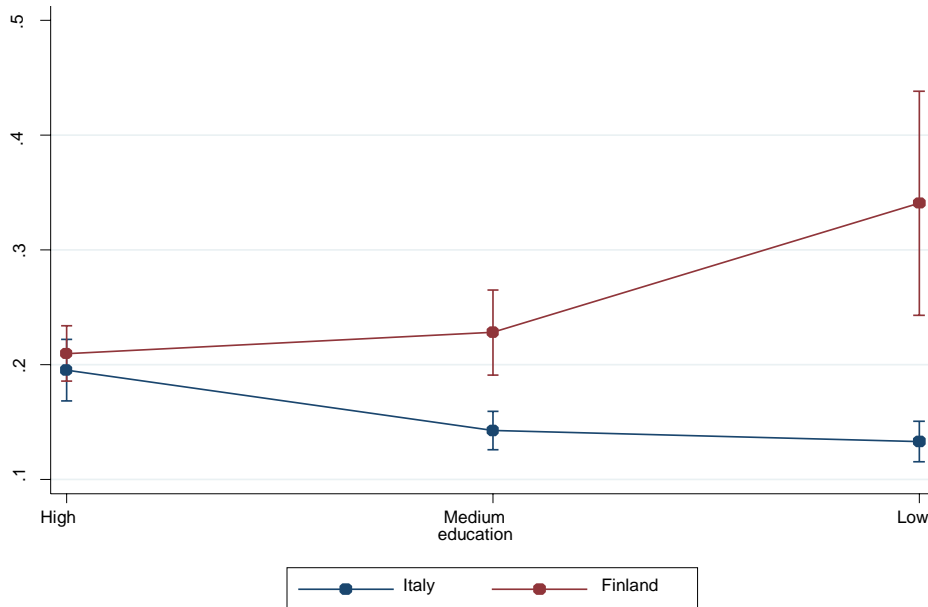
Fig. 7: Differences between Italy and Finland in the joint probability to be childless and in union, by education

Adjusted Predictions with 95% CIs

In order to analyze the phenomenon in its complexity we also estimated a bivariate probit model, modeling the probability to be childless and the probability to be not in union.

Fig. 8: Differences between Italy and Finland in the joint probability to be childless and not in union, by education

Adjusted Predictions with 95% CIs

The analysis of the effect of the interaction term between education and country on the joint probability to be childless and to be single shows that differences in the childlessness levels in the two countries are statistically significant only for medium and low educated women and, most important, that an opposite education gradient in the two countries exists (Fig. 8).It emerges that Italian high educated women are more likely to be childless, with respect to the low educated ones, while in Finland high educated women are less likely to be childless, than the low educated one. It is thus possible to conclude that the main difference between the analyzed countries lies in the different probability single women have to be childless, by educational level. In Italy high educated women (who are, in general, more likely to be not in union) are less likely to have children than the low educated ones, probably because they have the highest opportunity costs of having children and because their formation paths bring them to a child-free lifestyle, but also because they are more informed than low educated women about contraceptive methods, so they have a greater probability to avoid out of union pregnancies.

In contrast, in Finland high educated single women are less likely to be childless compared to women with low education. It could be that the political and institutional context allows them to experience low opportunity costs of having children so that they are able to independently take care of their children and do not necessarily need to be in a stable union to be mother, it is also possible that low educated women are more linked to a traditional idea of family formation and they refuse the idea to have children without having a partner.

Moreover, after controlling for other individual factors, education is confirmed to play a relevant role in determining women's choices both on union formation and on motherhood. A negative education gradient in both countries emerges when considering the probability to be childless, conditioned to the probability to be in union: high educated women are more likely to be childless probably as the result of the motherhood delaying process, that is considered as a strategy to avoid conflicts between parenthood and education, or occupational career

aspirations. Postponement is likely to be associated with decreased fecundability, but it is also possible that this without-children period brings women to the choice to stay childless and pursue their own goals according to personal, renewed preferences. It could be also that in Italy high educated women are more likely to have no children because of the lack of suitable family policies which can alleviate the high opportunity costs of motherhood. In Finland, on the other hand, (comparably) generous public policies guarantee balancing work and family life for women and, compared to Italy, high educated women are more likely to be voluntary childless.

The opposite educational gradient in childlessness emerging between the two countries when jointly analyzing the probability to be childless and the probability to be single, shows that in Finland, where family ties are more and more weakening, high educated women have a lower probability to be childless with respect to the low educated ones. Couple life is no longer considered a self-evident option in peoples' lives, and particularly persons with a higher education are expected to be forerunners in this respect, thus choosing motherhood even when they do not have a partner. They have the chance to choose to have out of partnership children, without any social disapprove.

In Italy, high educated single women are instead more likely to be childless compared to low-educated women. The traditional model of two-parents family is still widely spread and recommended, and having children but not partner is socially stigmatizing. Highly educated women, that are generally more conscious about the use of contraceptive methods are able to avoid out of union motherhood, while low educated women more often face single motherhood, often strongly criticized by the social conservative environment.

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