Tesi di Dottorato in Demografia – XIII ciclo

Università degli studi di Roma "La Sapienza"

Marriage Market and Homogamy in Italy: an Event History Approach

Dottoranda

Romina Fraboni

Supervisori

Professoressa Viviana Egidi

Dottor Francesco C. Billari

Coordinatore del Dottorato in Demografia

Professor Marcello Natale

Anno Accademico 1999–2000

Each of us when separated, having one side only, like a flat fish, is but the indenture of a man, and he is always looking for his other half.

Plato, *SYMPOSIUM, XVI,D*

Acknowledgements

This research has benefited of the Doctoral Fellowship from the *Ministero dell'Università e della Ricerca Scientifica e Tecnologica (Murst).* The XIII PhD in Demography in Italy has been held by the *Dipartimento di Scienze Demografiche*, *Università degli studi di Roma 'La Sapienza'*, consortium of the *Università di Roma*, *Firenze* and *Padova* (Italy). During my PhD I took advantage of the meeting and exchange of opinions with many.

First of all I thank my tutor Viviana Egidi and my external co-tutor Francesco Billari for their comments and suggestions on my work. I owe particular gratitude to Viviana Egidi for providing me with the possibility to access and work on the provisional file (standard) of the 1998 household survey. I owe a special thank to Francesco Billari for having invited me to the Max Planck Institute for Demographic Research (Rostock, Germany). The Rostocker period has given me great scientific insights, and has made me greatly appreciative of event history analysis. I am grateful to have had the opportunity to work with him.

During these years, I have had some special important opportunities to develop my project. First it was useful for me to participate and present of an earlier version of this study, at the Graduate School organised by the European Consortium for Sociological Research (ECSR) at the University of Mannheim (Germany) in Autumn 1998. Furthermore, my experience as a PhD student has benefited from two very important and formative periods: a stage at the Institut National d'Études Démographiques (INED), in Paris (France), August 1999, and a period of research at the Max Planck Institute for Demographic Research (MPIDR), in Rostock (Germany) from the end of March 2000 to the middle of December 2000. I dedicated the first period to review the bibliography and to learn from the experience of Michel Bozon, to which I express my gratitude. I am also grateful to Patrick Festy for his helpful opinions.

I spent the most intensive and productive time at the Max Planck Institute of Rostock, Germany. Here I took advantage of a pleasant and, above all, scientifically stimulating environment, collaborating with the Independent Research Group of Early Adulthood. I am particularly grateful to Arnstein Aassve and Pau Baizãn Munoz for their useful comments. I am likewise thankful to Riccardo Borgoni for his comments on statistical modeling and for his friendship. A special thank is also acknowledged to Jana Tetzlaff for reading and efficiently editing my English. The third chapter, reviewed in form of a paper, has benefited of the English editing made by Karl Brehmer. I would also like to express my acknowledgment to Kirill Andreev for providing me with useful hints in using the Lexis software, to Anatoli Yashin, Aart Liefbroer, Gianpiero Dalla Zuanna and Eugenio Sonnino for their bibliographic suggestions and opinions. I am also particularly thankful to Robert Schoen for an useful discussion.

A special thank to the personnel working at the Max Planck as well as that working at the Istat: they both have always satisfied all my requests.

Moreover, I wish to thank the *Istituto Nazionale di Statistica* (ISTAT) for providing me with very rich data-bases and the permission to work on the file standard of the 1998 household survey. I am particularly indebted to Sabrina Prati and Cristina Freguja.

Of course, any mistake is my only responsibility.

Outside work, I wish to thank all those who supported me during these years: my family, my friends and Filippo. During this year I missed them all lots. In particular, my family who always supported and encouraged me in many ways: however, my gratitude to them goes far beyond their understanding of my commitment to this work. Lastly, a very special thank to Filippo, who although my distance has always been very close, and directly involved in my problems and difficulties. He also narrowed the distance between us, spending last year traveling between Italy and Germany many times. His understanding and support have been unique to me and to the end of this project.

Romina Fraboni

13 December 2000,

Rostock, Germany

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Chapter 1

Theoretical Framework and Background

Over the past decades in the most developed countries deep changes have been observed in the process of family formation. These are strictly linked to the features of entry into early adulthood. End of education, entry into the labour market, leaving the parental home, entering into sexual intimacy, forming a union, childbearing, childrearing have shown a strong interdependency and the emerging of new, more differentiated models of family formation across countries.

Among these, changes in marriage, considered to be the foundation of the family system, have played a major role.

> *"But marriage being traditionally the initial phase in the formation of a family and the family being considered as a major building block of society, a more sociological approach rather than a purely demographic one should be adopted in nuptiality research"* (United Nations, 1990[181, p. 294]).

This chapter is mainly divided into two parts. In the first part I present a review of the theoretical framework developed by many scholars to explain the marriage market and its features in the developed countries: the concept of marriage market, the demographic approach, the economic approach, the sociological approach to it and the roles of preferences and norms. In the second part I briefly focus on the main changes regarding marriage behaviour in Europe and especially in Italy. This chapter represents a ground to which return back during the following pages.

1.1 Introduction

In the popular opinion, love between two persons is able to overcome every kind of barrier, making people blind and irrational in their actions. According to the ideal of romantic love, in contemporary societies the selection of a partner appears to be totally chaotic and a real matter of personal tastes.

"We grow up believing in true love, in finding our 'one and only' "
(Buss, 1994[37, p. 5]).

However, numerous studies have shown that *mate selection*, or *assortative mating*, happens in a quite systematic way[1]. Obviously there are clear patterns in what can seem random: the most frequently observed pattern in assortative mating is that according to which similars marry most often than dissimilars. In literature this phenomenon is known as *homogamy* or, when it refers to marriage within a group, *endogamy*, and, on the contrary, the opposite phenomenon of mating between individuals of different social positions is said *intermarriage*, *heterogamy* or *esogamy*.

Studies on homogamy can be roughly distinguished according to their main focus on similarities between partners regarding their social class, level of education, employment, religion, ethnic group with the aim of measuring the level of openness or closure of a stratification system of a society. A high level of homogamy, relatively to the cross-sectional characteristics of a couple, means the existence of rigid barriers between groups and of a closed stratification system.

For instance, researches on ethnic and racial intermarriage tries to measure the level of integration of different nationalities (Stier and Shavit, 1994[177]) while religious intermarriage is aimed at understanding the control of churches on individual's life choice. Lastly, socio-economic homogamy is based on the idea of describing how a stratification system is open, relating marriage patterns to mobility patterns[2].

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[1] *"... but we never choose mates at random. We do not attract mates indiscriminately ... our mating is strategic, and our strategies are designed to solve particular problems for successful mating"* (Buss, 1994[37, p. 5])

[2] Social inequality arises from the interplay of two mechanisms: social stratification and formation of social class. The latter has its roots in the economic sphere and pursues the monopolisation and the exploitation of scarce societal resources by creating economic and political organisations, the former relates to interests and aims of persons and families as individual actors. Therefore inter- and intragenerational reproduction of social inequality is the result of homogamous marriages (wife-

Homogamy can therefore be considered as a mechanism to maintain the *status quo*, while heterogamy an important mechanism of equalisation and interchange. The effects of intermarriage are basically that it decreases the identification to a group among children as well as the negative attitudes (prejudices and stereotypes) of individuals towards other groups[3]. Indeed intermarriage has been defined "sociologically relevant" because of

"... its inherent dynamic. It is not just a reflection of boundaries that currently separate groups in society, it also bears the potential of cultural and socio-economic change" (Kalmijn, 1998[113, p. 397]).

With regard to social stratification system, when people belonging to high social classes marry up and those belonging to low social classes marry down, there exist little opportunities for those with lower social status to improve their status *via marriage* and higher social class people will not often cope with a descendant mobility. On the other way round, low homogamy means the presence of a great deal of interactions among individuals belonging to different social strata, therefore indicating a stratification system very open to upward and downward movements.

In such a way, homogamy, as a research topic, can be considered as a complement to the study of intergenerational social mobility, to evaluate the openness of a stratification system of a society.

Many scholars today study who marries whom to understand the reproduction of social inequality with particular attention towards the role of education (Blossfeld et al., 1999 in press[23]; Blackwell, 1998[21]; Mare, 1991[130]). Therefore they point out the way in which mechanisms influencing individual and isolated marriage decisions (at the microlevel) lead to a far-reaching reproduction of social inequality (at the macrolevel) and, at the same time they wonder why a few people succeed in escaping the forces of social reproduction.

husbands dimension) and of status inheritance (father-children dimension) (Haller, 1981[94]).

[3] Evolutionary psychology focuses on early experiences, parenting, and other environmental factors to explain variability in mating strategies. (Buss, 1994[37, p. 217]).

1.2 Theories of marriage

1.2.1 The concept of 'marriage market' in the economic approach to the demographic behaviour

Normally people do not like to think of themselves as participants in a market when it comes to personal aspects of life such as the search for a partner. Being compared to other individuals who compete for the same possibly scarce commodity does not seem represent a comforting idea. This is connected to the fact that, in contemporary western societies, the family sphere is viewed as being something theoretically quite different from the economic market, because of the strong roots of concept such as romantic love and parental love. A market approach to marriage has been adopted for a long time by economists (e.g. Becker, 1974 [9], 1981[10]) to explain why people do get married or remain single, how do they live a married life, and the frequency and causes of divorce[4]. Nevertheless, in the literature there is not widespread agreement on what a marriage market is, given that each discipline tries to focus on some of its more relevant aspects. For what we need here, the *marriage market* is, broadly speaking, the place of interaction between the sexes at the moment of the search for a partner: there, each individual neither represent a pure object nor a pure acquirent, but he/she plays both roles at the same time, so that a double choice, double consent must be verified (Becker, 1974 [9]).

According to Becker (1981[10]), unmarried men and women can be viewed as trading partners who decide to marry if each partner has more to gain by marrying than by remaining single. As in all trading relationships, the gains from marriage are based on the fact that each partner has something different to offer. In particular, the socialisation process traditionally induces a comparative advantage of women over men in the household because women invest mainly in human capital that raises household efficiency, and comparative advantage of men and women in the labour market because men invest mainly in capital that raises market efficiency. In particular both men and women are viewed as participants in markets for household labour, which in general terms includes childbearing, childrearing and other family-related goods. Men demand wife labour and supply husband services as well as women demand husband labour and supply wife services. By plotting aggregate

[4] In this work we are not going to take into account same sex couples.

demand and supply schedules and finding their intersection, which represents the equilibrium, we obtain the markets (for each sex) for household labour:

"Marriages tend to occur when at the market 'wages' for female and male household labour the amount of such labour a woman wants from a husband equals the amount of labour he wants to supply and when the amount of work this same man wants from a wife equals the amounts of work she is willing to perform" (Grossbard-Shechtman, 1985[91, p. 377]).

According to Becker, it is this sex specific specialisation of labour in our society and the mutual dependence it produces between the sexes, that provides the major incentive for partners to marry. Becker concludes that a rise in the earnings and labour force participation of women reduces the gains from marriages, given that a sexual division of labour becomes less advantageous.

1.2.2 Marriage market or marriage 'markets'?

Assortative mating, *mate selection* and *partner selection* (Girard, 1981[80]) are the most used terms to indicate the process of choice of the partner. Trying to trace the boundaries of the place where such process develops is very difficult and, after all it would not be very useful. In fact, a unique "space" called the marriage market simply does not exist as the search for a partner involves several dimensions of our life: school, university, place of work, place of living, neighbourhood, friends, family, relatives, cultural associations, sporting club, religious and political associations, place of holidays, etc.

All these represent a potential marriage market: some of them may play a more important role than others, not only because of our greater involvement in terms of time, but also because of the higher value which we recognise or attribute to them, and which is the result of internalised norms[5]. Bozon and Heran (1988[35]) distinguish among three main kind of places of meeting: public places, open to everybody; reserved places, pretty heterogeneous, but for which the admission depends on the payment of a fee or some other form of selection; private places which mainly include family and friends.

[5]People develop a preference for certain spaces more than others also as a result of the segmentation of the social structure: judgement categories are strongly related to interiorised categories of perceptions, which differ according to sex and social milieu (Bozon, 1991[32]).

Henry (1973[97]), on the one hand, compares the relations between the sexes to the market where the bargaining and the exchange happens and, on the other hand, to the retort, the tool where chemical reaction between certain proportions of atoms of different elements may occur[6]. Nevertheless it is not enough to have just the same number of partners of both sexes to give birth to new partnerships for everybody. Partnership formation is a more complicated process which does not reduce itself to passages from status of being single to married. Henry suggests a broader concept besides that of market, as this not necessarily means binding relations. The process of couple formation is characterised by a sequence of steps. Joining a group, a 'circle of relations', on the basis of the age of those who belongs to that group, is one of these steps. There are multiple circles according to the geographical dispersion of a population and each of them combine some particular ages of its individuals. Henry (1972[96]) hypothesises that individuals choose to fit a certain circle on the basis of their age, but then the choice of the mate inside each circle of relations is made randomly.

According to Henry (1972[96]) there are several stages before a legally married couple is constituted. It should be observed that the exposure to marriage is virtually not usually discernible. The author distinguishes four stages. First, there is a process of candidacy for marriage, when individuals are more or less conscious to wish to get married fairly soon. Then individuals join a circle which corresponds, at least in some respects, to the tastes of the candidate, especially insofar as age is concerned. These two stages involve each sex independently from the other. As a third step there is the formation of couples within these circles, and lastly, the social recognition by marriage of the couples have been formed. The third step takes place in the circle according to the rules that vary widely from one model to another[7]. Henry recognises the fundamental role of the circle as a melting pot in which the combining that leads to marriage takes place. Henry hypothesises that individuals choose to fit a certain circle on the basis of their age (given that the youngster prefer to stay with young people and the older with older), but then the

[6]Henry analyses the way in which two populations, composed by single individuals of each sex (atoms), sort and give birth to a new population composed by couples (molecules). Molecules take form when certain proportion of atoms meet (Henry, 1973[97]).

[7]Rules can be for instance those concerning exclusions, incest, religion, height, color.

choice of the mate inside each circle of relations is made randomly. Moreover, the author suggests that random celibacy may be negligible even in small population; celibacy due to substantial variations in sex ratio by age can be spread over so many cohorts that it becomes unnoticeably for each one of them; lastly, fluctuations in the conditional age distribution at marriage are about the same as if couple were formed randomly in one circle, the only exception being represented by the postwar periods.

Distance may represent a significant constraint to find a suitable partner [8]. Endogamy and exogamy express the possibility to marry someone who does not belong to the same geographical group. During the twentieth century the improved communication among countries and the rapidity of their diffusion has been so high to produce a greater mobility of the people on the territory, besides a greater social mobility, also reflected on the process of assortative mating .

The geographical proximity of partners makes the meeting and the reciprocal choice easier. In France, a survey on assortative mating has been conducted and, among other things, it revealed that geographical mobility is, especially in a context of strong deruralisation of the country, a central question in understanding the complexity of the process (Bozon and Heran, 1987[33], 1988[35], 1987[34]): to this aim information on the residence of each partner at each significant point in time of their life cycle would also be useful. Indeed the place of birth does not reflect the real pool of potential partners. The place of residence of the married couples, on the other way round, gives us information on a successive moment, and therefore is not useful to estimate the marriage market from a geographical point of view. In the above-mentioned French study, the geographical endogamy of mates was measured in four points in time: at their birth, during their teens, when they first met and before their marriage. Evidence shows that endogamy, when measured only on the

[8] People used to live in small communities where the number of available mates was quite limited and often further diminished by societal rules (due to the organisation of the society in caste or class, for example)(Hajnal, 1965[93]). This affected the possibility of getting married by restricting the circle of potential mates. To counteract this, societies reacted in different ways. For example Eastern European Jewish community had recourse to the professional 'marriage brokers'; in a system based on caste the solution mainly meant finding a mate outside the local community, thus promoting intermarriage with all the relevant effects on the social organisation and genetic structure of the population. Moreover, marriage was used as a tool of 'alliance' between families, kinship, communities, and countries, especially by well-to-do classes and the aristocracy.

basis of place of birth of the couple, is underestimated; a leap forward is done when the place of residence during the adolescence is taken into account (the place of residence during the adolescence is an indicator of the residential mobility), even though the place were they lived before marrying is pretty close to the one where they first met. This may indicate that the possibilities to choose a partner are strongly related to the geographical constraint or that, once they make their choice, they move less. Of course, the mobility on a territory is also a function of the social mobility of individuals: in the same study also the socio-professional positions and average age at first meeting are linked[9].

But, within residential space, people do not attend the same places indiscriminately: the fact that they belong to a social class may orient them towards more frequent exchanges with some people than others. Spaces of social interaction do have a broader meaning which goes beyond the physical environment. It is useful then to study the assortative mating process focusing on the relations between, for example, age differences and the characteristics of the place of first meeting between the partners: some spaces have a very exclusive character, others a very anonymous or familiar, closed or open one. The above-mentioned French study reveals that the socialisation process creates a segmentation in the social universe: in fact, people belonging to a certain social class, have more chances to meet those belonging to the same milieu. Therefore, socialisation creates a first approximative selection of the eligible; then each person evaluates the fan of alternative possibilities he/she can afford on the basis of his/her own preferences.

1.2.3 The marriage squeeze

Strictly related to the concept of marriage market is that of *marriage squeeze*. Many scholars studied a way to measure it (Akers, 1967[1]; Musham, 1974[139]; Schoen, 1981[162], 1982[163], 1983[164]) or to measure its causes and effects (Heer and Grossbard-Shechtman, 1981[100]; Caldwell et al., 1983[38]; Goldman et al. 1984[84];

[9]High professionals and managers have the highest age at marriage, and the furthest pool; unskilled working class marry younger and choose their spouse within the same common, district, department; agricultural workers show a weak endogamy at the level of the municipalities and a strong endogamy at the level of the district as if they were recruiting their spouses in a small area of their country (Bozon and Heran, 1987[34]).

Greene and Rao, 1995[90])[10]. The term was introduced, for the first time, in 1959 to the annual meeting of the American Association for the Advancement of Science by Glick et al. (1963[83] quoted by Glick, 1988[82]).

As many demographic, biological, social and economic factors influence nuptiality, they can sometimes cause a 'squeeze' on the marriage market and on the possible choices of people involved. Indeed this expression was introduced to refer to the effect of the baby boom in the United States: girls born during the rapid increase in the birth rate, eventually faced a shortage of men, born few years early. Therefore Glick et al. (1963[83]) said that the shortage of eligible men placed women in a marriage squeeze and since then, this term has been used to describe the instability that arises when there is a sexual imbalance in the number of marriageable persons.

The general idea is that the number of marriageable men, relative to that of marriageable women, should be taken into account as one of the factors that influence decisions to get married or remain single. For example, when at an aggregate level, more men are available for a given number of women (that is to say: there is a shift in the aggregate demand, while aggregate supply remains unchanged) the number of women who marry increases. Starting from the hypothesis that women prefer marital stability more than men do, Grossbard-Shechtman (1985[91]) states that if the wife's competitive value in the market for household labour is low and if she has little bargaining power, she is not likely to ensure long duration marriages (thus divorcing) or (in initial) commitment to legal marriage.

Moreover, the imbalance between the sexes, measured in terms of the sex ratios has been linked to the spread of cohabitation and divorce (Grossbard-Shechtman, 1985[91]). From this 'economic' perspective, a marriage squeeze for men which means unfavourable conditions for them, is supposed to increase the ratio of the legal unions to consensual unions, because some of the women involved in relations with men will exploit the favourable market conditions to make a union legitimate, thus decreasing the percentage of unmarried people. Therefore, under such favourable circumstances, women are more likely to transform unions into marriages. Clearly the converse also holds: if there is a marriage squeeze for women, which means unfavourable conditions for them, then an increase in the ratio of nonmarital to

[10]For a review of the literature see also McDonald, 1995[133].

marital unions occurs because new consensual unions will form from unmarried men and new women, and from previously married men and new women.

Moreover, an interpretation of the spread of the feminism has suggested that, not only the revolution in the contraceptive technology, which began in 1960, but also the shift in the ratio of males to females at marriageable ages, which took place in the late 1950s and early 1960s, was interconnected to the advent of the women liberation movement (Heer and Grossbard-Shechtman, 1981[100]). In particular men during the 1950s faced a squeeze due to the decrease in the absolute number of births at the end of the 1920 and early 1930s, and for the two-three years usual age gap between partners; in turn, women during the 1960s coped with a shortage of men, because of the relative rise in births at the end of the 1940 and beginning of the 1950, and the age gap between partners. The authors suggest that the worsening of market conditions for women, pushed them to organise and raise women's compensation above the market level. The mechanism bargaining for higher possible wages involves restrictions on entry into that market. According to this interpretation, many feminists have committed themselves to singlehood (Heer and Grossbard-Shechtman, 1981[100]). Moreover the authors suggest that the male squeeze at the end of the 1980s will predict a period of return to a higher evaluation of the traditional female role.

From a demographic point of view, the marriage squeeze has been basically studied in relation to the variation in the age-sex composition due to fluctuations in fertility trends (Akers, 1967[1]; Henry, 1973[98]; Schoen, 1981[162], 1983[164]). This sheds light on the 'quantitative' features of the populations. In addition, many attempts have been made to evaluate the 'qualitative' characteristics of local marriage markets in assortative mating and marital dissolution[11].

However, the approach is bound by the fact that it seeks to explain only those changes that have different quantitative effects on the two sexes and it is not very useful in explaining simultaneous variations (increase and/or decrease in age at marriage) in both sexes (Oppenheimer, 1988[141]).

[11] There is some evidence that the increased education and labor force participation among unmarried women and the high geographic mobility rates in local areas also increase marital instability and lower nonmarital fertility (South and Lloyd, 1992[174], 1995[176]).

1.2.4 Similarities and differences with Job-Search Theory

The matching process between partners can easily be compared to that of job search. The basic idea regarding Job-Search Theory is that there is a distribution of potential job offers for any given searcher, only a small proportion of which represents a 'perfect' match (Oppenheimer, 1988[141]). Due to the heterogeneity of labor demand and supply, both workers and employers lack the necessary knowledge to achieve a perfect and instantaneous matching of workers to jobs. As search has a cost, individuals do not continue up to their perfect match, but they pursue a strategy which consists in deciding a minimally acceptable match, in terms of wage, which is called the 'reservation' wage. Of course, the higher the reservation wage, the smaller the acceptable proportion of jobs in the offer distributions and the longer the time spent searching (the probability of finding a good match in each unit of time is low). Therefore, the quality of match and the length of time spent searching are functions of the reservation wage.

The matching of men and women in the marriage market is closely akin to the matching of employers and employees in the labour market. Between the labour market and the marriage market there are some similarities (Oppenheimer, 1988[141]). In short: both processes are carried out under considerable uncertainty, searching can be very costly, there exists a minimum acceptance level set by each individual, the length of time spent searching is bound up with the minimally acceptable match and closely linked with costs and expected benefits. For example, the cost of lengthy searches in the labour market presumably leads job-seekers to revise downward the minimum wage-offer they would regard as acceptable for employment. When jobs are scarce, unemployment increases and the reservation wage of job-seekers declines. Analogously, lengthy searches in the marriage market may contribute both to non marriage and to demographic *mismatches* between marital partners, reflecting changes in both the relative supply and composition of eligible men as women age (Lichter, 1990[126]).

But there still exist some differences between the two markets: in terms of actors, of utility function and role of the age variable. Searchers in the labour market are simply defined as the unemployed who are looking for a job, while in the marriage markets they are not easily definable. Young people start long before we can assume they are looking for a marital partner: moreover, people may find a partner even though they are not voluntarily looking for it. This fundamental ambiguity of marriage-search behavior indicates that the best strategy is to focus on measuring what conditions foster or impede successful matches.

As regard the utility function, in the labor market it is represented by the income people expect to gain, while in the marriage market it does not have a directly measurable definition, because it is a more complex function: it involves not only socioeconomic status, but also long-run intimacy, emotional support, companionship, children, sex, etc. In brief, not only socio-economic characteristics have to be accounted. It is probably not highly meaningful to try to operationalise marriage utility as we do with the reservation wage.

But probably the most important difference which emerges between the two markets is the one regarding the role of *age*: in fact in the marriage market it assumes a very important role related to its meaning.

First of all, the shape of the distribution of potential partners does change dramatically with age and, with it, the efficiency of the search process (given that marriage progressively thins out the eligibles - Goldman et al., 1984[84]; Diekmann, 1990[67]; Raley, 1996[148]).

Second, a dynamic development in the characteristics of individuals occurs with age. This might represent a reason for the greater instability observed for early marriages as future characteristics are unknown at young ages. Exogenous factors may affect the predictability of the future characteristics of the partner. Postmarital socialisation process has been invoked as a factor that may reduce unpredictability.

Third, the decision to accept a particular match does close off to other opportunities in future. There is an opportunity cost which is higher at younger ages. Conversely, later marriages, even though not as desirable as those refused earlier, may be accepted because of a shift to lower acceptance level. The risk of a marriage less desirable than the one refused earlier is higher for women, given that they more often marry older men. The supply of potential males decreases with age for women, while the supply of women increases with age for men (Goldman et al., 1984[84]).

The result of the search will therefore depend not only on the number of suitable partners, but also on the reliability of information about important characteristics of both the searcher and potential partners. Both these two elements change with age: the availability of potential partners decreases with age, while the reliability of information increases with age. Thus, the constant interaction between the availability of partners and the reliability of information determines the variability of the timing process (Oppenheimer, 1988[141]).

1.2.5 Elements of uncertainty

Uncertainty is due to the lack of knowledge regarding either potentially alternative partners or to changes of the current partner's attributes. Some of the traits which characterise a partner may be unknown at the moment of the choice or they may successively change with age by acquiring new adult and unexpected roles. According to Barbagli, (1990[6]) many sociologists and economists agree that people who marry very young have high probability to divorce because they devote a few amount of time to the choice of their partner, therefore acquiring an insufficient amount of information on the marriage market. Making long-term matches, implies also

> *"estimating the nature of the future characteristics on the basis of the incomplete information currently available"* (Oppenheimer, 1988[141, p. 571]).

Sometimes a period of courtship or cohabitation may, to a certain degree, be helpful in reducing uncertainty, as well as the postmarital socialisation can compensate for part of the imperfect predictions made during the selection process. Moreover, those who have been married and who have had children in a previous marriage, are affected by a greater uncertainty due to their lower attractiveness. Of course a reduction of the uncertainty can be achieved by focusing on the current characteristics of the partner, which are, somehow explicative of his/her future resources. Education, occupation, ethnic group, family background can reduce the degree of uncertainty and can help in the filtering process of spouse selection (Goode, 1964[88]). Among all these various badges that characterise individuals, the most important role is assigned to work (Oppenheimer, 1988[141], Kalmijn, 1994[112]): it is expression of the value, lifestyle and prestige of a person.

As we said above (see 1.2.4) the timing of marriage depends on the interaction between availability of potential partners and on reliability of information. Early marriages may therefore be affected by a greater instability, as their success depends on how well the prediction about the future characteristics of the partners and their future lives together will be like. Obviously also exogenous factors play a very important role in affecting future predictions. In any case postmarital socialisation acts as a compensation process.

Then, both the available number of 'suitable' partners and the reliable information about their characteristics affect the success of the search. These aspects of marriage market are assessed in terms of quantity and quality of its actors (Scott and Lloyd, 1992[174], 1995[176]; Raley, 1996[148]). As the availability of potential partners decreases with age, the 'optimal time for marriage', if defined on the basis of the greatest number of unmarried persons, is supposed to be at relatively young ages, wheras, if defined on the basis of the highest information available on assortative mating attributes, is probably at relatively old ages (Oppenheimer, 1988[141]; Danziger and Neuman, 1999[59]). Moreover a certain degree of free will of the individuals should be allowed, even if they are supposed to act rationally (Blossfeld and Timm, 1999[23]).

1.2.6 Marriage-Timing Theory

Age patterns

The well-known age distribution of first marriages by sex consistently reveals the existence of a nonmonotonic, bell-shaped pattern observed for different countries, periods, and socioeconomics groups. The first marriage age distribution corresponds to a left-skewed unimodal frequency distribution, whose regularity has been often referred to the existence of a law governing the marital process. In particular three type of models have been proposed. For the 'latent state model' the age at marriage is the result of two components: a random variable referred to the duration of the latent state 'not in search of a mate' and duration of the latent state 'in search of a mate'. For instance Coale and McNeil (1972[51]) assumes that the waiting time until entering the search state is normally distributed and that the search time prior to transition to marriage is the sum of exponentially distributed waiting times. In particular, once in search of a mate, there is a waiting time (exponentially distributed) before the first meeting, then a waiting time before the dating (exponentially distributed) and, lastly, a waiting time before marrying.

A second model is that based on the 'unobserved heterogeneity model'. In the rational search process under imperfect information, for each individual there is a linear increase with age in the transition rate to marriage, but as the rate varies in the population, we observe, in the overall population a nonmonotonic aggregated pattern.

The third group of model is the 'diffusion model', introduced by Hernes in 1972([99]). This model assumes the existence of a kind of contagion process among individuals at their marriageable ages. Those already married of the same cohort exert a a social pressure to marry. For an applications to the Italian case of the three models see Billari (2000[18]).

Age differences among partners

Understanding the reasons of the timing of marriage has been a central aim of researchers of different disciplines. For example, economists mainly analysed the influence of the entry into the labour market on the acquisition of adult economic role and on the age at marriage of both sexes (Becker, 1974[9], 1981[10]; Danziger and Neuman, 1999[59]).

Sociologists' studies on marriage timing, highlight gender and social differences in close connection with stratification system and chances of social mobility (Goode, 1964[88]; Haller, 1981[94]; Oppenheimer, 1988[141]).

Demographers mainly point out changes in marriage timing as a result of structural variation of the population size due to variations in the natality rates across birth cohorts and in differential mortality between sexes (Henry, 1975[98]; Festy, 1971[72]; Bartiaux, 1994[8]).

Trends and differentials in marriage timing result from variations in the degrees of difficulty people encounter in mating assortatively. A great deal of studies have developed theoretical frameworks where the assortative mating is linked to transition to the economic roles both in traditional and in contemporary societies (Oppenheimer, 1988[141]; Danziger and Neuman, 1999[59]).

Many economists studied the age differences between partners. The timing of marriage has been linked to the problem of the searching process. According to Becker's neoclassic Theory of Marriage (1974[9], 1981[10]), household commodities cannot be purchased in the market and are most efficiently produced by combining the time inputs of two spouses. Benefits from marriage increase with the extent to which spouses' time jointly produces household commodities. Furthermore, if both spouses are working and the husband's wage rate exceeds the wife's wage rate, an increase in the husband's wage rate or a decrease in the wife's wage rate will increase the benefits from marriage since the husband will specialise more in the market work and the wife more in the household production. In the absence of uncertainty and costs of marriage, each individual either marries the most desirable individual, or stays single, if the net gain from marrying any potential spouse is negative. Therefore the ensuing equilibrium in the marriage market maximises the aggregate gain from all marriages. In case of uncertainty about the characteristics of potential spouses, marriage is costly: the individual spends time and other resources searching for the best attainable match. Therefore the age at marriage depends both on the expected gains from marriage and on the costs of finding a suitable spouse.

In 1977, Keeley[117] (quoted by Danziger and Neuman, 1999[59]) combines Becker's theory and search theory defining the age at marriage as the sum of the individual's starting age at search and the length of the search period. Larger expected gains from marriage induce people to marry younger. In particular Keeley states that if wage rates are higher for men than for women, a man's optimal marriage age decreases with his wage rate, while a woman's optimal marriage age increases with her wage rate, because her direct costs of search are greater and her expected gains from marriage are smaller. That is to say, for men there is an anticipation of the marital behaviour, while for the women there is a postponement.

In traditional societies, where only males earn an income, age at marriage is strictly linked to the problem of information ('revelation problem'): young men, who believe they are likely to become economically successful, postpone marriage in order to prove their ability and increase their appeal to more desirable women, while young men who do not think they are likely to command high earnings later in life, choose to marry young (Bergstrom and Bagnoli, 1993[13, p. 181]). In traditional societies, women do not earn any income and their value in the marriage market depends only on their ability in household production, therefore to their potential partners the postponement of marriage does not help in revealing much additional information about them. Hence, in this model all women marry young: the more desirable women marry with the older successful men and the less desirable women marry the young men who are less likely to command high earnings. In contrast to Becker and Keeley, Bergstrom and Bagnoli obtain that a man's optimal age at marriage increases with is wage rate. The difference between the two theories is due to the fact that the latter is mainly referred to traditional societies where the earning power of men is particularly important.

Because of reproductive constraints, age differences at marriage between men and women are supposed to reflect sex differences in human reproductive strategies: the sociobiological explanation (Otta et al., 1999[142]) of the age difference at marriage is based on the assumption of the sexual bimaturism of our species, according to which women mature 2 or 3 years earlier than men. Also from the evolutionary (psychological and anthropological) point of view all mating behaviour entails changes over time. For instance, a woman's desirability as a mate is strongly determined by signals of her reproductivity, whose value generally diminishes as she gets older (Buss, 1994[37])[12]. While women's desirability as mates declines steeply with age, the same does not apply to men's. Men's value in supplying resources, indicated by features such as income and social status, shows a markedly different distribution according to age than women's reproductive value. To this regard, there are two important differences between the sexes: men's resources and social status typically peak much later in life than women's reproductive value, and men differ more markedly from one another in the resources and social status they accrue[13]. Given the difficulties in measuring social status, evidence shows that in no known culture do teenage boys enjoy the highest status. In contemporary western societies income tends to be quite low among men in their teens and early twenties, while it

[12]The downturn of a woman's desirability is shown in some societies where women are literally purchased by men in return for a bride price. The final price, set by bride's father after considering all competing offers and demanding a higher price, depends essentially on the perceived quality of the bride. The higher the reproductive value of the bride, the greater the bride price. Moreover several other factors lower a woman's value to a prospective husband and hence lower her price as a potential bride: a physical handicap, pregnancy, the existence of a child from previous man, etc. (Buss, 1994[37]; Bhat and Halli, 1999[17]).

[13]In ancestral gatherer-hunter societies, men did not vary in the amount of their resources but they did vary with regard to their social status. Contemporary societies show differences, bigger than in ancestor societies, in the amount of resources distributed among their individuals and smaller than in ancestor societies in status differences among them (Buss, 1994[37]).

rises thereafter.

Therefore, if we consider men and women at the same age, they differ on average in their value as mates. If the central component of a woman's desirability is her reproductive value and that of a man's is his resource capacity, men and women of the same age are not typically comparable in their desirability. Moreover, because of a greater variability among men, age *per se* is a less influencing factor in mating for men.

Marriage squeeze as women age, from a psychological point of view, is in large measure an outcome of the sexual psychology of men and women.

"At the heart of the squeeze is the sharp decline in female reproductive value with age, which caused selection to favor ancestral men who preferred younger women as mates and to favor ancestral women who preferred older men with resources as mates"(Buss, 1994[37, p. 203]).

Age differences between spouses can also be a sensitive indicator in the analysis of the general context of gender differences and the recent changes in nonmarital unions. For example, evidence shows, that in the cases of unions of single cohabitants, age differences between partners are small, while in the case of first marriages without prior cohabitation age differences are higher, especially when the woman is very young or with very low education. Therefore, it emerges that women with higher occupational precariousness, because younger and less educated, prefer to be 'dominated' by the age of their man; on the contrary young men are largely indifferent to the age of their mate (Bozon, 1990a[30], 1990b[31]).

Attempts have been made to test whether age heterogamy may also affect the whole quality of the marriage, but age heterogamy seems to be strictly related to socioeconomic and ethnic groups. In the United States, age heterogamous marriages have been substituted by a great proportion of age homogamous marriages, and this has been interpreted as an effect of the equalisation process (Vera et al., 1985[186]; Atkinson and Glass, 1985[5]).

Gender specific and origin specific nuptiality models

Acquiring adult economic roles is a crucial step in the transition into adulthood especially as regard timing. For those who want to get married, the entry into the labour market may signify a step forward marriage, and, moreover, this process structures life in many ways, not only for the workers themselves, but also for those close to them. Given the strong role of work in the timing of marriage, it is interesting to investigate whether it plays a differential role on the genders. Oppenheimer, 1988[141] analyses the system of functioning of the marriage market both in a traditional society and in a modern one.

Parsons, as well as Becker, emphasises the importance of gender segregation of roles for the stability of the family and even for the society itself (1949[144]). From his point of view, gender segregation of roles, which destines women to be mothers and housewives, is functional to the harmony of the couple and of the family as a whole, as it prevents competition between partners.

Also Becker argued that the more different the trade to bargain between women and men, the more the advantage from it: thus women highly specialised in household production and men highly specialised in work production, maximise their gain from marriage. Moreover, positive assortative mating for complementary traits (education, intelligence, attractiveness) and negative assortative mating for substitutes (income) occur: men with high earnings potential marry women with low earnings but which are superior with respect to other characteristics. According to the New Home Economic, the labor force participation of women has weakened the gain from marriage and has become the main reason for the increasing divorce rates, as the benefit for strong division of roles has greatly diminished (Becker, 1981[10]).

Let us imagine a traditional society where only men work and women are, therefore, strictly dependent, in their socioeconomic status, on the status of their husbands. As a young man does not possess a clearly identifiable position, especially if he aims at socioeconomic upward mobility, his future is quite uncertain and this will affect his chances to marry young. The high cost of search and uncertainty may force him to either decide to lower his minimum acceptance level, thus marrying young, or to improve his economic position, thus marrying later[14]. Nevertheless, sometimes the postponement of marriage, due to low income earnings of the male, can be contrasted with her earning capacity when the wife works during the early

[14] Premarital sex, in contemporary societies, reduces the high cost of postponed marriage, allowing a delay in marriage timing (Oppenheimer, 1988[141]).

years of marriage: therefore, if she collaborates in the labour market and if they succeed in controlling fertility for a while, age at marriage can be lower than usual. In such a traditional society, women's traits are already defined at young ages and their reproductive capacity declines from their middle twenties. For Becker, women satisfy their advantage as soon as they marry and, as regard their future, women have much lower uncertainty than men do. Therefore, because the supply of available men to them is decreasing with age, women normally have a faster transition to marriage than men. This also implies different ages among spouses, especially when women are very young (Bozon, 1990[31]). To prevent daughters from marrying, families used to increase their advantages and attractiveness by the dowry system: it also functions to strongly contrast the declining supply of men as girls get older (Goode, 1964[88]; Oppenheimer, 1988[141]; Buss, 1995[37]; Bhat and Halli, 1999[17]).

Let us now imagine that women work for a longer period of time, not just before having their first child, which is the case for most of the developed countries. Several hypotheses have been developed to demonstrate that increasing female labour force participation has produced, by a greater economic independence, delay in marriage, rise in divorce, strong marital instability and eventually decline in fertility (Becker, 1974[9], 1981[10, chap.10]; Davis, 1985[60]). In the United States, the change in the rates of marriage are found to be linked to the reduced willingness of women to marry and to their increased ability to support themselves outside marriage, instead of to some constraints on the marriage market which, anyway, operates in the same direction for both sexes (Goldscheider and Waite, 1986[85]). Nevertheless, job-search theory may highlight the role played by other factors, as well. For example, schooling has increased its importance as a tool to improve the chances for a good job. As a consequence, early marriages may represent an obstacle to this aim. Another factor which may bring about a delay in marriage for working women is linked to the greater effort required by the adaptive socialisation process. Although the mechanism of the assortative mate selection has remained unchanged, the socialisation requires a more intensive commitment: if both partners are workers, they have to pool their energies and to cooperate in a better way. Thus, postmarital adaptation may be no longer sufficient as a compensation mechanism. A period of cohabitation may represent an alternative way of living, pooling together the advantages of marital relations, but, at the same time, still allowing a certain degree of independence and reciprocal knowledge. In this sense premarital cohabitation may represent a 'prelude' to marriage (Villeneuve-Gokalp, 1994[187])[15]. Lastly, earning money for a woman may increase her attractiveness, even at increasing ages, and may enlarge her marriage market (also thanks to the directly enlarged labour market in which she is involved). According to Oppenheimer[141] the greater instability of marital unions may well be linked to the recent and fast changes in contemporary societies.

Exogenous factors

Several changes in marriage timing patterns depend, both cross-sectionally and longitudinally, on exogenous factors such as, for example, changes occurring in the labour market. The demand for highly specialised professionals, requires a lengthening of the period of study and, in some cases, also higher geographical mobility during the training period, and therefore a postponement of the timing of marriage (Oppenheimer, 1988[141]; Mare, 1991[130]). Moreover, differences in the timing of marriage among working men will depend on their involvement in the type of career they want to reach (white collars versus blue collars).

Oppenheimer (1988[141]) argues that young men's income position is an extremely important factor affecting the timing of marriage of both men and women. The increase in the age at marriage can therefore be explained by the weak position on the labour market that young men occupy, linked to their uncertainty: even promising men may have a low entrance income[16]. In addition, periods of economic crisis or war directly affect marriage conditions. Therefore, at least in the American society, the author observes that most of the changes in marriage timing are still

[15] However, it should be observed that the relation between premarital cohabitation and marriage is not clear, as for marital dissolution seems to be higher for those who previously cohabited (Waite, 1995[189]).

[16] Oppenheimer insists on the point that it is the deterioration in young men's labour market position the more likely explanation of the changes in male marriage timing and perhaps of female as well. According to Easterlin, the recent sharp decline in the relative economic position of young men can be mainly attributed to the entry into the labour market of the baby-boom cohort. Therefore, the situation should reverse once the baby-bust cohort arrive. Still Oppenheimer observes that the cause of the delay in the transition to a stable work career is due to the shift towards more professionalised occupational structure characterised by relatively steep age-earnings profiles and this situation would not improve once the baby bust cohort will arrive.

the consequence of the changes in the young men's economic position, instead of the increased economic independence of women.

1.2.7 Homogamy through preferences, expectations, orientations and norms

Marital unions are characterised by a complex web of long-term trust and reciprocity that appears to be unparalleled in other species (Buss, 1994[37, p. 221]). In this sense, the cooperation between sexes reaches a pinnacle among humans. From an evolutionary point of view two 'sexual strategies' exist[17]: as adaptations are evolved solutions to the problems posed by survivals and reproduction, correspondingly, sexual strategies are adaptive solutions to mating problems.

From the point of view of evolutionary psychology (Buss, 1994[37]), fulfilling each other's evolved desires is the key to harmony between a man and a woman. Therefore, a woman's happiness increases when the man brings more economic resources to the union and shows kindness, affection and commitment, while, a man's happiness increases when the woman is more physically attractive than he is, and when she shows kindness, affection, and commitment. From this perspective, those who fulfill each other's desires have a more successful relationship[18].

Assortative mating has already been defined as a quite complex phenomenon in which many choice mechanisms interact. At an aggregate level, marriage patterns arise from the interplay of three social factors: preferences at the individual level, influence of group level factors and structural constraints (Kalmijn, 1998[113]).

As we said with respect to that concept, on a marriage market each individual evaluates his/her set of potential spouses, on the basis of their resources and in the perspective of increasing 'familiar', not individual's, goods. To this aim different kinds of resources can be distinguished and the main ones are the following two:

1) Socioeconomic resources that produce economic well being and status: from

[17]The term 'strategy' is used as a metaphor: sexual strategies do not require conscious planning or awareness (Buss, 1994[37, p. 6]).

[18]According to Buss (1994[37]), typical of humankind is that two unrelated individuals can bring all of their individual resources into a lifelong alliance characterised by love. Some of these resources tend to be linked to a person's sex, such as a female's reproductive viability or the male's provisioning capacity. But mating resources typically transcend these reproductive essentials to include such capacities as protection from danger, deterrence of enemies, formation of alliances, tutoring of children, loyalty in times of absence, and nurturance in times of sickness.

the competition for them there is a strong selection among the most attractive candidates and the least attractive ones have to rely on one another, and this phenomenon produces homogamy. The competition for these resources, which is aimed to marry someone of high status, is strictly dependent on the role of women in a society. In a traditional society, for example, the exchange happens between man prestige (in terms of paid labour) and woman qualities (household labour). In contemporary societies this has changed as women in the labour market have increased their attractiveness to men. In fact, wife's human capital is seen as a way to help husband's access to higher career.

2) Cultural resources in terms of values, worldview, knowledge: such kind of similarities have been studied by psychologists. People prefer to marry someone with cultural similarity, because this makes easier taking decisions about their future plans, daily life, children's education. Cultural similarity has been recognised as being successful in establishing long-term relationship, because it ensures common basis of conversation, provides confirmation on one's norms and values and reduces the friction within marriage that may arise from dissimilarities.

Some authors think that social characteristics are correlated with socioeconomic and cultural resources and that homogamy and endogamy are *by-products* of the individual preferences for resources in a partner. For instance, although related to income and ascribed status, educational homogamy can also be the result of common taste, values and lifestyles developed by those who have been longer involved in the educational system[19]. For others, social characteristics such as education, occupation, race, ethnicity may be used to show individual features and to enter in a kind of spouse selection process: people first select the network of friends and acquaintances with similar characteristics and then choose their partners among them homogamously (Goode, 1964[88]; Henry, 1973[97]).

The influence of group level factors can be understood if we focus on people who are not directly involved in marriage. Kalmijn (1998[113]) refers to them as 'third parties': they develop incentives or sanctions to avoid new generations from

[19] In a recent study on recently married couples in the U.S. emerged that assortative mating by cultural status is more relevant than assortative mating by economic status (Kalmijn, 1994[112]).

marrying exogamously. Each individual develops, at a different level, the so-called 'sense of peoplehood' linked to norms that are accepted by his/her society. Group identification is normally due to the socialisation process and to the network. Education has an important role in this context as it weakens the identification in a group, therefore increasing intermarriage (Kalmijn, 1988[113]).

At the same time, even for those who do not interiorise norms of endogamy, there may be a force that presses them to certain behaviour. Institutions may use direct or indirect sanctions to enforce their norms. For instance, the family, the church and the state may adopt groups' sanctions against exogamous marriages. Sanctions and norms developed as a form of protection and consolidation against the external forces[20]. Therefore, in this context, the family may neglect its support and approval, the church can denounce interfaith marriages, and the state may segregate racial intermarriages.

Lastly, not only individual and group-level factors, but also structural arrangements govern endogamy and homogamy. There is more than one structure arrangement: demographic composition of a population, regional distribution of groups, functional of settings (such school, workplace, and neighbourhood) can represent some of the constraints. Basically they act in terms of quantity and quality of the number of eligibles in the marriage market. First of all, the effect of group size implies that endogamy is negatively related to the degree of heterogeneity of a population (Kalmijn, 1998[113, p. 402]). Moreover, the distribution of a population on a geographical area is crucial as isolation may contribute to high endogamy.

The characteristics of local marriage markets, such as schools, workplaces, and neighbourhoods, are extremely important in explaining marriage patterns. The school, for instance, is the most efficient market because it is homogeneous with respect to age and heterogeneous with respect to sex. The workplace is considered less efficient even though the increasing participation of women in labour market may change its role (South and Lloyd, 1995[176]).

A central message of human sexual strategies is that mating behaviour is enor-

[20]'Differences in mean age at first marriage exist among rural women as well as among women with the same level of education in different countries. Because standard socio-economic indicators are not sufficient to account for the observed behaviour, more attention needs to be devoted to the socio-cultural factors involved, in particular to the marriage norms prevailing among these population subgroups' (United Nations, 1990[181, p. 294]).

mously flexible and sensitive to social context. Differences between the genders appear to be universal features of our evolved selves. Cultural variation represents one of the most fascinating and mysterious aspects of human diversity. Therefore men and women follow their preferences and expectations in terms of assortative mating under the constraints expressed by the social and cultural environment in which they live. The more the context is open to the external interchange, the higher the presence of intermarriage.

1.3 Recent studies in Europe and Italy (and US)

In 1990 the United Nations[181] stated about the role of the marriage market:

"...Despite considerable insights achieved by available marriage market studies, there are still difficulties in assessing quantitatively the effect of the marriage market and especially in distinguishing its interactions with social factors. In addition, social adaptability to market imbalances needs to be further studied." (United Nations, 1990[181, p. 294])

Nowadays, researchers still agree with the importance of studying marriage, despite of recent and increasing changes in the model of family formation in developed countries (United Nations, 1990[181]; Leridon, 1991[120] ; Roussel, 1992[154]; De Sandre et al., 1999[65])[21].

From a theoretical point of view, either at a microlevel and at a macrolevel explanation, the decline in marriage, the increase in divorce, the rise in cohabitation and in the birth out-of-wedlock have been linked to the decline in the advantages of marriage. Long term socioeconomic and cultural trends have (slowly) modified individual preferences, constraints, opportunities and, at the same time, the meaning of marriage has changed. As the trends towards decline and postponement of marriage, emergence of cohabitation and increase in marital instability have been common to most of western countries, theories have been developed to shed light, at a macrolevel, on these almost universal demographic patterns. A summary of the changes in the marriage related demographic behaviour observed in the European

[21] Evidence from a recent survey in Italy shows the existence among Italian women and men, also and above all those belonging to young generations, of a strong attachment towards marriage: ...it still appears as a fundamental value and this places Italy in a quite singular situation with respect to the other European countries, especially the Northern ones. (De Sandre et al., 1997[64])

1970	**B**	**DK**	**D**	**EL**	**E**	**F**	**IRL**	**I**	**L**	**NL**	**A**	**P**	**FIN**	**S**	**UK**	**IS**	**NO**	**CH**
Total First Marriage Rate																		
Women	0.98	0.82	0.98			0.92		*1.01*		1.06	0.91		0.94	0.62			0.96	0.87
Men	0.96	0.76	0.92			0.91		*1.02*		1.01	0.85		0.89	0.58			0.92	0.82
Mean age at first marriage																		
Women	22.4	22.8	22.5	23.7	24.7	22.6	25.3	*23.9*		22.9	22.9	24.3	23.4	23.9			22.8	24.2
Men	24.4	25.3	24.9	28.7	27.4	24.7	27.4	*27.4*		25.0	25.6	26.6	25.3	26.4			25.5	26.5
Proportion of first marriages																		
Women	92.4	86.1	85.9	96.2	98.9	92.5	99.2	*99.0*	92.3	94.0	86.8	97.9	92.6	89.0	88.3	90.9	93.3	91.2
Men	92.0	86.1	83.9	93.6	97.6	92.1	99.0	*97.6*	91.1	92.7	84.3	96.4	91.4	87.9	87.6	90.4	92.7	89.0
Total divorce rate	0.10	0.25	0.17	0.05		0.12			0.10	0.11	0.18	0.01	0.17	0.23	0.16	0.18	0.13	0.15
Live births outside marriage																		
as % of all live births, 1995	15	47	16	3	11	37	23	*8*	13	16	27	19	33	53	34	61	48	7
1995																		
Total First Marriage Rate																		
Women	0.57	0.65	0.56	0.75	0.60	0.49		*0.62*	0.56	0.53	0.55	0.77	0.57	0.44	0.54	0.50	0.54	0.63
Men	0.52	0.61	0.49	0.73	0.58	0.48		*0.59*	0.50	0.49	0.50	0.76	0.52	0.42	0.50	0.48	0.50	0.58
Mean age at first marriage																		
Women	25.4	29.0	26.4	25.7	26.8	26.9		*26.7*	26.6	27.1	26.1	24.8	27.0	28.7	26.3	28.4	27.3	27.4
Men	27.4	31.4	29.1	29.8	28.9	28.9		*29.6*	28.9	29.4	28.6	26.7	28.9	31.1	28.5	30.4	29.8	29.8
Proportion of first marriages																		
Women	77.6	73.0	76.1	91.4	95.2	82.9		*95.7*	80.2	83.5	79.8	93.7	80.8	78.9	70.9	83.5	81.7	82.7
Men	77.0	73.3	77.0	89.7	93.5	81.9		*94.1*	79.6	82.0	79.2	90.8	81.1	78.4	70.4	82.6	79.7	80.1
Total divorce rate	0.55	0.41	0.33	0.17	0.12	0.38		*0.08*	0.33	0.37	0.38	0.16	0.49	0.52	0.45	0.34	0.46	0.38
Live births outside marriage																		
as % of all live births, 1995	15	47	16	3	11	37	23	*8*	13	16	27	19	33	53	34	61	48	7

Table 1.1: Main indicators of marital behaviour in the European countries, 1970 and 1995

Source: Eurostat, 1997[71]

countries between 1970 and 1995 is reported in table 1.1. The decreasing attractiveness of marriage, observed as a reduction of nuptiality rates and an increase of divorce rates, has been explained by the complexity of the structure of the underlying social, economic and cultural changes. Although it is difficult to find a set of most influencing factors, it is usually recognised that rapid changes in fertility, marriage, divorce and cohabitation appear because of a mixture of socioeconomic and cultural factors (Van de Kaa, 1987[184], Lesthaeghe and Surkyn, 1988[124]): urbanisation, industrialisation, emancipation, the rise of the welfare state, individualisation, secularisation. This complex structure of factors has determined shifts in individual preferences (towards more individuality, freedom, independence), in constraints (towards less normative constraints and less affirmation to institutional regulations of the state, the church or the family) and opportunities (women's economic independence through labour market participation and individualisation of social security). Structure, culture and technology are according to Van de Kaa, three basic interrelated social dimensions among which one can search for an explanatory framework of the deep demographic changes occurred in the past decades: the complex set of transformation which they involved are known as Second Demographic Transition. Secularisation and individualisation are long-term *cultural changes* that have modified individual preferences in terms of marriage and divorce. 'Silent Revolution' is the most used term to refer to changes occurred in the cultural dimension. During the seventies, when marriage was perceived as 'bourgeois', the growing importance of individual's self-fulfilment and the weakening of the normative guidelines, have led to the decline of marriage and the rise of divorce. This shift in individual preferences occurred together with a shift in individual opportunities for the free choice.

According to Van de Kaa[184], *structural changes* are: modernisation, increase in the standard of living and social security benefits, functional differentiation, widespread of increasing education, women's increasing earning of power. Especially the last factor has been addressed by the economic theories (Becker 1974[9], 1981[10]) as the major factor in reducing the expected gain of marriage[22]. The in-

[22] Historically through marriage women gained economic support from the husband whereas men gained support regarding domestic services from the wife. The rise in the earning power of women, resulting from increasing education and labour force participation has disturbed this traditional gender based division of labour.

creasing earning power of women has also increased the opportunity costs of children, because childbearing often coincides with a woman's exit from paid employment.

Researchers agree in attributing the main cause of the risk of divorce to the changes observed in marriage as regard to its value, its function, its advantage. Changes in divorce can only be properly understood by related changes in marriage. Macro sociological theories highlight the loss of societal functions of marriage as the main reason of its decline (Espenshade, 1985[70]). Others refer to the declining preference or 'taste' for marriage (Bumpass, 1990[36]). According to Roussel (1989[153]), the shift from material to immaterial advantages of marriage is an underlying cause for rising divorce trends[23].

The last very important factor which facilitated the move away from marriage is *technological change*: for example the availability of good contraception, known as 'Second contraceptive revolution', allowed the increase in the age at first marriage because it enabled couples to avoid the fear of pregnancy. This revolution was also facilitated by the spread of more information both by transport system and by communication means.

The lengthening of youth, which characterises the period between adolescence and adulthood autonomy, is a general phenomenon in Europe opposed to the traditional model, according to which the entry into adulthood is characterised by a strong synchronism of steps along two main axes: on the first axis, the educational-occupational one, we register end of studies and entry into the labour market, and on the second axis, the familiar-conjugal one, we observe exit from family of origin and marriage. Despite a great number of differences in calendars within genders and social origins, synchronism is intended to be due to the traditional sequence among phases: the end of study is normally followed by finding of the first job which provokes, after a while, the exit from parental family and then the marriage. In the *traditional model*, youth has a very marginal role: it is a privilege basically of the bourgeoisie and of the males (Galland, 1993[73]). Nowadays in Europe the tradi-

[23]Remarriage plays a very important role in the debate regarding marriage as an institution. Kalmijn and de Graaf (2000[114]) observe that if remarriage rates are high, it is not very sensible to regard divorce as a sign that the institution of marriage is fading. The combination of frequent divorce and frequent remarriage points to other factors that may cause marital instability and suggest that a model of sequential marital monogamy fits the present situation better.if a low rate of remarriage is compensated by a high rate of cohabitation, the thesis of a weakening marriage institution is still a potentially valid interpretation of demographic trends.

tional model has been substituted by a new series of intermediate situations between adolescence and adult autonomy which shows a trend somewhat cross-national. In a very general way, four typologies of models regarding the adulthood have been distinguished for groups of countries. The *northern model* is characterised by a quite early exit from the family of origin, followed by a long phase as single or couple and, afterwards, by marriage (although not necessarily) and births. Opposed to this there is the *mediterranean model* which can be divided into four periods: lengthening of studies, precariousness of the job, permanence with parents even when a relative professional stability has been reached, and, eventually, marriage. Among these two models Great Britain and France have to be kept distinct. In *Great Britain*, despite an early entry in labour market and an early autonomy, the age at first birth is the highest in Europe; *France* is in between the southern and the northern model because it shows a lengthening of the study period and, at the same time, of the life-span as single (Galland, 1993[73]).

1.3.1 Nuptiality trends in Europe

In 1965, the Hajnal study on the European marriage pattern revealed the existence of an almost unique model which lasted almost two centuries up to 1940. The European model, which pervaded the whole of Europe, with the exception of eastern and south-eastern countries, was characterised by a high age at marriage and a high proportion of people who never marry. Analysing data for 1900 Hajnal[93] imagines the existence of an hypothetical

> *"line running roughly from Leningrad to Trieste"* (Hajnal, 1965[93, p. 101])

that divides Europe in two parts: the west side, the so-called 'European' with the characteristics already mentioned and the south-east one with a very low proportion of never married people (marriage is almost universal) and a low age at first marriage.

Ways of union formation have deeply changed in Europe during the last three decades. The decline of nuptiality has been general and the cross-sectional indicators have reached values never observed before in most of countries (Sardon, 1992[159]).

From a demographic point of view, there are still few considerations regarding the role of marriage. First of all, one of the most important aspects is the one linked to its key-role as a *regulator* of the growth of a population: Malthus highlighted this function in comparison with the more brutal (violent) increase of mortality and therefore is nuptiality after a period of crisis that let the stressed population recover.

Another very crucial aspect in demography, which was instead introduced by sociologists during the 50s, is the key-role of marriage as a *intermediate variable*: the fertility rate is a function of some elements among which can be envisaged the age at marriage, the proportion never married and the rate of disruption (Bongaarts). The cause-effect relation has been introduced in demography to link variations in fertility to variations in marriage patterns.

As regard marital dissolution

One of the major changes in the industrialised countries of the West is the increase in the rates of divorce since 1950, which accelerated in about 1965 (increase in the frequency of divorce occurred since 1965). The search for an explanation for the increase of divorce has put forward a number of 'reasons': lower age at first marriage, increased number of prenuptial conception, increases in women's labour force participation rates, liberalisation of the divorce laws (Roussel, 1989[153]).

Neither separately nor together the whole set of explanatory factors can be related to the increase in the frequency of divorce. It is indeed very important to take into account the *norms* of a society with respect to these factors: norms designate some of these factors as incompatible with the idea of a 'good marriage' and therefore marriages with such characteristics are more likely to end in divorce[24]. Divorce seems to be strictly linked to the dominant pattern of marriage in the society: the greater the difference from the dominant pattern, i.e. the greater the degree of *heterogamy*, the greater the probability that the marriage will end in divorce (Roussel, 1989[153, p. 24]).

Roussel (1989) analyses the trends in marriage and in its function: historically the main goal of the marriage was to survive, to maintain the property within the family, to ensure security in old ages through the procreation of the children ([153, p. 25]). 'Traditional' marriage was a union where both spouses' expectations were relatively modest, the family coincided with the unit of production and wives and husbands played two complementary roles. The institution of marriage was legit-

[24] For example in Denmark, premarital conceptions have practically no correlation with divorce, while other societies show a strong impact (Christiansen, 1963[49] cited by Roussel, 1989[153, p.24]).

imated by the culture and thereby could not be broken. During the nineteenth century western industrialised societies developed a different type of dominant marriage among the bourgeoisie: it was based on the solidarity of the couple through affection. It was naturally based on the mutual happiness of the spouses and implied a permanence of conjugal bond. This type of marriage still continues today, but, besides it, there is another type of union, where the institution of marriage itself is secondary. This type of marriage, where the ceremony is viewed as a socially convenient formality, has a greater number of expectation which will not easily be permanently fulfilled. Therefore, the author assumes a greater frailty of this type of marriage, as a result of the unrealistic nature of the spouses' expectations. This pattern of marriage just breaks down as soon as the romantic love stops. Lately, a new model of marriage, based on reason appeared since the beginning of the seventies: each partners evaluates the relationship in which he/she is involved and recognises the possibility of divorce as part of this contractual type of marriage. According to Roussel (1989[153]) the increase of divorce, is strictly linked to the different types of marriage and in particular to the high fragility associated with this last type of marriage: its precariousness and its spread among people has increased the total divorce rate.

1.3.2 Italy

Some data ...

In 1996 the absolute number of marriages in Italy is 278,611 which corresponds to a nuptiality rate of 4.9 marriage per 1000 people. Total First Marriage Rate, obtained summing up the age specific first marriages rates below the age of 50, has shown a great reduction as well as the postponement: while at the beginning of the 70s the period rate was still higher than 1000 per thousand for both sexes (1017 for men and 1009 for women), in 1996 it is 565.4 per thousand for men and 600.2 per thousand for women. In addition, the decrease of the total first nuptiality rate is higher for men than for women, as the latter probably more often marry men, which are at their second wedding (Righi, 1997[149, chap. III]). The mean age at first marriage has passed from 28.4 in 1990 to 29.9 years in 1996 for men and from 25.6 in 1990 to 27.1 years in 1996 for women; as a consequence, given that most of fertility in Italy happens inside marriage (De Sandre et al., 1997[64, chap. 1]), also the mean age at first birth has grown from 26.9 in 1990 to 28.1 years in 1995. Looking at the birth cohort behaviour, a strong decline of nuptiality can be confirmed. From one birth cohort to the other, for both sexes, a decline in the level and an increase in the age at marriage is observed (Righi, 1997). The decline of marriage in Italy starts from the cohorts born in 1955: they first postpone it but then they do not compensate at later ages (Castiglioni, 1999[45]). Despite the general reduction of the nuptiality across cohorts, some differences exist at a regional level. Women younger than 25 in the North of Italy are increasingly reducing their propensity to marriage with respect to those living in the South. Men, living in the North marry less often than those who live in the South at each age: this seems to represent a peculiar behaviour of the young in the North, regardless of their level of education and other variables.

Since its introduction in 1970, divorce rate in Italy has doubled starting from 5% up to 10% in 1996 even though it remains the lowest in Europe (Monnier, 1998[138]). Growing civil marriages[25] represent 20.3% of total marriages with a large geographical variability (in the northern regions up to 35% of marriages are civils while the minimum observed in the southern regions is 6.2%). Also, the number of second marriages is growing: they represent 6% and 4.4% of all marriages respectively for males and females.

Changes in nuptiality are also strictly linked to the growing proportion of the young that remain at home longer. In Italy, in 1998, 66.5% of men and 50.9% of women aged 18-34 are still living with their parents. 41.7% of people aged 18-34 are employed, but considerable differences exist at the regional level. In particular, if almost 60% of young people have an employment in the North of Italy, and 41.3% in the Centre, only about 25% of people aged 18-34 are in the same conditions in the South. But unemployment represents a reason not to leave their family only in 15.9% of cases, reaching 28.8% of people living in the South. When asked about the reasons of their permanence in the parental home, most of the young say that they keep their autonomy (47.3%), a considerable percentage are still studying (29.5%) and a 15.4% do not manage to find housing. Moreover, most young people consider

[25] Civil marriages are those not celebrated by a religious rite. In Italy marriages celebrated by religious rite have also civil validity, while the contrary does not hold.

their permanence at home normal (38.3%) and do not feel the need to leave (28%) while 21.8% would prefer to leave and 4.2% try to adapt themselves to their current situation (Sabbadini, 1999[157]).

Although its decline, marriage still represents the most favourite way of family formation, while consensual unions are not much spread. These are increasing with birth cohorts but quantitatively few, yet: in 1995, out of 100 unions, 2 are consensual unions for the birth cohort 1946-50 while 12 are consensual unions for the birth cohort 1966-70 (De Sandre et al., 1997[64, p. 85]). Marriage is still a central institution also for the young generations, to which consensual unions, as an alternative way of life in couple, represents a temporary experience: especially before the birth of the first child, it quickly becomes marital union (Sabbadini, 1997[156]). Looking at the results from the *Seconda Indagine Nazionale sulla Fecondità* (INF-2)[26], De Sandre (2000[63]) briefly addresses the trends in marriage and birth rates, starting from the 1960s cohorts, to deep structural changes. It results from putting off strategy that combines many factors:

"(a) major investments on education and work even for women, (b) a coherent change in cultural representation of the life of a couple, (c) a moderate esteem of different types of unions other than marriage, (d) a parental family realignment with a long presence of young adults children, especially men, (e) a specific generational inclination to putting off the choices of an adult life" (De Sandre, 2000[63]

Dalla Zuanna and Castiglioni (1996[46]) summarise the main relevant explanations used for understanding the social changes that occurred in the western societies with particular evidence to the Italian case.

First, the economy and the job market structure have greatly changed during the last thirty years in the more developed countries, bringing about the reduction in the wage differentials among men and women, rise of the women labour force's

[26] INF-2 was designed in the frame of the *Fertility and Family Survey*, coordinated by *PAU* (Population Activity Unit) of the *UNECE* (United Nations Economic Committee for Europe). The FFS project involved 23 developed countries with a common core questionnaire. INF-2 has been conducted in Italy during the period: november 1995 and winter 1996. The sample was composed by 4824 women aged 20-49 years regardless their marital status, and 1206 men aged 20-49 years regardless their marital status and 602 partner of the interviewed women. The findings presented in this section mainly refer, whether not directly indicated, to the analysis of the data from the INF-2 and published in De Sandre et al, 1999[65], in particular, as regard marriage to the study of Castiglioni (1999)[45].

offer, the growth of consumptions, etc. Changes in the economic structure may have made marriage less attractive than singlehood or cohabitation. From this point of view, young adults in Italy may economically take advantage from their staying home even when they work, so to better exploit the parental support and to increase their saving money capacities.

Second, as regard the role of women, most changes have to be related to their increasing involvement in education[27]. Increasing human capital on one hand delays marriage as it requires a longer period of economic dependence on their families (Blossfeld and Huinink, 1991[25]), and, on the other hand, it enhances their perspective regarding values, worldview and roles among genders. Education enrollment confirms the negative relation with nuptiality: those who study more, marry later and less (as a cohort). Indirect effect of education, as that linked to the spread of modern behaviour (such as the cohabitation) does not emerge, yet.

Third, the Sexual Revolution and the Secondary Contraceptive Revolution have involved all western countries and have been put forward as a crucial factor of the major social changes especially in gender relationship. Age at first sexual intercourse has decreased especially for women and the use of highly efficient contraception (especially if not directly linked to the the sexual intercourse, such as spiral and pill) has spread. The pattern of entry into adult sexual behaviour for women has converged to the men's one. In Italy major shifts have been observed for the cohorts born in the 50s which, first, separated sexual behaviour from formation of a new family. Strikingly, data from INF-2 show that cohorts born during the second half of the 60s in Italy, on the contrary to what observed for other European countries, have a reversal trend. As concerns the age at first sexual intercourse[28]. The first age at sexual intercourse has risen for women born during the early 70s up to 22 years (De Sandre, 1997[64]). Moreover, while for men there are no deep differences over all the country, women in the North have their first sexual intercourse

[27] In 1991 the great majority of the italian provinces showed, among students, a higher proportion of women than of men. Italian families are addressing a great amount of their money to their daughters' education (Castiglioni e Dalla Zuanna, 1996[46]).

[28] The major decline has been observed for the cohorts of women born in 1961-1965 up to age 17-19. The social and cultural context lived during their adolescence has been put forward as an explanation for the anticipation of their sexual behaviour. Thereafter, the age at first sexual intercourse increased again for women (De Sandre et al., 1997[64, chap. 3]; Cazzola, 1999[48, chap. 21])

2 years earlier than the southern women. As a consequence the traditional, rigid pattern of contraception, marriage and fertility has shifted towards a more flexible one where partners regulate their behaviour according to their preferences and to the surrounding chances offered by the society.

As a fourth element of explanation of part of the demographic behaviour Dalla Zuanna and Castiglioni focus on the role of tradition in Italy: this has been mainly observed from the religious and the familialistic point of view. Italy has been always supposed to be particularly affected by religion both directly (by promoting early entry into marriage) and indirectly[29] (by lower involvement towards new patterns of family formation). But young Italians, even when practicing, often reinterpret in a more permissive way the sexual ethic of the Church or they just adopt a very prudent behaviour to what concerns family. Familism represents the other aspect of the Italian tradition. It refers to a situation where each individual organises his/her life around the family to which they belong, and therefore this family's utility function overcomes his/her utility function. Based on this point of view, the decreasing fertility can be read looking at the concerns of the Italian families about their capabilities to maintain the well-being of their children in the long term (or probably their only child, Castiglioni and Dalla Zuanna[46]). As precariousness of a new family is not allowed, the delay in marriage may be viewed as a

"familialistic answer to the changed socio-economic conditions during the last two decades"(Castiglioni and Dalla Zuanna, 1996 [46, p. 8]).

Lastly, the existence of external constraints can be considered as a decisive factor of social changes. For example, when the availability of houses is very poor, new couples have greater difficulties in leaving the parental home and either in marrying and in cohabiting.

1.4 Research questions and outline of this work

Among other western countries, Italy represents an interesting case in the study of recent process in family change. For younger generations too, marriage holds a relevant role and represents an important step, though non-marital cohabitation is

[29] Studies show a strong negative association between religiousness and propensity to 'more uxorio' unions (Sabbadini, 1987[155] quoted by Castiglioni e Dalla Zuanna, 1996[46]).

emerging as a behaviour. The interest for analysing the marriage market and the homogamy in Italy stems from the need to study a field of research which has been partially abandoned during the last years, and is strictly intertwined with the recent trends of declining fertility rates characterising this country.

Significant changes in the propensity to marry, together with baby booms, busts and migrations shape the marriage market. Big changes in the level of fertility may affect, some decades later, the opportunities of marriage of eligible individuals, creating a marriage squeeze. Apart from the variation due to the pattern of births during World War I and II (Colombo, 1975[57]; Bartiaux, 1994[8]) and the effects of fascist pro-natalist policies (Festy, 1971[72]), also the long phase of reduction of births, over the last 30 years in Italy, could have played an important role in the actual marriage market. Male cohorts are nowadays systematically greater than the female ones, two, three years younger, and this may have an influence on the nuptiality intensity by sex and on the proportion of ever married men/women. Internal migration also interacts with the patterns of natality.

My purpose here is to provide an overview of the nuptiality trends characterising the last 30 years in Italy. In particular, I want to study how patterns of first marriage behaviour have changed over time.

In a second step, I aim at evaluating the dynamics of the Italian marriage market under the hypothesis that, since World War II, roller-coaster natality has affected differently the marital opportunities of both sexes, enlarging or narrowing the pools of the eligibles. I am also interested in studying the regional imbalances in the marriage market, which are strongly connected to differential migration by sex.

Then, I pass to the analysis of the transition to first marriage from a micro-based longitudinal perspective. My purpose is also to evaluate whether and to what extent macro variables regarding the availability of eligible partners shape the process of transition to first marriage for men and women. Many theories highlight the role played by constraints on the marriage market in affecting chances of marriage at the individual level. Moreover, given that the timing of marriage changes according to gender, cohorts and other aspects related to the life-course of the individuals, I also wish to ascertain whether and to what extent the marriage squeeze affects the age-patterns of the transition to first marriage.

Lastly, I study the characteristics of the partners who marry. My purpose here is to analyse whether and to what extent the processes of societal dynamics (modernisation above all) have brought about a shift in assortative mating process with respect to partner's traits. Homogamy patterns are analysed under the assumption that the rise in regional mobility trends overall the country might have lowered the probability of marriages between partners coming from the same region of birth. The lengthening of the education for both sexes and the increasing female labour force participation might have accrued the process of equalisation, at least as regard the age difference between partners. Another aspects of reasearch is also the role of educational assortative mating. Homogamy is therefore studied according to the following dimensions: age, place of origin and education. I also aim at evaluating the effects of the marriage market conditions in shaping the homogamy trends.

This work is composed by 5 chapters. In this first chapter I introduced the theoretical framework with reference to the literature. I also presented a brief description of the trends concerning marriage in Europe and, in particular, in Italy. Chapter two will focus on timing and occurrence of first marriage for men and women. In this phase, the classical perspective of studying the trends in nuptiality according to the two one-sex dimensions to analyse *if* and *when* people get married is adopted.

A special attention then is given to the role and the characteristics of the marriage market (chapter three). In this work, marriage market is a broad concept, similar to that of 'circles de relations', 'pools' which attempt to take into account multiple dimensions of the assortative mating process. Studying the marriage market opens questions regarding the methodology to adopt for its analysis. The discussion is still open, but in this work, indices based on a specific solution to the two-sex problem will be adopted and/or introduced. The basis for this analysis in these two chapters is given by first marriage rates (ISTAT) and nuptiality tables for both sexes by place of residence of the spouses, for the period 1969-1995.

In order to evaluate the role played by marriage market conditions on the marital behaviour, I then include the aggregate conditions of the marriage market as determinants of the transition to first marriage (chapter four). This requires a linkage between the macro measures of the marriage market characteristics and the individual life histories. The role of the marriage market as a macro variable will then be integrated and discussed in its effects on the transition to first marriage. A life-course approach offers an integrated frame of reference in which these various life domains are simultaneously taken into account. Therefore, it is from an individual perspective (*'methodological individualism'*, Coleman, 1990[53]) that it is possible to shed light on the pursued strategies to aim certain life goals in response to changes not only in their own lives but also in their environment.

The data used in chapters four and five are available from the survey *Indagine Multiscopo sulle Famiglie, 1998* (ISTAT).

Also in the last chapter, I will adopt an event history approach to accomplish the study on homogamy. Studying the characteristics of married people by applying an event history analysis represents a new methodological tool in this field of research. This chapter provides also a review of the literature concerning the dimensions under study: homogamy by age, place of origin and education. Lastly, the marriage market measure is integrated to the individuals' life courses and its role is evaluated with respect to the analysis of the homogamy patterns.

This dissertation aims at widening the scope of traditional demographic studies on the process of union formation in Italy with particular attention to the impact of the marriage market and the characteristics of assortative mating process. The transition into first marriage is examined from a life course perspective for both sexes. Particular attention is given to the dynamics of the transition into marriage across cohorts and with an attempt in the integration of micro and macro level information.

Chapter 2

Nuptiality in Italy: 1969 - 1995

2.1 Introduction

During the last thirty years, many changes occurred in the process of family formation in Italy. Among these, the transformations concerning the marital behaviour have a crucial role. In this chapter we study the patterns of marriage in Italy from 1969 to 1995: starting from marriage rates, we analyse the main indicators regarding first marriage behaviour for men and women over the period. In particular, next section contains a description of the available source; section 2.2.1 introduces the formal definitions used to calculate indicators of timing and occurrence of nuptiality; the third section (2.3) contains an evaluation of the quality of the data: it turns out necessary to introduce an adjustment procedure (section 2.3.1). The data base concerning first marriage rates by place of celebration is presented in section 2.3.2. Section 2.4 describes the aggregate patterns of marriage in terms of total first marriage rate and mean age at first marriage, both cross-sectionally (2.4.1) and longitudinally (2.4.2); section 2.5 provides an application of contour maps to nuptiality: this results to be very informative about the general shifts in first marriage behaviour occurred over the last thirty years. Lastly, section 2.6 contains a short analysis of the macroregional differences, based on contour maps, as well. The analysis is conducted at the level of the country as a whole, although sporadically will go in much deeper detail of study, at the regional level.

The aim of this chapter is to provide a general view on the dynamics of Italian nuptiality from a macro perspective both cross-sectionally and longitudinally.

2.2 First nuptiality in Italy by sex, region, cohort: the source

In Italy, marriage is a legal union of two persons of opposite sex. The legality of the union may be established by civil and/or religious means. Civil marriage does not involve a religious ceremony but is recognised by law, religious marriage implies also civile effects. Statistical registration of marriages is compulsory. Like other vital statistics, those on marriage and divorce are collected at the local level.

The main source for a detailed and deep knowledge of nuptiality in Italy is the registration of marriages. Since 1926 the *Istituto Nazionale di Statistica*, Istat, registers marriages through an exhaustive and continue collection of data. Information about each marriage are registered by the 'Ufficiale di Stato Civile', say Officer of Vital Statistics, by filling a certificate (the form called 'mod. ISTAT D.3', in conformity with the norms contained in the Decreto n.1238, 9 July 1939 regarding the regulation of the 'Ufficio di Stato Civile'). Although there has been some change over time, information about each marriage regards date and place of event, date and place of birth, place of residence[1], marital status, level of education, occupational status and citizenship of both spouses. It is worth to note that, information about place of residence of the spouses is not available for the period 1952-1968, as marriages were only registered by place of event.

Since long time, Istat computes data on current nuptiality regularly each year with the purpose of calculating the main aggregated total and age specific indicators. Nevertheless, a period approach does not allow to follow and interpret the evolution of the phenomenon occurring across cohorts with regard to both total rate and timing of the process. A research group on nuptiality inside Istat worked to fill with this gap by reconstructing first marriage rates in Italy, at regional level, in a macro-longitudinal perspective. Marriages of bachelors (to single, widowed or divorced women) and of spinsters (to single, widowed and divorced men) by single year age group, from 15 to 49 years, by region of registration of the event, from 1952 to 1995,

[1] The registration of marriage according to the place of residence of the spouses is that related to the 'de jure' or resident population, while marriages by place of event are those related to the 'de facto' population. A certificate of marriage is filled according to the place in which it happens, and afterwards the 'Ufficiale di Stato Civile' communicates the act to the place in which each spouse resides.

and region of residence of the spouses, from 1969 to 1995, represent the events under study[2].

After a revision and collection of the data[3], two archives on first order marriage rates have been built:

1) by region of residence of the spouses, sex, single year age, calendar years 1969-1995;

2) by region of registration of the event, sex, single year age, calendar years 1952-1995.

These represent the data bases which we use to analyse nuptiality in Italy.

2.2.1 Formal definitions

Briefly, for each calendar year t, and for region k and age x, age specific first marriage rates, $m(x,t)$, have been built in the following way:

$$^{k}m(x,t) = \frac{^{k}M(x,t)}{^{k}P(x,t)}1000 \tag{2.1}$$

where $^{k}M(x,t)$ are marriages of spinsters (to single, divorced and widowed men) and bachelors (to single, divorced and widowed women) aged $(x, x+1)$ at time t for region k and $^{k}P(x,t)$ are person-years lived by men and women residents in region k at time t, regardless of their marital status, between exact age x and $x+1$. Age specific first marriage rates (2.1) express the observed male and female marriage occurrences between age x and $x+1$ over person-years lived by each sex from age x to $x+1$ at time t. It is worthy to note that the denominator of the rate is the average male and female population regardless of their marital status. This rates are called reduced events, or 'frequencies' as they are called in the English literature, or second type rates (Leridon and Toulemon, 1997[122]) and are incidence measures related to the population surviving competing events, having or not experienced the event studied (first marriage, in this case). If there is independence between marriage and these competing risks (mortality and migration) they are equivalent

[2]Italy is composed by 20 regions, which can be easily grouped in 3 macroregions. As a whole, the variable region assumes 23 different values. We will return on this point later, giving a very short description of the regional classification.

[3]For a detailed description of the collection and homogenisation of the archives, see Santini et al., 1999 [158].

(in a cohort approach) to the first marriages in a nuptiality table (multiplied by an adequate scalar). When nuptiality is analysed as a unique process composed by renewable events (marriages by order), instead of a set of different processes of not renewable events, then the expression (2.1) is the only way to measure the intensity of the process, when the conditions of independency and continuity are satisfied (Santini, 1992[159]). Thus, the data base contains the unconditional rates of first marriage. These result to be smaller than the conditional rates defined by taking into account, at the denominator, only people at risk of their first marriage (i.e. only unmarried people). Yet, to build conditional rates one should need the distribution of the population by marital status and this is available only at census time. In the next chapter we will also adopt a procedure to estimate the conditional rates.

The birth cohort T for both spouses is calculated as a difference between the calendar year of marriage t and their age at marriage x. Either cross-sectionally and longitudinally, it is possible to calculate the Total First Marriage Rate $TFMR$ and the mean age at marriage $\overline{X}$ as follows: cross-sectionally for the calendar year t:

$$TFMR(t) = \sum_{x=15}^{49} m(x,t) \tag{2.2}$$

and

$$\overline{X}(t) = \frac{\sum_{x=15}^{49} x \cdot m(x,t)}{TFMR(t)} \tag{2.3}$$

longitudinally, for the cohort born in T:

$$TFMR_T = \sum_{x=15}^{49} m(x,T+x) \tag{2.4}$$

and

$$\overline{X}_T = \frac{\sum_{x=15}^{49} x \cdot m(x,T+x)}{TFMR_T} \tag{2.5}$$

Although similarly built, measurements of the Total First Marriage and mean age at marriage have different meanings in a cross sectional and in a longitudinal perspective. In the period approach, each of the age specific first marriage rate belongs to a different birth cohort that has reached age x in time t. They are therefore abstract measures that provide the advantage of giving a period-related interpretation. Period Total First Marriage Rate (2.2) and mean age at marriage (2.3) are biased with respect to the ones built in a longitudinal perspective. In fact the $TFMR(t)$ for the calendar year t (2.2) is sensitive to changes in the timing of nuptiality. For example, given a certain total first nuptiality rate for cohorts, a postponement (or anticipation) in the timing (2.5) of nuptiality will bring about a reduction (or increase) in period indicators.

Furthermore, the two archives on first order nuptiality differ according to the kind of marriages specified in the numerator of their rate. Let us indicate for each sex:

$$^{k}m(x,t) = \frac{^{k}M^{res}(x,t)}{^{k}P^{res}(x,t)} \tag{2.6}$$

the age specific first marriage rate for region of residence k, for a spouse aged $(x, x+1)$ during year t; and

$$^{k}c(x,t) = \frac{^{k}M^{cel}(x,t)}{^{k}P^{res}(x,t)} \tag{2.7}$$

the first marriage rate for those aged $(x, x+1)$, who celebrate their marriage in region k (regardless of their own place of residence) during year t. As it can be seen the two age specific first marriage rates (2.6) and (2.7), differ only for the quantities in the numerator, as the denominators contain the same 'de jure' population (those aged $(x, x+1)$ who reside in region k, at time t. This is because, for the denominator, the person-years lived in region k for the 'de facto population' are not available: an estimate of the population present in a territory exists only in occasion of a census. In such a case, the rate (2.7) is biased as it contains, in the numerator, marriages that are not necessarily yield by the population in the denominator. As usual:

$$^{k}TFMR(t) = \sum_{x=15}^{49} {^{k}m(x,t)} \tag{2.8}$$

is called Total First Marriage Rate by place of residence of each spouse and

$$^{k}\overline{X}(t) = \frac{\sum_{x=15}^{49} x \cdot {^{k}m(x,t)}}{^{k}TFMR(t)} \tag{2.9}$$

mean age at first marriage by using the first marriage rate (2.6) by region of residence of the spouse $k = 1, \ldots, 23$ and for years $t = 1969, \ldots, 1995$; while:

$$^{k}TIC(t) = \sum_{x=15}^{49} {^{k}c(x,t)} \tag{2.10}$$

is here called Total Index of Celebration and

$$^{k}\overline{X}(t) = \frac{\sum_{x=15}^{49} x \cdot {^{k}c(x,t)}}{^{k}TIC(t)} \tag{2.11}$$

is the mean age at marriage of those who marry in region $k = 1, \ldots, 23$ and years $t = 1952, \ldots, 1995$, by using the first marriage rate (2.7) by region of celebration.

2.3 Data quality

The analysis of the series of the Total First Marriage Rates for birth cohorts (2.4) from the Istat data base highlights the existence of an inconsistency: some of the birth cohorts had an exceptionally high total rate. In particular some of them showed a TFMR greater than 1000: this would mean that a real cohort of 1000 people at age 15 would experience more than 1000 first marriages, which is obviously absurd. In fact, such a result can only be accepted in a cross-sectional observation, where the effect of changes in the timing can produce an exceptionally high total rate.

But, as observed in a previous work on this data base (Santini et al., 1999[158]), such a problem is surprising: in this case the age specific first marriage rate (2.6) comes from the 'de facto' population and the quantity in the numerator and in the denominator are homogenous. Checks on the possible source of biases for both quantities in the denominator and the numerator were conducted.

As already pointed out (Santini et al., 1999[158]Cohorts born in 1955 and 1954 for the single women and in 1951 and 1954 for single men were most affected by the high total nuptiality rate. For women, the age specific nuptiality rates analysis highlighted a sharp increase at ages 22 (for the cohort born in 1955) and 23 years (for the cohort born in 1954); both ages were reached by these women in correspondence of the calendar year 1977. Similarly, men born in 1951 (and in 1952) showed an extraordinary high rate at age 26 (and 25) years; both ages where reached by these men in correspondence of the calendar year 1977. Discussion about possible sources of bias for the year 1977, and partly 1978, focused around the introduction, in those years, of a new module of registration of marriages. From 1976 to 1979 a 'optical scannering' module has been introduced to substitute the traditional one. Errors are probably related to the correction of the register data by the application of a deterministic method which, as a result, biased the age distribution for the 1976-1978 marriages[4]. Thus, the research group proposed to adjust the age specific first

[4]The denominator, at least for women, contains the person-years lived at time t and between age x and $x + 1$ has been already used for a previous study on fertility by cohorts born after World War II (Istat, 1997).

marriage series by age, sex, region (both of registration of the event and of place of residence of the spouses), for the years 1976-78 (Santini et al. 1999[158]).

Up to now the correction of the age specific first marriage distribution has not yet been accomplished. As it represents the necessary requirement for successive analyses on this data base, we preliminarily focus on the adjustment procedure of the series for the years 1976-78 both for place of residence and for place of registration of the event, by sex and all age groups.

2.3.1 Adjustment of the data base

The first step, in this phase, has concerned the choice of a method of adjustment of the data set. Alternatives among which to choose, were mainly two: either fitting or smoothing over time the age specific series. Attempts to evaluate the accuracy of first, second or third linear order fitting and a 9 or 11-terms moving average have been made. At local level, the result does not seem to vary significantly according to one of these methods rather than the other. Maybe the worst method seems to be the first order linear fitting, while some accuracy could be highlighted in the smoothing procedure through an 11-terms moving average.

We eventually chose and applied the 11-terms moving average method to adjust cross-sectionally all the series of the age specific first marriage rates for 1976, 1977 and 1978 years both for region of residence and for place of the event, for both sexes as follows:

$$^{k}\overline{m}(x,t) = \frac{\sum_{j=t-5}^{t+5} {}^{k}m(x,j)}{11} \qquad t = 1976, 1977, 1978 \tag{2.12}$$

Once adjusted cross-sectionally, the longitudinal reconstruction of the data base has been conducted with the aim of observing the resulting aggregated synthetic measures. In particular a check on the TFMR for a birth cohort (2.4) should provide us with some idea of the correctness and accuracy of the new nuptiality rate.

First, let us focus on the single years rates. Figures 2.1 and 2.2 show the comparison between adjusted and original first marriage rates for female and males by birth cohorts for those ages most affected by biases[5]. As it can be seen the unusually high rates of first marriage decrease to normal level after the 11 terms moving average.

[5]But the moving average procedure has been applied to every age specific rate for each region, all years and both sexes.

In particular if for women aged 22 the rate exceeds the 160 per thousand value, for the 1955 birth cohort, after the adjustment it stays at around 100 per thousand. At the same time also the peak for males aged 26 years who belongs to the 1951 birth cohort decreases to level similar to the adjacent ones. In figure 2.1 and 2.2 both cases of resulting adjustments, by place of residence and place by celebration respectively, are displayed.

Second, summing up to age 50 the cohort age specific first marriage rates, it is possible to check whether the smoothing procedure worked in the sense of not exceeding the 1000 marriages level. Indeed, as regards the data base of the age specific first marriage rates by cohort and place of residence of the spouses, the Total First Marriage Rate stays under the level of 1000 marriages out of 1000 single people at the beginning of the birth cohort (table 2.1). In table 2.1, birth cohorts are censored either to the left (those born from 1920 to 1953) and to the right (those born from 1947 to 1979). Nevertheless, the highest total rate reached is that referred to women born in 1954 (observed for a total amount of time of 28 years and which could therefore well include almost all their first marriage story) and it is around 930.6 first marriages per 1000 women at age 15.

2.3.2 Marriages by place of celebration

Despite the adjustment procedure, the Total Index of Celebration in longitudinal dimension (which we do not present here) often surpasses the 1000 marriages level. This is, nevertheless, not surprising: in this case, as we said earlier, age specific rates are not homogeneous between numerator and denominator, given that the occurrences at the numerator do not come from the population at the denominator (resident). As a consequence of the intensive and prolonged mobility of the Italian population across regions (and abroad), the sum over the ages 15-49 can exceed the level of 1000 first marriages for 1000 persons at age 15 in a cohort, when we look, subnationally at the place where marriages are celebrated. Indeed, internal and external movements have been quite common, especially during the 1960s and 1970s (Sori, 1979[172]; Favero and Tassello, 1978[151]; Bonaguidi 1985[26]). Internal movements involved mostly young men from the southern regions to the northern ones (above all towards the so-called ‘industrialised triangle area’: Liguria, Piedmont

Figure 2.1: Marriage rates for selected ages resulting in the birth cohorts, before and after correction for the calendar years 1976-1978, by place of residence - Italy

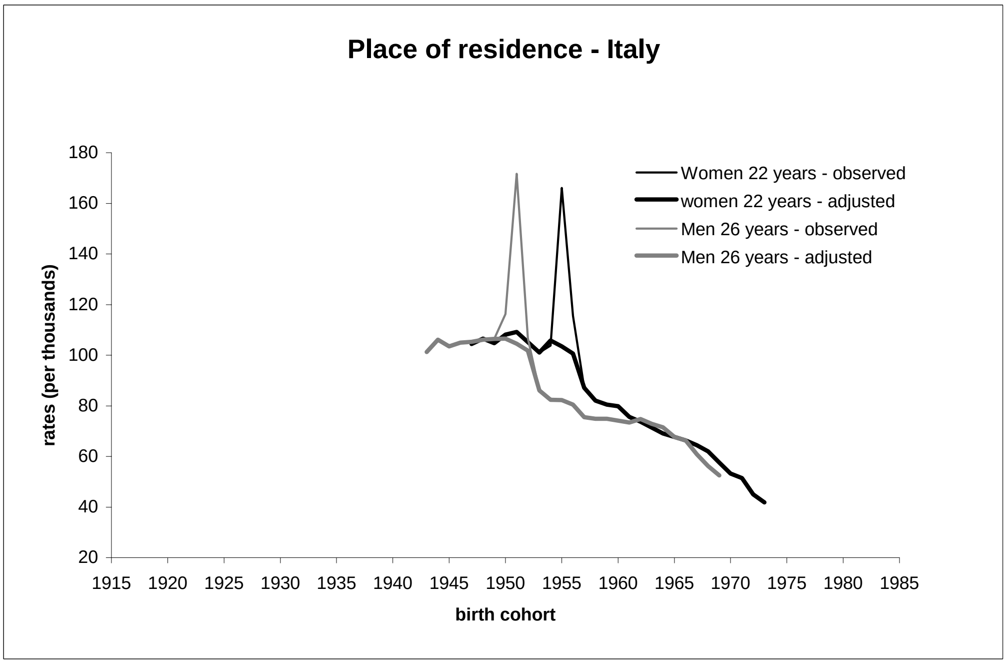


Figure 2.2: Marriage rates for selected ages resulting in the birth cohorts, before and after correction for the calendar years 1976-1978, by place of celebration - Italy

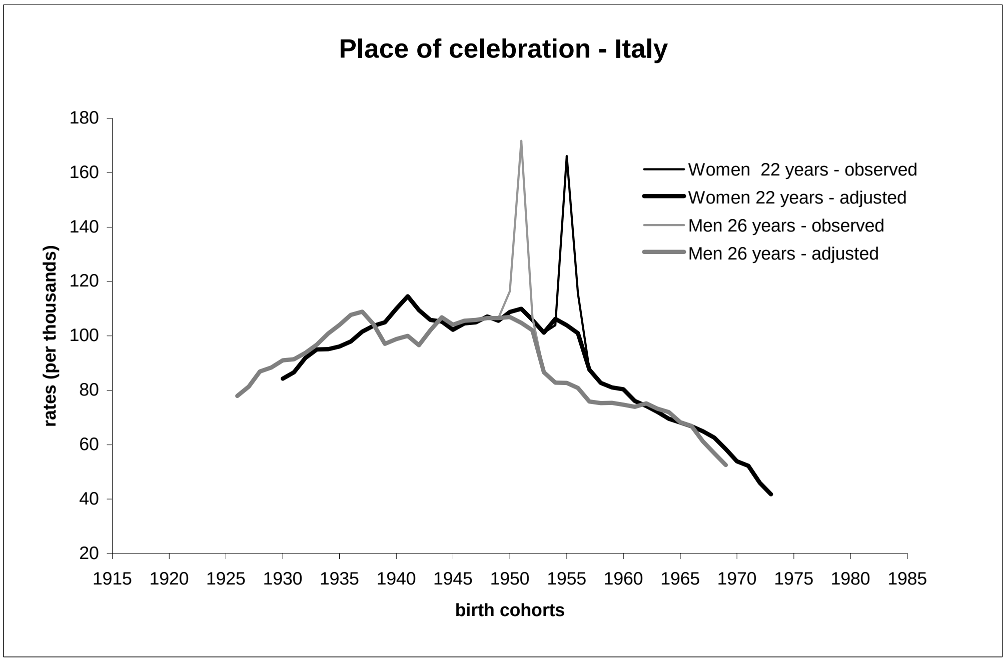


Table 2.1: Total First Marriage rates for the birth cohorts (censored), by sex and region of residence - Italy

birth cohort	WOMEN NORTH	WOMEN CENTRE	WOMEN SOUTH	WOMEN ITALY	MEN NORTH	MEN CENTRE	MEN SOUTH	MEN ITALY
1920	1.0	1.1	1.5	1.2	1.2	1.6	1.6	1.4
1921	2.1	2.2	3.1	2.4	2.6	2.4	2.8	2.6
1922	3.5	3.2	4.7	3.8	4.5	4.3	5.3	4.7
1923	6.4	6.8	7.8	6.9	7.2	7.0	7.5	7.3
1924	8.4	8.7	11.0	9.3	9.7	9.1	10.4	9.8
1925	10.3	11.7	13.6	11.6	12.2	11.6	12.7	12.3
1926	12.7	12.7	17.2	14.2	15.2	14.1	16.8	15.5
1927	14.5	15.2	19.8	16.3	18.2	16.8	20.2	18.6
1928	16.8	17.0	22.9	18.8	21.8	19.2	25.5	22.5
1929	19.6	19.6	27.9	22.3	26.3	24.3	29.8	27.0
1930	22.4	23.9	30.7	25.4	31.5	29.0	38.0	33.1
1931	26.2	25.0	35.3	28.9	36.4	34.7	45.2	38.9
1932	28.7	28.4	39.9	32.3	42.9	40.0	52.5	45.4
1933	33.3	31.3	44.6	36.7	52.3	49.9	64.7	55.8
1934	38.4	36.0	52.5	42.6	62.3	59.7	77.9	66.8
1935	43.4	41.7	56.5	47.3	74.2	71.9	93.9	80.0
1936	48.1	48.6	64.9	53.6	91.7	90.7	113.4	98.4
1937	57.4	55.8	75.2	62.8	113.0	110.9	140.3	121.2
1938	68.9	65.7	89.7	74.8	145.8	150.1	182.2	157.8
1939	81.1	82.3	106.5	89.4	183.6	193.0	230.7	199.9
1940	100.9	102.9	128.8	110.2	238.5	256.0	290.9	258.2
1941	126.3	130.2	163.0	138.7	318.8	336.9	380.1	341.1
1942	160.1	166.9	204.7	175.5	381.9	410.2	454.0	409.4
1943	207.6	210.5	252.1	222.5	484.1	519.2	553.6	512.3
1944	267.8	273.4	317.4	284.5	586.1	631.4	633.4	608.9
1945	343.8	355.0	389.0	360.9	662.9	683.7	726.4	687.0
1946	458.2	457.1	475.7	463.2	758.8	816.7	794.1	780.6
1947	550.0	552.4	548.2	548.9	803.3	848.3	853.8	828.2
1948	658.7	656.7	630.2	647.0	832.0	877.7	883.8	858.0
1949	742.4	739.6	716.9	731.7	850.6	885.1	908.7	877.1
1950	812.8	816.8	793.3	806.0	851.1	891.8	906.1	878.1
1951	853.3	868.9	851.2	855.4	855.7	899.4	923.6	888.5
1952	869.7	870.3	878.7	873.9	838.4	872.9	904.7	869.1
1953	891.2	895.9	915.7	902.7	819.9	851.7	899.4	854.9
1954	891.5	911.3	930.6	912.1	802.2	839.0	869.5	834.1
1955	886.0	893.5	918.4	902.2	790.1	824.5	873.5	828.0
1956	857.4	865.8	901.6	878.0	786.9	814.5	856.8	818.4
1957	830.5	852.0	879.4	855.3	768.8	786.1	837.9	798.0
1958	821.9	828.5	878.1	846.9	758.9	779.4	831.0	789.9
1959	815.2	819.1	865.5	837.4	745.8	767.0	818.0	777.1
1960	807.5	809.2	863.2	831.4	729.2	742.0	808.1	761.6
1961	802.8	796.5	855.8	824.2	684.4	705.2	770.2	720.9
1962	781.0	784.1	847.4	809.6	649.3	669.9	746.3	689.8
1963	758.2	756.1	829.1	787.7	609.3	624.3	707.4	649.0
1964	720.7	729.0	806.5	757.7	561.5	572.3	666.6	602.8
1965	676.7	669.4	766.1	712.2	496.9	504.2	609.0	540.2
1966	628.9	619.9	726.1	667.1	426.0	422.9	535.5	466.5
1967	560.9	555.7	685.4	610.7	342.7	334.2	453.5	383.2
1968	495.2	485.1	633.3	549.8	266.4	254.8	372.3	304.9
1969	413.4	401.8	562.8	471.8	191.9	182.5	280.5	224.4
1970	327.2	319.9	484.9	389.7	124.4	113.8	203.0	153.0
1971	246.2	236.2	400.8	307.3	76.7	68.7	136.2	98.6
1972	170.3	164.5	312.2	227.1	43.0	40.7	86.8	60.0
1973	111.0	108.4	234.3	161.4	22.9	23.0	50.8	34.3
1974	65.9	67.5	165.6	108.1	11.4	11.3	27.6	18.2
1975	36.3	37.4	109.7	67.9	5.3	5.4	14.2	9.1
1976	18.5	20.6	65.8	39.5	2.2	2.4	6.5	4.1
1977	7.9	8.1	31.6	18.5	0.8	0.7	2.4	1.5
1978	0.8	1.6	5.1	2.9	0.1	0.1	0.3	0.2
1979	0.2	0.4	1.6	0.9	0.0	.	0.0	0.0

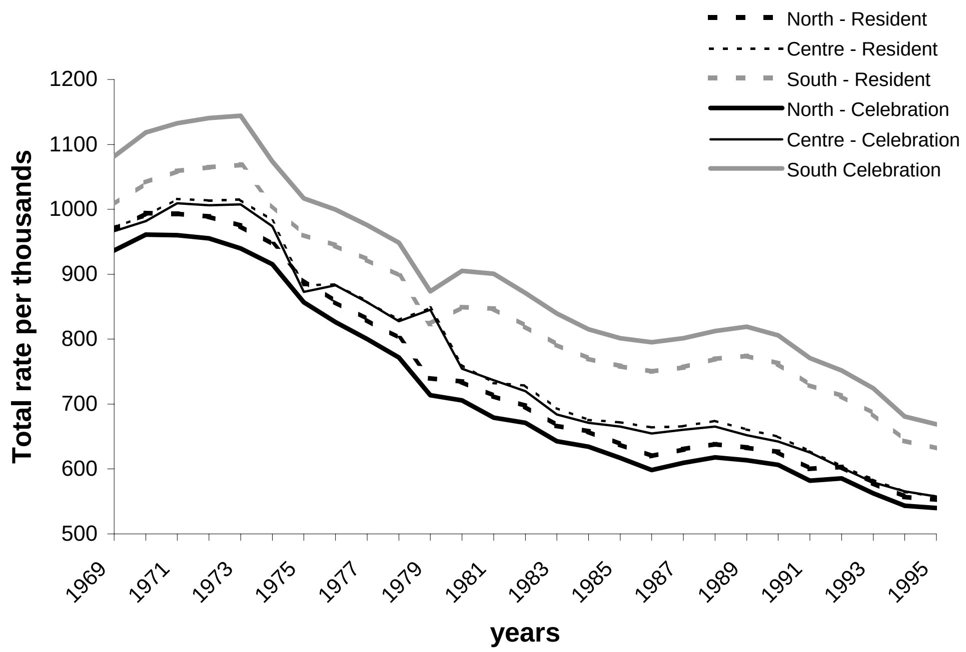
and Lombardy). Moreover, it should be observed the emerging role of some regions (for instance Umbria) to their religious 'attractiveness' for the spread of sanctuaries.

External movements were directed towards European countries and were also seasonal movements without a changing of the residence: this implies that men turned frequently back to Italy to marry. We should also note the existence up to the beginning of the 1960s, of a fascist law that did not allow for transferring the residence to a new one, unless a certificate of a regular job in the new city was shown. But, despite of the mobility of the population, marriages are often celebrated in a region different from that where one resides. Regions with high Total Index of Celebration are mainly the southern ones and Umbria (in the Centre). We can hypothesise the following: although men migrated to the North, they returned to marry in the South, probably because their native regions still represented their pools (next chapters will shed lights on this hypothesis). The case of Umbria can be slightly different: we can hypothesise that in this region, maybe, a high attraction is played by the presence of lots of religious sanctuaries spread in all the territory. Despite the fact that it cannot be used to somehow measure the total propensity to marry for a real cohort, the Total Index of Celebration can still provide a measure of the attractiveness of the place of celebration.

Let us compare the age specific first marriage rates in a year t for those aged $(x, x+1)$, who celebrate their marriage in region k (regardless of their own place of residence) (2.7) and those who reside in a region k (2.6).

What can be observed from a comparison between the two measures, given that the denominators are constants, is that, when (2.7) is greater than (2.6), then surely spouses who contract their marriages in region k are more than those who there also reside. In this case it is possible to say that region k attracts marriages from people who normally reside elsewhere. This is often the case when, for example the partners live in two different regions and they necessarily have to decide where to marry. Normally, in Italy, marriage is uxorilocal and therefore it is highly likely that the groom, for the marriage celebration, moves to the place where the bride lives and resides. Another reason could be that, because of the existence of their own network of families and relatives in the place where they bore, migrant men return to marry in their place of origin. For instance, a southern man, migrated to the

Figure 2.3: Total First Marriage Rate and Total Index of Celebration, by macroregions, MEN: 1969-1995



North and with a new residence there, will go back to South to find his spouse and to marry her.

Actually, looking at the results of the comparisons between the Total First Marriage Rate and the Total Index of Celebration for the macroregions, it is worth to note that North and South have two specular behaviour as regard men (table 2.2 and figure 2.3). While for the Centre of Italy, from 1969 to 1995, no appreciable differences emerges for both sexes, for the North the measure obtained for the men, summing up rates of first marriage by place of celebration (therefore the Total Index of Celebration), is lower than the Total First Marriage Rate over the time (figure 2.3 and table 2.2). On the other way round, the South shows the opposite pattern between the two measures: as place of celebration, South of Italy plays a very attractive role. It somehow compensates the northern pattern: in the South, more marriages are contracted as overall, than those celebrated there by the people who also reside there. Instead women do not show sensitive differences between the measure of the total rate according to whether they reside or not in a region: this confirms the hypothesis of uxorilocal marriages in Italy also linked to their very low migratory movements.

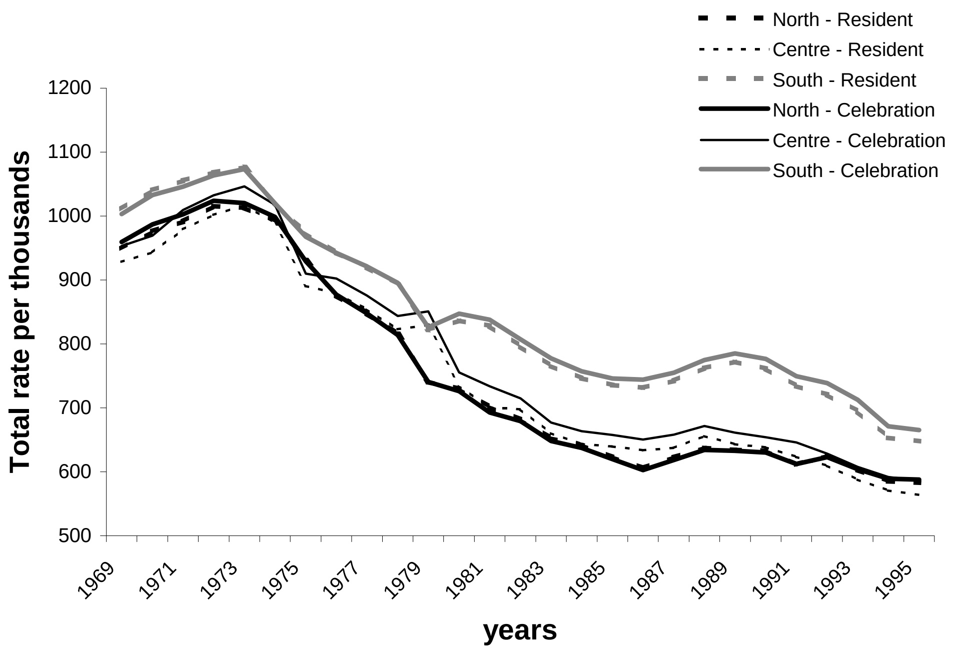
Table 2.2: Total First Marriage Rate and Total Index of Celebration, by macroregions, MEN: 1969-1995

calendar year	PLACE OF RESIDENCE				PLACE OF CELEBRATION			
	NORTH	*CENTRE*	*SOUTH*	*ITALY*	*NORTH*	*CENTRE*	*SOUTH*	*ITALY*
1969	968.7	972.6	1007.0	983.8	936.7	966.4	1081.8	992.3
1970	994.1	990.0	1041.3	1009.7	961.2	981.8	1118.5	1017.9
1971	993.3	1016.2	1058.8	1019.0	960.3	1009.5	1132.5	1025.9
1972	989.2	1014.0	1064.7	1018.1	955.3	1006.1	1140.7	1025.1
1973	974.9	1014.5	1068.5	1011.9	939.7	1007.5	1144.1	1018.8
1974	945.9	982.8	1006.7	971.6	915.4	973.8	1073.8	977.9
1975	891.6	883.2	960.7	912.2	856.9	872.7	1016.8	912.8
1976	857.4	884.5	944.4	891.5	826.5	883.2	999.5	895.5
1977	830.4	858.4	922.7	866.8	800.2	856.9	975.8	870.6
1978	801.1	829.3	897.9	839.5	771.8	827.6	948.4	843.1
1979	740.0	848.4	823.6	789.1	713.6	845.1	873.9	794.1
1980	734.5	760.5	849.5	780.1	705.6	754.3	905.0	785.5
1981	712.5	732.5	847.1	764.4	679.2	736.7	901.0	769.3
1982	696.7	728.9	819.9	747.1	671.2	720.0	871.2	752.2
1983	666.6	693.8	791.8	717.4	642.9	684.1	839.7	722.1
1984	657.9	675.4	770.0	702.3	634.2	671.3	815.4	707.3
1985	637.7	671.9	758.4	688.5	617.0	665.5	801.5	693.6
1986	619.6	664.0	750.0	676.0	598.6	654.9	795.4	681.2
1987	630.5	665.6	756.8	683.7	609.3	660.4	801.5	689.3
1988	638.5	674.3	769.3	693.6	618.0	665.4	812.7	698.3
1989	632.8	661.0	774.5	690.4	613.3	651.9	819.4	696.0
1990	626.3	649.8	762.4	680.9	606.3	642.3	805.8	685.9
1991	600.0	627.6	729.4	653.1	582.0	625.7	770.9	659.4
1992	603.5	604.6	712.1	644.3	585.5	602.1	751.9	649.9
1993	578.5	583.9	685.4	619.6	562.7	579.3	724.3	625.5
1994	557.1	564.7	643.8	591.5	543.6	565.6	680.8	598.9
1995	552.8	557.6	631.6	591.7	540.0	557.6	668.9	591.7

Table 2.3: Total First Marriage Rate and Total Index of Celebration, by macroregions, WOMEN: 1969-1995

calendar year	PLACE OF RESIDENCE				PLACE OF CELEBRATION			
	NORTH	*CENTRE*	*SOUTH*	*ITALY*	*NORTH*	*CENTRE*	*SOUTH*	*ITALY*
1969	949.3	928.3	1011.4	971.1	959.6	953.2	1003.1	977.5
1970	976.2	943.1	1040.4	995.8	987.0	969.2	1032.9	1003.0
1971	991.2	979.2	1055.5	1014.4	1002.6	1009.4	1045.9	1021.8
1972	1015.4	1001.7	1067.9	1033.4	1024.1	1032.3	1063.7	1041.8
1973	1012.9	1016.8	1076.4	1037.1	1020.4	1046.6	1073.6	1045.3
1974	992.5	989.4	1020.9	1001.7	998.6	1017.8	1019.8	1009.5
1975	930.6	890.6	973.2	937.8	929.1	910.0	967.4	938.8
1976	876.1	879.2	942.7	901.5	877.1	902.4	942.2	906.3
1977	848.1	853.9	919.8	875.9	847.9	875.9	921.2	880.6
1978	815.2	823.0	892.9	845.7	813.9	843.8	895.7	850.2
1979	740.5	829.9	821.9	787.7	740.7	850.9	826.2	793.4
1980	729.8	734.1	836.5	771.3	726.3	755.5	847.1	778.0
1981	701.4	700.4	828.2	749.7	692.8	733.9	837.9	756.0
1982	681.6	697.9	796.3	728.6	679.2	714.7	807.3	734.9
1983	652.5	660.2	765.6	697.6	648.4	677.1	777.3	703.5
1984	641.2	643.4	746.5	682.4	637.4	663.3	757.2	688.5
1985	622.8	639.6	735.4	669.8	620.0	657.5	746.1	676.0
1986	606.0	633.9	731.4	660.3	602.6	650.2	743.9	666.7
1987	622.4	637.5	742.3	672.6	618.5	658.0	755.0	679.6
1988	637.6	655.9	762.1	690.5	634.1	671.8	774.7	696.8
1989	634.3	643.3	771.9	690.6	632.7	661.4	785.0	698.4
1990	632.8	638.2	761.5	685.4	630.4	654.2	776.6	693.1
1991	611.4	623.4	734.4	663.4	612.0	646.1	749.8	673.8
1992	625.0	609.6	720.5	661.9	622.8	628.6	738.6	671.5
1993	603.3	587.7	694.8	638.9	604.2	607.7	712.7	650.0
1994	585.2	570.8	653.0	612.3	589.4	591.8	671.0	625.0
1995	582.9	563.9	647.8	621.7	587.7	586.0	665.4	621.7

Figure 2.4: Total First Marriage Rate and Total Index of Celebration, by macroregions, WOMEN: 1969-1995



Besides, it can be noticed that, after a slight increase in the first half of the 1970s, the Total First Marriage Rate started its decline, both for men and women. In 1973, the Total First Marriage Rate was of 1037 for men and 1012 for women, but in 1995 it almost halved, being equal to 591.73 and 621.71 respectively (tables 2.2 and 2.3). Moreover, the fact that the values exceed the level of 1000 first marriages in a year, should not worry: as from this perspective we are not talking about 'real' cohorts: the nuptiality behaviour of a period is sensitive to the timing of the cohorts involved. As a result of the anticipation of the nuptiality decisions, couples may make the period rate higher than expected. Later on this chapter we will discuss the pattern of nuptiality across ages.

The ideas are basically that men who moved from the South to the North of Italy, found some constraints against them on the northern marriage market and had, at the same time, more links and attachment to the place where they came from. Therefore, we can hypothesise that the most favourable marriage market to them was represented by their place of origin.

Moreover, as not all those who moved, changed soon their residence to a new one, we can hypothesise that they did not change their residence until they marry.

If this is the case, then the attachment towards the place of origin can be strong, even in terms of the marriage market.

Bearing in mind the characteristics of the nuptiality rates by place of celebration, we shall, by now on, consider only the data base of the nuptiality rates by region of residence. The basic assumptions that support this choice are:

- rates that come from the resident population (2.6) are homogeneous in their numerator and denominator, and longitudinally they hold a demographic meaning;
- the place of residence can be assumed as a proxy of the future place of residence, at least for men.

An open question regards the role of the place of origin and its socio-cultural importance in marital choices, but this is going to be investigated in the next chapters (by using survey data) as a problem of homogamy by place of origin.

2.4 Patterns of Italian marriage

Even though data have been computed at regional level, in this part we just look at the national or macro-regional level, given that the purpose of this chapter is not to provide a detailed differential analysis at the regional level, but to investigate more general shifts in marriage behaviour over time and, partly, across cohorts. Sometimes, we will attempt to go deeper in the territorial analysis[6]. Again, we will analyse only the data base of marriage rates by place of residence of the spouses at the time of the occurrence.

2.4.1 Cross-sectional analysis

The analysis of nuptiality patterns is conducted by looking at the cross-sectional levels of the Total First Nuptiality Rates and of the mean age at marriage for both sexes from 1969 to 1995. As already seen in tables 2.2 and 2.3 and figures 2.3 and 2.4,

[6]Italian regions can be broadly divided in three macroregions: North, Centre and South. In particular, Piedmont, Valle d'Aosta, Lombardy, Liguria, Trentino AltoAdige, Veneto, Friuli Venezia Giulia and Emilia Romagna belong to the North; Tuscany, Umbria, Marches, Lazio belong to the Centre; and Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily and Sardinia form the South of Italy.

in more than 30 years there has been a general decline in the Total First Marriage Rates for both sexes. In particular, up to 1974 there is a slight increase in the total rate, while after that year a phase of decline becomes clear. During the first half of the 1970s, Total First Marriage Rate is higher than 1000, as results from the anticipatory behaviour of some cohorts. (Later we are going to investigate cohorts, as well.) The highest levels of Total First Marriage Rate are reached in the South, especially by the 1973 female first marriages. After that year, marriage behaviour dramatically shifted.

In thirty years the TFMR in Italy almost halved. In particular, at the beginning of the 1970s we should expect more than a thousand first marriages from an hypothetical cohort of 1000 men at age 15, if they experienced, at all the ages, the same rates observed that year (table 2.2). In 1995, the number of total marriages expected to be contracted by an hypothetical cohort of 1000 is 591.7 marriages for men (table 2.2) and 621.7 for women (table 2.3). From 1971, when we observe the highest rate for men for Italy as a whole, to 1995, the total rate for 1000 men in the North has decreased of about 44%, in the Centre of about 45% and in the South of about 40%. For women, instead, the decrease from the 1973 level was around 42, 45 and 40% respectively in the North, Centre and South of Italy. It should be observed that the decline has been shortly interrupted in 1979, when the Centre showed a small rise, and the South a deeper reduction, and at the very end of the 1980s, when a slight recover of marriages appears.

As regards mean age at marriage, a general behaviour can be envisaged also at macroregional level (Figure 2.5). In particular, if at the national level age at first marriage has passed from 23.6 years in 1969 to 26.2 in 1995, for brides, and from 27.0 to 29.1, for grooms, the increase has been quite heterogeneous for the macroregions. For instance, women in the North have delayed their first marriage from age 23.7 to 26.7 (3.0 years), those in the Centre have passed from age 23.6 to 26.9 (with the highest increase in the age at first marriage: 3.3 years), while those in the South have showed a slight delay from age 23.5 to 25.4 (1.9 years of delay only). In the same way, northern men postponed the age at their first marriage from age 27.0 to 29.4 (therefore a delay of 2.4 years), those in the central regions from 27.0 to 29.7 (with an increase of 2.7) and those in the southern ones from 27.0 to 28.6 years (only

Figure 2.5: Mean age at marriage by sex and macroregions: 1969-1995

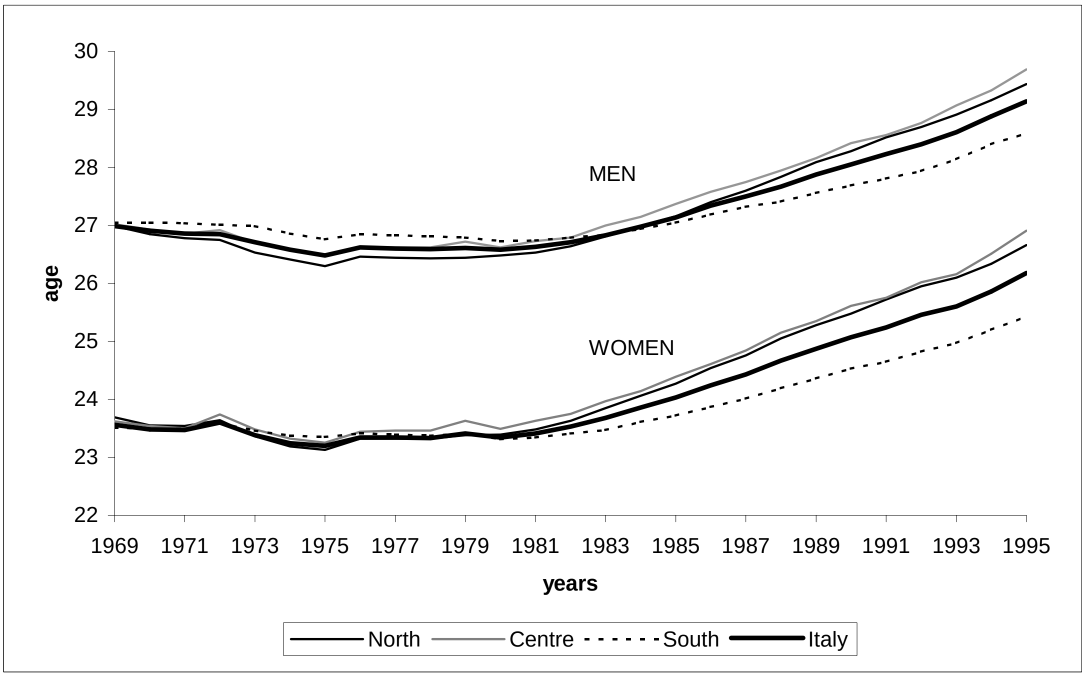
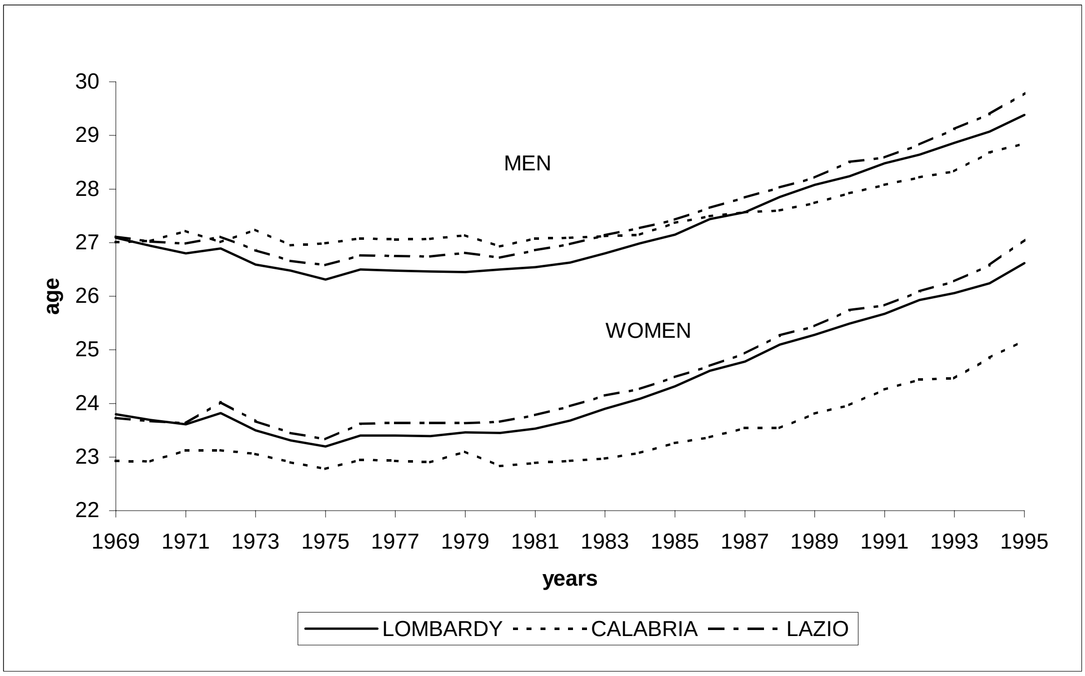


Figure 2.6: Mean age at marriage by sex and selected regions: 1969-1995



1.5 years of delay in almost thirty years).

Overall, both sexes show a phase of decline from the beginning of the period up to the first half of the 1970s (figure 2.5). But then, women since 1980 and men since 1982, started to increase their mean ages at first marriage up to 1995. In particular, southern Italy still shows the lowest age at first marriage than wherever in the country, while in central Italy women have the highest age at first marriage. Mean age at marriage for men deserves a note: up to 1982, men resident in the southern regions showed the highest average age at marriage, and those in the northern regions the lowest, but then a shift takes place and, as a result, men in the South have the lowest age at first marriage than all the other Italians.

In the last thirty years, there has been a growing differentiation of the marital behaviour, at least as regard the mean age at marriage, at a territorial level, especially for women. While in 1969 the mean age was homogenous between spouses in the North, Centre or South of Italy, in 1995 the age difference at first marriage is around 1.5 years between brides in the Centre and in the South, and about 1.1 years between grooms resident in the Centre and those resident in the South.

If we look at the differentiation between regions with regard to the ages of their spouses, we can say that it roughly goes from more than 3 years in 1969, more precisely from 3.3 in the North to 3.4 in the Centre and 3.5 in the South) to 2.8 in the North and in the Centre, to 3.2 in the South.

Taking into account three regions, Lombardy, Lazio and Calabria as representatives of North, Centre and South of Italy respectively, we should notice the widening pattern among women in their age at first marriage. While men's patterns get closer, being characterised by a faster shift upwards of Lazio and Lombardy average ages, women's levels get increasingly distant. In particular, the pattern of Calabria seems to move upward more slowly than the Lazio and Lombardy ones.

Over the last thirty years the shift upwards of the mean ages at marriage has also entailed a rearrangement of the distribution of the regions according to their average ages. Tables 2.4 and 2.5 classify each region according to the position occupied at the beginning and at the end of the period. As regard women the major jump upward in the age at first marriage is made by Emilia Romagna (from 1969 to 1995 it goes from position 14 to 5), while the biggest jump backward is made by Campania

Table 2.4: Italian regions by decreasing order of the mean ages at marriage in 1969 and 1995 - WOMEN

1969	mean age	position	1995	mean age	position
Sardinia	24.94	1	Liguria	27.16	1
Trentino Alto Adige	24.80	2	Friuli Venezia Giulia	27.09	2
Liguria	24.16	3	Lazio	27.05	3
Campania	23.87	4	Sardinia	27.05	4
Lombardy	23.80	5	Emilia Romagna	27.04	5
Lazio	23.73	6	Tuscany	26.89	6
Tuscany	23.62	7	Trentino Alto Adige	26.81	7
Veneto	23.60	8	Lombardy	26.62	8
Apulia	23.58	9	Umbria	26.60	9
Friuli Venezia Giulia	23.51	10	Marches	26.59	10
Marches	23.47	11	Veneto	26.49	11
Piedmont	23.46	12	Piedmont	26.33	12
Abruzzo	23.41	13	Abruzzo	26.05	13
Emilia Romagna	23.39	14	Valle d'aosta	26.04	14
Umbria	23.28	15	Molise	26.03	15
Valle d'aosta	23.19	16	Basilicata	25.99	16
Sicily	23.00	17	Apulia	25.54	17
Calabria	22.93	18	Campania	25.24	18
Basilicata	22.90	19	Calabria	25.18	19
Molise	22.62	20	Sicily	24.96	20

Table 2.5: Italian regions by decreasing order of the mean ages at marriage in 1969 and 1995 - MEN

1969	mean age	position	1995	mean age	position
Sardinia	28.81	1	Sardinia	30.04	1
Trentino Alto Adige	28.45	2	Liguria	30.02	2
Marches	27.40	3	Friuli Venezia Giulia	30.01	3
Liguria	27.37	4	Trentino Alto Adige	29.95	4
Abruzzo	27.16	5	Marches	29.82	5
Lazio	27.11	6	Lazio	29.79	6
Lombardy	27.09	7	Emilia Romagna	29.66	7
Sicily	27.03	8	Tuscany	29.52	8
Calabria	27.01	9	Umbria	29.52	9
Friuli Venezia Giulia	27.00	10	Lombardy	29.38	10
Umbria	26.99	11	Molise	29.34	11
Campania	26.93	12	Veneto	29.31	12
Veneto	26.89	13	Abruzzo	29.22	13
Basilicata	26.89	14	Basilicata	29.18	14
Tuscany	26.78	15	Piedmont	29.10	15
Piedmont	26.75	16	Valle d'aosta	29.04	16
Emilia Romagna	26.67	17	Calabria	28.85	17
Apulia	26.67	18	Apulia	28.43	18
Molise	26.43	19	Campania	28.31	19
Valle d'aosta	26.40	20	Sicily	28.31	20

(from position 4 to 18). As regard men, the longest steps are made by Sicily, which goes down from position 8 upward position 20, and from Emilia Romagna, which pass from position 17 downward to 7[7]. Although they may have followed different patterns, in 1995 a situation where the distinction between northern and central areas, on one hand, and southern areas, on the other, is better defined: for both sexes, in 1995, highest ages at first marriage characterise the group of northern regions, and lowest ages at first marriage describe the group of southern regions. A striking exception is represented by Sardinia, that keeps, for both sexes, a very high age at first marriage, all over the period.

2.4.2 Longitudinal analysis

Most of changes in nuptiality behaviour have occurred to the cohorts of women born in the 1940s and during the first half of the 1950s (Castiglioni, 1999). We now take into account some females and males cohort, starting from those born just after World War II. Of course the interpretation of their differential behaviour will be limited y the observation of the available ages. Among the cohorts chosen to analyse their longitudinal behaviour, there are both left censored (those born in 1945 and 1950) and right censored (those born in 1955, 1960 and 1965). Anyway, as regards women (figure 2.7), shifts in the nuptiality behaviour can be distinguished in three phases. First there is a general decrease in the level of the nuptiality rates. Second from 1950 to 1955 cohort, an anticipation in the age at first marriage can be envisaged (the curve becomes more skewed to left). Third, the declining level of the rates continues and the curve becomes plainer and less skewed (the age at first marriage is delayed). As a result the modal age for the first marriage rate moves from 21 for the 1950 cohort, to 22 for the 1955 cohort, to 21 for the 1960 cohort and then to 23 for the 1965 cohort. Moreover, both cohort 1960 and 1965 show a very high increase in the rate at first marriage for age 18: this results from changes in the law introduced in 1975 by 'Riforma del diritto di famiglia', according to which the minimum age at marriage was fixed at 18 years for both partners, without the

[7]Particularly, Liguria, Friuli Venezia Giulia and Emilia Romagna have been identified as the most problematic areas with regard to the lowest levels of fertility rates: the offspring has gone down to about 1 child per woman in the middle 1980s (Micheli, 1995[136]). The increase in the mean age at marriage that moved men and women from this region up to the highest positions in 1995, could be one of the factors to be linked to their very low fertility.

consensus of the parents[8].

Figure 2.7: First marriage rates by age and selected cohorts of WOMEN - ITALY

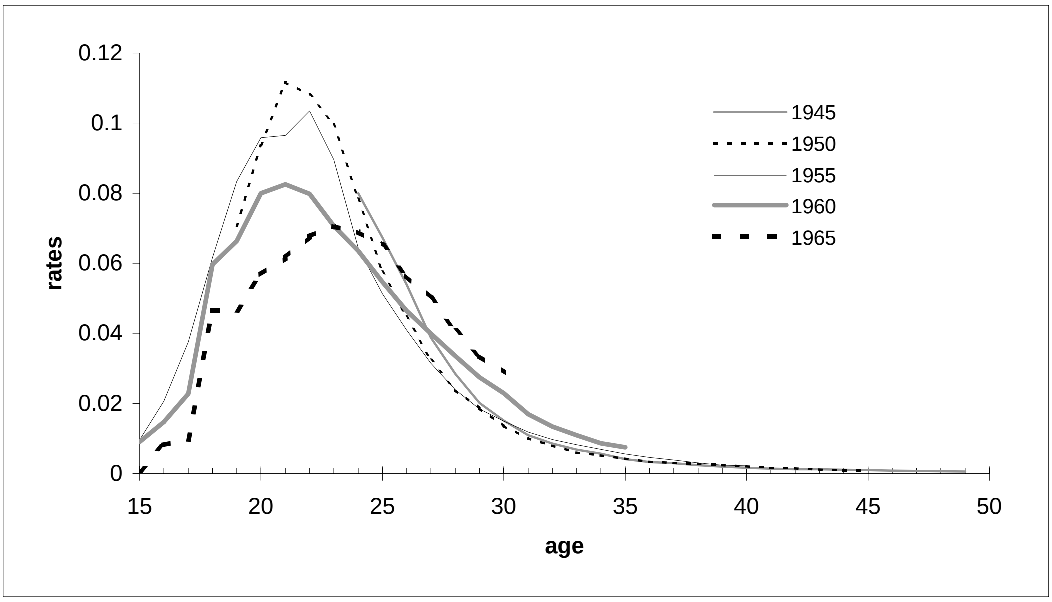
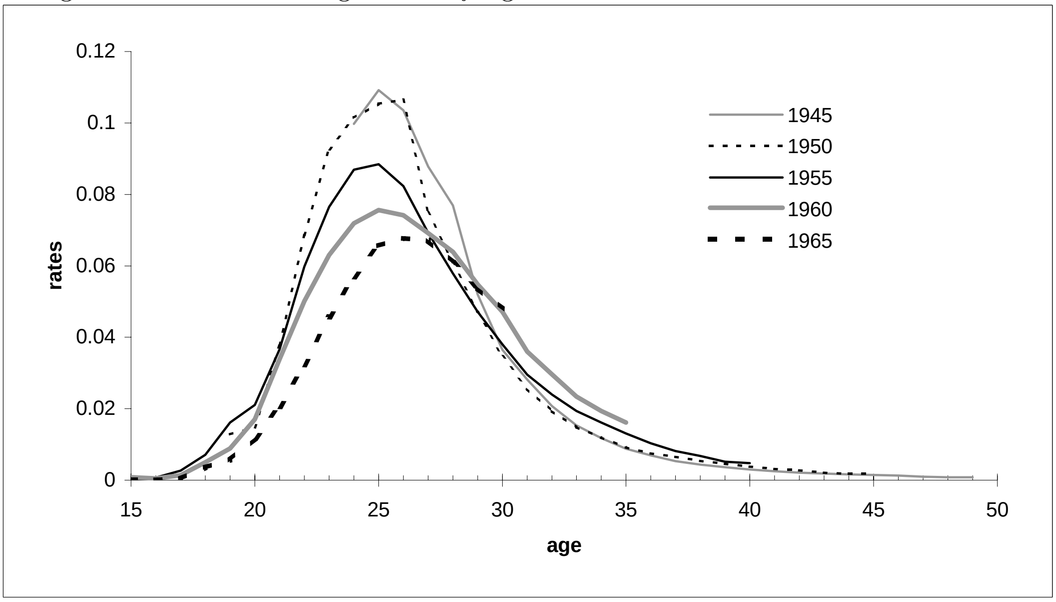


Figure 2.8: First marriage rates by age and selected cohorts of MEN - ITALY



Men show a pattern of change in the nuptiality behaviour across cohorts, that slightly moves toward lower and delayed levels of marriage rates (figure 2.8). Moreover, the shape of the nuptiality bell also for men tends to be less skewed. Here the

[8]Before the introduction of the reform, the minimum age at marriage was 16 for him and 14 for her, with the possibilities of further reductions to 14 and 12 respectively (Vincenzi Amato, 1997 [188]).

modal age for the first marriage rate moves slowly from age 25 for the 1945 cohort to age 26 for the 1965 cohort. For men, age 18 is only very slightly affected by the increased legal age minimum.

Despite the decrease in the highest level, both sexes experience also a catch up with their nuptial behaviour at later ages, so that, for instance, 1965 cohort curve is higher than previous cohort curves for women older than 26, and for men older than 29 years (figures 2.7 and 2.8).

If we compare the curves by sex, two different patterns of marriage behaviour emerge (Figures 2.9, 2.10, 2.11 and 2.12). The distance between curves highlights the early entry into first marriage for women in comparison to the male ones. It also results from the age difference among partners. Although censored, it is clear the general reduction of the first marriage rates if we look at their levels: the 1945, 1950 and 1955 cohorts (figures 2.9, 2.10 and 2.11) almost reach a value of 0.12 of the marriage rate, while cohort 1960 is hardly upon the 0.08 level (figure 2.12). Therefore the longitudinal analysis confirms the decrease in the marriage pattern observed cross-sectionally.

Figure 2.9: Age pattern of the nuptiality rates by sex - ITALY: cohort 1945

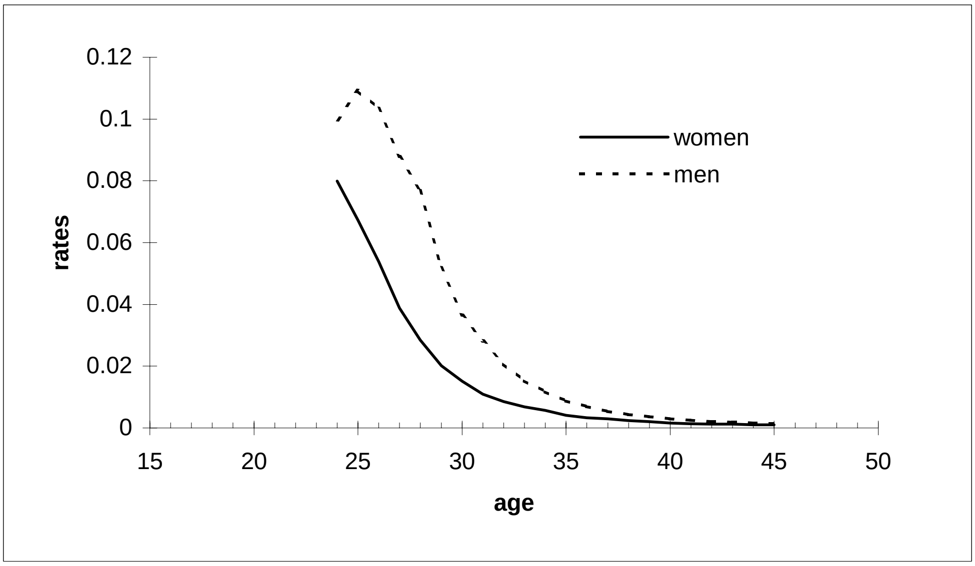


Figure 2.10: Age pattern of the nuptiality rates by sex - ITALY: cohorts 1950

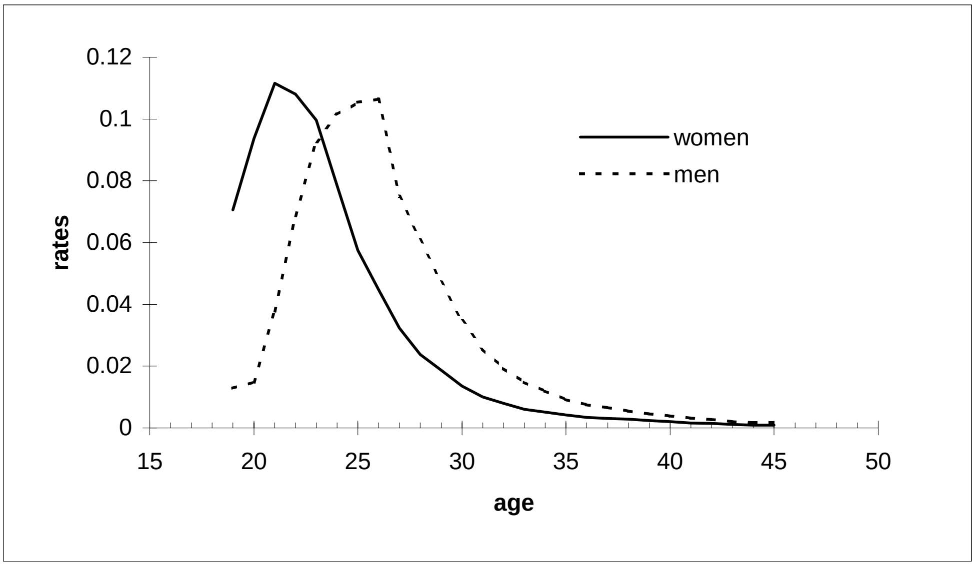
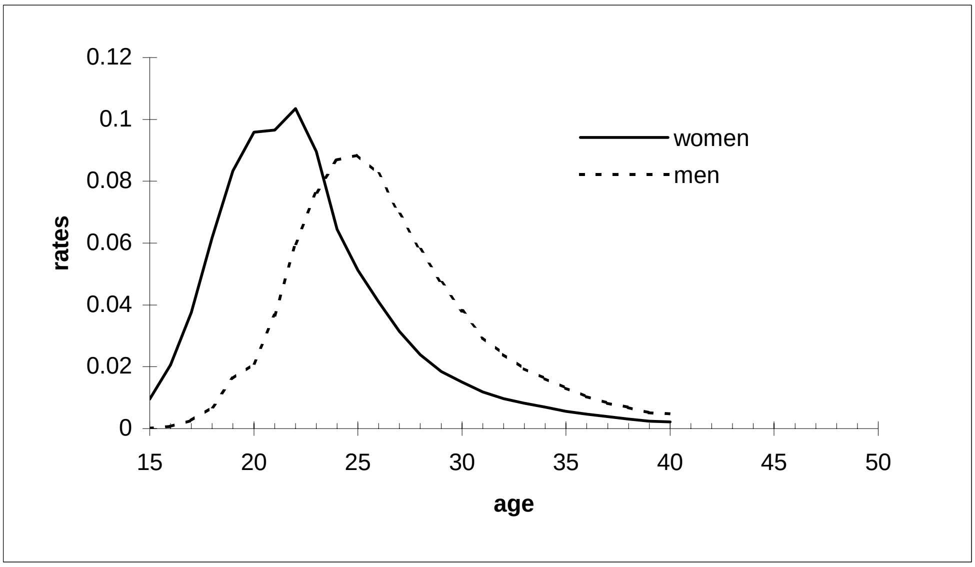


Figure 2.11: Age pattern of the nuptiality rates by sex - ITALY: cohort 1955



2.5 Contour maps of marriage by sex: an overview

Beside the aggregate measures of marriage, an attempt has been conducted to analyse the interaction between age, period and cohort effect(Gambill et al., 1986 [74]; Yi et al., 1985 [192]; Caselli et al., 1985 [41]; Caselli et al., 1987 [40]). First marriage rates can be represented over time as a contour map that offers the panoramic view of the interaction of age (15-49), period (1969-1995) and cohort (although censored: 1919-1979) variations (Andreev, 1999 [3])[9].

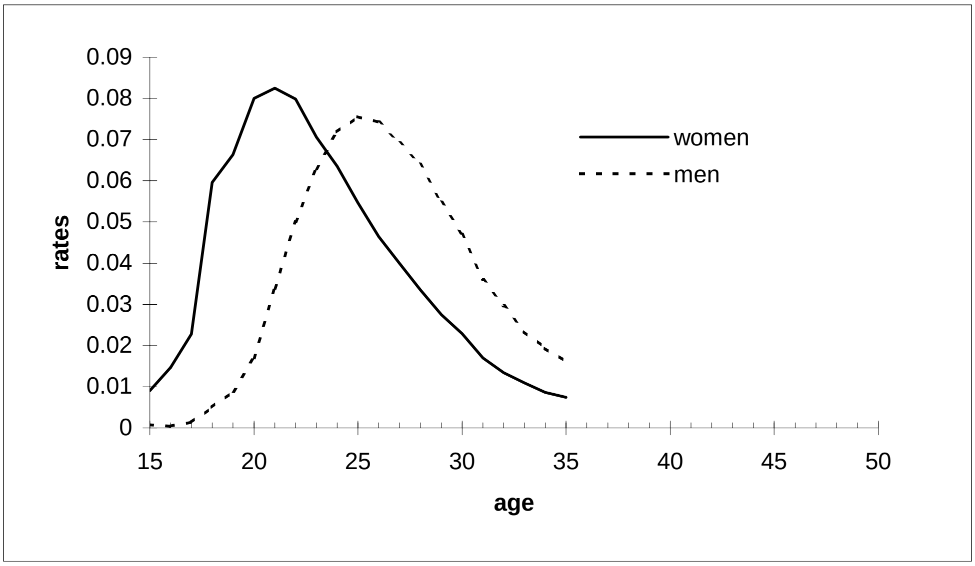
Figure 2.13 presents a shaded contour map of female first marriage rates by single year of age, from 15 to 49, and by single year, from 1969 through 1995. The scale highlights the level chosen to distinguish variations[10]: the lowest level represents ages and times when less than 1 per one thousand women got married, while the highest level gathers more than 100 marriages per 1 thousand women.

At first glance one may note the shift over the years involving the levels of

[9] 'Lexis' is the program used to produce contour maps and it is named after the German demographer Wilhelm Lexis who, in 1875, suggested describing the life course of individuals with the Lexis diagram.

[10] To setup the scale value, one can choose to input a proper scale vector, or to use a linear scale or a multiplicative one. Here, the first way has been followed as the additive method compresses the area and the multiplicative method can not be applied because of the zero values. The scale which we use divide the first marriage rates in seven intervals: lower than 0.0010, 0.0010-0.0050, 0.0050-0.0250, 0.0250-0.0500, 0.0500-0.0750, 0.0750-0.1000 and greater than 0.1000. A short description of the other two methods is reported in the appendix.

Figure 2.12: Age pattern of the nuptiality rates by sex - ITALY: cohorts 1960



marriage rates. After 1975, a slight decline in marriage rates starts. At around the middle of the 1980s there is a strong decline in the first marriage rate which is no more compensated at subsequent ages. Afterwards, the general decline is so deep that marriage rates for single women do not reach anymore the previous levels: at most, central ages at marriage show levels between 50 to 75 marriages per one thousand, that is half the value observed before the 1984. Moreover if we look at the very low level at the beginning of the marriageable ages, it is worth to note the shift upward. Let us follow, for example, the third level (rates from 0.0050 to 0.0250): in 1969 it includes ages 15 and 16 at the beginning of the observation period, but then it arrives up to age 19 in 1995. At older ages there is a contraction of the rate of first marriage, as well.

Also men are affected by the same trend as women, figure 2.14: the red area from around age 18 to 29 from the beginning of the period, disappears from 1986. Ages 19-25 for women and ages 24-29 for men are those with the strongest decline in the marriage rate. Indeed, if we consider the age pattern in figure 2.13, then we could be interested to evaluate how deep the decline has been. To this purpose figures 2.15- 2.22 show, for both sexes, the patterns over time. As we expected, after a slow increase in the first half of the 1970s for women, especially for ages 21 24, a phase of decline starts. Most affected are ages 21-22 for women and 22-26 for men. It is worth to note also a slight catch up for women for ages 24 on, from the middle of the 1980s, as a result of the postponement of the nuptial behaviour across cohorts.

Overall, cohort effect is not very striking, as one could imagine, for example, for the cohort who entered their marriageable age during the late 1960s. Some slight cohort effect can be envisaged in the reduction between 1982-1984 for women born in the early 1960s. As regards men, figure 2.14, the decline, occurring at ages where most marriages are celebrated, is slightly postponed. From 1985 to 1986, at ages 26, marriage declines from more than 75 per one thousand men to the level between 50 to 75 per one thousand men aged 26. After a phase of slight rise of the marriage rate by age, in the early 1970s, then, for some ages, a quite linear decline starts (for example at ages 23 and 24, figure 2.17 and 2.18, respectively) up to the end of the period of observation, and for some other, the decline is a bit more

Figure 2.13: Contour maps of first marriage rates, WOMEN - ITALY, 1969-1995

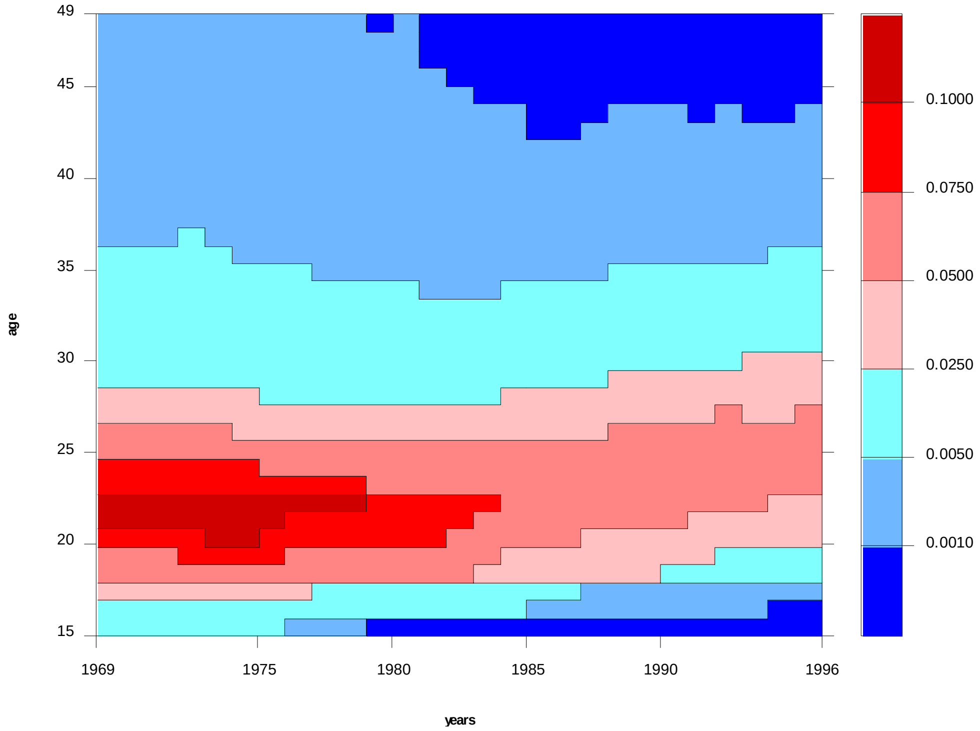


Figure 2.14: Contour maps of first marriage rates, MEN - ITALY: 1969-1995

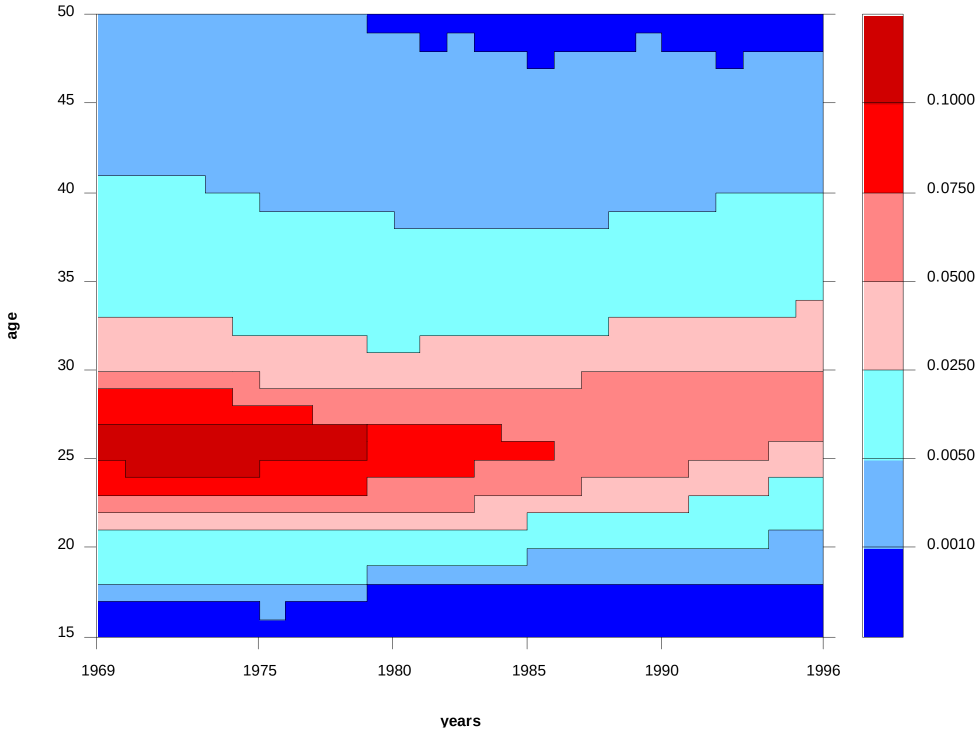


Figure 2.15: First marriage rates by sex, years 1969-1995, ITALY, AGE=21 years

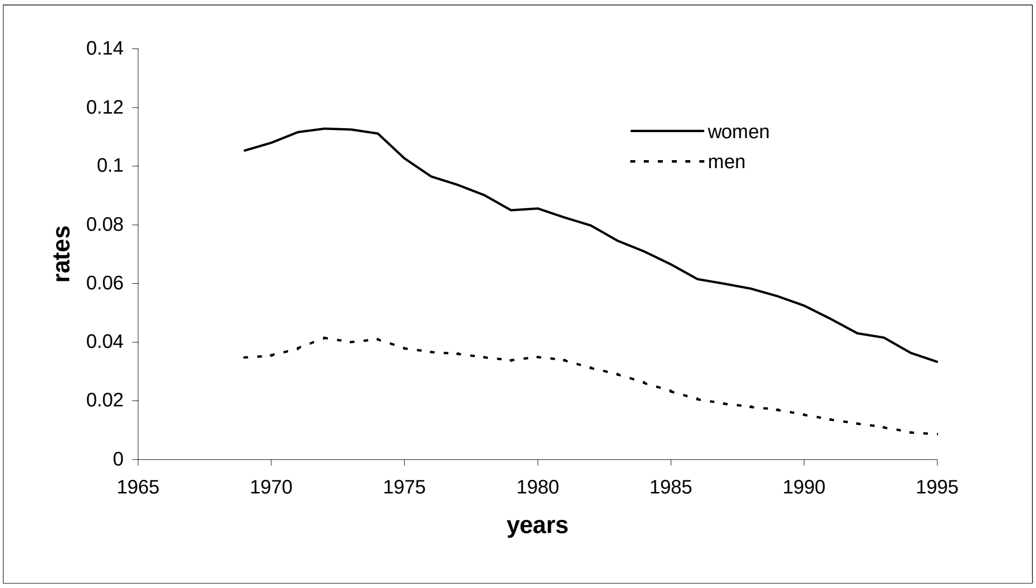


Figure 2.16: First marriage rates by sex, years 1969-1995, ITALY, AGE=22 years

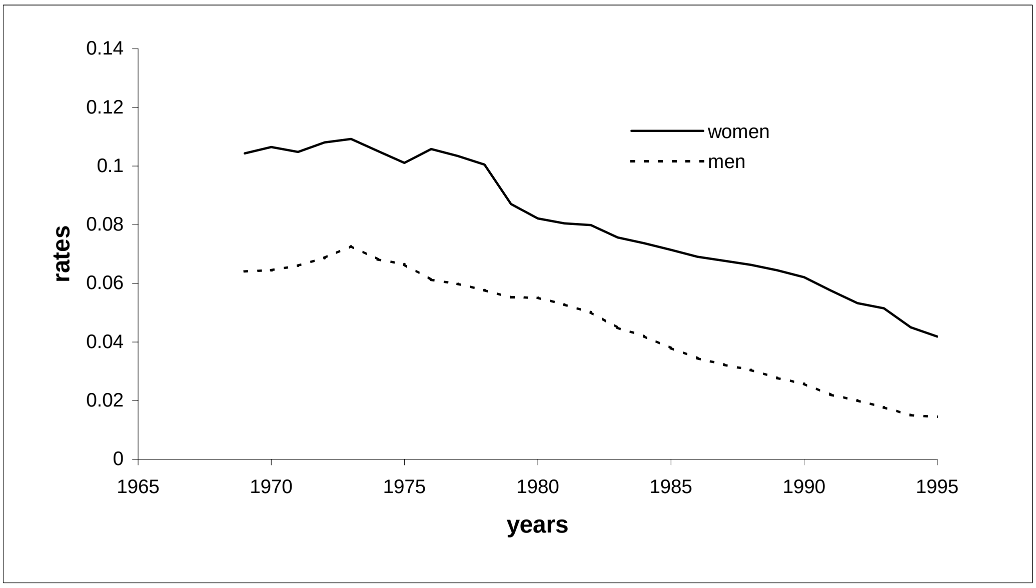


Figure 2.17: First marriage rates by sex, years 1969-1995, ITALY, AGE=23 years

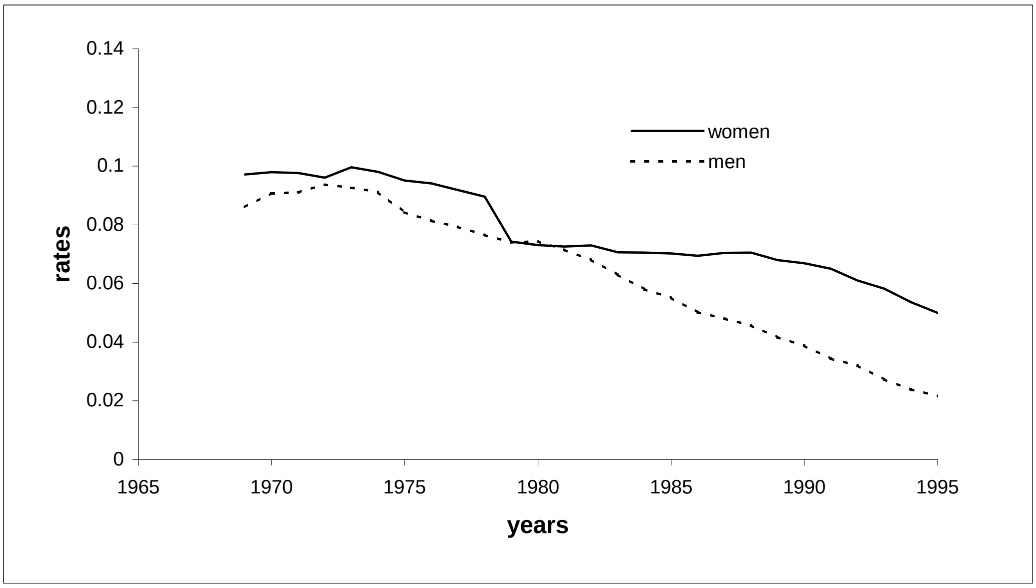


Figure 2.18: First marriage rates by sex, years 1969-1995, ITALY, AGE=24 years

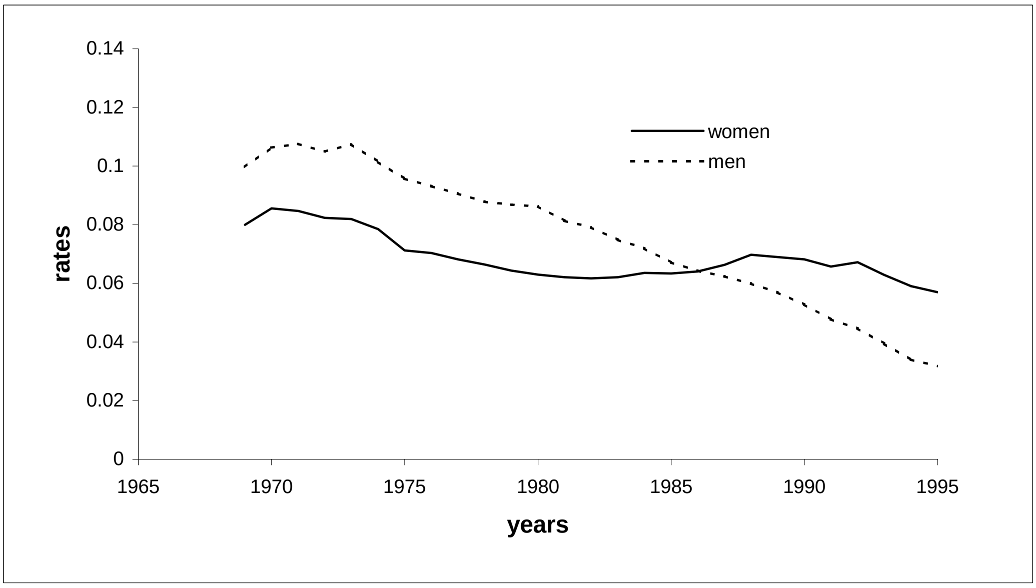


Figure 2.19: First marriage rates by sex, years 1969-1995, ITALY, AGE=25 years

Figure 2.20: First marriage rates by sex, years 1969-1995, ITALY, AGE=26 years

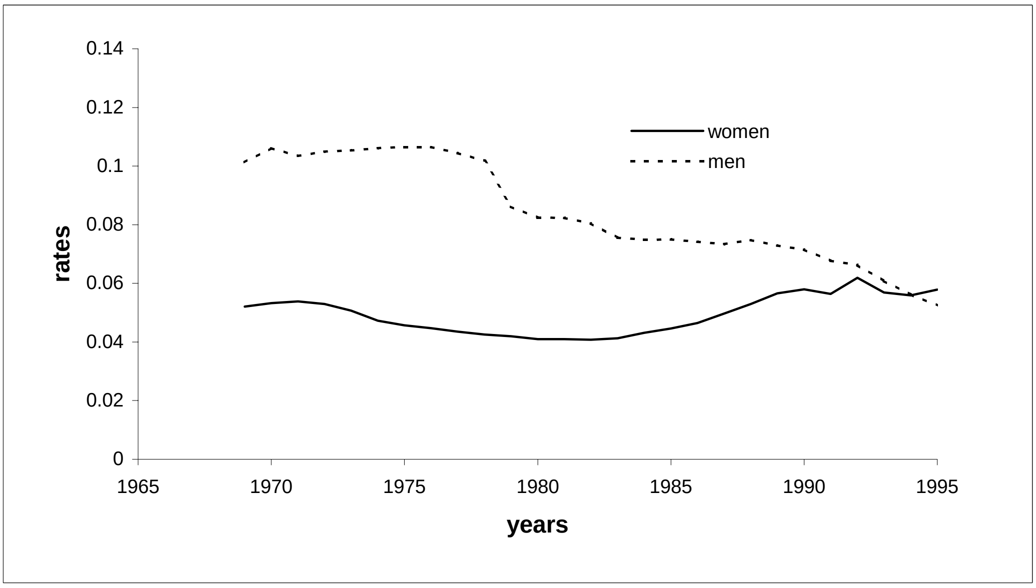


Figure 2.21: First marriage rates by sex, years 1969-1995, ITALY, AGE=27 years

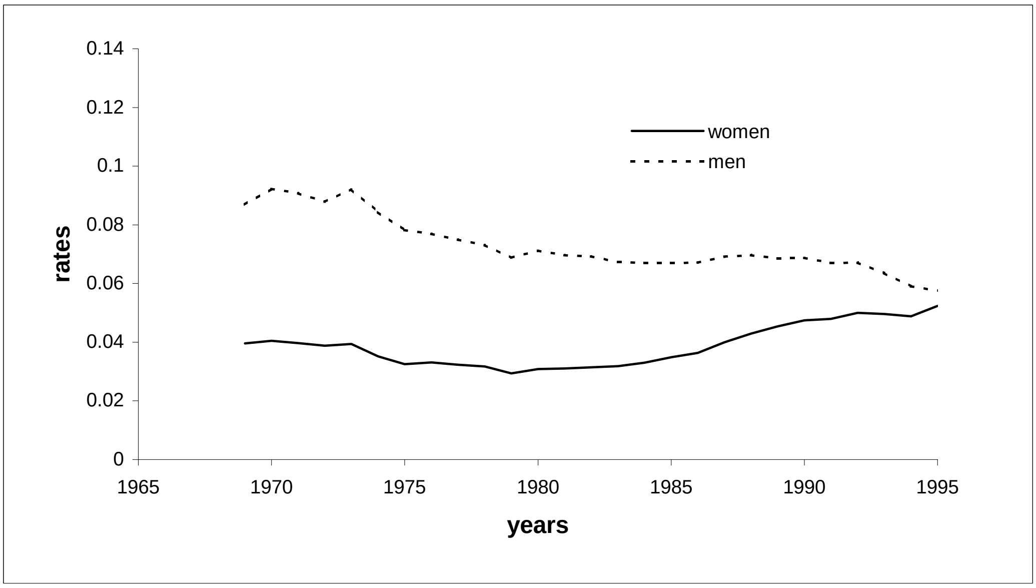
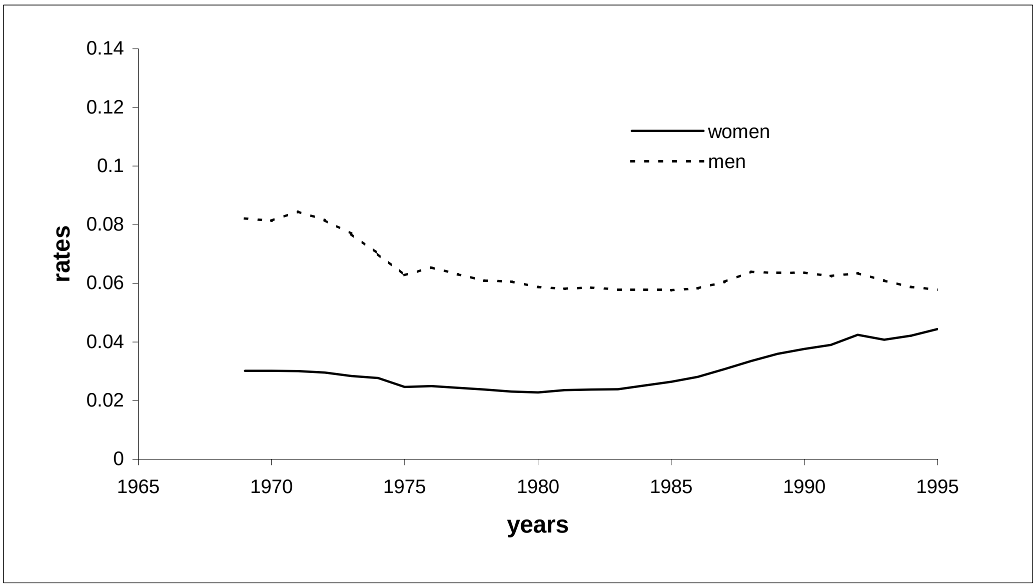


Figure 2.22: First marriage rates by sex, years 1969-1995, ITALY, AGE=28 years



pronounced age 25 2.19 and 26 2.20.

However, the pattern of marriage by age is very low for men at their teens. Following the contour line of the level 0.005 it can be seen some increase from age 17 in 1969 to age 21 in 1995: therefore less then 1 marriage is celebrated by 1000 men aged 21 in 1995. Moreover as the female one, the pattern of marriage rates above the 0.025 line follows a decline (especially for upper ages) around 1980 and then a small and narrowed recover. At later ages (48-49 years), a very low level of first marriages (less than 0.0010) appears in marriages.

Overall, for both sexes there are either a narrowing effect at youngest and oldest ages, and a reduction of the levels of marriage rates at central ages at marriage (red area). No significant cohort effect is envisaged by the aggregate analysis of first marriage rates at national level.

2.6 Comparison between macroregional and national rates

The dynamics of marriage rates is here analysed by taking into account the macroregional deviations from the national pattern. In such a way, it is possible to shed light to the major differences of the macroregions over the years 1969-1995 and the ages 15-49 years. In the following figures 2.23, 2.24, 2.25, 2.26, 2.27 and 2.28, the red areas define a positive difference between the macroregional level and the national one while, the blue areas depict a situation where local rates are lower than the national ones. Therefore, red areas correspond to ages, years or cohorts characterised by marriage rates higher than the national (see average) ones, while blue areas are characterised by first marriage rates lower than the national (see average) ones. The main differences are concentrated in correspondence of the most marriageable ages.

In fact, at first glance a strong distinction between northern (almost all in blue) and southern pattern (almost all in red) appears.

In particular, for northern women there is a clear age effect at around 20 years when the rates of first marriage rapidly become higher than the national levels and, few years afterwards, they return below it (figure 2.23). This highlights the high concentration of the marriage behaviour in a small age interval. Moreover, unlikely the men of the same area, northern women show also a slight cohort effect, as the red strip moves upward: these women, born in the early 1960s, postpone their marriage at later ages more than elsewhere in the country (see also figure 2.7). Men in the North experience higher rates at first marriage than all the Italians only up to the beginning of the 1980s, but then they quickly shift their behaviour, marrying later (figure 2.24 and 2.8). A specular situation emerges for the South, where almost all the surfaces are red (figures 2.27 and 2.28), therefore signaling higher rates of first marriage. In particular the South shows first marriage rates higher than the national ones both at early and at older ages. On the contrary, for the marriageable ages a blue strip toward upper ages divide the female pattern. Men show a blue spot up the early 1980s.

The Centre of Italy depicts a more variegated situations. An age effect appears for both sexes at around 20 years for women (figure 2.25) and 24-25 years for men (figure 2.26). Below those ages the rates of the central regions are lower than the national level and the contrary happens for the rates in the red strip above it. A slight increase in the threshold of deviation from the national level appears for the cohorts born in the early 1960s. A period effect can be envisaged for the year 1979 when, with respect to the adjacent years, the rates are higher than the national ones. Understanding the factors affecting this period effect needs more in depth analysis.

Figure 2.23: Differences of first marriage rates: North-Italy - Women: 1969-1995

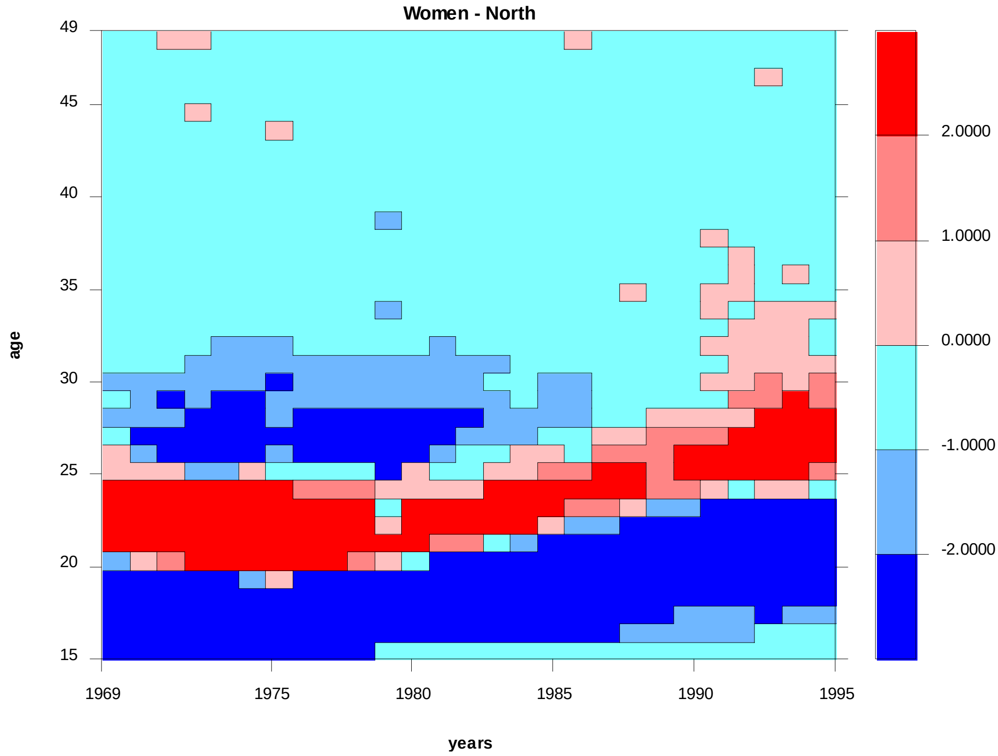


Figure 2.24: Differences of first marriage rates: North-Italy - Men: 1969-1995

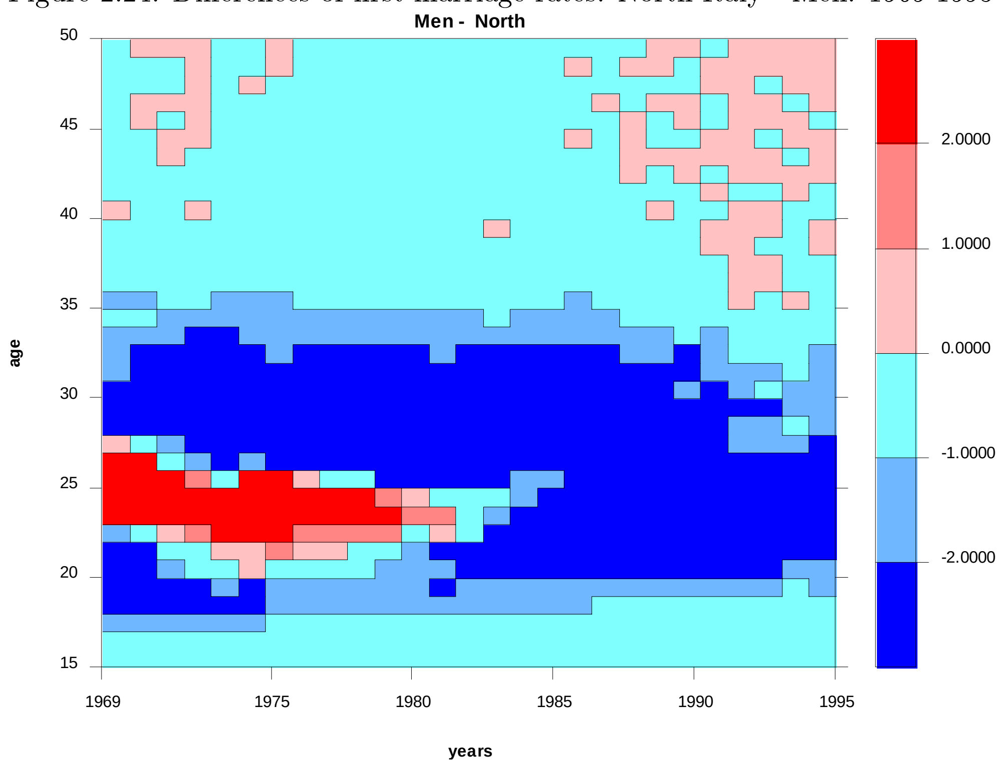


Figure 2.25: Differences of first marriage rates: Centre-Italy - Women: 1969-1995

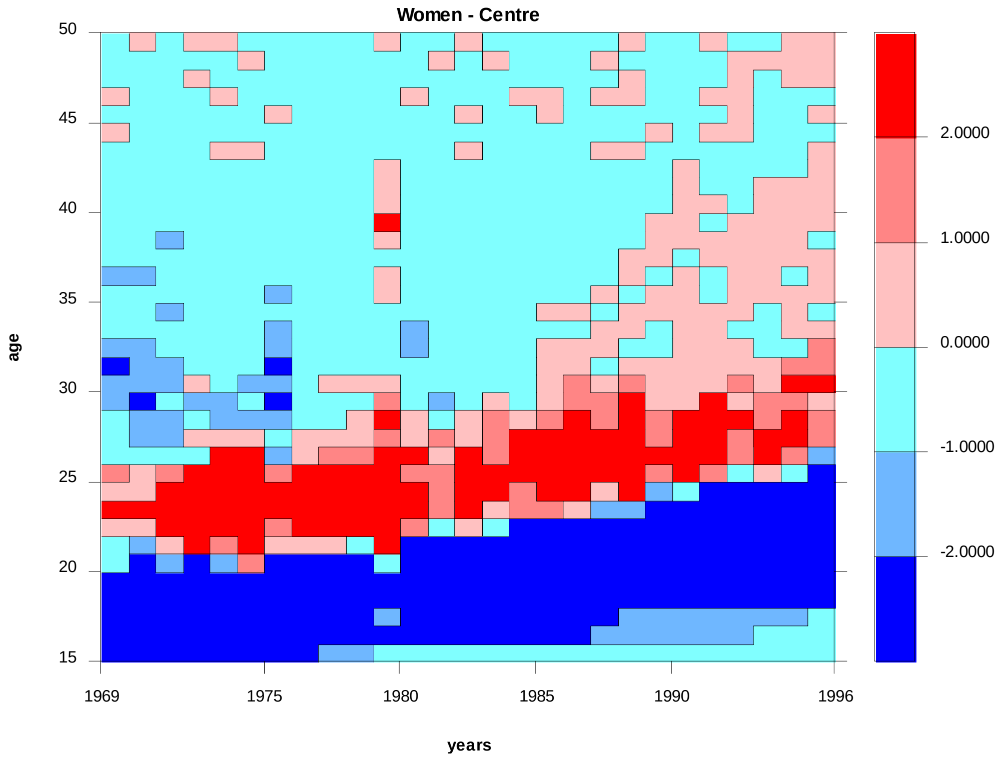


Figure 2.26: Differences of first marriage rates: Centre-Italy - Men: 1969-1995

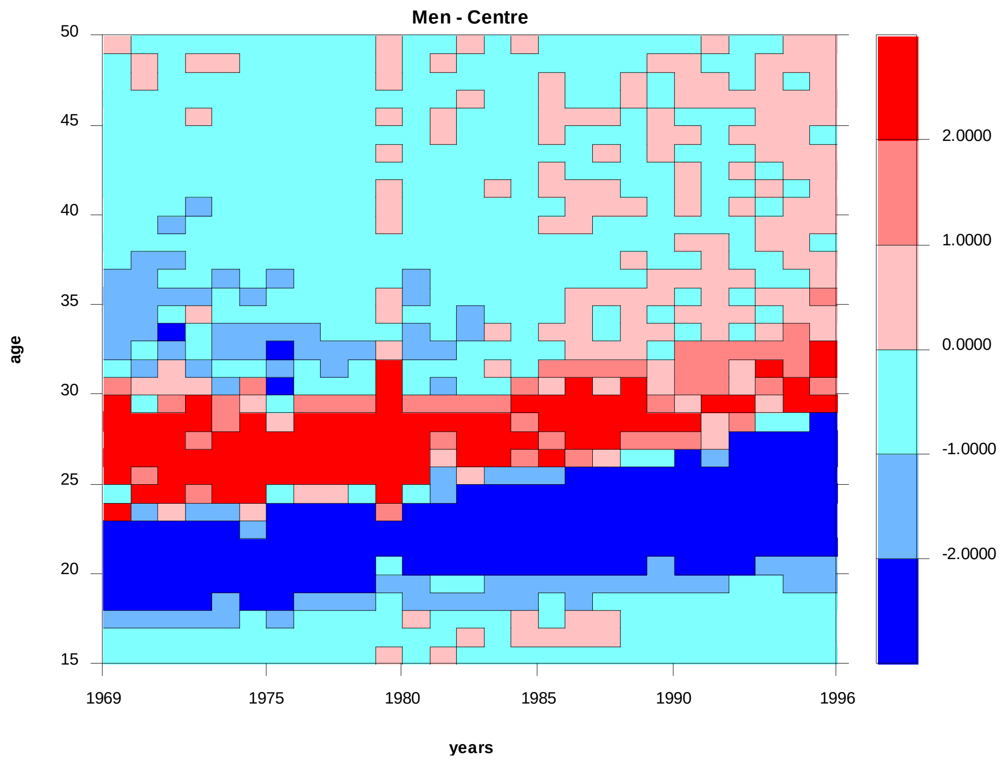


Figure 2.27: Differences of first marriage rates: South-Italy - Women: 1969-1995

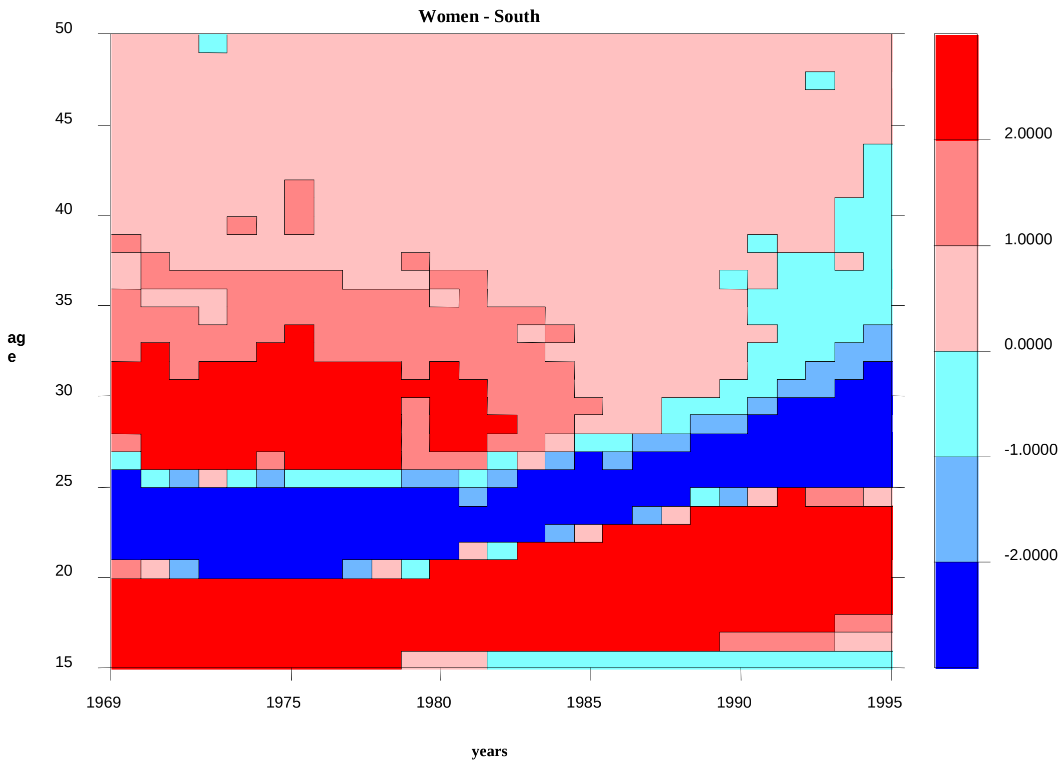
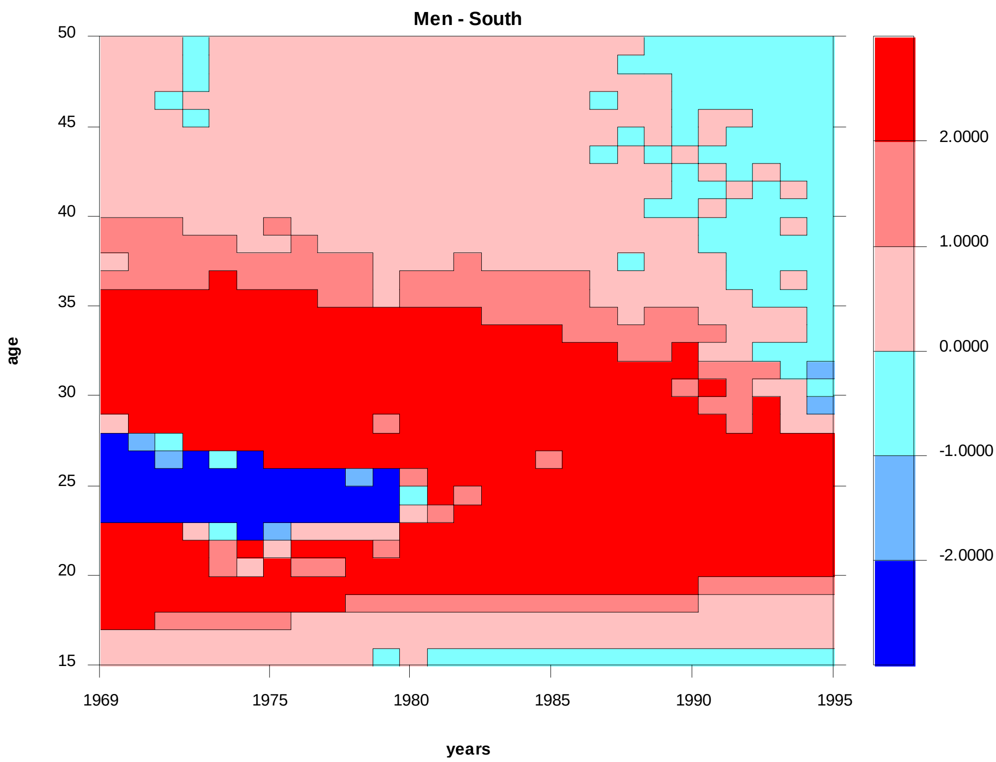


Figure 2.28: Differences of first marriage rates: South-Italy - Men: 1969-1995



2.7 Summary

Briefly, in this chapter we described the nuptiality data base available in Italy for both sexes and we adjusted the age specific first marriage rates for the years 1976-78. On the adjusted data base by place of residence of the spouses, occurrence and intensity of marriage have been described mainly at the macroregional level and only sporadically the focus is on the regional level. The period under study is characterised by a steady reduction: over 30 years Total First Marriage Rate has halved. The mean age at marriage declined for both sexes from 1969 up to the first half of the 1970s. Since 1980, women and, since 1982, men experienced a constant increase in the age at first marriage and a growing territorial differentiation. The cohort analysis looked at the pattern of the age specific first marriage rates by sex: decrease of the levels of the rates, postponement of the modal values (but for women there is a slight anticipation for the 1955-1960 cohorts), and decrease in the skewness around them are the main features of the transformations occurred across cohorts.

Contour maps are here applied to study nuptiality at glance: they provide us with a useful tool in highlighting the major shifts occurred in the last 30 years to the Italian marriage behaviour. Although it remains still hard to disentangle cohort, period and age-related effects, the contour maps analysis does not reveal strong cohort effects, at least at national level for the period under study: all cohorts are progressively involved in the process of postponement of nuptiality. Maybe a slight effect could be seen for the cohort of women born in the early 1960s. The period effect which lower the rates between 1980 and 1985 for both sexes is quite evident. As regard age, one should note the reduction in the level of nuptiality between 20-24 years for women, and 23-29 for men, and the slight movement upward of the nuptiality rate, as a result of the postponement of marriage. Lastly, the decline in marriage observed at very young ages, at least for women is the consequence of the modification by law of the minimum age at marriage.

Chapter 3

Measures of the Imbalance on the Marriage Market

3.1 Introduction

In this chapter we focus on what is known in literature as the marriage market. The search of a partner is strictly linked with the availability of the eligibles of the opposite sex. In the first chapter we have already introduced the concept of marriage squeeze as the effect on marriage behaviour of the imbalances between the number of men and women in their prime ages at marriage. Marriage squeezes are typically a consequence of differential cohort size.

In the next sections, after a brief review of the most used measures introduced in the literature, some indices of the marriage squeeze to Italian nuptiality tables. In particular, three measures of the imbalance between the sexes at marriageable ages will be applied to the cross-sectional tables for the years 1969-1995. Unfortunately, the unavailability of completed nuptiality tables by birth cohorts does not allow to measure this imbalance longitudinally.

The aim of the chapter is to analyse the Italian marriage market and to study whether deep changes in natality observed over time, since World War II, may have played a role in the transition to marriage for both sexes. We study Italy both in its baby-boom period and its baby-bust period. The latter is particularly interesting because it made Italy one of the countries with the lowest fertility ever observed. It seems worthwhile to measure the impact of structural constraints on nuptiality and to interpret changes in nuptiality also as the result of the imbalance between the sexes.

This chapter provides also an aggregate time-dependent measure of the imbalance on the marriage market to be used as a proxy of the constraints played by the population structure resulting from its frequent shifts in birth patterns from World War II onward. As the analysis will be conducted by region of residence (the data base used in the previous chapter), a tentative interpretation of the consequences on marriage opportunities, of the differentials between sexes of internal migration will be presented.

In particular, after briefly reminding the goals pursued in literature for studying the marriage market conditions and some of its implications (section 3.2), in section 3.3 we present an overview of the measures introduced by scholars. These can be broadly divided between those that use sex-ratios (section 3.3.1) and those who focus on the two-sex problem approach (section 3.3.2). Besides these, also other new indices of the marriage market imbalance have been introduced here (section 3.3.3). All these measures will be applied to two one-sex nuptiality tables which will then be build to this purpose (see appendix). Section 3.4 presents the outcomes of the application of the measures of the squeeze (the one introduced by Schoen in 1983 and the two new alternatives proposed here) to the trends over time in Italy and section 3.5 focus on the regional pattern, giving space to some discussion and comments on the intertwined roles of marriage and migration (sections 3.5.1, 3.5.2 and 3.6).

3.2 Marriage market and marriage squeeze: trends over time

As we said in the first chapter, the term marriage squeeze was introduced in 1959 (Glick et al., 1963[83]) to refer to the situation created by the baby boom in the United States. The rapid increase in the birth rates then meant a shortage of eligible men and a 'squeeze' for women at their marriageable ages. The authors speculated that some of the excess women would never marry while some others would marry men who were younger or older than men they would have married in case of absence of the baby boom. Evidence showed, few years afterwards, that, during the period 1951-1978, changes in the age sex distribution of the young population caused a decrease of 1.5 years in the mean age at marriage for men and an increase of about 1.5 years in the mean age at marriage for women, besides an increase in the dispersion of the age at marriage, especially for women (Schoen, 1983[164]).

Many scholars have argued that the marriage squeeze has several other far-reaching social implications. As an example, according to the economic point of view expressed by Herr and Grossbard-Shechtman (1981[100]), the marriage squeeze reduced the proportion of U.S. females who would have married in the 1960s and 1970s and lowered the 'compensation' that men were obliged to pay women for their traditional roles. They argued that, together with the availability of contraception the marriage squeeze fostered the spread of the Women's Liberation Movements. Moreover, an appreciable deviation from a balanced sex ratio has been interpreted as one of the factors affecting the relationships between sexes as well as family and other social institutions (Guttentag and Secord, 1983[92]). A shortage of women, emphasises traditional sex roles, because men who want to get married are required a greater commitment to the union. Conversely, when there is a surplus of women, traditional aspects of marriage and the family play a minor role and divorce and births out-of-wedlock become more widespread.

Fluctuations in fertility caused by baby booms and baby busts gave rise to very important changes in the number of live births in Italy. Moreover internal migration, immigration, and emigration have shaped the size of the eligible population in significant ways. It is conceivable that large fluctuations had a significant impact, some decades later, on the marriage market, creating marriage squeezes, and they may also have been partially responsible for changes in the transition to marriage. There has however not been any systematic attempt to analyse the dynamics of the marriage market and marriage squeezes in the light of long-term fluctuations in birth rates.

The understanding of the marriage squeeze is linked to the manifestations of two-sex population dynamics given that men and women reciprocally interact in the process of matching. The discussion here is heavily based on Schoen 1988[166], 1983[164].

The analysis of nuptiality as well as fertility, should take into account that the male and female marriage rates in each reciprocal preference are influenced by the age-sex composition of the population. Thus the observed marriage rates reflect the interaction of the underlying preferences and the age-sex composition of that population. This is one of the most important distinctions to make between marriage or fertility rates on one side and mortality, divorce, migration, or other demographic rates on the other side: the latter can be basically seen as determined by a fixed set of underlying propensities that are *independent* of the composition of the population[1].

Let us assume that in an hypothetical population men typically marry women two years younger. A rise in the annual number of births of that population, will bring about a marriage squeeze for women: men will be looking for brides among larger cohorts of women born some years earlier, while women must look for grooms among the smaller cohorts born some years before. If the population has instead experienced a substantial decline in the annual number of births, the same process would operate, but it would be the men who would be caught in a marriage squeeze.

Briefly, the mating problem arises from the following set of circumstances:

- men and women marry on the average at different ages[2],
- the number of births fluctuates from year to year.

Basically, the equilibrium between the sexes in a marriage market depends on (McDonald, 1995[133]):

- Sex Ratio at birth and the survival male/female ratio from birth to age at marriage, if marriage takes place always at the same age;
- age structure, which is a function of the variation of births across years, if marriage takes place at different ages. Two cases can be distinguished: on one hand we may have a stationary population where the number of births $N = constant$, on the other hand a non stationary population (where $N \neq constant$), whose case is more complex.

[1]For example, the probability that a person exact age x will die, depends only on the force of mortality at that age, while the probability that a men exact age x will marry a woman exact age y depends on the (x, y) marriage preference, the male population at exact age x and the female population at exact age y.

[2]The marriage market reflects the effects of the age-sex structure of a population, but also the existence of social norms that somehow regulate the proper age at marriage. In particular, social norms may also prescribe a range of acceptable ages or even acceptable differences between the ages of partners (Billari, Micheli, 1999[19]).

The way to measure quantitative imbalances between the men and women on the marriage market is not unique. Many scholars proposed, according to their aims, alternative measures but a general agreement does not exist, yet.

3.3 Measure of the marriage squeeze

The measures introduced in the literature for studying marriage market conditions can be broadly divided between two categories: those that use sex-ratios and those that focus on the two-sex approach. Let us first discuss both sets of measures and then propose two simple new measures.

3.3.1 Sex Ratios

The most common way to measure the marriage squeeze is by means of a sex ratio, which is usually expressed as the number of men for every 100 eligible women. A very simple measure of the marriage market is the sex ratio for selected age groups determined on the basis of the cross-classified ages at marriage for men and women, as for example:

$$I_1 = 100\frac{M_{25-29}}{F_{20-24}} \tag{3.1}$$

Often, men in a given age group have been compared to women in a smaller and some years earlier age group, reflecting the empirical differences between partners' ages. Of course, having age groups of the same width does not take into account the fact that the female age distribution of marriage is normally more concentrated around the mode than the male distribution and that there may be variations in the timing of the process.

An alternative measure has been introduced by Akers (1967[1]), who defines the following index of the marriage squeeze as weighted ratio of men who marry women aged y over women aged y, where the weights at each age approximate the probability of marriage at that age. The weights for the index proposed by Akers are first marriages of women aged 15-24 and men aged 15-29. According to Akers, these ranges include those ages at which most women marry and the ages of most of the men whom they marry (more than 80% in both cases, Akers, 1967 [1]).

$$I_2 = \frac{\sum_{y=15}^{24} A_y \sum_{x=15}^{29} B_x^y P_x^m}{\sum_{y=15}^{24} A_y P_y^f} \tag{3.2}$$

in which: P is the population, x is the age of male, y is the age of female, B_x^y is the proportion of females marrying at age y who marry men of age x, and A_y is the proportion of all females that marry at age y, taken from a (period) nuptiality table. Note that for any given age of females, the relative supply of marriageable males may be given by the following expression:

$$i_y = \frac{\sum_{x=15}^{29} B_x^y P_x^m}{P_y^f}$$

where in the numerator there are men who marry women aged y and in the denominator there are women aged y. The author attributes the increase in the age at marriage and in marriage rates, observed in United States in the 1960s, to the dynamics of the age-sex population composition. The disproportions in the number of males and females of a given age at their first marriage were due to the fact that more females were born in the baby-boom period (after World War II: June 1946 - July 1947) than males a few years earlier (July 1944 - June 1945). As a consequence, American women in the 1960s faced a marriage squeeze.

To measure the impact on sex roles in the United States of the female marriage squeeze (the shift in the sex ratio at eligible ages which took place in the late 1950s and early 1960s), the contraceptive revolution (which began in the 1960s), and the women's liberation movement Heer and Grossbard-Shechtman (1981[100]) introduce two different indexes. Their basic idea is to compare men and women in an age interval of the same width for both sexes. In particular, the age intervals were chosen such that the midpoint of the male group, 23.0 years, was very close to the median age at first marriage for men during the period that starts in the early 1960s and ends in 1975; while the midpoint of the female group, 20.5 years, was very close to that of women at the beginning of this period. Therefore, as a first measure, they introduce the ratio of males aged 19.50-26.49 to females aged 17.00-23.99 as:

$$\underbrace{I_3 = \frac{M_{19.50-26.49}}{F_{17.00-23.99}}}_{7-year\ period\ surrounding\ the\ median\ age\ at\ first\ marriage\ for\ each\ sex} \tag{3.3}$$

As Akers (1967[1]) previously pointed out, there is more than one way to measure marriage squeeze and therefore the authors suggested to use also another index together with the (3.3), which specifically take into account only those who are not yet married. Thus, the second index proposed by Heer and Grossbard-Shechtman (1981[100]) is:

$$I_4 = \underbrace{\frac{M^{Un}_{20-29}}{F^{Un}_{18-29}}}_{\textit{Unmarried at marriageable age}} \tag{3.4}$$

In both cases, I_3 (3.3) and I_4 (3.4):

$I > 1 \Rightarrow$ marriage squeeze for males,

$I < 1 \Rightarrow$ marriage squeeze for females.

In such cases, the index assumes an equilibrium value of one. For both of these definitions they observe the existence of a marriage squeeze for women in the United States for the period under study.

In 1984 Goldman et al.[84], criticise sex ratios as they do not offer a realistic measure of the availability of mates for several reasons:

1) selected age differences are very limited: although the mean age difference between husband and wife is relatively stable at about 2.0 to 2.5 years, the distribution of age differences is relatively wide;

2) these measures exclude factors other than age and sometimes marital status in defining the marriage market. Obviously many other social, economic, cultural, personal factors enter into the definition of availability;

3) most of existing ratios consider only cohorts in their early twenties and hence ignore the question of availability for older unmarried cohorts, who are becoming an increasingly larger percentage of the unmarried pool.

Alternatively, the authors suggest to develop a measure of the availability of the potential mates, that incorporates information about the pool available as well as the competition for that pool and that reflects the normative selection patterns by some characteristics (in their empirical study race, age, educational level). They suggest to use the so called *Availability Ratio*. They start considering the chances of an arbitrary woman, which they call Ego, of finding a mate in a particular calendar year. Main hypotheses they introduce are:

- in Ego's town or locality, there are 100 males of suitable characteristics (say age, education and race) to marry;

- each of the 100 suitable men has 100 women suitable for him.

More precisely, they define the Availability Ratio for a woman as follows:

$$I_5 = AR = \frac{number\ of\ suitable\ men\ (for\ Ego)}{average\ number\ of\ suitable\ women\ for\ (Ego's)\ suitable\ men} \tag{3.5}$$

Under the conditions introduced earlier, I_5 equals to unity for Ego, while if there were 500 women for each men, then AR=0.2. Note that (3.5) refers to Ego. The AR for a man or a cohort, is simply defined as the number of suitable women divided by the average number of suitable men for these women. One should also note that (3.5) is not the probability of Ego's marrying: just because each of Ego's 100 suitable men has 100 suitable women from which to choose a mate, Ego is not certain to marry. Yet, the AR gives us some sense of how likely Ego is to find a mate, or the odds that Ego could marry if other considerations were conducive to marriage. Again we have the following situation: if the average woman in the original cohort has one suitable man and the average suitable man has one suitable woman, then $AR = 1$. For women:

$AR < 1 \Longrightarrow$ imbalance in the marriage pool makes it difficult for women to find mates;

$AR > 1 \Longrightarrow$ a favorable sex ratio from the female point of view.

To specify the "Suitability" they calculate the AR for a cohort of women at particular ages (therefore selecting a cohort), education, race, as follows. Let:

M_{ij} = number of men aged i in the educational level j who are suitable (because, for instance, they have same race of the cohort of women taken into account)

$W_{M_{ij}}$ = number of women who are suitable for men aged i of educational level j. The denominator of the competition for M_{ij} (3.5) equals:

$$\frac{\sum_i \sum_j W_{M_{ij}} M_{ij}}{\sum_i \sum_j M_{ij}} \tag{3.6}$$

where there are the sums over i (age) and j (educational level) for that original cohort. Therefore as it represents the total number of suitable men divided by the average number of suitable women for these men, the AR (3.5) becomes

$$I_5 = AR = \sum_i \sum_j M_{ij} \div \frac{\sum_i \sum_j W_{M_{ij}} M_{ij}}{\sum_i \sum_j M_{ij}} = \frac{[\sum_i \sum_j M_{ij}]^2}{\sum_i \sum_j W_{M_{ij}} M_{ij}} \tag{3.7}$$

If $W_{M_{ij}} = M_{ij}$, that is to say the average woman in the original cohort has one suitable man and the average suitable man has one suitable woman, then $AR = 1$.

Moreover they introduce also the *Comparative Odds Ratio* (COR) which compares the female AR with the AR for males of the same race, age, and educational level:

$$COR = \frac{AR^M}{AR^F} \tag{3.8}$$

Therefore 3.8 represents the number of males available per 1 females and:

- $COR < 1$ women have better market situation than men of that age and education;
- $COR > 1$ men have better market situation than women of that age and education;
- $COR = 1$ a balanced market for men and women.

There are two limitations of the AR: first, as it is empirically derived, it reflects the existing pattern of age at marriage and age differences of partners and the accommodation of partners to the supply and demand of potential mates at that time. Second, it does not care about age preferences of partners: the procedure does not differentiate the preferences of a person for an unmarried partner near his or her own age, from the preferences for an unmarried partner at the extreme of the age constraint.

To overcome the first problem, Goldman and her colleagues assume that the empirical base is the only sensible way to proceed: they artificially constrain age choices allowing individuals of approximately the same age to marry, or older men to link with younger women. For the second problem the authors have defined a procedure to weight age preferences which consists in the two-sex central marriage rate. It measures the ages at which people marry in relation to the number of persons at each age who are eligible to marry. Therefore

$$CMR = \frac{M_{ij}}{\sqrt{m_i f_j}} \tag{3.9}$$

where M_{ij} is the number of marriages occurring during the year to grooms aged i and brides aged j and m_i and f_j are the respective number of unmarried males and females at those ages.

The AR and COR have been applied to the Italian case (De Rose e Rufo, 1994[62]) in an analysis of the Italian population distributions by sex and marital status in various censuses (years 1936-1981). They obtain two major results, and it is useful to summarise them briefly in view of our application. First, there is a general disadvantage for women at most ages if one excludes the age-group15-19. Second, the cohorts of women born during the two world wars and during the baby-boom are in a better position on the marriage market than other women in the same period. Moreover, under the assumptions that widowed and divorced people choose their partners among their own, the position of these women in the marriage market is even worse, because of the high sex mortality ratio at older ages. The analysis of the COR ratio shows mainly the same results: a better position for women only up to age 20, when the marriage market then becomes disadvantageous for them (the number of single men available for single women decreases progressively) after that age. Only for the 1981 census does there emerge a favourable situation for women older than 40. The authors also note that, over time, the marriage market conditions for single women at older ages improve as the rates, even if still negative, become closer to 100. The 1981 situation is new, as we observe a rise of the COR ratio at older ages (which means improving conditions for women at older ages): it assumes the shape of a reversed J.

There are, however, some drawbacks to the measures we have just discussed. First of all, the assumption that most partnerships are established within a given age range or with a given age difference between partners does not provide the desired flexibility for measuring the marriage squeeze we are looking for. This is a key aspect, especially when analyses are conducted over a longer time span. In fact, not only the timing of marriage for men and women may change over time, but also the age preferences of each partner may shift. Moreover, these measures exclude factors other than age – and sometimes marital status – for defining the marriage market. Obviously, many other social, economic, cultural, and personal factors should enter into the definition of availability. Lastly, most existing ratios consider only cohorts in their early twenties, thereby ignoring the question of availability for older unmarried cohorts, which are becoming an increasingly larger percentage of the unmarried pool. Schoen (1988[165]) observes, among others, that sex ratios only capture one-sex compositional effects. Even when refined, sex ratios combine changes in the age- and sex-specific rates with one-sex compositional effects (marginal effects). To measure the marriage squeeze, however, it would be necessary to measure the changes in age- and sex-specific marriage rates which are produced by changes in the age and sex composition of the population. Furthermore, such indices are not adequate for the analysis of the Italian case. After a slight anticipation in age at marriage in the early 1960s, marriage timing in Italy moved in the direction of higher ages at first marriage and increasing variability at the regional level (De Sandre et al., 1997[64]). Moreover the dispersion of the age distribution around the modal value is normally higher in the male pattern than in the female one, so that fixing the age range would exclude different proportions of marriages.

3.3.2 Measures derived from the two-sex nuptiality tables

Several solutions to the so-called two-sex problem (that is, the reconciliation of male and female rates) have been proposed in the literature. Two main families of models can be envisaged: the axiomatic approach, which starts from a list of 'axioms' have been set as a requirement for an acceptable solution (Hoem 1969[102], Pollard 1975 [146], Schoen 1983[164]) and the behavioural approach, which starts from a set of assumptions about the individual behaviour of candidates searching for a partner (Henry 1972[96], Dagsvik 1998[58]). Some are based on the geometric, arithmetic, or harmonic mean between the male and the female rates, others on the minimum or maximum solution (they assume, for instance, the number of marriages to be the minimum number obtained by multiplying the sex-specific rate by the corresponding population). The main alternative approaches to the harmonic mean solution are the iterative adjustment (McFarland, 1975[134]) and the panmitic circles approach (Henry, 1972[96]). For a comparative analysis see Schoen (1988[166]) and Keilman (1998[118]).

In 1983, Schoen [164] provides a formally precise definition of the marriage squeeze. He considers the marriage squeeze as being closely associated with the 'two-sex problem' in formal demography.

'The two-sex problem is that a population's observed male and female marriage (or fertility) rates cannot simultaneously be incorporated into demographic models,

or even be used to provide a consistent estimate of the number of marriages (or births) a population might be expected to have in the following year' (Schoen, 1983, p.62[164]).

To see why this is the case, let us consider marriage rates, bearing in mind the obvious requirement that the number of males aged x marrying females aged y must be the same as the number of females aged y marrying males aged x. When we multiply the observed male rate for (x, y) marriages by the male population aged x in some second population with a different age-sex composition, we get a certain number of (x, y) marriages. In general, however, that number will not be the same as the number of (x, y) marriages produced by multiplying the first population's female rate for (x, y) marriages by the number of females aged y in the second population. Therefore, a change in age-sex composition forces a change in marriage rates, and that is the kind of change which produces a marriage squeeze: we shall say that an inconsistency between male and female marriage rates exists. In 1981, Schoen[162] proposed for the discrete case to introduce an appropriate condition for consistency between an observed and a model population, given by:

$$\underbrace{{}^{m}W(x_n, y_n) + {}^{f}W(x_n, y_n)}_{\textit{observed population}} = \underbrace{{}^{m}w(x_n, y_n) + {}^{f}w(x_n, y_n)}_{\textit{model or second population}} \tag{3.10}$$

where the ${}^{m}W$ and ${}^{f}W$ represent observed male and female occurrence/exposure rates of marriage between males aged x to $x + n$ and females aged y to $y + n$ and the ${}^{m}w$ and ${}^{f}w$ represent the corresponding male and female rates in some second or model population. In other terms:

$${}^{m}W(x_n, y_n) = \frac{M(x_n, y_n)}{{}^{m}P(x_n)}, \qquad {}^{f}W(x_n, y_n) = \frac{M(x_n, y_n)}{{}^{f}P(y_n)}$$

$${}^{m}w(x_n, y_n) = \frac{m(x_n, y_n)}{{}^{m}L(x_n)}, \qquad {}^{f}w(x_n, y_n) = \frac{m(x_n, y_n)}{{}^{f}L(y_n)}$$

where $M(x_n, y_n)$ represents the number of marriages between males aged x to $x+n$ and females aged y to $y+n$ in an observed population of males ${}^{m}P(x_n)$ aged $x, x+n$ and of females ${}^{f}P(y_n)$ aged $y, y + n$. Analogously, $m(x_n, y_n)$ represents the number of marriages between males aged x to $x + n$ and females aged y to $y + n$ in a model population of males ${}^{m}L(x_n)$ aged $x, x + n$ and of females ${}^{f}L(y_n)$ aged $y, y + n$.

The consistency condition (3.10) is an *harmonic mean consistency condition* (Schoen, 1981[162]) because it is equivalent to equating the observed population number of (x_n, y_n) marriages divided by the harmonic mean of the observed male population aged x to $x+n$ and the observed female population aged y to $y+n$ with the second population's number of (x_n, y_n) marriages divided by the harmonic mean of its corresponding male and female populations:

$$\frac{M(x_n, y_n)}{{}^mP(x_n)} + \frac{M(x_n, y_n)}{{}^fP(y_n)} = \frac{m(x_n, y_n)}{{}^mL(x_n)} + \frac{m(x_n, y_n)}{{}^fL(y_n)}$$

$$\frac{M(x_n, y_n)[{}^fP(y_n) + {}^mP(x_n)]}{{}^mP(x_n){}^fP(y_n)} = \frac{m(x_n, y_n)[{}^fL(y_n) + {}^mL(x_n)]}{{}^fL(y_n){}^mL(x_n)}$$

$$\frac{M(x_n, y_n)}{\dfrac{1}{\dfrac{1}{{}^mP(x_n)} + \dfrac{1}{{}^fP(y_n)}}} = \frac{m(x_n, y_n)}{\dfrac{1}{\dfrac{1}{{}^mL(x_n)} + \dfrac{1}{{}^fL(y_n)}}} \tag{3.11}$$

Schoen has shown that equation 3.10 reconciles the male and female rates and he specified and calculated two-sex life table models that reflect the complex interactions of the observed marriage market.

In equation (3.10), the sum reflects the underlying reciprocal preference for marriage between males aged x to $x+n$ and females aged y to $y+n$: but these preferences are influenced by the age-sex composition of the population (the observed marriage rates reflect this interaction).

Now, to provide a measure of the marriage squeeze, Schoen introduces the idea of *magnitude* of marriage attraction between males and females in specified age-sex groups. Obviously, if the number of males and females in the two-sex age-groups is the same, then there is no imbalance between the sexes and male and female rates are equals. If the number of males and females is not the same, then the sex with the larger population has a smaller rate, while the other sex has a larger rate. The greater the imbalance between the number of males and the number of females, the greater the difference between the male and the female rates. Thus the extent of the imbalance is reflected in the difference between observed rates.

Let us take into account a rectangular population, where the number of people is the same for every age: in this population there is no marriage squeeze, as the population at risk for every age is the same for both sexes. As in every life table, period and cohort experience are identical and in each birth cohort the number of males who marry must be the same as the number of females who marry. Schoen then adds the following assumptions:

1) there is no mortality between age 15 to 49: the only decrement of the table is marriage. This is a fairly realistic assumption in developed countries;

2) the male and female radix value are equal: ${}^{m}l_0 = {}^{f}l_0$ are the initial cohort sizes. Even though the sex ratio at birth is around 105 males for every 100 females, on the large numbers, this assumption preserves the symmetry and balance of the two sexes and it greatly simplifies the calculations.

As the initial size of the male and female cohorts does not change and the marriage preferences (and mortality rates) are fixed, the experience of each cohort in the model is the same as the experience of the model's population in any year. Therefore the two-sex nuptiality-only life table provides a population without any marriage squeeze because cohort marriage behaviour is identical to period behaviour and the age-sex composition of the model is completely determined by the underlying preferences: the number of males and females who wed in any period (or cohort) is indicated by ${}^{mf}l_0^w$, where l_0^w is the number of marriages to person at above age 0 and the superscript mf indicates that the value is from a two-sex (male-female) table. The analogous values from a one-sex male and female life table are ${}^{m}l_0^w$ and ${}^{f}l_0^w$ constructed using the same values ${}^{f}l_0 = {}^{m}l_0$ and reflecting the observed males and females rates of the given population[3].

Therefore, under a specified set of marriage preferences, ${}^{mf}l_0^w$ gives the number of males and females who marry in a population free of marriage squeeze. Under the same set of marriage preferences, but using the rates which bear the imprint of the age-sex compositional effects that produce the marriage squeeze, ${}^{m}l_0^w$ and ${}^{f}l_0^w$ are the number of males and females who marry.

According to the author the marriage squeeze can be defined as:

$$S = \frac{{}^{m}l_0^w - {}^{f}l_0^w}{{}^{mf}l_0^w} \tag{3.12}$$

In the right hand side of equation (3.12) there is, in the numerator the difference between the number of male and female life-table marriages calculated using rates

[3]In fact, the observed male age-specific marriage rates can be used to calculate a one-sex male life table with ${}^{m}l_0^w$ out of a cohort of ${}^{m}l_0$ males marrying. Similarly, for females, we can construct a set of age-specific marriage rates and then built the life-table ${}^{f}l_0^w$ out of a ${}^{f}l_0$ females marrying. The marriage magnitude implied by the observed male and female rates (therefore under a specified set of marriage preferences) yields what has been called a TWONUP model where ${}^{mf}l_0^w$ males and ${}^{mf}l_0^w$ females marry out of a cohort of l_0 persons of each sex, in a population free of a marriage squeeze.

that bear the imprint of the marriage squeeze, while the denominator represents the number of either the male or the female life table marriages in a model that has the same set of magnitudes of the marriage attraction, but no marriage squeeze. Equation (3.12) indicates the difference between the male and female marriages that is produced by the marriage squeeze expressed as a proportion of the number of marriages that would occur in the absence of a marriage squeeze. Now, the difference (3.12) between number of males and females who marry in the associated one-sex male and female life tables ${}^{m}l_0^w$ and ${}^{f}l_0^w$, relative to the number who marry in the two-sex model ${}^{mf}l_0^w$ addresses the magnitude and the direction of a marriage squeeze as follows:

- when both one-sex models have the same number of marriages, i.e., ${}^{m}l_0^w = {}^{f}l_0^w$, then $S = 0$,
- when male rates yield a number of marriages greater than the number of female marriages, ${}^{m}l_0^w > {}^{f}l_0^w$, then $S > 0$ and there is a marriage squeeze for females,
- when male rates yield a number of marriages smaller than the number of female marriages, ${}^{m}l_0^w < {}^{f}l_0^w$, then $S < 0$ and there is a marriage squeeze for males.

Moreover, the larger the absolute value of S, the greater the *tightness* of the squeeze. Now, the sum between ${}^{m}l_0^w$ and ${}^{f}l_0^w$ relative to two times ${}^{mf}l_0^w$ reflects the number of males and females who marry in the two one-sex models, relative to the number who marry in the two-sex model (where there are ${}^{mf}l_0^w$ male marriages and ${}^{mf}l_0^w$ female marriages).

Therefore, the index:

$$R = \frac{{}^{m}l_0^w + {}^{f}l_0^w}{2\,{}^{mf}l_0^w} \tag{3.13}$$

measures the degree to which the age-sex composition of the given population serves to depress the observed number of marriages below what would have resulted in the absence of an imbalance between the sexes. Instead, the number of marriages 'lost' to the marriage squeeze as a fraction of the number of observed marriages is

$$Q = \frac{1 - R}{R} = \frac{2\,{}^{mf}l_0^w - ({}^{m}l_0^w + {}^{f}l_0^w)}{{}^{m}l_0^w + {}^{f}l_0^w} \tag{3.14}$$

In this index, on the right hand side there is, in the numerator, the number of male and female marriages in the two-sex nuptiality table minus the marriages yield in the two one-sex life tables, while the denominator contains the number of marriages in the one-sex models. Note that Q can never be negative, given that all three models have the same radix value and have decrements only to marriage.

Now, the very usefulness of this model is due to the ease of application when we come to a different formulation of the previous indices S, R and Q, taking into account that we can write (as a result of the piecewise constant rates) in each age interval:

$$\beta = e^{-\sum_x n^m W(x_n,\cdot)} \tag{3.15}$$

$$\gamma = e^{-\sum_y n^f W(\cdot,y_n)} \tag{3.16}$$

Where n is the width of the age-group, $(\cdot)$ indicates that marriages involving persons of the other sex at all ages are included in the marriage rate and β and γ can be though as the proportion of the male and the female life-table cohorts that *never* marry (PNM). From the classical, or exponential life-table calculation we also have that:

$$^{m}l_0^w = l_0(1-\beta) \tag{3.17}$$

$$^{f}l_0^w = l_0(1-\gamma) \tag{3.18}$$

where l_0 is the common radix. In the same way, also the two-sex nuptiality table can follow the same line of reasoning:

$$^{mf}l_0^w = l_0\{1 - exp[-\sum_x n^m w(x_n,\cdot)]\} = l_0\{1 - exp[-\sum_y n^f w(\cdot,y_n)]\} \tag{3.19}$$

where the final equality is due to the fact that the male and female cohorts must have the same number of marriages in the two-sex model.

Now, dividing the last equality in equation (3.19) by l_0, rearranging and then taking the logs, we have

$$\sum_x n^m w(x_n,\cdot) = \sum_y n^f w(\cdot,y_n) \tag{3.20}$$

But the summations include all marriages, and then, we know from the basic consistency condition (3.10) that:

$$\sum_x n^m W(x_n,\cdot) + \sum_y n^f W(\cdot,y_n) = \sum_x n^m w(x_n,\cdot) + \sum_y n^f w(\cdot,y_n) \tag{3.21}$$

Then, combining the last two equations (3.20) and (3.21) one gets:

$$\sum_x n^m w(x_n, \cdot) = \sum_y n^f w(\cdot, y_n) = \frac{1}{2}[\sum_x n^m W(x_n, \cdot) + \sum_y n^f W(\cdot, y_n)] \tag{3.22}$$

and using (3.22) and (3.16) and (3.15):

$$^{mf}l_0 = l_0(1 - \sqrt{\gamma\beta}) \tag{3.23}$$

Recalculating S, R and Q in (3.12), (3.13), (3.14), Schoen proposed the new version:

$$S = \frac{\gamma - \beta}{1 - \sqrt{\gamma\beta}} \tag{3.24}$$

$$R = \frac{1 - \frac{1}{2}(\gamma + \beta)}{1 - \sqrt{\gamma\beta}} \tag{3.25}$$

$$Q = \frac{\frac{1}{2}(\gamma + \beta) - \sqrt{\gamma\beta}}{1 - \frac{1}{2}(\gamma + \beta)} \tag{3.26}$$

Now equations (3.24)(3.25)(3.26) are very useful because they show that, under mild assumptions, we only need to know the two parameters γ and β, which are simple functions of the sum of the observed age-specific male and female marriage rates, to compute the Schoen's indices of imbalance on the marriage market. Thus to find S, R, and Q is not necessary to calculate a whole life table or to know the full arrays of $^mW(x,y)$ and $^fW(x,y)$ rates; the levels of the sums of the male and female marriage rates suffice. The size of those sums reflects the level of marriage, and the difference between them reflects the severity of the marriage squeeze. Since in any period equal numbers of males and females marry, the male and female rates share in a sense the same numerators. If one sum exceeds the other, it is an indication that the population in the denominators for that sex are smaller. Hence, there are few of that sex relative to the number in the other sex, which thus find itself in a marriage squeeze (Schoen, 1983[164]).

Before moving on, it is worth noting that Schoen's approach analyzes the dynamics of the interactions between the sexes in nuptiality.In his model marriage preference depends only on age and sex, while other dimensions, as socio-economic status, marital status and ethnicity are not considered.

3.3.3 Two new simple measures of the marriage squeeze

In this section, we take Schoen's reasoning as our starting point and describe two measures that operate analogously to his S measure. The underlying idea is that differences in the observed quantum of nuptiality between the two sexes indicate the presence of a marriage squeeze.

Let us start from the observed *Proportion Ever Marrying* (PEM) for men (PEM^m) and for women (PEM^f), respectively. It should be stressed that the quantities (3.15) and (3.16), introduced in the previous section express the *Proportion Never Married* (PNM) for men and women respectively. In the same way, their complementary measures are known as *proportions ever marrying* (PEM) and are easily obtained as follows:

$$PEM^m = 1 - \beta$$

$$PEM^f = 1 - \gamma$$

Now, another very simple way to look for some evidence of the imbalance on the marriage market could be obtained by taking into consideration the previous proportions, in the following way:

$$I = Imbalance = \frac{PEM^m - PEM^f}{PEM^m + PEM^f} \tag{3.27}$$

this index I expresses the difference in the proportion ever marrying in a nuptiality table as a fraction of the sum of the proportions ever marrying in both sexes. This index differs only very slightly from the one proposed by Schoen. It can however be directly computed if one has access only to the proportion ever marrying. We can see that the interpretation is quite similar to Schoen's index:

- when both one-sex populations have the same proportion ever marrying, then $I = 0$, and there is no marriage squeeze;
- when male rates yield a proportion ever married higher than that for females, then $I > 0$, and there is a marriage squeeze for females;
- when male rates yield a proportion ever married smaller than that for females, then $I < 0$, and there is a marriage squeeze for males.

In addition to I, it could be useful to introduce here another even simpler and alternative measure of the imbalance between the sexes. Often one has access only to measures based on reduced events (Wunsch and Termote, 1978[190]) instead of occurrence/exposure measures. As we also said in the previous chapter, reduced events for marriage, are given by the number of marriages at each age divided by the total age-specific population of that sex. The sum of age-specific first marriage rates is the so-called Total First Marriage Rate $TFMR$. Starting from the sex-specific measures $TFMR_m$ and $TFMR_f$ we can define a similar index

$$I_{freq} = \frac{TFMR_m - TFMR_f}{TFMR_m + TFMR_f} \tag{3.28}$$

The rationale behind the building of the indices I and I_{freq}, is almost the same as the one given by S (even though the denominators are still affected by the squeeze experienced by the two populations), but in addition, they point to a further simplification of the measure of the marriage squeeze. In particular, I_{freq} has the advantage of being solely based on the reduced events and, as a consequence, does not require to pass through the building of the whole nuptiality tables, therefore providing an easy tool of analysis of the unbalance between the sexes on marriage market. Sometimes occurrence/exposure rates for constructing nuptiality tables are not available. In fact, that would require the distribution of the population by marital status, which is not always available in non-censuses years, even in countries with fairly good statistical records. On the other hand, the main disadvantage of our simple indices is that they cannot be connected to measures of the theoretical impact of the marriage squeeze such as Schoen's R and Q.

3.4 Trends over time in Italy

We now apply the above-mentioned measures of the marriage squeeze to Italian nuptiality data from 1969 to 1995. Yet, before its application, we would like to point out some other issues.

First, a two-sex nuptiality table is built starting from data which contain simultaneously the number of male and female marriages for each possible combination of the spouses' ages. This means that we should have a double entry table where, in each row the ages of the groom y_n and in each column those of the bride x_n appear. For each cell we could then calculate the marriage rate corresponding to that exact combination of age of the groom and age of the bride: we would then have all the partial distributions by age of the bride for each selected age of the groom and viceversa. But, as most of the times data are available for each sex separately, it is easier to build the two one-sex nuptiality tables (one for men and the other for women). In this case, our information is limited to the knowledge of the marginal distributions by age of the spouse, for each sex. As we see, this does not represent a problem given that, the index of Schoen S, R, and Q, can be easily computed from the two single sex life-tables and that also I and I_{freq} can be built.

Second, in his work, Schoen started from occurrence/exposure rates of first marriage. This are conditional first marriage rates built in the following way: at the numerator they present the number of marriages occurring at that given age of the groom (bride) and in the denominator there are the person-years lived in a year by those males (females) in that particular age group without being married.

After building nuptiality tables for each sex at regional level and for the period 1969-1995 (see appendix, for a detailed description of the method followed to pass from unconditional rates to marriage probabilities), the Schoen's indices described earlier can be calculated. In fact, by applying the male and female rates to equations (3.15) and (3.16):

$$\beta = PNM^m = e^{-\sum_x {}^m W(x,\cdot)} = e^{-\sum_{x=15}^{49} {}^m \nu_x}$$

$$\gamma = PNM^f = e^{-\sum_y {}^f W(\cdot,y)} = e^{-\sum_{y=15}^{49} {}^f \nu_y}$$

one gets the proportion never married (PNM) for men and women respectively for each year, and their complementary measures to unity, give the proportions ever marrying (PEM).

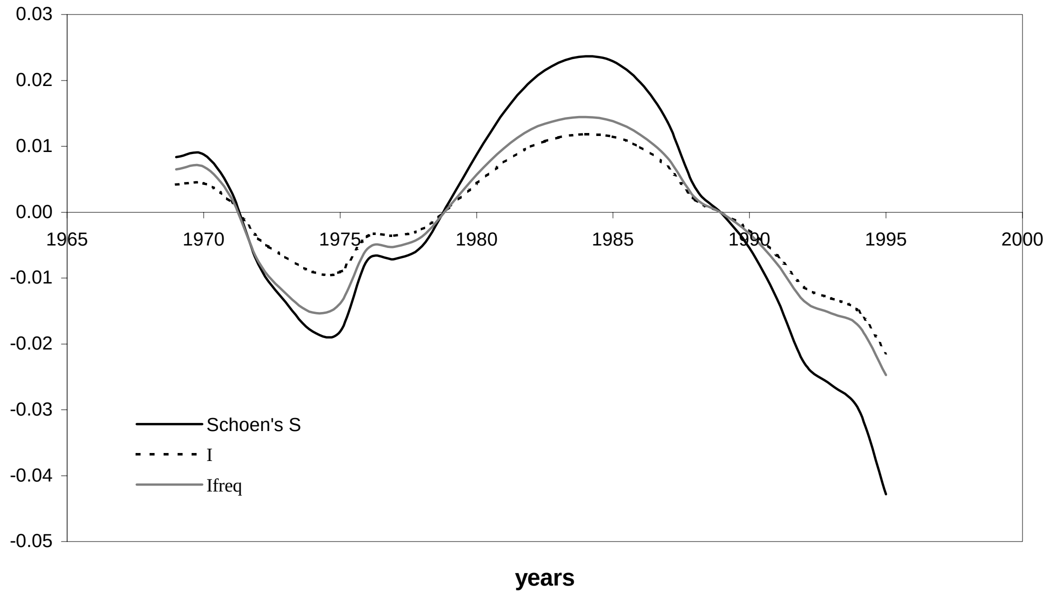
In table 3.1 several indicators of Italian marriage intensity and marriage market are reported. An increase in the proportion of never married people at age 50 for both sexes (columns 3 and 6 respectively), but especially for men can be observed. The probability that a women would never marry, given the 1969 preferences and the years population composition was 18%, while this same probability reached the value of 42% in 1995. Men, as well, experienced an increase in the proportion never married from 17% in 1969 to 44% in 1995. Conversely, the proportion ever married

Table 3.1: Proportion ever married (PEM) and never married (Gamma and Beta) at age 50 by sex and measures of the imbalance between the sexes: 1969-1995 - $ITALY$

	MEN			*WOMEN*			*Schoen's Indices:*		*Alternative measures:*	
YEAR	TOT $\Sigma^m v_x$	P.N.M. β	P.E.M. $1-\beta$	TOT $\Sigma^f v_y$	P.N.M. γ	P.E.M. $1-\gamma$	Squeeze S	marriages 'lost' Q	Imbalance I	I_{freq}
1969	1.7531	0.1732	0.8268	1.7142	0.1801	0.8199	0.00835	0.000041	0.00417	0.00651
1970	1.8336	0.1598	0.8402	1.7889	0.1671	0.8329	0.00874	0.000049	0.00437	0.00691
1971	1.8629	0.1552	0.8448	1.8453	0.1580	0.8420	0.00327	0.000007	0.00164	0.00230
1972	1.8584	0.1559	0.8441	1.9023	0.1492	0.8508	-0.00790	0.000043	-0.00395	-0.00748
1973	1.8411	0.1586	0.8414	1.9168	0.1471	0.8529	-0.01364	0.000129	-0.00682	-0.01230
1974	1.7200	0.1791	0.8209	1.8076	0.1640	0.8360	-0.01813	0.000199	-0.00907	-0.01522
1975	1.5504	0.2122	0.7878	1.6206	0.1978	0.8022	-0.01810	0.000159	-0.00905	-0.01386
1976	1.4955	0.2241	0.7759	1.5212	0.2184	0.7816	-0.00731	0.000024	-0.00366	-0.00558
1977	1.4303	0.2392	0.7608	1.4532	0.2338	0.7662	-0.00710	0.000020	-0.00355	-0.00524
1978	1.3604	0.2565	0.7435	1.3755	0.2527	0.7473	-0.00515	0.000010	-0.00257	-0.00369
1979	1.2369	0.2903	0.7097	1.2331	0.2914	0.7086	0.00155	0.000001	0.00078	0.00087
1980	1.2155	0.2966	0.7034	1.1950	0.3027	0.6973	0.00877	0.000022	0.00439	0.00569
1981	1.1789	0.3076	0.6924	1.1456	0.3180	0.6820	0.01515	0.000063	0.00758	0.00969
1982	1.1394	0.3200	0.6800	1.0984	0.3334	0.6666	0.01989	0.000102	0.00995	0.01256
1983	1.0732	0.3419	0.6581	1.0310	0.3567	0.6433	0.02267	0.000120	0.01134	0.01399
1984	1.0407	0.3532	0.6468	0.9988	0.3683	0.6317	0.02366	0.000124	0.01183	0.01442
1985	1.0114	0.3637	0.6363	0.9726	0.3781	0.6219	0.02292	0.000111	0.01146	0.01380
1986	0.9851	0.3734	0.6266	0.9529	0.3856	0.6144	0.01969	0.000079	0.00985	0.01174
1987	1.0010	0.3675	0.6325	0.9779	0.3761	0.6239	0.01368	0.000040	0.00684	0.00820
1988	1.0216	0.3600	0.6400	1.0149	0.3624	0.6376	0.00376	0.000003	0.00188	0.00221
1989	1.0144	0.3626	0.6374	1.0150	0.3624	0.6376	-0.00030	0.000000	-0.00015	-0.00020
1990	0.9945	0.3699	0.6301	1.0038	0.3665	0.6335	-0.00541	0.000006	-0.00271	-0.00328
1991	0.9375	0.3916	0.6084	0.9583	0.3835	0.6165	-0.01314	0.000034	-0.00657	-0.00783
1992	0.9199	0.3985	0.6015	0.9555	0.3846	0.6154	-0.02286	0.000102	-0.01143	-0.01349
1993	0.8713	0.4184	0.5816	0.9090	0.4029	0.5971	-0.02623	0.000124	-0.01312	-0.01535
1994	0.8176	0.4415	0.5585	0.8569	0.4245	0.5755	-0.03000	0.000147	-0.01500	-0.01728
1995	0.8179	0.4414	0.5586	0.8749	0.4169	0.5831	-0.04281	0.000305	-0.02141	-0.02470

(PEM in the table) decreased in the period that starts from 1969 to 1995. In the same table the aggregate measure of the imbalance between the sexes are also computed. According to Schoen (1983) the S index provides the proportion of the difference between male and female marriages in the one-sex nuptiality tables as a fraction of the number who marry in the two-sex model. As it can be also seen in figure 3.1, S and the alternative indices of imbalance I and I_{freq}, show the same pattern, although the former presents a stronger emphasis. All three measures are negative, thus indicating a disadvantage on the marriage market for men, in the period from 1971 to 1979, with the lowest levels reached in the years 1974-75, and in the period after 1989. On the other hand, the indices show a marriage squeeze for females for the years, 1969-1971 and for the years 1979-1989; the highest value is reached in 1984. It seems, then, that the newly proposed indices describe the existing imbalance on the marriage market rather well (table 3.1 and figure 3.1). The proportion of marriages 'lost' because of the marriage squeeze (here we refer

Figure 3.1: Comparison between different measures of the imbalance between the sexes on the marriage market: 1969-1995 - *ITALY*

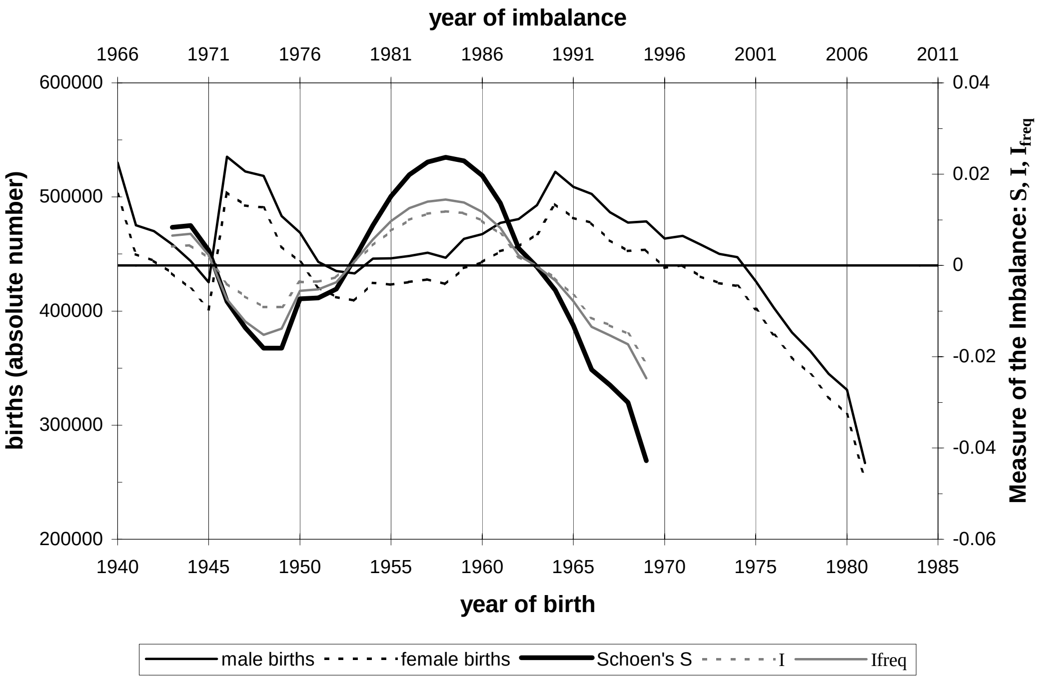


to Schoen's R) is at a maximum when the squeeze is tightest, regardless of its sign. The highest loss is for the years 1974-75 and 1983-85. More recently, as the squeeze has become tighter, the proportion of lost marriages has also been increasing (table 3.1).

The dynamics of the marriage squeeze are clearly challenging: how can we explain such fluctuations? As in US-based studies, we first look at the evolution of births.

By plotting the trend in the number of births and the measures of the squeeze (S, I, I_{freq}) together, we can get the idea of how variations in natality are echoed in subsequent imbalances in the marriage market (figure 3.2). The basic idea is that women who were born during a period of growth in the number of births were more likely to have trouble in finding a proper match. In contrast, men born during a phase of reduction in the number of births are more likely to find themselves in a squeeze when searching for a partner. The time-scale of the abscissa at the top exhibits a lag of 26 years with respect to the scale at the bottom, given that the average age at marriage over the entire period and including both sexes is 25.7 years. The latter figure (at the bottom) is linked to the annual number of births, while the former (the top) indicates the time scale for the index of imbalance. This can provide us with a broad idea of the delayed effect of the variation in the birth cohorts

Figure 3.2: Comparison between birth cohorts size (1940-1981) and squeeze S (1969-1995) - *ITALY*



at approximately the time when the individuals can be expected to get married, that is, at the age of 26 years.

The number of births has oscillated significantly over time in Italy. As was the case in many European countries, natality decreased drastically during the Second World War, while the first 5 years after the war showed a marked increase. During the early 1950s the number of births decreased again (down to a total of about 860,000) and this general level remained constant up to the beginning of the 1960s. In the early 1960s the well-known increase in the birth rates known as the baby-boom occurred. In 1964, 1,016 thousands babies were born in Italy. After that year, births started to decrease steadily (down a level of 526,000 in 1995).

The pattern of the squeeze, as described by the indices S, I, and I_{freq} broadly follows the dynamics of the pattern of births, with the expected lag corresponding more or less to the mean age at marriage. Around the years 1973-75, the squeeze is strongly negative: the gap between the male and female probability of ever marrying is about 2 per cent, relative to their joint probability. This can be linked to the recuperation in the number of births that occurred after the Second World War about 25-30 years earlier (1946-1948). As a consequence of the decline in births that occurred immediately after this post-war catch-up, a marriage squeeze against males showed up when men from these cohorts came of marrying age. They experienced a disadvantage in searching for their partners among the smaller cohorts born a few years later. Similarly, we can observe a strong marriage squeeze against females in the first half of the 1980s. From the mid-1950s to the mid-1960s, there was a slight but steady rise in the absolute numbers of births, which translated into a disadvantage for women of marrying age in the first half of the 1980s. The declining number of births observable just after the baby-boom brings about a strong negative index.

Given the recent steady decline in the number of births in Italy (which is comparable to the decline in some other countries that have reached very low levels in fertility) we can expect to see an even tighter marriage squeeze against men in the near future. This might affect the transition to marriage and, potentially, contribute to a further reduction in fertility.

3.5 Regional differences and the role of internal migrations

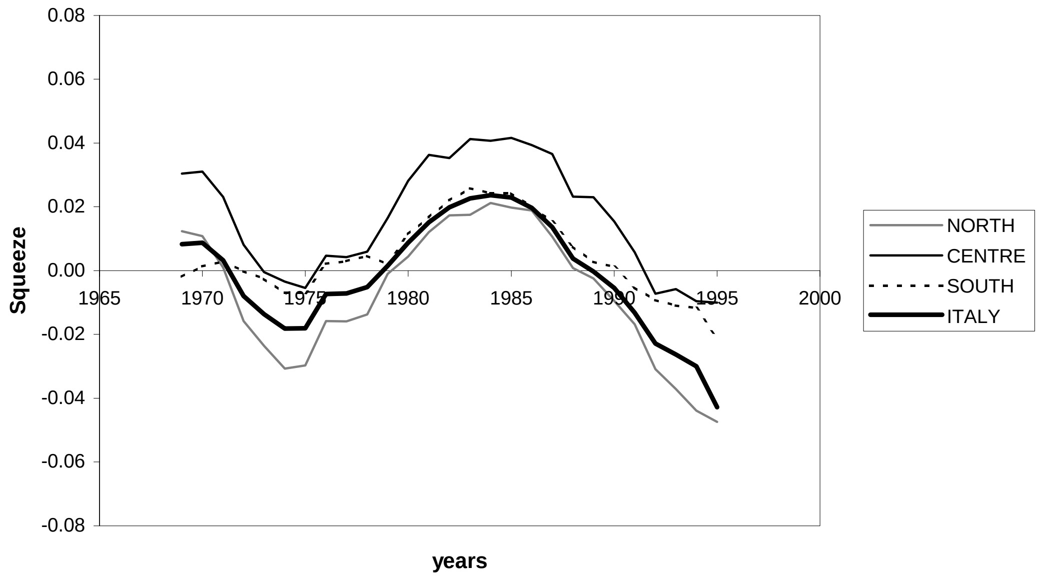
Trends observed and just described for Italy as a whole may hide rather complex patterns at the regional level. Given the possibilities of our data, we conduct a regional analysis. As we said in chapter 1, the idea is that space matters in the marriage market. This means that regional migrations influence the marriage squeeze, and this should be reflected in the measures of imbalance between the sexes. We assume that mortality does not really matter in the period under study. Of course, given the level of migratory flows, the interpretation will be much less straightforward than it would be for the national level.

3.5.1 Macro-regional patterns

The overall trends described earlier for Italy as a whole also hold at the macroregional level[4] (figure 3.3). Nevertheless, levels appear to be different. The Centre of Italy

[4]This analysis has also been conducted using the new indexes of imbalance I and I_{freq}, but to save space we report here only the result regarding Schoen's S.

Figure 3.3: Measure of the Squeeze in the macroregions: Italy, 1969-1995



has a different behaviour for its almost always positive index of the squeeze: the tightness of the squeeze in the Centre, which reaches the level +0.04 in the first half of the 1980s (marriage squeeze for women), is the highest among those observed for the other macroregions. Such a level of the squeeze ($S = +0.04$) means that the male and female rates imply a gap between the male and female probability of ever marrying, relative to their joint probability, of 4 percent (tables 3.2-3.3). The same pattern holds true for southern regions, as well (where the highest level reached in the middle of the 1980s is around 0.025), while northern regions experienced an especially tight squeeze for men during the 1970s (maximum level of -0.03: negative difference between male and female probability of ever marrying relative to their joint of probability about 3 percent) and, recently, from the end of the 1980s onward.

On the whole, it seems that there was a marriage squeeze against men during the 1970s and early 1990s in northern Italy, whereas in central and southern Italy there was almost always a female disadvantage, which was especially high at the beginning of the seventies and in the middle of the 1980s (figure 3.3).

It is tempting to say that areas of high outmigration tended to have a squeeze for women and viceversa for area of high immigration. With respect to this, however, the Centre is rather heterogenous. One should then examine the evidence more

Table 3.2: Measure of the Squeeze in the regions according to the Schoen's S index, 1969-1995

year	Piedmont	Valle d'Aosta	Lombardy	Trentino A. Adige	Veneto	Friuli-Ven. Giulia	Liguria	Emilia Romagna	Tuscany	Umbria	Marches	Lazio
1969	0.0433	-0.0207	0.0297	-0.0138	-0.0200	-0.0397	0.0156	0.0088	0.0213	-0.0084	-0.0168	0.0595
1970	0.0368	-0.0293	0.0261	-0.0263	-0.0157	-0.0366	0.0130	0.0071	0.0201	-0.0065	0.0024	0.0552
1971	0.0175	-0.0522	0.0129	-0.0362	-0.0183	-0.0485	-0.0014	0.0066	0.0081	-0.0013	-0.0012	0.0458
1972	-0.0042	-0.0541	-0.0061	-0.0469	-0.0301	-0.0618	-0.0140	-0.0086	-0.0096	-0.0167	0.0033	0.0284
1973	-0.0128	-0.0853	-0.0163	-0.0582	-0.0363	-0.0656	-0.0253	-0.0086	-0.0171	-0.0168	0.0002	0.0157
1974	-0.0289	-0.0659	-0.0254	-0.0620	-0.0377	-0.0615	-0.0294	-0.0142	-0.0216	-0.0186	-0.0064	0.0149
1975	-0.0300	-0.0763	-0.0248	-0.0557	-0.0383	-0.0720	-0.0360	-0.0010	-0.0193	-0.0158	-0.0088	0.0107
1976	-0.0064	-0.0517	-0.0106	-0.0433	-0.0255	-0.0582	-0.0198	-0.0016	-0.0068	-0.0140	0.0022	0.0181
1977	-0.0078	-0.0447	-0.0116	-0.0416	-0.0241	-0.0560	-0.0206	-0.0005	-0.0071	-0.0140	0.0047	0.0165
1978	-0.0073	-0.0405	-0.0099	-0.0381	-0.0206	-0.0510	-0.0200	0.0028	-0.0044	-0.0111	0.0067	0.0172
1979	0.0061	-0.0051	-0.0015	-0.0366	-0.0053	-0.0411	-0.0153	0.0226	0.0112	-0.0117	0.0058	0.0304
1980	-0.0049	0.0285	0.0090	-0.0225	0.0007	-0.0434	0.0019	0.0331	0.0263	0.0113	0.0169	0.0360
1981	0.0010	0.0510	0.0216	-0.0098	0.0042	0.0025	-0.0114	0.0314	0.0345	0.0102	0.0241	0.0460
1982	0.0210	0.0504	0.0184	-0.0079	0.0117	-0.0002	0.0068	0.0377	0.0213	0.0095	0.0366	0.0485
1983	0.0084	0.0526	0.0247	-0.0052	0.0151	0.0042	0.0012	0.0344	0.0307	0.0258	0.0341	0.0525
1984	0.0161	0.0138	0.0307	0.0039	0.0138	0.0079	0.0129	0.0300	0.0304	0.0252	0.0309	0.0523
1985	0.0223	0.0405	0.0288	0.0064	0.0173	0.0010	0.0002	0.0199	0.0265	0.0237	0.0397	0.0542
1986	0.0107	0.0366	0.0329	-0.0052	0.0115	0.0160	0.0090	0.0194	0.0287	0.0395	0.0210	0.0502
1987	0.0047	0.0325	0.0198	-0.0084	0.0078	0.0021	-0.0056	0.0186	0.0252	0.0216	0.0219	0.0490
1988	-0.0055	0.0602	0.0097	-0.0216	-0.0035	-0.0016	-0.0130	0.0084	0.0163	0.0266	0.0116	0.0293
1989	-0.0027	0.0476	0.0026	-0.0180	-0.0102	0.0034	-0.0168	0.0078	0.0207	0.0254	0.0191	0.0246
1990	0.0016	0.0174	-0.0056	-0.0220	-0.0199	-0.0167	-0.0128	-0.0092	0.0066	0.0154	0.0032	0.0233
1991	-0.0075	0.0217	-0.0141	-0.0272	-0.0227	-0.0157	-0.0221	-0.0207	0.0024	0.0257	-0.0051	0.0072
1992	-0.0330	0.0609	-0.0255	-0.0443	-0.0376	-0.0287	-0.0464	-0.0247	-0.0191	0.0010	-0.0124	-0.0001
1993	-0.0303	-0.0175	-0.0402	-0.0475	-0.0427	-0.0201	-0.0286	-0.0354	-0.0197	0.0031	-0.0149	0.0034
1994	-0.0453	-0.0539	-0.0423	-0.0530	-0.0527	-0.0369	-0.0390	-0.0361	-0.0257	-0.0011	-0.0176	0.0008
1995	-0.0459	-0.0488	-0.0494	-0.0529	-0.0533	-0.0278	-0.0361	-0.0442	-0.0264	0.0036	-0.0271	0.0025

year	Abruzzi	Molise	Campania	Apulia	Basilicata	Calabria	Sicily	Sardinia	NORTH	CENTRE	SOUTH	ITALY
1969	-0.0584	-0.0600	-0.0015	0.0171	-0.0060	-0.0671	0.0254	-0.0025	*0.0124*	*0.0304*	*-0.0019*	**0.0083**
1970	-0.0407	-0.0441	-0.0018	0.0184	-0.0061	-0.0638	0.0273	0.0053	*0.0108*	*0.0311*	*0.0014*	**0.0087**
1971	-0.0295	-0.0239	-0.0038	0.0210	-0.0064	-0.0542	0.0246	0.0136	*0.0010*	*0.0231*	*0.0029*	**0.0033**
1972	-0.0253	-0.0333	-0.0078	0.0111	0.0112	-0.0556	0.0209	0.0152	*-0.0158*	*0.0081*	*-0.0002*	**-0.0079**
1973	-0.0197	-0.0379	-0.0099	0.0096	-0.0035	-0.0471	0.0154	0.0083	*-0.0236*	*-0.0005*	*-0.0026*	**-0.0136**
1974	-0.0199	-0.0419	-0.0225	0.0050	0.0391	-0.0475	0.0123	0.0055	*-0.0307*	*-0.0035*	*-0.0069*	**-0.0181**
1975	-0.0232	-0.0434	-0.0202	0.0043	-0.0103	-0.0403	0.0198	-0.0086	*-0.0297*	*-0.0054*	*-0.0070*	**-0.0181**
1976	-0.0123	-0.0214	-0.0063	0.0151	0.0076	-0.0334	0.0178	0.0112	*-0.0158*	*0.0047*	*0.0021*	**-0.0073**
1977	-0.0084	-0.0202	-0.0054	0.0155	0.0089	-0.0294	0.0174	0.0106	*-0.0159*	*0.0042*	*0.0030*	**-0.0071**
1978	-0.0036	-0.0191	-0.0034	0.0175	0.0073	-0.0245	0.0179	0.0102	*-0.0137*	*0.0060*	*0.0046*	**-0.0051**
1979	0.0032	-0.0273	-0.0049	0.0207	-0.0097	-0.0255	0.0089	0.0042	*-0.0010*	*0.0165*	*0.0021*	**0.0016**
1980	0.0049	0.0098	0.0061	0.0252	0.0110	-0.0235	0.0245	0.0043	*0.0044*	*0.0282*	*0.0114*	**0.0088**
1981	0.0196	-0.0048	0.0132	0.0300	0.0062	-0.0158	0.0280	0.0094	*0.0121*	*0.0363*	*0.0167*	**0.0152**
1982	0.0196	-0.0021	0.0166	0.0371	0.0010	-0.0061	0.0355	0.0080	*0.0174*	*0.0353*	*0.0220*	**0.0199**
1983	0.0294	-0.0210	0.0217	0.0413	-0.0060	-0.0063	0.0392	0.0153	*0.0175*	*0.0413*	*0.0258*	**0.0227**
1984	0.0398	-0.0142	0.0154	0.0431	-0.0010	-0.0051	0.0356	0.0111	*0.0212*	*0.0407*	*0.0243*	**0.0237**
1985	0.0271	0.0030	0.0174	0.0364	0.0166	0.0039	0.0360	0.0083	*0.0198*	*0.0417*	*0.0243*	**0.0229**
1986	0.0341	0.0174	0.0103	0.0342	-0.0006	0.0030	0.0292	0.0086	*0.0189*	*0.0393*	*0.0200*	**0.0197**
1987	0.0312	0.0160	0.0093	0.0238	-0.0064	-0.0020	0.0278	-0.0046	*0.0107*	*0.0365*	*0.0154*	**0.0137**
1988	0.0210	-0.0042	0.0032	0.0128	-0.0049	-0.0001	0.0179	-0.0154	*0.0008*	*0.0232*	*0.0076*	**0.0038**
1989	0.0211	-0.0069	-0.0018	0.0039	-0.0151	-0.0081	0.0157	-0.0109	*-0.0025*	*0.0230*	*0.0028*	**-0.0003**
1990	0.0273	0.0131	-0.0019	-0.0009	-0.0052	-0.0100	0.0120	-0.0126	*-0.0095*	*0.0154*	*0.0012*	**-0.0054**
1991	0.0141	-0.0093	-0.0093	-0.0058	-0.0116	-0.0101	0.0062	-0.0256	*-0.0168*	*0.0058*	*-0.0053*	**-0.0131**
1992	0.0076	-0.0413	-0.0157	-0.0073	-0.0118	-0.0224	0.0050	-0.0249	*-0.0309*	*-0.0072*	*-0.0093*	**-0.0229**
1993	0.0005	-0.0220	-0.0133	-0.0177	-0.0262	-0.0201	0.0027	-0.0156	*-0.0371*	*-0.0058*	*-0.0109*	**-0.0262**
1994	0.0025	-0.0062	-0.0072	-0.0189	-0.0230	-0.0249	-0.0002	-0.0375	*-0.0439*	*-0.0096*	*-0.0117*	**-0.0300**
1995	-0.0156	-0.0523	-0.0176	-0.0269	-0.0331	-0.0295	-0.0111	-0.0347	*-0.0474*	*-0.0100*	*-0.0212*	**-0.0428**

Table 3.3: Continued - Measure of the Squeeze in the regions according to the Schoen's S index, 1969-1995

Figure 3.4: Measure of the Squeeze in the North of Italy (selected regions), 1969-1995

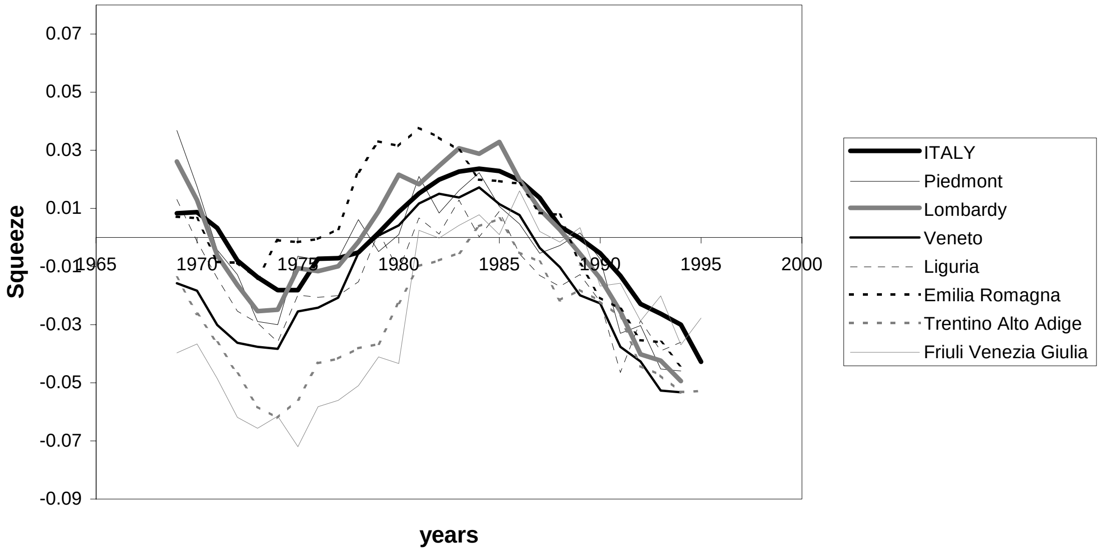


Figure 3.5: Measure of the Squeeze in the Centre of Italy, 1969-1995

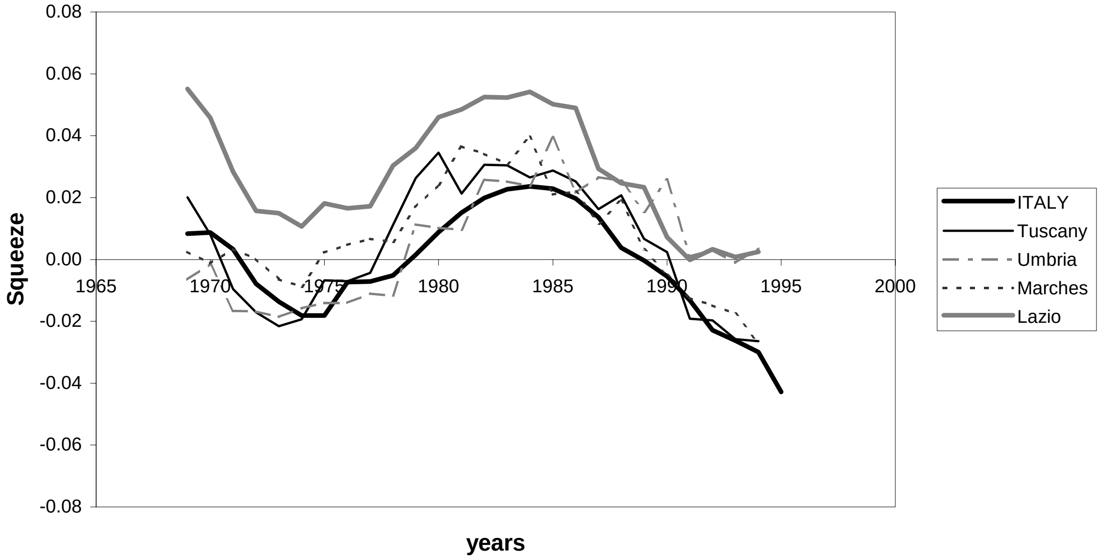
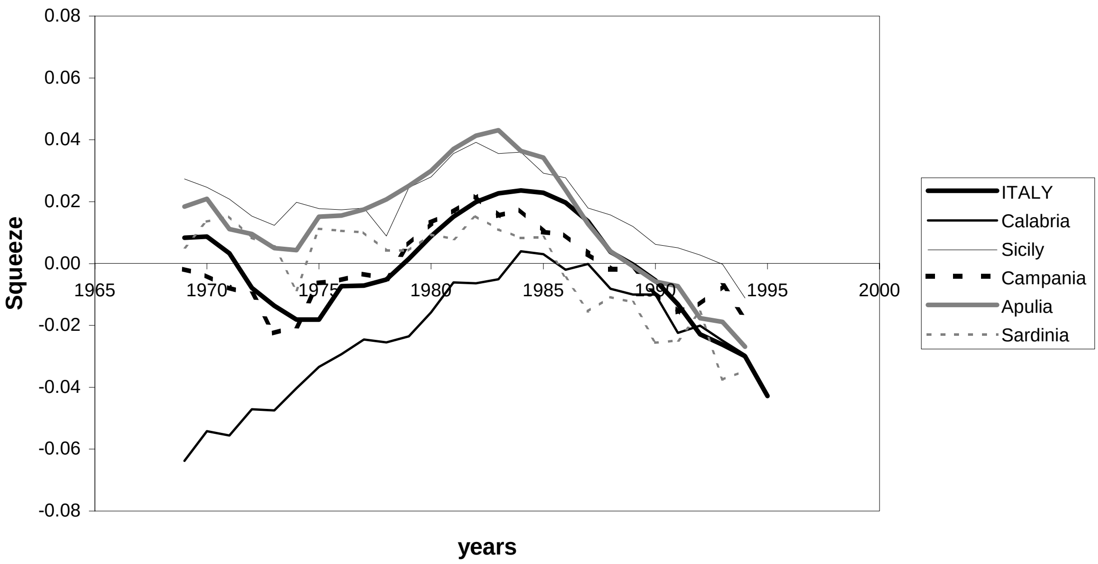


Figure 3.6: Measure of the Squeeze in the South of Italy (selected regions), 1969-1995



thoroughly.

It is not easy to distinguish regions as regard the internal movements on the territory of their population: we should need information on the pattern by age and sex of the inter-regional movements, and this is normally rarely available and strictly dependent on the quality of the data regarding the registration of the change of residence. One should also observe that decisions to migrate or move are not independent on the set of other socio-economic events regarding each individual. It would be necessary to shed light on the evaluations and the decision making process of the individuals, especially the young adults, to understand the link among events during their life-course such as end of study, training, job-search, leaving the parental home, marriage, etc. The causality mechanisms are unknown if we stay at the macro level of the analysis. For our specific purposes, we should better need information about the change of residence of both spouses and their geographical mobility before their marriage. As we stated in the previous chapter, we assume that those who marry move their residence in the place where they are willing to live.

Let us try to interpret the observed patterns in light of our knowledge of interregional migrations. As well known, the North is the richest part of the country. The North-West has always been the industrial power house of Italy, while the North-

East has seen a more recent industrial boom. The Centre is characterised by a new model of dispersed and small- to medium-scale industrialisation. The South and the Islands are affected by poverty in the interior regions and by economically stagnant coastal towns and cities (Istat, 1998[107]). Throughout the post-war period, the strongest flows have been from South-Islands to the North and internally within the North (from North East to North West). Smaller flows have been targeted to the central region of Lazio (mostly, to Rome) from the southern regions and central and east coast provinces (Golini, 1974[87]).

From a very general point of view, migration rates at different geographical scales show that, at least for the comparison between 1955 and 1993, short-distance (province-internal) migration was the most important, and it also declined the least. The second-most important kind of movement was long-distance migration. Finally, medium-distance migration between provinces was less important. By 1993 it had fallen to half its 1955 level. Long-distance inter-regional, migration was a constant factor over the period 1955-93. It was characterised by heavy outflows from the South of Italy to the North before 1978 and by smaller outflows after that year (Istat, 1998[107]).

The 1960s, the years of the 'economic boom', saw a great deal of movements across regional boundaries in Italy. Especially southern Italians moved towards the economic triangle (Piedmont, Liguria and Lombardy) and towards northern Europe (especially the Federal Republic of Germany and Switzerland). But the strongest flow was directed towards the North of Italy. Between 1958 and 1963 more than 900,000 people left South Italy. Municipalities of the area of the industrialised triangle (in the North West) experienced an increase of 69,000 new residents coming from the South. In 1962, when an old fascist law against urbanisation was abrogated[5], this number jumped to 203,000 new unities and in 1963 kept an high level: 183,000 individuals (Ginsborg, 1989[77] ; Bonifazi et al.1999[28]). South-to-north migration losses are most marked for the young adult ages of labour force entry, between 15 and 29 years (Istat, 1998 [107]).

During the 1970s Italy underwent a trend that had started in the late 1960s,

[5]Intermunicipality migration rates had a marked peak in 1962, but this was due to considerable adjustment of the registers after the 1961 Census to regularise urban registrations which has been previously restricted by the fascist law on urbanisation [107].

which is characterised by a reduction in both long- and short-distance geographical mobility. This trend, which resulted from both economic and social factors, has been called a 'counter-urbanisation' process and it mainly refers to the transformations of the flows that were earlier directed towards towns. The years 1973-1975 saw a sharp decline in internal migrations, which was associated with the employment effect of the first oil shock (Istat, 1998[107]). Of the Italian regions only Sicily exhibited the opposite behaviour, as the dynamics to and from its towns increased in the 1970s (Micheli, 1988[135]). The 1980s were then characterised by a very low level of inter-regional moment.

If we focus on the trend of the marriage market described by S, we notice the existence, over the twenty-five years under study, of a pattern of imbalance between the sexes which can be explained by the internal movement of the Italian population.

At the regional level, we observe that the general pattern regarding the divisions holds, although some regions exhibit a certain degree of deviations therefrom. Among the central regions, for example, Lazio has particularly striking (figure 3.5)[6]. It has an extremely high and positive level of S over the entire period, which means that women are subject to a marriage squeeze in general. Thus, there is no simple connection between in- and out-migration and the direction of the squeeze. The South, in contrast, is characterised by two strong, distinct patterns. On the one hand, Sicily and parts of Apulia exhibit a constant, positive level of the imbalance to the disadvantage of women, whereas Calabria, on the other hand, shows a degree of marriage squeeze that increases from a very low level up to a zero, which was reached in the mid-1980s, only to fall again (figure 3.6 and table 3.3). Northern regions have very high S values, which approach one another when negative. Veneto, Liguria, and Piedmont, in particular, are areas where the squeeze against men is particularly tight (figure 3.4 and table 3.2).

These apparently contradictory results stimulated us to perform a deeper analysis of two neighbouring regions of the South with different marriage market dynamics: Calabria and Sicily.

[6] In this region the presence of Rome, Italy's capital, is a relevant factor.

3.5.2 Evaluating some regional differences: Calabria and Sicily

The need to find an explanation of the regional patterns of imbalances observed in the marriage market requires to go deeper into a finer level of analysis. As it has been observed from other scholars (Cantisani, Dalla Zuanna 1996[39]), long term analyses of the nuptiality patterns need to take into account the marriage market features as embedded in a system composed also of other demographic processes, like births and migrations. An attempt of evaluation can be presented if we consider the pattern of the squeeze associated to some selected regions.

Our reasoning is here based on the assumption that mortality differentials did not play a striking role in comparison to that assumed by birth fluctuations and migration differentials. It could be argued that the period under study, from 1955 to 1995, has been characterised by increasing gains in life expectancy, especially to women's advantage, and that the pattern by cause of death greatly shifted its profile by age and sex. Yet, there is no reason to believe that this could have been different at the regional level when comparing, for instance, Calabria and Sicily. Most of the differences in the local marriage markets are here mainly attributed to birth size differences and to the role of the migratory movements.

In this section we focus on a dynamic comparison of the marriage squeeze in two regions: Sicily and Calabria (table 3.4 and figure 3.7). In Sicily there prevails a disadvantage for women in the marriage market (I_{freq} always positive), while in Calabria it is men who are in a worse position over time (I_{freq} is almost always negative).

The two neighbouring (and mostly outmigration) regions share very similar fertility trends (Santini, 1997[106]). Since 1940 the birth pattern is characterised by a drop during the Second World War period, which was followed by a "catch-up process" in the second half of the 1940s, and then a slight decline over time. In contrast, the two regions have a very different history of migratory movements, which is highly differentiated between men and women (table 3.5). First of all, it must be noted that there are no data available on the inflow and outflow on migratory movements by marital status[7]. It should also be stressed that data regarding place

[7]Nor is the population distribution by marital status available at the regional level, except for in censuses years. Estimates are available for Italy as a whole for the years 1952-1981 (Castiglioni, 1989[43]).

Table 3.4: Summary of the main indicators for Calabria and Sicily, 1969-1995

calendar year	CALABRIA						SICILY					
	TFMR			Mean Age		Difference	TFMR			Mean Age		Difference
	Men	Women	I_{freq}	Men	Women	in ave. ages	Men	Women	I_{freq}	Men	Women	in ave. ages
1969	912.3	1014.3	-0.0529	27.01	22.93	4.08	1035.3	992.0	0.0214	27.03	23.00	4.03
1970	934.9	1037.6	-0.0521	27.03	22.92	4.11	1069.9	1020.0	0.0239	27.03	22.91	4.12
1971	971.1	1065.8	-0.0465	27.22	23.12	4.1	1079.4	1033.8	0.0216	26.98	22.92	4.06
1972	973.4	1072.5	-0.0484	27.01	23.13	3.88	1084.6	1045.7	0.0182	26.99	23.14	3.85
1973	979.3	1062.6	-0.0408	27.24	23.06	4.18	1086.9	1058.4	0.0133	26.94	23.06	3.88
1974	902.9	972.0	-0.0369	26.95	22.90	4.05	1038.5	1018.0	0.0100	26.90	22.97	3.93
1975	904.2	961.9	-0.0309	26.99	22.78	4.21	978.6	949.5	0.0151	26.75	22.97	3.78
1976	876.6	920.5	-0.0245	27.08	22.95	4.13	955.6	930.4	0.0134	26.87	23.08	3.79
1977	857.7	894.3	-0.0209	27.06	22.93	4.13	935.2	911.4	0.0129	26.85	23.09	3.76
1978	835.7	864.4	-0.0169	27.07	22.90	4.17	911.3	888.0	0.0130	26.83	23.08	3.75
1979	745.9	770.3	-0.0161	27.14	23.10	4.04	858.6	847.9	0.0062	26.79	23.24	3.55
1980	792.9	817.3	-0.0151	26.93	22.83	4.1	887.8	856.3	0.0181	26.72	22.98	3.74
1981	770.5	785.7	-0.0098	27.08	22.89	4.19	864.0	830.1	0.0200	26.68	22.99	3.69
1982	762.7	767.8	-0.0033	27.09	22.93	4.16	855.2	813.6	0.0249	26.75	23.03	3.72
1983	731.6	736.4	-0.0033	27.12	22.97	4.15	821.9	779.6	0.0264	26.82	23.15	3.67
1984	739.3	743.3	-0.0027	27.15	23.08	4.07	811.9	774.1	0.0238	26.89	23.30	3.59
1985	728.7	724.5	0.0029	27.37	23.26	4.11	798.0	761.0	0.0238	26.96	23.36	3.6
1986	721.9	718.6	0.0023	27.49	23.37	4.12	801.3	770.8	0.0193	27.06	23.49	3.57
1987	729.5	730.8	-0.0009	27.57	23.54	4.03	801.7	772.6	0.0185	27.15	23.59	3.56
1988	730.7	730.2	0.0003	27.60	23.54	4.06	832.7	812.5	0.0123	27.23	23.79	3.44
1989	717.1	724.0	-0.0048	27.74	23.81	3.93	825.6	808.0	0.0108	27.33	23.92	3.41
1990	713.5	722.0	-0.0059	27.92	23.97	3.95	816.3	803.2	0.0081	27.41	24.10	3.31
1991	694.0	702.4	-0.0060	28.08	24.26	3.82	760.1	754.1	0.0040	27.45	24.12	3.33
1992	658.7	676.5	-0.0133	28.22	24.45	3.77	765.4	760.3	0.0033	27.62	24.35	3.27
1993	630.4	645.3	-0.0117	28.33	24.47	3.86	713.3	710.9	0.0016	27.78	24.49	3.29
1994	602.4	619.9	-0.0143	28.68	24.85	3.83	661.4	661.6	-0.0001	28.06	24.70	3.36
1995	604.5	625.5	-0.0171	28.85	25.18	3.67	643.4	651.9	-0.0066	28.31	24.96	3.35

Figure 3.7: Imbalance in the marriage market measure between Calabria and Sicily, 1969-1995

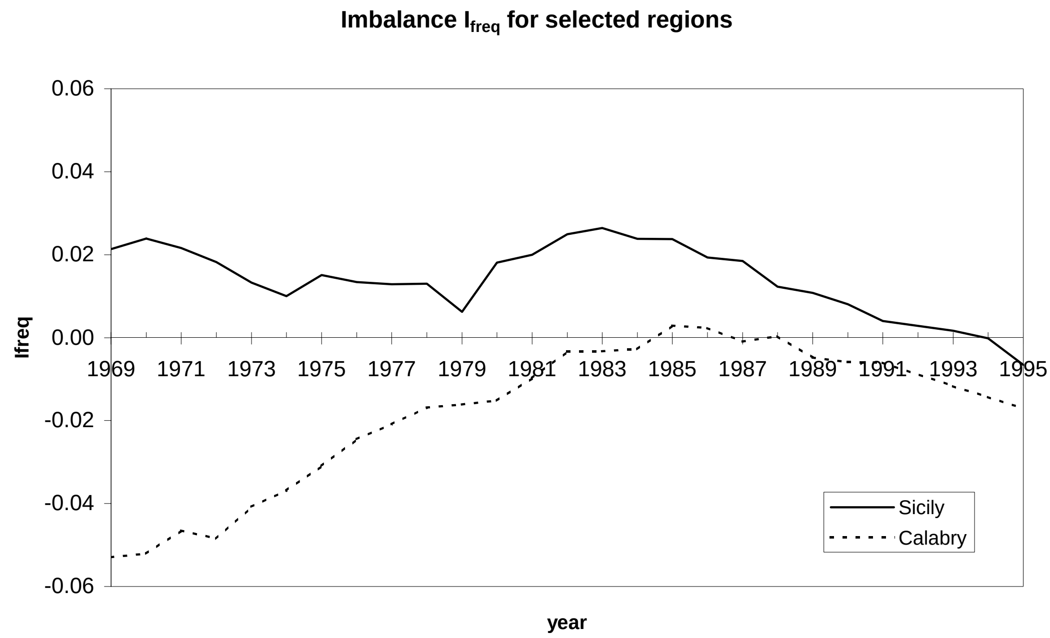


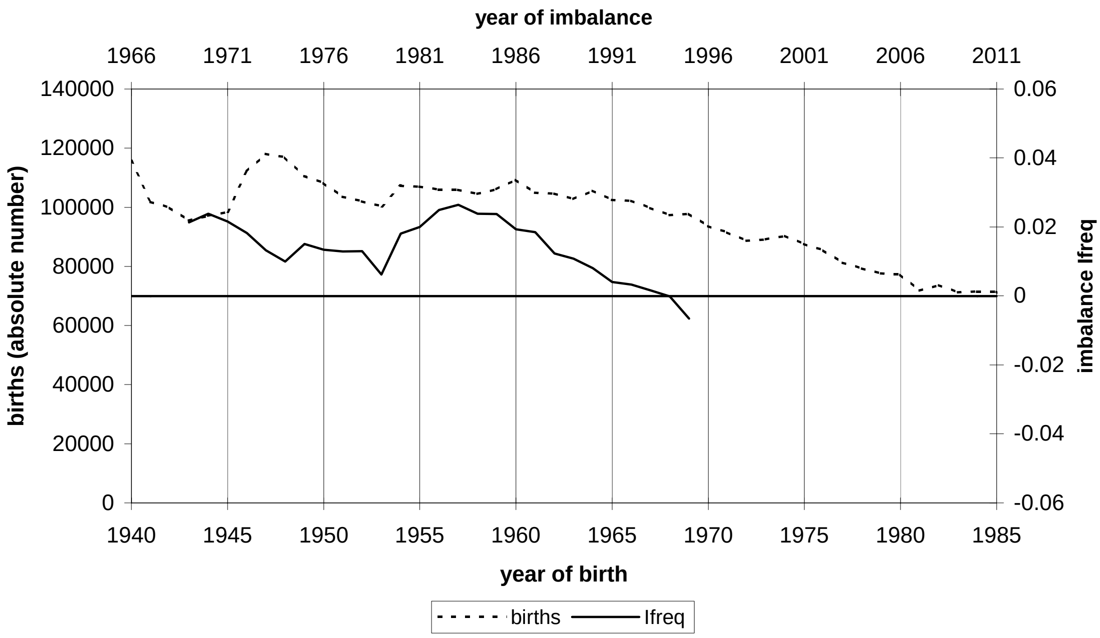
Table 3.5: Inflow and outflow migrations rates by sex and 5-years age group, for Calabria and Sicily, 1969-1995

MEN	**CALABRIA**					**MEN**	**SICILY**				
	total outflows	total out. Rate	total inflows	total in. rate	net migra. rate		total outflows	total out. Rate	total inflows	total in. rate	net migra. rate
15-19						*15-19*					
1955	943	9.61	262	2.67	-6.94	1955	1273	6.23	616	3.01	-3.21
1960	1324	16.07	281	3.41	-12.66	1960	1700	9.24	676	3.67	-5.57
1965	1353	13.83	506	5.17	-8.66	1965	1775	8.35	1105	5.20	-3.15
1970	2808	30.40	733	7.94	-22.46	1970	4317	22.31	1485	7.67	-14.63
1975	1971	20.73	806	8.48	-12.25	1975	3101	15.22	1845	9.05	-6.16
1980	1560	15.65	635	6.37	-9.28	1980	2587	11.91	1304	6.00	-5.91
1985	837	8.62	539	5.55	-3.07	1985	1461	6.72	1182	5.43	-1.28
20-24						*20-24*					
1955	2607	28.10	713	7.68	-20.41	1955	4012	20.83	1928	10.01	-10.82
1960	4037	47.97	845	10.04	-37.93	1960	6079	32.24	2255	12.0	-20.3
1965	2934	42.26	1141	16.43	-25.83	1965	4897	30.13	2658	16.4	-13.8
1970	5059	60.71	1539	18.47	-42.24	1970	7950	41.82	3437	18.1	-23.7
1975	3589	42.93	1534	18.35	-24.58	1975	5391	30.17	3277	18.3	-11.8
1980	3206	36.99	1367	15.77	-21.22	1980	5129	27.00	2559	13.5	-13.5
1985	2473	26.45	1298	13.88	-12.57	1985	4712	23.09	2549	12.5	-10.6
25-29						*25-29*					
1955	2434	29.51	804	9.75	-19.76	1955	3721	20.35	1852	10.13	-10.22
1960	3683	47.62	928	12.00	-35.62	1960	5270	30.36	2101	12.10	-18.26
1965	3034	41.71	1473	20.25	-21.46	1965	4923	29.04	3217	18.98	-10.06
1970	3155	56.78	1346	24.22	-32.55	1970	6255	45.27	2982	21.58	-23.69
1975	2431	31.43	1623	20.98	-10.45	1975	4321	24.15	3206	17.92	-6.23
1980	2410	32.58	1259	17.02	-15.56	1980	3965	24.03	2512	15.23	-8.81
1985	2039	25.52	1353	16.93	-8.59	1985	4203	23.69	2682	15.12	-8.57
WOMEN	**CALABRIA**					**WOMEN**	**SICILY**				
	total outflows	total out. Rate	total inflows	total in. rate	net migra. rate		total outflows	total out. Rate	total inflows	total in. rate	net migra. rate
15-19						*15-19*					
1955	918	9.71	264	2.79	-6.92	1955	1273	6.44	625	3.16	-3.28
1960	1228	15.42	297	3.73	-11.69	1960	1677	9.48	712	4.02	-5.45
1965	1202	13.02	544	5.89	-7.13	1965	1751	8.64	1283	6.33	-2.31
1970	3342	38.67	624	7.22	-31.45	1970	4411	24.25	1532	8.42	-15.83
1975	2460	27.54	887	9.93	-17.61	1975	2820	14.36	2070	10.54	-3.82
1980	1500	15.70	662	6.93	-8.77	1980	2081	9.83	1409	6.65	-3.17
1985	730	7.83	667	7.15	-0.68	1985	1445	6.86	1427	6.77	-0.09
20-24						*20-24*					
1955	2233	24.08	681	7.34	-16.73	1955	2792	14.54	1245	6.48	-8.06
1960	3243	39.82	809	9.93	-29.89	1960	4109	22.33	1511	8.21	-14.12
1965	2347	34.74	1114	16.49	-18.25	1965	3356	21.02	2029	12.71	-8.31
1970	4580	59.59	1171	15.24	-44.36	1970	6472	35.63	2726	15.01	-20.63
1975	3262	41.92	1672	21.48	-20.43	1975	4139	23.82	3185	18.33	-5.49
1980	2699	33.11	1234	15.14	-17.97	1980	3579	18.99	2364	12.54	-6.45
1985	2049	22.62	1385	15.29	-7.33	1985	3209	15.65	2344	11.43	-4.22
25-29						*25-29*					
1955	1994	23.91	650	7.79	-16.11	1955	2694	14.45	1287	6.90	-7.55
1960	3097	38.90	757	9.51	-29.39	1960	3899	21.87	1500	8.41	-13.45
1965	2461	34.32	1240	17.29	-17.03	1965	3580	21.01	2386	14.00	-7.01
1970	2381	43.08	955	17.28	-25.80	1970	4305	30.66	2134	15.20	-15.46
1975	2103	29.42	1635	22.87	-6.55	1975	3291	18.73	3080	17.53	-1.20
1980	1883	26.75	1124	15.97	-10.78	1980	2862	17.08	2029	12.11	-4.97
1985	1649	21.54	1199	15.67	-5.88	1985	2769	15.24	2144	11.80	-3.44

of residence are often affected by quality problems.

Since we do not have the possibility to check internal movements of the population by sex, age, and marital status, we can only give some hypotheses of interpretation. First, some general remarks on the migration differentials. Calabria has had higher outmigration than Sicily. Inflow rates are low in both regions and show no significant differences between men and women. Except for in the age group 15-19 male and female out-migration movements are almost identical in both regions. Women from Calabria in the 20-24 age group had an outmigration rate comparable to that of men, particularly since 1970, while women from Sicily always had a outmigration rates considerably lower than that of men (table 3.5). The year 1972 was characterised by a very high level of migration, especially in comparison with the following period, when internal movements declined significantly due to the oil shock.

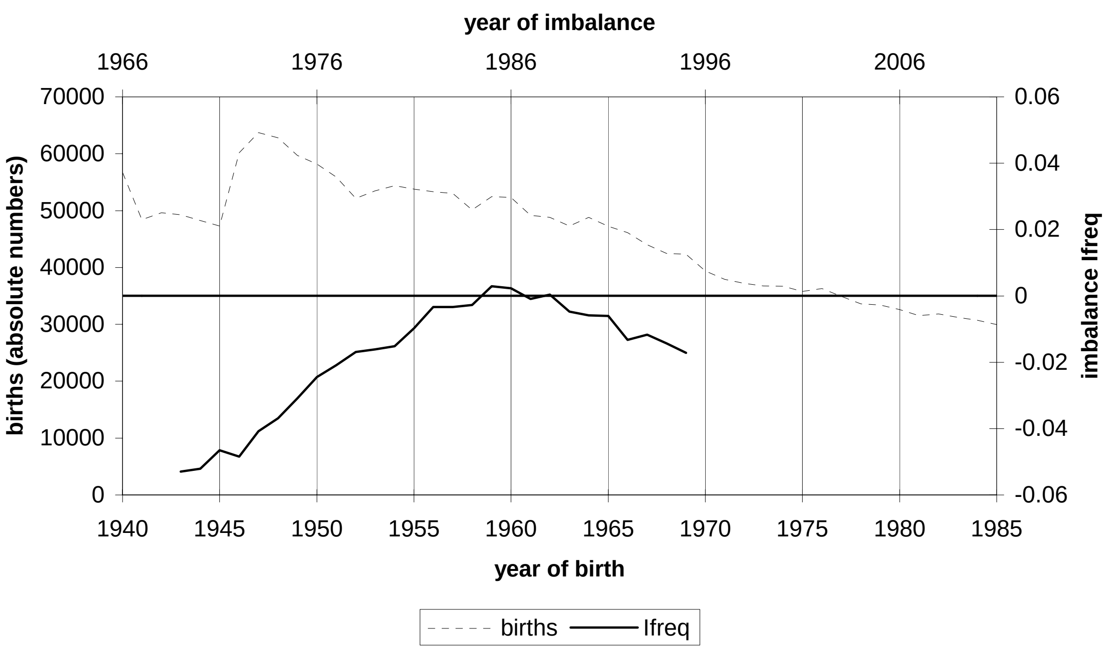
Figure 3.8: Comparison between birth cohort size and imbalance I_{freq} - SICILY



Our attempt to disentangle the components contributing to the observed imbalance starts from the years where the highest marriage imbalances are registered. We then attempt to understand the changes in the annual mean ages of men and women and the size of the cohort to which they mainly belong.

In particular, we select some of the years where the two regions show a particularly high (positive or negative) imbalance in marriage market conditions. Figure 3.7 shows the imbalances for the two regions, measured by the I_{freq} index over the years 1969 and 1995 (but, as we stated earlier, this measure is coherent with the other two, S and I, in the sign of the imbalance). In Sicily in 1972, the Total First Marriage Rate 1084.6 first marriages for men is and 1045.7 for women. This means that the imbalance in the marriage market is positive (there are more male marriages than females ones). The actual figure is 0.0182 (table 3.4 and figure 3.8): this means that there is a 2% difference in the proportion ever marrying, relative to the total proportion in both sex population, between 1000 men and 1000 women single at their 15 birthday. The year 1972 is also characterised by one of the lowest differences in the mean age at marriage of men and women: 3.9 years. Men, who married at an average age of 27, belong on average to the 1945 birth cohort, while women, who married at an average age of 23.1, belong on average to the cohort born in 1949. Because of the exceptionally low natality during the Second World War, men born up to 1945 were looking for brides among the large pool of post-war baby-boomers. Moreover, the male advantage on the marriage market can also be seen in the slight

Figure 3.9: Comparison between birth cohort size and imbalance I_{freq} - CALABRIA



shifts in period-specific age at marriage. When compared to previous years, the male mean age in 1972 is in a phase of slight decrease while that of women is rising. Furthermore, the positive situation for men was accentuated by the fact that women did not migrate with the same intensity as men did. The low mobility of women in Sicily put them in a very disadvantageous position with respect to marriage. In a nutshell, in 1972 Sicily the male advantage in the marriage market is essentially the outcome of the differential sizes of cohorts.

In comparison, it is striking to see that the sign of the squeeze in Calabria is always to the disadvantage of men. And this although Calabria shared the same declining birth pattern as Sicily (and Italy as a whole) during the war and the same rise in birth rates afterwards. We assume then that differential migratory movements between sexes have played a key role (table 3.5). It is worth noting that the net migration rates for the women in Calabria after 1970 are higher than they are for men in the age groups 15-19 and 20-24. Of course, we do not know the marital status of these young migrant women, but since they left at such young ages, we can assume that the majority of them were unmarried at the time of their move (or that they moved to marry a partner they had already met).The pool of eligible women was thus diminished. This improved the chance for young women to get married while it caused a marriage squeeze for the men. The high level of migration of young women can be assumed to be the main reason for men's disadvantage in Calabria in 1972 and surrounding years.

In 1979 there was still imbalance in Sicily to the disadvantage of women, although an equilibrium had almost been reached. Here the key to interpreting the situation is the slight postponement in the age at marriage of women born around 1955-56 (who had a mean age at marriage of 23.2 years) and of men born around 1952 (who had a mean age at marriage of 26.8 years), together with the slight decline in births that occurred in the early 1950s and the ensuing rise in the second half of that decade. In 1979, in fact, the difference between the mean ages at marriage, just 3.6 years, is again one of the lowest observed for this region[8].

[8]It should also be noted that it is not necessarily a noticeable reverse in timing that takes place to compensate for an imbalance in the cohort sizes among which men and women choose their partners. It is often just a slight increase in the mean age of those in the unfavourable position as well as a slight decline in the age of those in the more favourable position that can compensate for the outcome (Schoen, 1983 [164]).

To arrive at an adequate interpretation of the imbalance in Sicily in 1983 one needs to include some further factors. The imbalance in favour of men is fairly high in that year ($I_{freq} = 0.0264$), and the mean age at marriage is around 27 for men and 23 for the women, with a precise difference of 3.7 years. The natality component does not contribute very much to clarifying the situation. The 27 year-old grooms belong on average to the cohort born in 1956 and the 23 year-old brides were born on average in 1959-60. In the late 1950s there was a slight increase in births in Sicily, which may have been partly responsible for a female disadvantage. Furthermore, analysing the age pattern of nuptiality rates for some selected years, we notice that in Sicily (and, with less emphasis, also in other southern regions) there was a sudden increase in the rate of marriage for 18-year-olds (figure 3.10). The introduction of a law concerning the family reformation in terms of nuptiality can help in the understanding of the phenomenon. According to the new law, the minimum age at marriage was set at 18 for both men and women[9]. In Sicily, where the timing of marriage had been particularly early for women, the introduction of this law turned out to have an abrupt delaying effect on the behaviour of potential brides. The proportion of those who marry at 18 years is extraordinarily high starting with the cohort of women born in 1957 (figure 3.10). This age effect can be largely attributed to the institutional change. The postponement of entry into first union for this birth cohort further increased the disadvantage of women, who were already in an unfavourable position due to their low mobility.

Lastly, Calabria as depicted in 1983 observes a more balanced marriage market, as the Total First Marriage Rates for men and women have almost the same level: 731.6 first marriages for men and 736.4 for women. The mean age is about 27 years for men and 23 for women, with a difference of slightly over 4 years. Here the cohorts involved are mainly men born in 1955-56 and women born in 1960. It should also be noted that the left-skewed bell-shaped pattern for Calabria in 1983 is characterised by a fork between ages 18 and 20 for women in the 1960 cohort and between age 18 and 26 years for men in the 1950 and 1955 cohort (figure 3.10). Here again we can imagine that the reduction in the level of out-migration, which also meant a greater

[9] Some exceptions allowing people to marry at younger ages were and are still allowed but only through a judge's ruling.

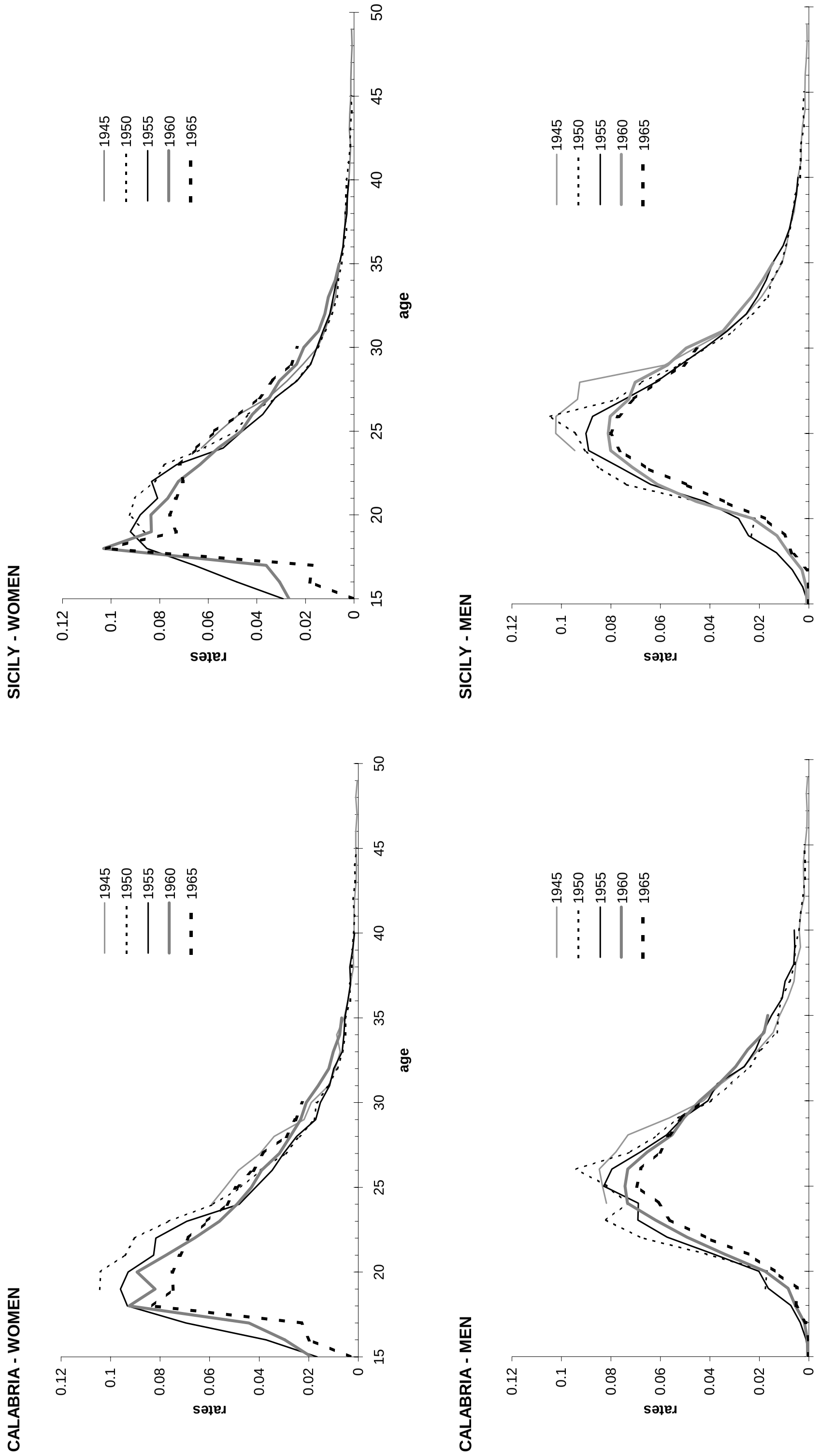


Figure 3.10: Age pattern of nuptiality rates by sex and birth cohorts, for Calabria and Sicily

degree of similarity between the sexes than in Sicily, together with the changes in the timing of marriage (a slight decline in mean age for men and a slight rise in the mean age for women) ended up balancing the marriage market.

From the comparative analysis of Calabria and Sicily, we notice that the effect of fluctuations in natality and of migratory movements (together with the sex differentials in migrations) have been highly intertwined in shaping the marital chances at the regional level. We also have some evidence that the legal change concerning the minimum age at marriage played a relevant role.

3.6 Summary

In this chapter, we studied the marriage market from a dynamic perspective. The Italian case is particularly interesting due to the strong fluctuations of the post-war period, from baby boom to baby bust. The measures proposed in the literature arising from two-sex demography, in particular Schoen's index, together with other simple alternatives such as our measures based on reduced events, allowed us to trace the dynamics of the marriage squeeze and to compare it to the evolution of births at the national level.

Our main finding is that there is an imbalance on the Italian marriage market that stems from significant variations in the number of births. Some cohorts of women find themselves in a marriage squeeze (basically the 1980s) while other cohorts of men, especially those born after the post-war rise in births or after the baby-boom, face this same unfavourable situation. The squeeze was particularly strong for women in the Centre and the South of Italy in the early 1970s and the 1980s, while the same was true for men, especially in the North, during the 1970s and since the beginning of the 1990s.

In addition, we showed that migration, especially differential migration by sex, had a crucial role in determining the extent of the marriage squeeze at a regional level. The cases of Calabria and Sicily showed that migratory patterns matter. Some evidence was also found for an influence of the institutional setting, namely the legal norms determining the minimum age at marriage.

This reasoning does not take into account possible shifts in preferences across cohorts, as regard qualitative aspects of the partner choice, such as those regarding his/her employment, his/her social status, his/her educational level or other macro factors such as the unemployment rate at the local level, the condition of the housing market, etc. It should also be noted that, in general, the measures used lack of considerations about the effects of the squeeze to some crucial ages, where the impact of the squeeze might be decisive even for future catch up behaviour. Therefore there is a need for more in-depth analysis aiming at evaluating age and sex-specific impact of the structural constraints arising from an unsteady growth of the population.

However, our findings are particularly important in light of current developments in the number of births in Italy (and, most likely, in other European countries as well). They show that, if there is no influence of migration, a marriage squeeze against men can be expected for the coming decades. Immigration may change this, of course, depending on the sex composition of the migrants. In any case, it seems that a marriage squeeze resulting from a decline in births might itself be the cause of a subsequent decline in births, especially in those countries where marriage is still crucial for reproduction.

Chapter 4

The marriage market and the transition to marriage

4.1 Introduction

In the previous chapter we stressed the relevance of the compositional constraints observed on the Italian marriage market, because they can be considered as factors that might potentially affect the process of mate selections. In this chapter, our purpose is to evaluate the impact of macro variables regarding the availability of eligible partners in shaping the process of transition to first marriage in a micro perspective for men and women. Many theories presented in chapter 1 highlighted the role played by the constraints on the marriage market in shaping the chances of marriage at the individual level, particularly if we think about some specific and small pools.

In this chapter the process of transition to first marriage in Italy, resulting from the behaviour of the individuals included in the 1998 Multipurpose Household Survey is studied together with some other transitions typical of the early adulthood and particularly relevant for the previous one (entry into first job). Moreover, individual life-courses have been linked to the macro (aggregate) measures of the marriage squeeze introduced in chapter 3. Both measures proposed in this work for the first time (see chapter 3) and the one introduced by Schoen (1983[164]) are used as indicators of the marriage squeeze observed in Italy.

The analysis will be conducted dividing the survey sample in sub-groups, by sex and, mainly, 10-years birth cohorts. To highlight the territorial differences and their trends over time, it turns out useful, to adopt a broader classification of cohorts of analysis ($<= 1935$, $1936-65$, $>= 1966$). Age is the duration variable.

The effect of the marriage squeeze (measured in the previous chapter through S obtained from the nuptiality table, I, obtained by dividing the difference between men and women in the proportion ever married, by their sum, and I_{freq}, computed from first marriage tables based on rates of the second kind, also known as reduced events or frequencies) is introduced as a time-dependent covariate both for the region of birth and for that of residence at the interview.

The present chapter is structured as follows. The next section deals with the data and their quality problems used in this part of our work. Section 3 is dedicated to the description of the techniques used in the chapter: mainly nonparametric models of event history for the analysis of age at first marriage and semiparametric and parametric models for the evaluation of the impact of macro variables of the squeeze on the transition to first marriage. Therefore, the analyses presented in this chapter can be distinguished into two parts. The first (section 4) aims at describing the transition to first marriage, by applying nonparametric methods by sex, birth cohort, territorial level (section 4.1). The second part (section 5) is devoted to the search and the evaluation of an effect of the marriage squeeze on the Italian marriage market by using models with different assumptions about the pattern of the time dependence of the rate. Moreover, nonnested parametric models incorporating the effect of alternative indexes of the squeeze are compared. Section 6 aims at broadening the framework of the transition to first marriage: section 6.1 takes shortly into account the transition to the first job and section 6.2 aims at evaluating the role of the marriage market, controlling for birth cohort, region of birth, level of attained education and entry into the labour market. The last section is devoted to the summary of the outcomes. The appendix to this chapter is dedicated to the explanation of the models and their estimates.

4.2 Data and quality problems

This part of the work is based on the analysis of the data from the Italian Household Survey, carried out by the National Institute of Statistics (ISTAT), in 1998, on a national representative sample of about 59,000 belonging to 24,000 Italian households. This survey belongs to an integrated system of sample social surveys that has been

Table 4.1: Sex and marital status distribution at the Survey (age >= 15 years), ITALY

MARITAL STATUS	MEN	WOMEN
Married	14875	14875
Separated de facto	195	264
Separated de jure	214	294
Divorced	150	262
Widowed	578	2794
TOTAL	***16012***	***18489***
Single (censored)	7564	6331
TOTAL	***23576***	***24820***

arranged on a new framework, since 1993[1].

The special topic of the 1998 survey is 'Households, Social Subjects and Conditions of the Infancy'. Retrospective information on several topics and dimensions of the individual life-courses have been collected from all members of the household.

We focus our attention on individuals older than 15 years at the time of the survey and on age at first marriage, that represents our dependent variable under study. Table 4.1 contains the description of first marriages by marital status of the sample, as observed in the sample at the time of the survey (June 1998). Our total sample is therefore composed by 48,396 individuals older than 15 years and the total number of events is of 34,501 first marriages. Since only first marriages are taken into account, there has been the need to rebuild the information about that marriage both for those currently married (not necessarily at their first marriage[2]) and for those who were married (currently widowed, separated or divorced). Consensual

[1] On average each of those surveys deals with 24,000 households which correspond to about 70,000 individuals and collects information on about 800 variables. One annual survey on living conditions and five thematic surveys, rotating in a time slot of five years, constitute an integrated system covering the most important social topics: daily life, health, leisure time and culture, family and social subjects, citizen's safety and time use and tourism.

[2] Some quality problems are those regarding the lapse recall for the date of first marriage especially for men, currently married and in couple, that are not directly asked about their first marriage (which could be different from the current one). In such a case their current wife is asked to remember whether and when he married first.

unions[3] and same sex unions are left apart[4].

Though the survey design is retrospective, some problems have been encountered in drawing the life-courses of the individuals and, as a consequence, in the application of our event history analysis. To perform our analysis, the requirement would be a complete collection of information of the educational, working and marital career. First of all, in order to evaluate the role of the marriage market in the individual's marriage opportunities, we would need to follow his/her territorial movements among regions. The survey provides us with the information about the residence at the survey time time (post) and at birth (ante), but it lacks any other information between the two. A question regarding the change of residence during the first job searching process has been included in the questionnaire. Unfortunately, such information has not been registered and we, therefore, cannot have a vague idea of the role played by the intermediate (between that of birth and that of current residence) market.

However, also for those who never worked before, it would be sensible to know which was their residence when, say, they were approximately at the beginning of their marriageable ages (because, for example, they could have followed their family's movements). For instance, given that a section of the survey deals with 'his/her parents' education and work' when the interviewed was approximately 15 years old, it would have been wise to include also a question about the place of residence at that time. A question of this kind has been included in a survey conducted in France and it turned out to be a bit more successful than the place of birth in identifying the marriage market of the couples (Bozon, 1987[34]). Another problem is due to the incoherence among the possible answers regarding the educational status and the educational attainment: the former includes also the possibility of being enrolled in vocational training courses which is, on the contrary, excluded from the latter set of answers. Moreover, we would like to know exactly when people ended their studies, also in case they abandoned them, earlier than expected, without attaining the final

[3]The 1998 household survey showed that 14,875 couples, out of 15,203, are married couples: consensual unions at the time of the survey represent only 2.2% of all couples. As well known, in comparison to other western countries, premarital cohabitation in Italy still represents a marginal phenomenon. In particular in 1998, around 6% of all Italian couples experienced a premarital cohabitation.

[4]We do not have any kind of information about these couples.

degree. In fact, any additional year spent in the educational system is expected to increase the human capital of the individual. Educational attainment underestimates the involvement in the educational system of the individuals, especially in a country like Italy, where the permanence in it is prolonged and when it plays a very important role in the process of family formation in comparison to other European countries (Blossfeld, 1995[69], Pinnelli and De Rose, 1995[145]).

Another weakness of the survey pertains to the collection of the timing of some peculiar event. Although the problems related to the definition of premarital cohabitation and of consensual union, to study these emergent phenomena it should be necessary to know the date of entry into and exit from each consensual unions. Probably, measurement errors arise from the questions regarding the duration of the consensual union as well as of the past cohabitation experience. In both cases, the question does not lead to the identification of the timing of such events nor to their multiple experiences during the individual life-courses. Information regarding the length of the life span spent in a union is meaningless if we do not know the starting time of such a union, especially in the case of past experiences that did not result into a formal union[5]. It would be useful to collect information regarding the history of the unions independently from the marital status of the individuals. If the aim is to distinguish between different paths followed by the individuals belonging to a population, it should be sensible to go in depth in their 'biography' as concern the history of their unions. However, consensual unions, still relatively few in Italy, mainly act as an intermediate variable in the process of transition to first marriage. Next analyses will not distinguish between direct marriage or a first marriage with previous cohabitation.

[5] In this case we cannot even subtract the duration of that experience from the date of marriage, as could be done in the case of a premarital cohabitation.

4.3 Techniques of analysis

Over the last 20 years, *event history* data collection[6] and analysis have become increasingly spread among social scientists. There has been common agreement in the recognition that the substantive process under study is based on few characteristics which can be summed up in the following way: the units of analysis (not necessarily individuals, but also, for instance, organisations, societies) move from one discrete status to another (because an event occurs); this change occurs at any point in time; time-constant and/or time-dependent factors influence the events (Coleman, 1990[53]).

Moreover, a great theoretical emphasis has been given to the importance of the mode of explanation of the behaviour of social systems that entails examining processes internal to the system, involving its components parts, or units at a level below that of the system (Coleman, 1990[53]). Thus explaining macro-changes requires to consider changes in the individual level behaviour, and therefore, the link between macro and micro changes (Giele and Elder, 1998[75]).

The present study uses this theoretical approach in analysing marriage behaviour. As we stated in the first chapter, we should consider marriages as the results of the matching opportunities and of the preferences, expectations and norms regarding the assortative mating (Kalmijn, 1998[113]). Opportunities of marriage are here identified by the macro demographic features of the marriage market for each calendar year and region, as it is shown in greater detail later. Event history analysis regarding the transition to first marriage will be conducted in two main steps: the first deals with the description of the behaviour by birth cohort and sex and the second with models including the effects of some covariates as well as some time-period effects.

In this first part, a descriptive analysis of the processes characterised by single non-renewable events along a continuous time axis is presented. In particular, we refer to the set of techniques of description of a process with a single state of origin

[6] It consists in the collection of the timing of events occurred along the life course of the units. An event-oriented observation design records all the changes in qualitative variables and their timing. In this way one can get the most complete data regarding changes in the qualitative variables that may occur at any point in time. E.H. data can be collected longitudinally mainly through a retrospective survey and/or a panel survey. For a description of the advantages and disadvantages of these data collection see Blossfeld and Rohwer, 1995[24].

and a single state of destination (Blossfeld and Rowher, 1995[24]).

The well-known life table approach represents the classical method yielding non-parametric estimates of the survivor function, and transition rates, for durations given in a set of episodes. The life table methods require to group durations according to some intervals on the time axis, but this cause some drawbacks that should be considered. First, results depend more or less on arbitrarily defined time intervals and, second, the method should be applied if there is a relatively large number of episodes, that makes estimates conditional for each interval reliable.

An alternative method for nonparametric estimation of survivor functions and its derivatives is the *Kaplan-Meier* (1958[115]) or *product-limit method*. This approach has been suggested by several researchers[7] but it is mainly attributed to Kaplan and Meier (1958[115]). Kaplan and Meier showed that its estimators are maximum likelihood estimators and then it emerged as the standard for survivor function estimations. A basic characteristic of the product-limit estimator is that it does not require any distribution assumption and, as we said, it differs from the life-table method because it does not require any arbitrarily defined division of time into intervals. Instead, the product-limit method is based on the calculation of a risk set at every point in time where at least one event occurs, so that the researcher does not intervene in choosing time intervals of analysis, but, on the contrary, intervals derive directly from the observed durations (Blossfeld and Rower, 1995[24]). Product-limit estimation method is here introduced as a first descriptive tool for the transition to first marriage in Italy controlling for some basic characteristics.

Appendix to this chapter, is dedicated to a brief description of the main features of the method which will then be applied in our analysis. For further explanations of the method see Collett (1997[55]), Rohwer and Pötter (1998[150]), Blossfeld and Rohwer (1995[24]), Yamaguchi (1991[191]), Tuma and Hannan (1984[179]), Allison (1984[2]). The analysis has been performed by using TDA.

4.3.1 Linking macro and micro data

The bulk of our analyses attempts to directly ascertain the effect of the supply of spousal alternatives on the transition into first marriage in Italy. According to the

[7] Namboodiiri and Suchindran (1987[140]) stated that the Product-Limit approach to the estimation of the survival function was proposed by Böhmer in 1912.

indexes presented in chapter 3, we argue that the pattern of the marriage squeeze may have hampered or eased the experience of our event under study (marriage) in a different way between women and men. Our aim is therefore to link the macro level of analysis, expressing the conditions on the marriage market, and the micro level of analysis represented by the life-course of the individuals. We should recall that variables at the macro level are measures of the marriage squeezes built cross-sectionally using nuptiality tables for each calendar year, while variables at the micro level represent individual life-courses data taken from the 1998 survey.

In figure 4.1 we report the information coming from both sources having on the x-axis the calendar years, and on the y-axis the age of the individuals (cohorts). Let us say that cross-sectionally, for each calendar year 1969-1995 and for each region we have two nuptiality tables (for both sexes) which describe the marriage pattern for ages 15-49 (see chapter 2). As described in chapter 3, for each year three synthetic indicators of the squeeze have been built (S or I or I_{freq}) starting from the male and the female first-marriage tables and, somehow, summarising their total age-pattern. In particular S was the Schoen index expressing the difference between the male and female marriages that is produced by the squeeze expressed as a proportion of the number of marriages that would occur in the absence of a marriage squeeze. I has been proposed in this research to simplify the previous index as it is expressed by the difference over the sum of the male and female proportion ever married from the nuptiality table and lastly I_{freq} represents the imbalance in the marriage market measured from the total nuptiality rate obtained summing up over ages the second type rates. Thus we have 20 (one for each region) indicators of the squeeze (of each type: S or I or I_{freq}) relatively to each of the calendar year 1969-95. This macro level represents the features of the marriage market (positive values of S, I, and I_{freq} denote an imbalance against women, while negative values indicate a squeeze against men) and it is then linked to the individuals' experiences, corresponding to the micro level. The survey conducted in June 1998 contains information collected retrospectively on marriage for every individual belonging to the household included in the sample. In particular, for the individuals we look at: their age at the time of the survey, birth cohort, region of birth, region of current residence, attained level of education, first job, date of their first marriage. It should be stressed that in order to link the two levels of analysis (macro and micro) we need to look at the birth cohorts who start their path, their life-courses since the very beginning at age 15. Individual life-courses resulting to be left-censored in 1969 (all the area above the diagonal in figure 4.1) cannot be included simply because for them we are not able to measure the macro variable occurring at every age of their life: for instance, we have the measure of the squeeze occurring, say, at age 20 in 1969 for the cohort born in 1949, but we do not know which was the existing imbalance before that age for the same birth cohort. We need to follow only the individual life-courses that start from age 15 on.

Figure 4.1 describes the common part between the two sources: it includes the years 1969-1995, ages 15-41 and birth cohorts 1954-1980. It is important to note that the right censoring does not correspond to the survey time, but it is instead arranged on the 31st December 1995. Thus individual data were all censored at the end of 1995 because we did not have access to the macro variables after 1995. Moreover, in this first part of our analysis, in order to have a sufficient amount of information and to evaluate the impact of the compositional constraints (the squeeze) on the most completed cohorts, we decided to focus our analysis on birth cohorts 1955-64; aged 31-41 at the time of the survey (grey area).

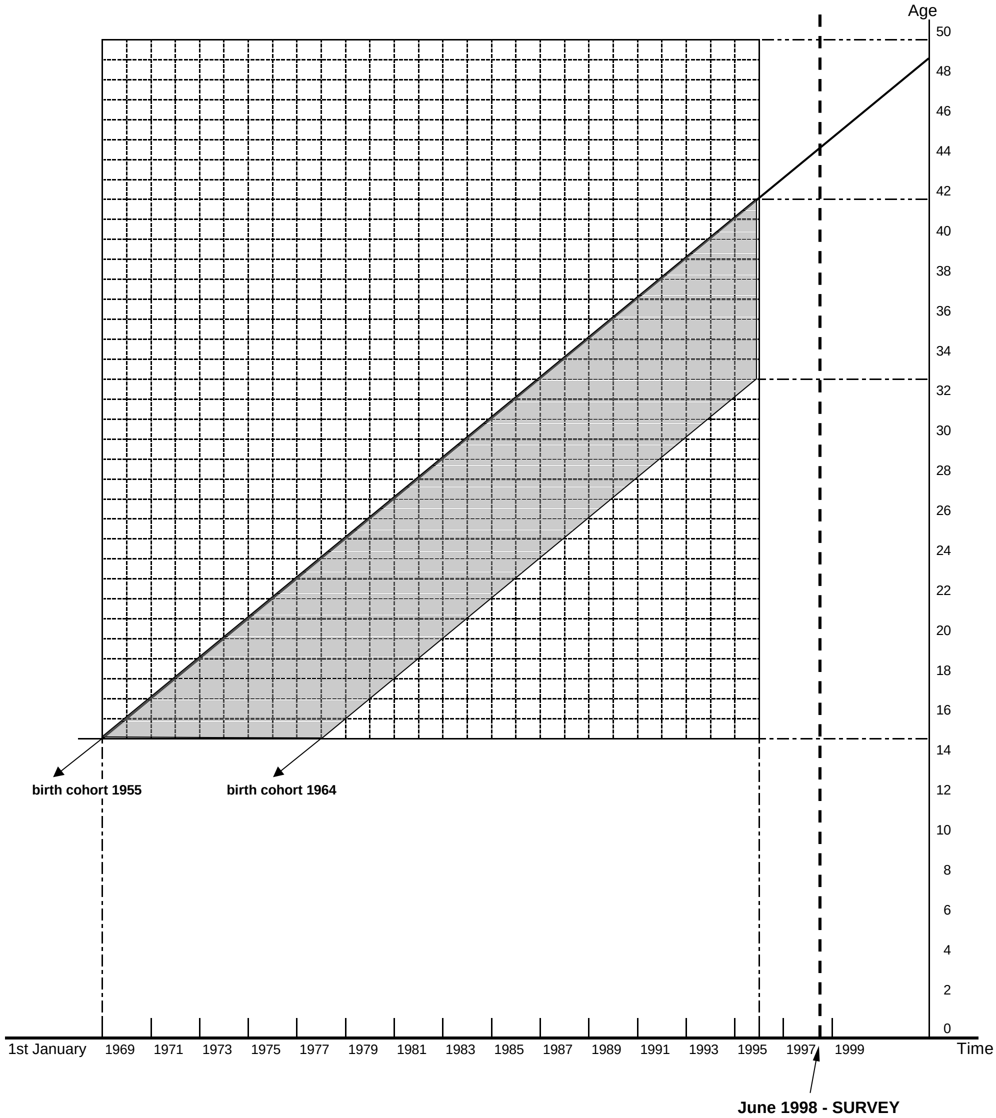
The assumptions which we introduce in the analysis of the imbalances between the sexes at the territorial level are the following. For each individual there can be at least two major pools within which to look for a partner:

- the region of origin
- the region of residence at the time of the survey

Of course, people might move at every stage in their life, widening the horizon of their marriage market, and might even return to their starting point (their region of residence might, after a long time spent traveling around, eventually coincide with their region of birth, for instance) and, therefore, we would loose the complete history of the individual. As we already said, the 1998 household survey collected the information regarding the destination region in case of migratory movements due to first job search reasons, but this information then was lost.

It is worthwhile to highlight that our macrolevel analyses provide us with time-

Figure 4.1: Diagram of the link between the nuptiality data-base and the 1998 Household Survey



The grey semi-transparent area addresses the merge between the macro and the micro data. The rectangular area, characterised by squares, is the first-marriages data-base by calendar year (1969-1996), age (15-49), sex, region of residence of the spouse; the triangle area refers to the individuals, younger than 41 years and born after 1955.Among these we then select cohort 1955-1964 (see text for more details) included in the 1998 household survey.

varying indicators of the squeeze[8]. To entail the link between the aggregate and the individual level it is necessary that the individual episodes are split accordingly. With this procedure we can divide each episode (or spell, or duration time before the occurrence of the event under study or before the interview) referred to as a unit of analysis, into sub-episodes known as splits, where the imbalance measure of the marriage market is allowed to vary. In our case, each episode starts at age 15 and ends either at first marriage or at the end of the year 1995. Our macro variables, S,I, and I_{freq} represent our covariates changing their values only at the beginning of a calendar year and yearly constant[9].

In such a way, the measure of the imbalance plays a role in each region of birth (as well as in each region of current residence) and calendar year. Consequently, each individual's age will be affected during his/her life-course by a time-varying squeeze. The result of the split consists in having divided the time axis into time-periods in correspondence of the 1st of January of each year and to assume that the transition rates are constant in each of these intervals but can change between them.

In particular, the episode splitting procedure is a method for handling time-varying covariates and therefore to include their effect on the causal explanation of the model. The procedure requires that at all points in time where at least one of the explanatory variables changes its value, the time axis is split into sub-episodes, called *splits* of the episode. In each split the explanatory variables assume different values; all the episode splits have the same state of origin and state of destination, which is equal to the origin state of the original episode and are therefore considered as censored; the last split assumes a destination state equal to destination state in the original episode.

[8]Our imbalance on the marriage market is, as we said, a synthetic measure meaning that is annual measure but it varies at regional level and for every calendar year.

[9]In particular, the episode splitting procedure can be briefly described as follows. The original episode is split into sub-episodes and each of them constitutes a new record containing information about the origin state of the original episode, the values of all the covariates at the beginning of the sub-episodes, the starting and ending times of the sub-episode, information indicating whether the sub-episodes end with the destination state of the original episode or they are censored. All the episodes, except the last one, are regarded as right censored. Only the last episode is given the same destination state as the original episode.

Table 4.2: Transition to marriage by sex and other characteristics

		MEN		WOMEN	
		Median Duration	Cases	Median Duration	Cases
Birth cohort					
<=1924		28.5	1442	24.6	2221
1925-1934		28.2	2427	24.6	2651
1935-1944		27.4	3133	23.7	3170
1945-1954		26.6	4147	23.0	3969
1955-1964		27.7	4818	23.6	5054
1965-1974		30.6	4191	26.7	4491
>=1975			3288		3113
Cohort and macroregion of birth:					
<=1934	*North*	28.7	1482	25.0	1983
	Centre	28.0	778	23.9	982
	South	28.0	1544	24.5	1776
1935-64	*North*	27.2	4442	23.7	4506
	Centre	27.3	2110	23.3	2110
	South	27.1	5218	23.1	5117
>1964	*North*	31.2	2836	28.0	2864
	Centre	31.0	1238	28.0	1180
	South	29.9	3089	26.0	3167

4.4 Event history analysis of the transition to first marriage

4.4.1 Trends by gender and birth cohort

As a first application of the nonparametric method for the survivor analysis of single transitions we refer to the Kaplan-Meier or product-limit estimation method[10]: we consider subgroups by sex and birth cohort of the same population. Overall, the median age at first marriage by birth cohort shows a pattern characterised, first, by a decreasing and then by a rising phase. In table 4.2, where 10-years birth-cohorts have been reported, we observe that the median duration of first marriage has declined, both for men and for women, up to the cohort born in 1945-54, and since then, the median duration has increased again (see also figure 4.2).

First of all, it should be observed that a selection bias affects the oldest birth cohorts. Although the survey manages to sample individuals born at the turn of the century, in our analysis they represent a very selected proportion of the birth cohorts. Retrospective studies are based only on survivors and therefore require

[10]See Appendix for the explanation of method.

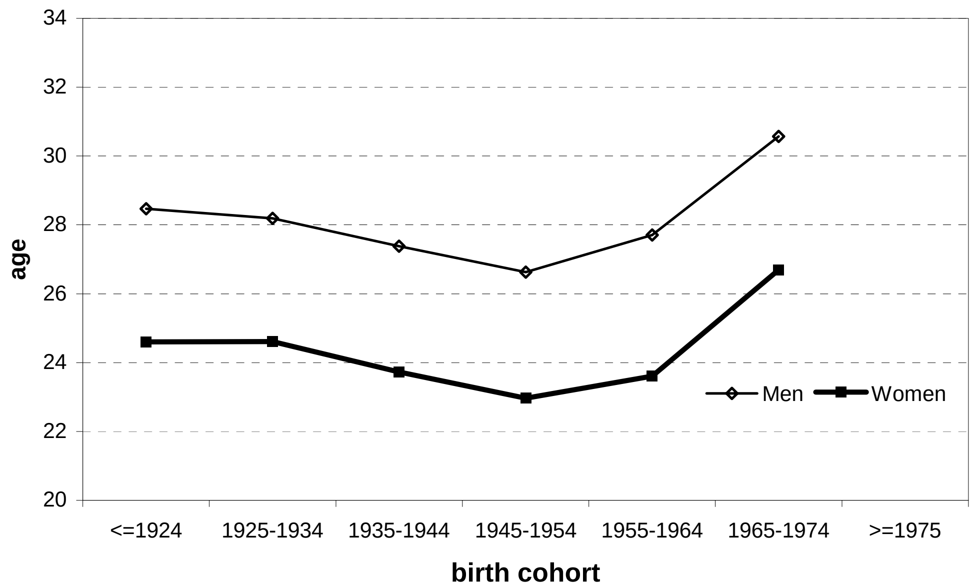
more attention in interpreting the results for the oldest cohorts. In our case, the cohorts born before 1934 seem to be especially affected by a selection bias (we shall go back to this point later). Bearing in mind this problem, we can anyway note that, while 50% of men born before 1934 married a woman, when they were aged 28.2, and 50% of women of the same cohort were married when they were 24.6 years old, for those born in the decade just after World War II (1945-54 cohort), the median age at first marriage reached a minimum: 26.6 years for men and 23 for women (table 4.2 and figure 4.2). These post-war cohorts are those bringing a novelty in the process of family formation by anticipating the timing of marriage: from previous studies it emerged that these are the cohorts involved in the 'marriage boom' which occurred in the 1960s and 1970s (Castiglioni, 1999[45]).

Later birth cohorts show a rapid increase in the age at first marriage: for those born during 1955-64, 50% of men get married by their 28th birthday and 50% of women by their 24th (Castiglioni, 1993[44]). Lastly, the youngest cohort (1965-74) is the one that shows the longest postponement of its marital behavior. In fact 50% of men married before their 31st birthday and 50% of women married before their 27th, both with a lag of 3 years on average if compared to the previous birth cohort and of about 4 years if compared to the cohort 1945-54, approximately including their parents' cohort.

However, when also taking into account the place of birth (table 4.2), residents in the North have the highest median age at first marriage both for men and for women born before 1934, with regional differences of a bit more than half a year among men. For those born in 1935-1964 there is much less variability (but this is, of course, due to the fact that in the 30-years cohort rises and drops are compensated): half of the men belonging to this cohort marries at age 27 and half of the women marries around age 23.

Now let us briefly compare the transition to first marriage by sex in each of the cohorts. As regard the strong selection effect already mentioned, we can compare our results in figure 4.3. In particular, we look at the cohorts gathering individuals born before 1924 and those born between 1925 and 1934 (figure 4.3). Indeed, in both pairs of curves, but especially in the first one, it emerges that, with respect to women, only a small proportion of men survive to first marriage. The very low

Figure 4.2: Median age at first marriage by sex and birth cohort



proportion, among the oldest-old cohort, of men unmarried resulting at the time of the observation is probably not due to their higher propensity to marriage, but is instead evidently linked to the fact that the unmarried men result to be less represented (because they died) than married men, at the time of the survey, made in 1998. A selection problem affects men, because of the higher mortality of those not married. Plenty of studies have highlighted higher mortality of those unmarried, so that marriage confirmed to be a selective process (Hu and Goldman, 1990[103]; Vallin and Nizard, 1977[183]).

Bearing in mind the selection process of the oldest cohorts and given that we also need to evaluate the regional differences, we prefer to aggregate the information and to consider the following birth cohorts: $<= 1934$, $1935 - 1944$, $1945 - 1954$, $1955 - 1964$, $>= 1965$ (tables 4.3 and 4.4). This does not represent a solution to the problem, but, at least, allows us to deal with a slightly higher proportion of respondents. There is a general decrease, from the first birth cohort to the second one, in the age at which half of the individuals of a cohort experiences the transition to first marriage. Also at regional level of analysis, median age at first marriage for birth cohort and sex follows the same pattern, observed in figure 4.2 for Italy as a whole. In fact, after a phase of decline of the median age at first marriage,

Figure 4.3: Transition to marriage by sex and birth cohort

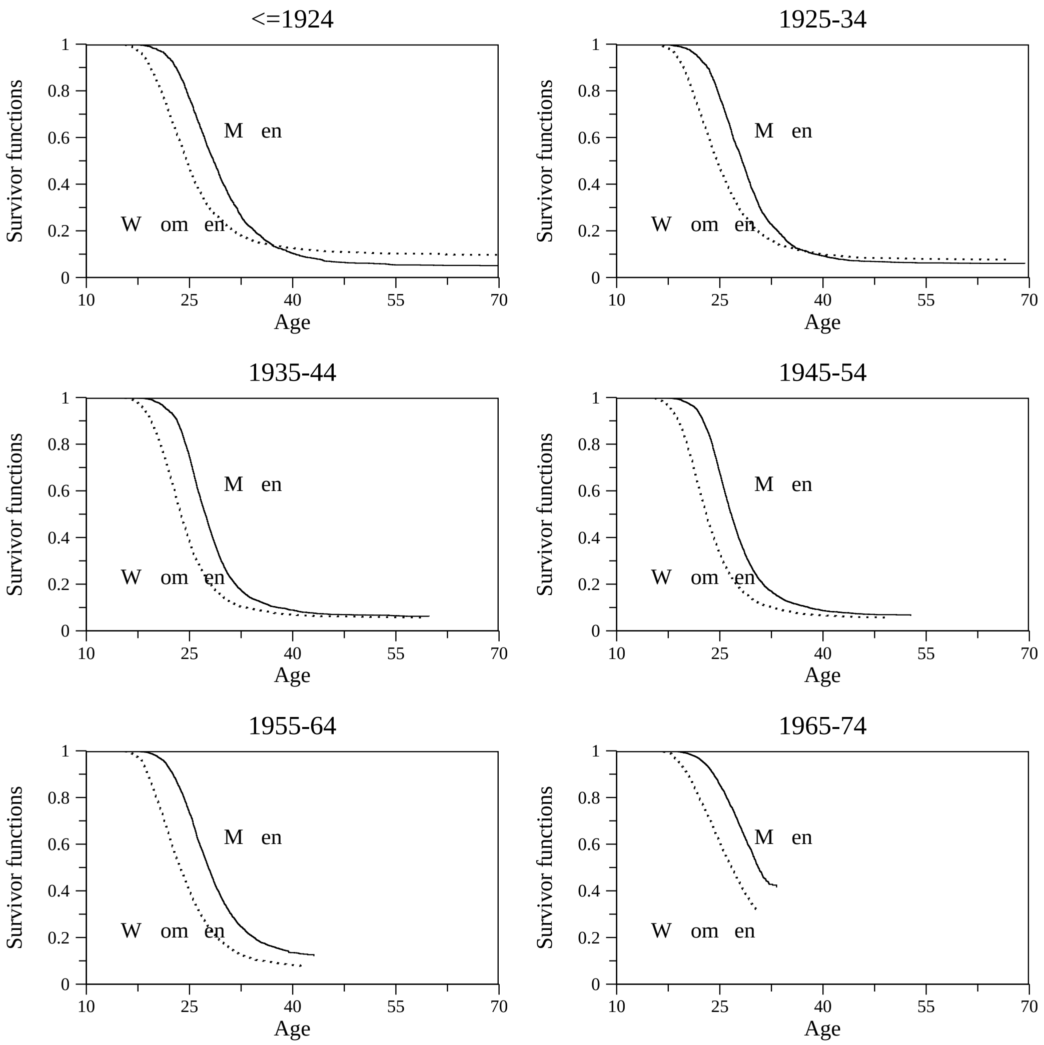


Table 4.3: Survivor function quartiles for marriage by sex, birth cohort and territorial division at birth

territorial division	quartiles	MEN <=1934	MEN 1935-44	MEN 1945-54	MEN 1955-64	MEN >=1965	WOMEN <=1934	WOMEN 1935-44	WOMEN 1945-54	WOMEN 1955-64	WOMEN >=1965
NORTH	*1st quartile*	25.9	25.1	24.2	25.1	27.5	22.1	21.8	21.1	21.1	24.2
	median	28.7	27.1	26.4	28.3	31.2	25.0	24.1	23.1	24.0	28.0
	3rd quartile	32.7	30.6	30.2	34.6		29.1	27.0	26.0	28.1	
CENTRE	*1st quartile*	25.1	25.2	24.4	25.1	27.6	21.1	21.3	20.6	21.1	24.3
	median	28.0	27.2	26.6	28.2	31.0	23.9	23.4	22.6	23.9	28.0
	3rd quartile	31.3	30.2	29.5	31.8		27.9	26.1	25.4	27.7	
SOUTH	*1st quartile*	24.7	24.5	24.3	24.5	26.1	21.0	20.6	20.2	20.2	22.2
	median	28.0	27.4	26.8	27.2	29.9	24.5	23.2	23.0	23.0	25.9
	3rd quartile	32.0	30.3	30.1	31.2		29.7	27.2	26.7	27.1	30.5
ITALY	*1st quartile*	25.2	24.9	24.3	24.8	27.0	21.5	21.3	20.7	20.7	23.3
	median	28.3	27.2	26.6	27.7	30.6	24.6	23.7	22.9	23.6	27.2
	3rd quartile	32.2	30.4	30.0	32.2		29.1	26.9	26.2	27.5	

which involved all birth cohorts up to 1945-54, a phase of sensible increase has been observed. The 1945-1954 birth cohort marks a turning point in the marital behaviour: it is characterised by an anticipatory marital behaviour which will be perceivable during the 1970s.

Afterwards, it should be highlighted that the major (highest) postponement with respect to the previous birth cohorts' behaviour has been experienced by the youngest cohort born after 1965: half of the men (women) in this birth cohort survived to first marriage on average 3(4) years more, in the median age, than the previous birth cohort. This trend holds also at regional level of analysis (table 4.3) even though the South has a small delay in that. A postponement process for the cohort born after 1945-54 emerges also at every stage of the transition to first marriage: so that the first quartile shows the postponement of the age at which 25% of people have experienced a marriage. For the South such a postponement is weaker than for the North and the Centre (table 4.3).

In table 4.4, we show that the proportions of survivors to marriage at selected ages, have first dropped, up to cohort 1945-54, and then quickly risen, therefore following the pattern already described by the median duration of first marriage. Marriage was more frequent and took place earlier for men and women born during the 1930s: then the proportion of unmarried at every age fell continuously up to the birth cohort 1946-55. For those born at the end of the 1950s and early 1960s we

Table 4.4: Proportion of survivors to marriage at selected ages by sex, birth cohort and territorial division at birth

territorial division	survivors at age	MEN					WOMEN				
		<=1934	1935-44	1945-54	1955-64	>=1965	<=1934	1935-44	1945-54	1955-64	>=1965
NORTH	S(20)	0.996	0.990	0.984	0.985	0.996	0.913	0.903	0.864	0.833	0.957
	S(25)	0.814	0.757	0.654	0.759	0.883	0.502	0.411	0.308	0.416	0.693
	S(30)	0.402	0.278	0.254	0.400	0.576	0.219	0.139	0.130	0.193	0.393
	S(35)	0.170	0.147	0.145	0.242		0.140	0.095	0.084	0.122	
	S(40)	0.105	0.107	0.109	0.198		0.113	0.073	0.066	0.098	
CENTRE	S(20)	0.986	0.987	0.990	0.982	0.996	0.846	0.855	0.827	0.851	0.962
	S(25)	0.763	0.765	0.682	0.752	0.893	0.401	0.332	0.285	0.427	0.698
	S(30)	0.334	0.257	0.230	0.340	0.580	0.190	0.102	0.077	0.171	0.416
	S(35)	0.157	0.114	0.107	0.168		0.110	0.056	0.049	0.089	
	S(40)	0.097	0.087	0.077			0.083	0.042	0.044	0.069	
SOUTH	S(20)	0.966	0.969	0.975	0.976	0.990	0.826	0.811	0.769	0.767	0.891
	S(25)	0.723	0.711	0.683	0.701	0.821	0.461	0.366	0.354	0.360	0.555
	S(30)	0.363	0.268	0.256	0.302	0.494	0.241	0.155	0.144	0.155	0.276
	S(35)	0.157	0.107	0.113	0.144		0.148	0.097	0.095	0.088	
	S(40)	0.087	0.066	0.071	0.095		0.122	0.075	0.074	0.069	
ITALY	S(20)	0.982	0.981	0.981	0.980	0.993	0.867	0.858	0.815	0.806	0.929
	S(25)	0.767	0.741	0.672	0.731	0.859	0.466	0.378	0.325	0.392	0.635
	S(30)	0.372	0.270	0.251	0.343	0.542	0.221	0.138	0.127	0.172	0.350
	S(35)	0.162	0.126	0.124	0.183		0.137	0.088	0.083	0.101	
	S(40)	0.097	0.087	0.086	0.133		0.111	0.068	0.066	0.080	

observe an inversion in the nuptiality trends, given that the proportion of unmarried survivors at every age has quickly risen (Pinnelli and De Rose, 1995[145]).

For the youngest cohort, born after 1964, the median age at marriage is quite different among the three division: 50% of men born in the North are married at their 32nd birthday, while those born in the Centre are married by age 31 and those born in the South anticipate their marriage with respect to other regions of birth before age 30. As regard women, 50% of the youngest (born after 1965) born in the North and in the Centre marry at age 28 years, but marry 2 years earlier, at age 26, if born in the South (table 4.3).

It could be useful to compare the results of the Kaplan-Meier application to those obtained in the previous chapters. In particular, in the second chapter we observed that over the period 1969-1995 mean ages at first marriages for both spouses slightly declined up to the first half of the 1970s, which can, in fact, be due to the behaviour of the cohort 1945-54, and, later, increased steadily, for the behaviour of the cohort born after 1955. Moreover, we said that up to 1982, men resident in the southern regions (and as an example we compared Calabria to Lombardia) showed the highest average age at marriage and those in the northern regions the lowest. Subsequently, a shift took place so that men in the South kept a lower age at first marriage than all other Italians. The event history analysis conducted on the birth cohorts represented in table 4.3 and 4.4 confirms our previous findings: as regard men, the median age at first marriage in the South was higher than in the North and in the Centre for birth cohort 1935-55 and 1945-54, but from the cohort born in 1955 it continues to be the lowest. Also the growing differentiation in the timing of the marriage among regions can be confirmed by the longitudinal analysis resulting from the Kaplan-Meier method: over time a widening difference in the ages at first marriage can be observed among territorial divisions. For each sex, median ages at first marriage, which are very close for the old birth cohort (small differences are of about one year over the country), show a growing difference among macroregions for the young cohorts, for instance, women born after 1965 in the South marry 2.1 years earlier than those born in the North and in the Centre (table 4.3).

In figure 4.4, patterns of transition to marriage are reported for men and women, and by cohort and division of birth. To make the reading easier, let us remember that the continue line corresponds to the North, the dotted line to the Centre and the dashed line to the South. Starting from a quite differentiated situation among macroregions of birth, for those born before 1934, men gradually assume a behaviour characterised by a lower variability between divisions of birth. While for the birth cohort <= 1934 men born in the Centre enter into first marriage slightly after the southern men and slightly before the northern ones, for the cohort born in 1945-54, which is also the one with the lowest proportions of survivals at marriage to all ages (therefore with the quickest transition to first marriage), patterns are rather undifferentiated by division of birth. From cohorts born during 1955-64 emerges the anticipatory behaviour of the southern regions when compared to the northern and central ones. Women in the South, indicated by the dashed line, enter early into first marriage, while central and northern ones marry slightly later. However, at around age 24 the dotted line, being the lowest line and corresponding to women born in Central regions, indicates a pattern of high transition to first marriage up to cohort 1945-54. From the cohort born in 1955-64 the South shows a pattern characterised by a quick transition to marriage, reached by the Central women only at around age 40. Lastly, the youngest cohorts of women, born after 1965, clearly show a gap between the marital behaviour of the southern women on the one hand, in comparison to that of the northern and central ones, which is postponed and overlapped on the other hand: there is now a clear fork between the curves. The youngest birth cohorts are censored by the interview and therefore their patterns, which is anyway characterised by a later entry into first marriage with respect to previous birth cohorts, is just perceivable (cohort born after 1965).

Overall, across cohorts there has been a slight anticipation of the age at marriage for those born in the years 1945-54 and a rise of the age at first marriage for the successive cohorts (see also figure 4.2).

4.5 Evaluating the impact of the marriage squeeze

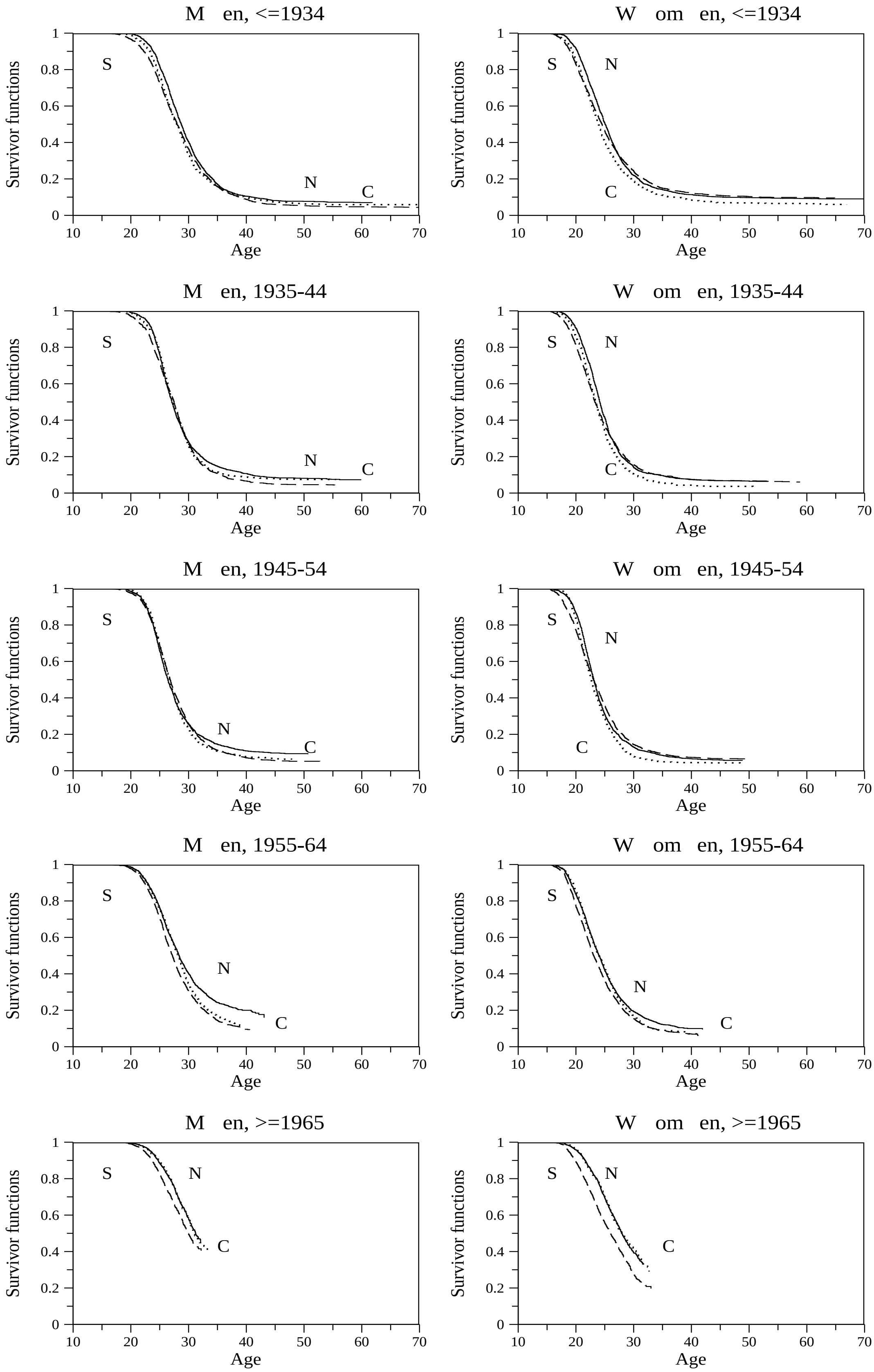
In order to evaluate the impact of the differential imbalances on first marriage between sexes, we apply event history models including the measure of the squeeze in the marriage market as a time-varying covariate. As we said, individual survey data have been linked to the three alternative measures of the squeeze (S, I and I_{freq}) computed both according to the region of birth of the individuals and to that of their residence at the time of the survey. Our main purposes are either to look for an effect of the squeeze and to ascertain whether there is a time dependence of the effect of the squeeze, controlling for regional differences. Here, the focus is on a set of cohorts whose life-courses are not censored at an early age: cohorts of individuals born in the period 1955-1964 have been chosen to evaluate the effect of the imbalances on the marriage market.

I) In particular, we would expect that increasing the measure of the squeeze, which entails a worsening of the conditions for women, could affect the marriage opportunities of both sexes differently. In fact,

   a) a squeeze against women definitely put them in a worse position, lengthening the spell, the duration of the time interval necessary to find an appropriate partner,

   b) on the other way round, a squeeze against women, speed up the mating opportunities of men.

Figure 4.4: Survivor functions by sex, cohort and macroregion of birth. ITALY



II) As a second step, we are interested in analysing the possibility that the impact of the squeeze might not be constant, but might indeed change over time. This implies the existence of an age pattern of the squeeze and, in this case, our expectations are the following.

a) For men, we would expect to find an acceleration in the marital behavior improving the marriage opportunities at all ages, especially for those which are normally less exposed to the risk of marriage. This means that perhaps, young men could take advantage of a situation characterised by a squeeze against women.

b) As regard women, we might expect that, even in the case of a squeeze against them, they are not entirely excluded from the process of assortative mating: the matching process will require more time for lots of them, so that the outcome will be a general postponement effect.

We also expect that the three measures analysed in the previous chapter, S, I and I_{freq}, do not behave differently, given that they are descriptive of the same phenomenon. Modeling the transition to first marriage by using this measures provides us with a test of their robustness: among other things, we also wish to test whether I and I_{freq}, though built in a simplistic way, succeed in describing the imbalance in the marriage market as S would do.

In evaluating a nested model's performance we use the likelihood-ratio test comparing each model to a reference model. To compare nonnested models we make use of the Bayesian Information Criterion (BIC) (see appendix). Theoretical explanations of the models can be found in the mathematical appendix, as well.

4.5.1 Proportional hazards model

To start with we could try to evaluate the effects of observed covariates without specifying a time period effect: a semi-parametric model of the Cox type. The Cox model is also known as semi-parametric because it does not specify the parametric distribution for describing the transition rate dependence on time. This model emphasises the role of the covariates in explaining a change in the transition rate to first marriage: covariates represent our knowledge about the observed heterogeneity of the population. One of its features is that it is based on the proportionality assumption, according to which two units of analysis have proportional effects on the basis of the specified baseline rate and a specific effect. At each point in time, the ratio of the effect of being in a covariate category relative to another is constant. In other words, "the effects of covariates can only induce proportional shifts in the transition rate but cannot change its shape" (Blossfeld and Rohwer, 1995[24, p.212]). The proportionality assumption implies that the duration of exposure has the same impact on each individual, suggesting that the probability of experiencing the life event (first marriage) varies over time in the same way for each respondent[11].

In our case, region of residence at the time of the survey (1998) or at birth are our covariates, and their effects are assumed to be independent from time. The purpose here is to show whether the marriage market situation explains part of the regional level differences. Sixteen models are presented: they control for the region of residence at the time of the survey and at birth (tables 4.5 and 4.6 respectively) for men and women, and, apart from Model I (basically used to check the improvement of the other ones), Model II includes S as a covariate, Model III includes I and Model IV includes I_{freq}.

In particular, the equation which expresses the transition rate $r(t)$ as a function of the baseline rate $r_0(t)$ and of the covariates $\mathbf{X}_1$ (region) and $\mathbf{X}_2$ (imbalance)[12], is the following:

$$r(t) = r_0(t) \exp(\beta_1 \mathbf{X}_1 + \beta_2 \mathbf{X}_2) \tag{4.1}$$

Comparing each of the models with an alternative measure of the squeeze (S, I, I_{freq}), to the first one, which exclude $\mathbf{X}_2$ it emerges that for men, the squeeze measures, positive over time, have no significant effects[13] (table 4.5, first part). The positive

[11] For more details about the model see the appendix.

[12] Region is a categorical variable, therefore $\mathbf{X}_1$ is a vector of dummy variables X_1=(Piedmont,... Sardinia); the measure of the squeeze is a continuous variable, therefore $\mathbf{X}_2$ assumes value in $\mathbf{R}$.

[13] It is normally of primary interest to test whether the parameter β_i is significantly not different from zero. The significance level reported in this and in the following tables corresponds to 1-p-value. The p-value represents the probability that the sample value would be as large as the value actually observed, if the null hypothesis ($\beta_i = 0$) is true. Therefore when in the column 'Signif' we have 1.000 it means that our coefficient has a p-value equals to 0.000. The β coefficients are the logarithm of the hazard ratio $r(t)/r_0(t)$ and any value of β in the range $(-\infty, \infty)$ will lead to a positive value of the hazard ratio. Note that positive values of β are obtained when the hazard ratio is greater than unity. An increase in a unity of $\mathbf{X}_i$ makes multiply the transition rate by $\exp(\beta_i)$ (for more details on the interpretation of the parameters see in appendix).

sign of the effect for men of a female disadvantage in the marriage market confirms our expectations. In turn, the squeeze for women, whichever be the measure adopted, has always a negative and significant effect (table 4.5, second part). This means that, if the squeeze increases (S, I or I_{freq} positive) then we have a negative effect for women, therefore they postpone marriage, at every time of their lives. Furthermore, men resident in the North-Centre and Sardinia have slow transition to first marriage, while those resident in the South experience marriage sooner. Also women resident in the North-Centre of Italy have a slow transition to first marriage (table 4.5). However, in the next models, we will not go in depth in the analysis of the regional differences, we will mainly use them as control variables. According to the Bayesian Information Criterion (BIC) used to compare 'nonnested models', for women the Model III, which uses the index I, is slightly better than previous others. Models controlling the region of birth of the individuals are reported in table 4.6, where we observe a situation similar to the previous one: all the measures of the squeeze show a positive effect, but not significant, for men while for women it is negative and always significant. As concerns the regions effect a clear cut behaviour is more straightforward. In fact, both women and men born in the North or in the Centre have a slower transition for first marriage than the baseline one, while the South (except Sardinia) they have a faster one. According to the BIC the best model in table 4.6 is the fourth for both sexes, therefore the best measure to represent the squeeze is I_{freq}.

As the model by region of birth and that by region of residence refer to different amounts of individuals[14], they cannot be compared using the BIC measure computed here.

All in all we can say that the proportional hazards model works better for women than for men. While for the former there is a clear decreasing probability of marrying in a situation characterised by their disadvantage, for the latter does not emerge a significant increase in the marriage opportunities. On the other hand, it should be highlighted that this model is very useful in case the proportionality assumption is respected. In other cases, it could simply be that the existence of an age-dependence

[14] It is necessary to remember that for the region of birth we excluded respondent born abroad or with a missing value for their region of birth.

Table 4.5: Cox models by sex and for alternative measures of the squeeze; by region of residence in 1998

REGION OF RESIDENCE AT THE TIME OF THE SURVEY

MEN

	Model I			**Model II**			**Model III**			**Model IV**		
	Coeff	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
Piedmont (base)												
Vaa	-0.3056	0.1345	0.9770	-0.3446	0.1377	0.9876	-0.3446	0.1377	0.9876	-0.3400	0.1374	0.9867
Lom	0.0280	0.0805	0.2716	0.0206	0.0807	0.2012	0.0206	0.0807	0.2013	0.0214	0.0807	0.2087
Taa	-0.2236	0.0992	0.9758	-0.1967	0.1012	0.9480	-0.1967	0.1012	0.9480	-0.1990	0.1011	0.9509
Ven	-0.0949	0.0891	0.7131	-0.0864	0.0893	0.6668	-0.0864	0.0893	0.6668	-0.0872	0.0893	0.6710
Fvg	-0.1208	0.1073	0.7394	-0.1098	0.1076	0.6924	-0.1098	0.1076	0.6924	-0.1107	0.1076	0.6960
Lig	-0.3902	0.1123	0.9995	-0.3760	0.1128	0.9991	-0.3761	0.1128	0.9991	-0.3772	0.1127	0.9992
Tos	0.0247	0.0895	0.2172	0.0035	0.0909	0.0310	0.0035	0.0909	0.0310	0.0058	0.0908	0.0508
Umb	-0.0298	0.1071	0.2195	-0.0545	0.1086	0.3842	-0.0545	0.1086	0.3842	-0.0520	0.1085	0.3682
Er	-0.1711	0.0966	0.9234	-0.1832	0.0970	0.9409	-0.1832	0.0970	0.9409	-0.1820	0.0970	0.9394
Mar	-0.0440	0.0968	0.3505	-0.0654	0.0981	0.4948	-0.0654	0.0981	0.4947	-0.0641	0.0981	0.4865
Laz	-0.0053	0.0918	0.0457	-0.0542	0.0988	0.4166	-0.0542	0.0988	0.4166	-0.0494	0.0984	0.3841
Abr	0.1660	0.0935	0.9241	0.1386	0.0957	0.8524	0.1386	0.0957	0.8524	0.1410	0.0957	0.8594
Mol	0.1123	0.1046	0.7172	0.1215	0.1048	0.7536	0.1215	0.1048	0.7536	0.1220	0.1049	0.7552
Cam	0.0797	0.0845	0.6546	0.0737	0.0846	0.6165	0.0737	0.0846	0.6165	0.0751	0.0845	0.6255
Pug	0.2393	0.0824	0.9963	0.2120	0.0849	0.9874	0.2120	0.0849	0.9874	0.2131	0.0851	0.9878
Bas	-0.1193	0.1145	0.7024	-0.1144	0.1146	0.6820	-0.1144	0.1146	0.6820	-0.1138	0.1146	0.6794
Cal	0.0957	0.0885	0.7205	0.1102	0.0891	0.7836	0.1102	0.0891	0.7836	0.1099	0.0892	0.7820
Sic	0.1643	0.0854	0.9457	0.1335	0.0885	0.8687	0.1335	0.0885	0.8687	0.1325	0.0891	0.8630
Sar	-0.1334	0.0994	0.8205	-0.1295	0.0994	0.8072	-0.1295	0.0994	0.8072	-0.1295	0.0994	0.8071
SQUEEZE:												
S				1.4457	1.0827	0.8182						
I							2.8897	2.1647	0.8181			
Ifreq										2.2297	1.7920	0.7866
n. parameters:	19			20			20			20		
n. events	3921											
Log-likelihood:	-30587.60			-30586.71			-30586.71			-30586.83		
BIC:				1.804			1.805			2.040		

REGION OF RESIDENCE AT THE TIME OF THE SURVEY

WOMEN

	Model I			**Model II**			**Model III**			**Model IV**		
	Coeff	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
Piedmont (base)												
Vaa	-0.2601	0.1165	0.9744	-0.1772	0.1170	0.8700	-0.1773	0.1170	0.8702	-0.1941	0.1168	0.9036
Lom	-0.1508	0.0739	0.9588	-0.1117	0.0742	0.8679	-0.1117	0.0742	0.8679	-0.1155	0.0741	0.8810
Taa	-0.2762	0.0919	0.9973	-0.3928	0.0942	1.0000	-0.3928	0.0942	1.0000	-0.3885	0.0940	1.0000
Ven	-0.1803	0.0830	0.9702	-0.2089	0.0832	0.9880	-0.2089	0.0832	0.9880	-0.2094	0.0832	0.9882
Fvg	-0.0505	0.0940	0.4090	-0.1527	0.0959	0.8886	-0.1527	0.0959	0.8888	-0.1542	0.0960	0.8918
Lig	-0.4513	0.1019	1.0000	-0.5067	0.1024	1.0000	-0.5067	0.1024	1.0000	-0.5046	0.1024	1.0000
Tos	-0.0636	0.0810	0.5673	0.0112	0.0821	0.1085	0.0112	0.0821	0.1083	0.0032	0.0818	0.0311
Umb	-0.2363	0.1003	0.9815	-0.1764	0.1008	0.9199	-0.1765	0.1008	0.9199	-0.1854	0.1007	0.9345
Er	-0.1956	0.0833	0.9811	-0.1309	0.0841	0.8808	-0.1310	0.0841	0.8808	-0.1356	0.0840	0.8936
Mar	-0.0488	0.0883	0.4195	0.0335	0.0894	0.2923	0.0335	0.0894	0.2922	0.0316	0.0894	0.2766
Laz	-0.1279	0.0838	0.8731	0.0597	0.0899	0.4938	0.0598	0.0899	0.4938	0.0454	0.0890	0.3901
Abr	-0.0195	0.0850	0.1811	0.0571	0.0860	0.4935	0.0571	0.0860	0.4934	0.0500	0.0858	0.4401
Mol	-0.0780	0.1019	0.5559	-0.1300	0.1023	0.7961	-0.1300	0.1023	0.7960	-0.1321	0.1023	0.8031
Cam	-0.0604	0.0800	0.5496	-0.0387	0.0801	0.3707	-0.0387	0.0801	0.3708	-0.0446	0.0801	0.4229
Pug	-0.0101	0.0776	0.1034	0.1051	0.0801	0.8101	0.1051	0.0801	0.8101	0.1045	0.0801	0.8081
Bas	-0.0788	0.1061	0.5425	-0.0868	0.1061	0.5868	-0.0868	0.1061	0.5867	-0.0868	0.1061	0.5864
Cal	0.1255	0.0817	0.8756	0.0435	0.0830	0.4000	0.0435	0.0830	0.4000	0.0406	0.0831	0.3745
Sic	0.0018	0.0782	0.0184	0.1253	0.0812	0.8772	0.1253	0.0812	0.8772	0.1336	0.0816	0.8984
Sar	-0.2582	0.0924	0.9948	-0.2604	0.0924	0.9952	-0.2604	0.0924	0.9952	-0.2593	0.0924	0.9950
SQUEEZE:												
S				-5.4209	0.9459	1.0000						
I							-10.8375	1.8908	1.0000			
Ifreq										-8.3583	1.4606	1.0000
n. parameters:	19			20			20			20		
n. events	4530											
Log -likelihood:	-35199.1			-35182.91			-35182.91			-35183.04		
BIC:				-28.724			-28.733			-28.466		

Table 4.6: Cox models by sex and for alternative measures of the squeeze; by region of birth

REGION OF RESIDENCE AT BIRTH

MEN

	Model I			Model II			Model III			Model IV		
	Coeff	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
Piedmont (base)												
Vaa	-0.3718	0.1733	0.9681	-0.4158	0.1761	0.9817	-0.4158	0.1761	0.9817	-0.4123	0.1758	0.9810
Lom	0.0375	0.0885	0.3279	0.0297	0.0887	0.2627	0.0297	0.0887	0.2627	0.0303	0.0887	0.2671
Taa	-0.2207	0.1079	0.9593	-0.1902	0.1099	0.9163	-0.1902	0.1099	0.9163	-0.1916	0.1098	0.9190
Ven	-0.0010	0.0959	0.0082	0.0102	0.0962	0.0842	0.0102	0.0962	0.0842	0.0096	0.0962	0.0795
Fvg	-0.1405	0.1231	0.7464	-0.1281	0.1234	0.7011	-0.1281	0.1234	0.7011	-0.1286	0.1233	0.7029
Lig	-0.2514	0.1250	0.9557	-0.2357	0.1255	0.9397	-0.2357	0.1255	0.9397	-0.2363	0.1255	0.9404
Tos	0.1261	0.0968	0.8076	0.1022	0.0982	0.7018	0.1022	0.0982	0.7018	0.1038	0.0981	0.7101
Umb	0.0153	0.1134	0.1070	-0.0117	0.1150	0.0809	-0.0117	0.1150	0.0808	-0.0100	0.1149	0.0691
Er	-0.1718	0.1047	0.8992	-0.1876	0.1053	0.9252	-0.1876	0.1053	0.9252	-0.1867	0.1053	0.9238
Mar	0.0677	0.1051	0.4806	0.0431	0.1065	0.3143	0.0431	0.1065	0.3144	0.0436	0.1066	0.3174
Laz	0.0965	0.0960	0.6851	0.0404	0.1037	0.3030	0.0404	0.1038	0.3029	0.0437	0.1032	0.3280
Abr	0.1938	0.1021	0.9424	0.1630	0.1043	0.8818	0.1630	0.1043	0.8819	0.1644	0.1042	0.8854
Mol	0.1364	0.1107	0.7820	0.1465	0.1110	0.8134	0.1465	0.1110	0.8134	0.1475	0.1110	0.8161
Cam	0.2327	0.0852	0.9937	0.2255	0.0854	0.9918	0.2255	0.0854	0.9918	0.2268	0.0853	0.9921
Pug	0.3158	0.0853	0.9998	0.2846	0.0880	0.9988	0.2846	0.0880	0.9988	0.2846	0.0882	0.9987
Bas	-0.0566	0.1147	0.3782	-0.0502	0.1148	0.3378	-0.0502	0.1148	0.3378	-0.0493	0.1148	0.3321
Cal	0.1720	0.0901	0.9438	0.1872	0.0907	0.9609	0.1872	0.0907	0.9609	0.1876	0.0908	0.9612
Sic	0.3131	0.0864	0.9997	0.2789	0.0897	0.9981	0.2789	0.0897	0.9981	0.2763	0.0904	0.9978
Sar	0.0188	0.0999	0.1492	0.0230	0.0999	0.1824	0.0230	0.0999	0.1824	0.0233	0.0999	0.1840
SQUEEZE:												
S				1.6229	1.1352	0.8472						
I							3.2445	2.2698	0.8471			
Ifreq										2.6122	1.8707	0.8374
n. parameters:	19			20			20			20		
n. events	3787											
Log-likelihood:	-29378.23			-29377.21			-29377.21			-29377.25		
BIC:				1.527			1.527			1.621		

REGION OF RESIDENCE AT BIRTH

WOMEN

	Model I			Model II			Model III			Model IV		
	Coeff	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
Piedmont (base)												
Vaa	-0.1075	0.1378	0.5649	-0.0176	0.1383	0.1014	-0.0177	0.1383	0.1018	-0.0352	0.1381	0.2013
Lom	-0.0752	0.0807	0.6485	-0.0326	0.0810	0.3130	-0.0327	0.0810	0.3131	-0.0371	0.0810	0.3532
Taa	-0.2387	0.0971	0.9860	-0.3578	0.0995	0.9997	-0.3579	0.0995	0.9997	-0.3522	0.0994	0.9996
Ven	-0.0387	0.0882	0.3392	-0.0704	0.0884	0.5741	-0.0704	0.0884	0.5742	-0.0709	0.0884	0.5777
Fvg	-0.0444	0.1076	0.3199	-0.1439	0.1093	0.8118	-0.1439	0.1093	0.8120	-0.1430	0.1094	0.8091
Lig	-0.3577	0.1123	0.9986	-0.4130	0.1127	0.9998	-0.4130	0.1127	0.9998	-0.4099	0.1127	0.9997
Tos	-0.0042	0.0895	0.0379	0.0706	0.0905	0.5648	0.0706	0.0905	0.5648	0.0618	0.0903	0.5061
Umb	-0.1448	0.1057	0.8294	-0.0861	0.1062	0.5826	-0.0861	0.1062	0.5827	-0.0959	0.1060	0.6345
Er	-0.1743	0.0924	0.9406	-0.1101	0.0931	0.7630	-0.1102	0.0931	0.7631	-0.1154	0.0931	0.7850
Mar	-0.0134	0.0947	0.1126	0.0717	0.0959	0.5457	0.0717	0.0959	0.5456	0.0688	0.0958	0.5270
Laz	-0.0664	0.0904	0.5374	0.1270	0.0969	0.8103	0.1271	0.0969	0.8104	0.1102	0.0959	0.7492
Abr	0.0636	0.0944	0.4995	0.1377	0.0953	0.8515	0.1376	0.0953	0.8515	0.1293	0.0951	0.8262
Mol	0.0512	0.1074	0.3663	-0.0037	0.1078	0.0272	-0.0037	0.1078	0.0272	-0.0055	0.1079	0.0407
Cam	0.0450	0.0797	0.4277	0.0674	0.0798	0.6017	0.0674	0.0798	0.6017	0.0609	0.0797	0.5552
Pug	0.0398	0.0802	0.3805	0.1586	0.0830	0.9440	0.1586	0.0830	0.9440	0.1566	0.0829	0.9410
Bas	-0.0007	0.1077	0.0051	-0.0060	0.1077	0.0448	-0.0060	0.1077	0.0447	-0.0059	0.1077	0.0439
Cal	0.1985	0.0828	0.9835	0.1121	0.0842	0.8167	0.1121	0.0842	0.8167	0.1099	0.0844	0.8073
Sic	0.1015	0.0796	0.7979	0.2282	0.0828	0.9941	0.2282	0.0828	0.9941	0.2351	0.0833	0.9953
Sar	-0.0904	0.0928	0.6699	-0.0899	0.0928	0.6674	-0.0899	0.0928	0.6674	-0.0889	0.0928	0.6618
SQUEEZE:												
S				-5.5748	1.0058	1.0000						
I							-11.1460	2.0105	1.0000			
Ifreq										-8.4889	1.5469	1.0000
n. parameters:	19			20			20			20		
n. events	4318											
Log -likelihood:	-33329.21			-33314.04			-33314.04			-33314.41		
BIC:				-26.698			-26.708			-25.960		

pattern does not emerge because it is confounded by compensating factors. The following analyses attempt to ascertain this point by further modeling the transition rate.

4.5.2 The piecewise constant exponential model

Assuming that the effects of the marriage market are proportional over time is, in most applications of transition rate models, not theoretically justified. For an appropriate modeling it is often crucial to include time-dependent covariates in transition rate models. The *piecewise constant exponential model* allows for the subdivision of the time-axis in a subset of intervals of analysis within which the transition rate is considered to be constant. It provides a baseline function, expressing the time-dependence of the process. As regards the effects of the covariates, the model gives us two possibilities, that we will see better later. To practical purposes, this approach appears to be particularly useful especially when the researcher is not in the position to directly include time-dependent covariates, or when s/he does not have a clear idea of the form of the time-dependence of the process (Blossfeld and Rohwer, 1995[24]).

If there are m time periods, the distribution of durations has m parameters[15]. In particular, we used to split the time axis differently between the sexes: for men we chose the ages 23, 25, 27, 29, 32 and for women the ages 18, 20, 22, 24, 26, 28, 30. The choice of the time split has been based on the criterion to gather approximately an equivalent amount of events in each interval.

There are two possible ways to include covariates. We can, for instance, assume that only a baseline rate, given by period-specific constants, can vary across time periods and, therefore, the covariates have the same (proportional) effects in each period (as they do not vary with time). Another way could be to allow for period-specific effects of covariates also. Having divided the time axis into m time periods,

[15] The choice of an appropriate number of intervals is subject to specific considerations. Evidently, the more the intervals, the best the approximation of the unknown baseline rate, but this implies a large number of coefficients to be estimated. On the other hand, a small number of intervals is less problematic as concern the estimations, but provides a rough approximation of the baseline rate. Therefore, it is wise to search for a compromise between the two alternatives. Another obvious requirement is building intervals with ending times for some episodes: that is to say, intervals should contain events.

Figure 4.5: Baseline function for the piecewise constant exponential model and confidence interval at 5%: MEN, Piedmont, birth cohort 1955-1964

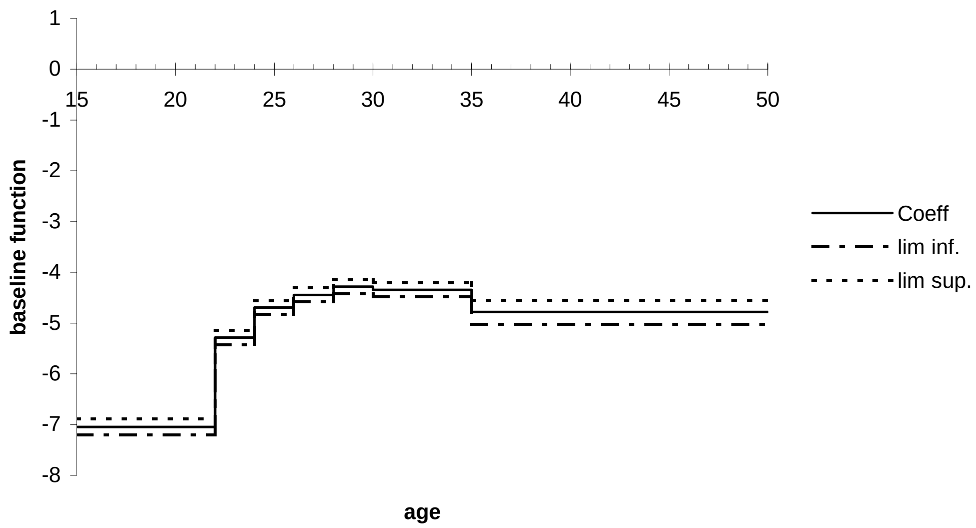


Figure 4.6: Baseline function for the piecewise constant exponential model and confidence interval at 5%: WOMEN, Piedmont, birth cohort 1955-1964

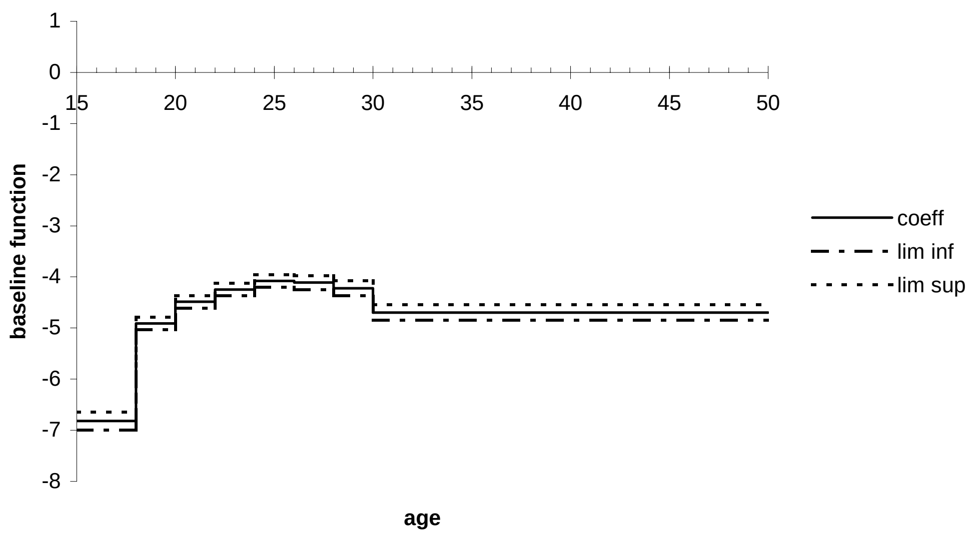
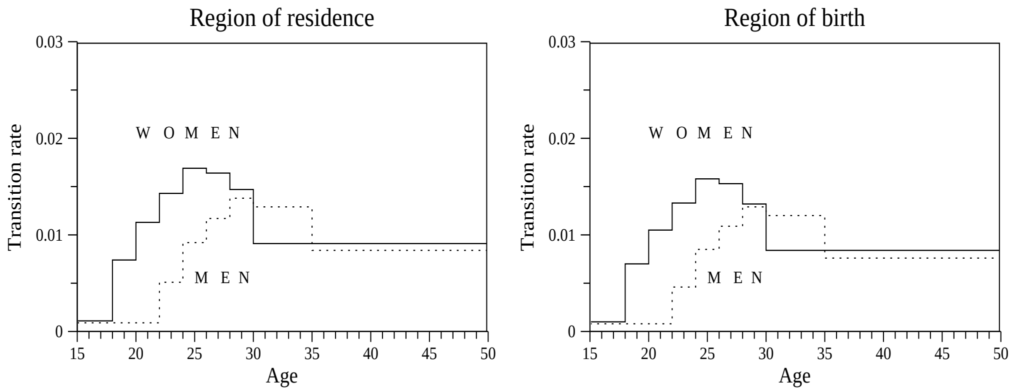


Figure 4.7: Transition rate for the piecewise constant exponential model by sex and region of residence and region of birth: Piedmont, birth cohort 1955-1964



we consider each interval given by:

$$I_l = \{t|\tau_l \leq t < \tau_{l+1}\} \qquad l = 1, 2, \ldots, m$$

When covariates are assumed not to vary, the parametric model that we are looking at is given by the following expression:

$$r(t) = \exp\{\bar{\beta}_l + \mathbf{A}\beta\} \qquad if\ t\ \in\ I_l \tag{4.2}$$

where $\bar{\beta}_l$ are the constant coefficients associated with the lth time period, so that they represent the time-varying components of the rate, $\mathbf{A}$ is the vector of covariates (regions and imbalance measures) and the β coefficients, associated to the covariates, are assumed not to vary across time periods.

In tables 4.7 and 4.8, we present the estimations of the coefficients where the covariates (regions of birth or of residence and imbalance) are constant over time (also figures 4.5 and 4.6).

The effects of the squeeze, whichever is the index used, are now all significant and positive for men, and significant but negative for women. In figures 4.5 and 4.6 confidence intervals at the 5 % level of the baseline coefficients are reported[16]: the estimated parameters for the baseline transition rate at first increase from -7.0456 to -4.2853 (for men, resident in Piedmont in Model I[17]) and then slightly decrease to

[16]The confidence interval at 5% for the coefficient baseline is computed by: $inf = coefficient - 1.96 * s.e.$ and $sup = coefficient + 1.96 * s.e.$.

[17]But the same pattern continues to be for Model II and III and for region of birth: see also table 4.7.

-4.7826 (after age 35). The same age pattern, increasing first and then decreasing, can be observed for women: note that the age intervals are different in this case.

The piecewise constant approximates the curves of marriage by ages. Therefore, the transition rate does changes with increasing durations of exposure (first marriage rate varies with age). To the transition rates, constant in each time interval (each age group), but varying across age-groups (figure 4.7), one has to add the coefficient associated to the set of covariates and assumed not to vary across time periods. Moreover, it should be stressed that the baselines are non-monotonic for both sexes and show a different schedule between men and women, slightly anticipated and higher for the latter, regardless of the region of birth or of residence (figures 4.5 and 4.6). The transition rates for region of residence and for region of birth (figure 4.7) keep the same pattern over time.

The hypothesis regarding the effect of the squeeze, regardless of the age pattern, is confirmed. Men gain from a situation characterised by an imbalance in the marriage market, by accelerating their transition to first marriage, while women experience a general disadvantage. In particular, an increase in the squeeze (thus an imbalance against women) has a positive effect on the male transition rate, but a negative effect on the female transition rate. In other words, when a squeeze against women occurs, then men take advantage of the situation having an increasing transition rate, therefore accelerating their marriage process, while women have greater difficulties in marrying.

The comparison between nonnested models shows that the model which uses the squeeze based on the index I_{freq} for men (either taking into consideration the region of birth or the region of residence at the time of the survey) has a BIC statistic slightly better than the others (even though the differences are really low, table 4.7). For women the model with the lowest BIC is the one which uses I_{freq} as imbalance (table 4.8).

4.5.3 The piecewise constant exponential model with period-specific effects

The great advantage of the piecewise constant exponential model is that it also offers the possibility to easily evaluate the period-specific effects of the covariates

Table 4.7: Exponential model with time-periods by region: MEN, ITALY

REGION OF RESIDENCE AT THE TIME OF THE SURVEY

MEN	Model I			Model II			Model III		
	Coeff	S.E.	Signif	Coeff	S.E.	Signif	Coeff	S.E.	Signif
[15,22)	-7.0456	0.0794	1.0000	-7.0456	0.0794	1.0000	-7.0409	0.0794	1.0000
[22,24)	-5.2843	0.0726	1.0000	-5.2843	0.0726	1.0000	-5.2893	0.0727	1.0000
[24,26)	-4.6915	0.0683	1.0000	-4.6915	0.0683	1.0000	-4.6967	0.0684	1.0000
[26,28)	-4.4445	0.0682	1.0000	-4.4445	0.0682	1.0000	-4.4483	0.0683	1.0000
[28,30)	-4.2853	0.0700	1.0000	-4.2853	0.0700	1.0000	-4.2879	0.0700	1.0000
[30,35)	-4.3479	0.0704	1.0000	-4.3479	0.0704	1.0000	-4.3503	0.0702	1.0000
[35,+)	-4.7826	0.1206	1.0000	-4.7826	0.1206	1.0000	-4.7865	0.1201	1.0000
Piedmont (base)									
Vaa	-0.4529	0.1381	0.9990	-0.4530	0.1381	0.9990	-0.4496	0.1377	0.9989
Lom	0.0034	0.0808	0.0340	0.0034	0.0808	0.0340	0.0038	0.0807	0.0371
Taa	-0.1231	0.1012	0.7764	-0.1231	0.1012	0.7764	-0.1215	0.1011	0.7706
Ven	-0.0640	0.0893	0.5269	-0.0640	0.0893	0.5269	-0.0631	0.0893	0.5204
Fvg	-0.0789	0.1077	0.5366	-0.0789	0.1077	0.5365	-0.0771	0.1076	0.5260
Lig	-0.3392	0.1127	0.9974	-0.3392	0.1127	0.9974	-0.3380	0.1127	0.9973
Tos	-0.0498	0.0909	0.4164	-0.0498	0.0909	0.4163	-0.0488	0.0907	0.4091
Umb	-0.1170	0.1086	0.7183	-0.1169	0.1086	0.7183	-0.1162	0.1085	0.7160
Er	-0.2192	0.0971	0.9760	-0.2192	0.0971	0.9760	-0.2193	0.0970	0.9762
Mar	-0.1205	0.0981	0.7810	-0.1205	0.0981	0.7810	-0.1240	0.0981	0.7940
Laz	-0.1791	0.0987	0.9304	-0.1792	0.0987	0.9305	-0.1793	0.0982	0.9321
Abr	0.0714	0.0956	0.5445	0.0714	0.0956	0.5445	0.0708	0.0955	0.5412
Mol	0.1470	0.1048	0.8394	0.1470	0.1048	0.8394	0.1528	0.1048	0.8551
Cam	0.0601	0.0845	0.5225	0.0601	0.0845	0.5225	0.0638	0.0845	0.5495
Pug	0.1425	0.0849	0.9065	0.1425	0.0849	0.9065	0.1358	0.0851	0.8895
Bas	-0.1054	0.1146	0.6425	-0.1054	0.1146	0.6425	-0.1016	0.1146	0.6249
Cal	0.1527	0.0891	0.9134	0.1527	0.0891	0.9134	0.1580	0.0892	0.9237
Sic	0.0546	0.0884	0.4632	0.0546	0.0884	0.4631	0.0382	0.0890	0.3317
Sar	-0.1218	0.0994	0.7794	-0.1218	0.0994	0.7795	-0.1209	0.0994	0.7759
SQUEEZE:									
S	5.2692	1.0661	1.0000						
I				10.5356	2.1315	1.0000			
Ifreq							8.9895	1.7460	1.0000
n. parameters:	27			27			27		
n. events	3921								
Log -likelihood:	-22721.94			-22721.94			-22720.85		
BIC:	-15702.570			-15702.573			-15704.752		

REGION OF RESIDENCE AT BIRTH

MEN	Model I			Model II			Model III		
	Coeff	S.E.	Signif	Coeff	S.E.	Signif	Coeff	S.E.	Signif
[15,22)	-7.1389	0.0852	1.0000	-7.1389	0.0852	1.0000	-7.1347	0.0852	1.0000
[22,24)	-5.3728	0.0785	1.0000	-5.3728	0.0785	1.0000	-5.3783	0.0785	1.0000
[24,26)	-4.7678	0.0741	1.0000	-4.7678	0.0741	1.0000	-4.7735	0.0742	1.0000
[26,28)	-4.5160	0.0740	1.0000	-4.5160	0.0740	1.0000	-4.5201	0.0741	1.0000
[28,30)	-4.3534	0.0757	1.0000	-4.3534	0.0757	1.0000	-4.3559	0.0757	1.0000
[30,35)	-4.4260	0.0762	1.0000	-4.4260	0.0762	1.0000	-4.4279	0.0760	1.0000
[35,+)	-4.8786	0.1262	1.0000	-4.8786	0.1262	1.0000	-4.8817	0.1257	1.0000
Piedmont (base)									
Vaa	-0.5268	0.1764	0.9972	-0.5268	0.1764	0.9972	-0.5236	0.1761	0.9971
Lom	0.0115	0.0887	0.1027	0.0115	0.0887	0.1027	0.0117	0.0887	0.1048
Taa	-0.1158	0.1099	0.7080	-0.1158	0.1099	0.7080	-0.1140	0.1098	0.7012
Ven	0.0367	0.0962	0.2973	0.0367	0.0962	0.2974	0.0377	0.0962	0.3052
Fvg	-0.0988	0.1234	0.5771	-0.0988	0.1234	0.5770	-0.0970	0.1233	0.5685
Lig	-0.1987	0.1255	0.8867	-0.1987	0.1255	0.8868	-0.1972	0.1255	0.8841
Tos	0.0470	0.0982	0.3682	0.0471	0.0982	0.3682	0.0480	0.0980	0.3757
Umb	-0.0729	0.1150	0.4738	-0.0729	0.1150	0.4738	-0.0723	0.1148	0.4708
Er	-0.2291	0.1053	0.9704	-0.2291	0.1053	0.9704	-0.2291	0.1053	0.9705
Mar	-0.0141	0.1065	0.1056	-0.0141	0.1065	0.1057	-0.0179	0.1065	0.1336
Laz	-0.0898	0.1036	0.6137	-0.0898	0.1036	0.6139	-0.0904	0.1030	0.6200
Abr	0.0936	0.1042	0.6311	0.0936	0.1042	0.6311	0.0929	0.1040	0.6283
Mol	0.1714	0.1109	0.8778	0.1714	0.1109	0.8778	0.1774	0.1109	0.8901
Cam	0.2097	0.0853	0.9860	0.2097	0.0853	0.9860	0.2134	0.0853	0.9876
Pug	0.2120	0.0880	0.9839	0.2120	0.0880	0.9839	0.2046	0.0882	0.9797
Bas	-0.0390	0.1148	0.2662	-0.0391	0.1148	0.2663	-0.0350	0.1148	0.2398
Cal	0.2245	0.0907	0.9866	0.2245	0.0907	0.9866	0.2299	0.0908	0.9887
Sic	0.1994	0.0896	0.9740	0.1994	0.0896	0.9739	0.1821	0.0903	0.9564
Sar	0.0303	0.0999	0.2386	0.0303	0.0999	0.2385	0.0313	0.0999	0.2459
SQUEEZE:									
S	5.4725	1.1186	1.0000						
I				10.9424	2.2364	1.0000			
Ifreq							9.3538	1.8236	1.0000
n. parameters:	27			27			27		
n. events	3787								
Log -likelihood:	-21900.56			-21900.56			-21899.33		
BIC:	-14926.715			-14926.719			-14929.189		

Table 4.8: Exponential model with time-periods by region: WOMEN, ITALY

REGION OF RESIDENCE AT THE TIME OF THE SURVEY

WOMEN	Model I			Model II			Model III		
	Coeff	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
[15,18)	-6.8206	0.0905	1.0000	-6.8207	0.0905	1.0000	-6.8274	0.0907	1.0000
[18,20)	-4.9098	0.0636	1.0000	-4.9098	0.0636	1.0000	-4.9121	0.0637	1.0000
[20,22)	-4.4873	0.0616	1.0000	-4.4873	0.0616	1.0000	-4.4868	0.0616	1.0000
[22,24)	-4.2450	0.0627	1.0000	-4.2450	0.0627	1.0000	-4.2443	0.0627	1.0000
[24,26)	-4.0794	0.0647	1.0000	-4.0794	0.0647	1.0000	-4.0787	0.0647	1.0000
[26,28)	-4.1125	0.0693	1.0000	-4.1125	0.0693	1.0000	-4.1112	0.0693	1.0000
[28,30)	-4.2202	0.0766	1.0000	-4.2202	0.0766	1.0000	-4.2168	0.0765	1.0000
[30,+)	-4.6979	0.0768	1.0000	-4.6979	0.0768	1.0000	-4.6897	0.0762	1.0000
Piedmont (base)									
Vaa	-0.2118	0.1171	0.9296	-0.2119	0.1171	0.9296	-0.2227	0.1168	0.9433
Lom	-0.1288	0.0741	0.9176	-0.1288	0.0741	0.9176	-0.1310	0.0741	0.9229
Taa	-0.3655	0.0941	0.9999	-0.3655	0.0941	0.9999	-0.3642	0.0940	0.9999
Ven	-0.2064	0.0832	0.9869	-0.2064	0.0832	0.9869	-0.2072	0.0832	0.9873
Fvg	-0.1238	0.0957	0.8040	-0.1239	0.0957	0.8042	-0.1267	0.0958	0.8138
Lig	-0.4912	0.1024	1.0000	-0.4912	0.1024	1.0000	-0.4905	0.1024	1.0000
Tos	-0.0119	0.0820	0.1152	-0.0119	0.0820	0.1152	-0.0166	0.0818	0.1605
Umb	-0.1925	0.1009	0.9437	-0.1925	0.1009	0.9437	-0.1982	0.1007	0.9510
Er	-0.1540	0.0840	0.9331	-0.1540	0.0840	0.9331	-0.1563	0.0839	0.9375
Mar	0.0080	0.0894	0.0710	0.0080	0.0894	0.0710	0.0079	0.0894	0.0704
Laz	0.0031	0.0898	0.0280	0.0032	0.0898	0.0282	-0.0044	0.0890	0.0392
Abr	0.0342	0.0860	0.3090	0.0342	0.0860	0.3090	0.0301	0.0858	0.2737
Mol	-0.1200	0.1023	0.7594	-0.1200	0.1023	0.7594	-0.1225	0.1023	0.7688
Cam	-0.0476	0.0801	0.4477	-0.0476	0.0801	0.4477	-0.0517	0.0801	0.4817
Pug	0.0686	0.0801	0.6085	0.0686	0.0801	0.6086	0.0701	0.0801	0.6190
Bas	-0.0969	0.1061	0.6389	-0.0969	0.1061	0.6389	-0.0970	0.1061	0.6395
Cal	0.0623	0.0829	0.5475	0.0623	0.0829	0.5474	0.0586	0.0831	0.5197
Sic	0.0855	0.0811	0.7081	0.0855	0.0811	0.7082	0.0937	0.0815	0.7494
Sar	-0.2613	0.0924	0.9953	-0.2613	0.0924	0.9953	-0.2605	0.0924	0.9952
SQUEEZE:									
S	-3.9354	0.9403	1.0000						
I				-7.8688	1.8795	1.0000			
Ifreq							-6.2080	1.4549	1.0000
n. parameters:	28			28			28		
n. events	4530								
Log-likelihood:	-25388.16			-25388.15			-25387.85		
BIC:	-19588.986			-19588.996			-19589.597		

REGION OF RESIDENCE AT BIRTH

WOMEN	Model I			Model II			Model III		
	Coeff	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
[15,18)	-6.8896	0.0953	1.0000	-6.8896	0.0953	1.0000	-6.8957	0.0955	1.0000
[18,20)	-4.9689	0.0690	1.0000	-4.9689	0.0690	1.0000	-4.9709	0.0691	1.0000
[20,22)	-4.5611	0.0673	1.0000	-4.5611	0.0673	1.0000	-4.5608	0.0673	1.0000
[22,24)	-4.3186	0.0682	1.0000	-4.3186	0.0682	1.0000	-4.3184	0.0682	1.0000
[24,26)	-4.1496	0.0699	1.0000	-4.1496	0.0699	1.0000	-4.1493	0.0699	1.0000
[26,28)	-4.1792	0.0744	1.0000	-4.1792	0.0744	1.0000	-4.1782	0.0745	1.0000
[28,30)	-4.3293	0.0824	1.0000	-4.3293	0.0824	1.0000	-4.3257	0.0824	1.0000
[30,+)	-4.7817	0.0822	1.0000	-4.7817	0.0822	1.0000	-4.7726	0.0816	1.0000
Piedmont (base)									
Vaa	-0.0506	0.1384	0.2853	-0.0506	0.1384	0.2855	-0.0621	0.1382	0.3471
Lom	-0.0483	0.0810	0.4488	-0.0483	0.0810	0.4488	-0.0510	0.0809	0.4713
Taa	-0.3299	0.0995	0.9991	-0.3299	0.0995	0.9991	-0.3272	0.0993	0.9990
Ven	-0.0662	0.0884	0.5464	-0.0662	0.0884	0.5464	-0.0671	0.0884	0.5520
Fvg	-0.1176	0.1092	0.7185	-0.1177	0.1092	0.7187	-0.1185	0.1092	0.7219
Lig	-0.3954	0.1127	0.9995	-0.3954	0.1127	0.9995	-0.3939	0.1127	0.9995
Tos	0.0492	0.0905	0.4133	0.0492	0.0905	0.4133	0.0436	0.0903	0.3710
Umb	-0.1040	0.1062	0.6726	-0.1040	0.1062	0.6725	-0.1106	0.1060	0.7030
Er	-0.1373	0.0931	0.8597	-0.1373	0.0931	0.8597	-0.1402	0.0930	0.8684
Mar	0.0458	0.0959	0.3671	0.0458	0.0959	0.3672	0.0447	0.0958	0.3593
Laz	0.0656	0.0968	0.5025	0.0657	0.0968	0.5027	0.0558	0.0958	0.4393
Abr	0.1173	0.0953	0.7819	0.1173	0.0953	0.7819	0.1120	0.0951	0.7613
Mol	0.0061	0.1078	0.0455	0.0061	0.1078	0.0455	0.0040	0.1079	0.0294
Cam	0.0590	0.0798	0.5401	0.0590	0.0798	0.5401	0.0544	0.0797	0.5052
Pug	0.1224	0.0829	0.8601	0.1224	0.0829	0.8602	0.1225	0.0829	0.8608
Bas	-0.0185	0.1077	0.1364	-0.0185	0.1077	0.1364	-0.0185	0.1077	0.1365
Cal	0.1305	0.0842	0.8788	0.1305	0.0842	0.8788	0.1276	0.0844	0.8696
Sic	0.1900	0.0828	0.9783	0.1900	0.0828	0.9783	0.1969	0.0832	0.9821
Sar	-0.0891	0.0928	0.6628	-0.0891	0.0928	0.6628	-0.0883	0.0928	0.6587
SQUEEZE:									
S	-4.0645	0.9994	1.0000						
I				-8.1273	1.9978	1.0000			
Ifreq							-6.3072	1.5393	1.0000
n. parameters:	28			28			28		
n. events	4318								
Log-likelihood:	-24171.9			-24171.9			-24171.81		
BIC:	-18281.895			-18255.207			-18255.372		

under study. Once the effect of the marriage squeeze has been ascertained, it is also reasonable to think about its distribution over time. Evidence from previous studies showed that the effect of the squeeze was very likely to act in the sense of a shift in the timing of marriage, instead of reducing the total amount of people who accessed to marriage (Schoen, 1983[164]). In particular, third world societies seem to be sensitive to the marriage squeeze as it can influence both the rate and the distribution of marriages. In developed countries, only the distribution of marriages is sensitive to imbalances in the number of the two sexes: the rate of marriage is relatively insusceptible to marriage squeezes (Schoen, 1983[164]).

It is now interesting to see whether the imbalance in the marriage market produces period-specific effects. A further generalisation of the piecewise constant exponential model can be obtained if we want also to include the effect of the time-constant covariates in each time interval. As we said before the standard piecewise constant exponential model requires splitting the time axis. Accordingly, also the effects of the covariates can be computed for each time interval[18].

In this case the model assumes the following expression:

$$r(t) = \exp\{\bar{\beta}_{\mathrm{l}} + \mathbf{A}\beta_{\mathrm{l}}\} \qquad if\ t \in\ I_l \tag{4.3}$$

where the $\bar{\beta}_{\mathrm{l}}$ are, as we said in the previous case, the constant coefficients associated with the lth time period, $\mathbf{A}$ is the vector of covariates (regions and imbalance measures) and the β_{l} coefficients of the covariates are now specific for each of the lth interval.

Our purpose is now to investigate the effect of the squeeze by age. By estimating that, the model provides also the effects, for each specified age group, of all covariates included: in this case we have the regions of residence or the regions of birth. This implies a considerable increase in the number of parameters to be estimated: in fact, if we split the time axis into 8 intervals, we have to estimate the baseline effect for each period (8 parameters), the effect of the squeeze for each of the intervals (8 parameters) and the effect for each of the 19 regions (because Piedmont is the reference) for every interval (8x19 parameters). Thus, the number of parameters

[18]Note that, by introducing constraints which fix the parameters of the covariates to be equal across time periods we obtain the same result as for the standard exponential model with time periods (Blossfeld and Rowher, 1995[24]).

to be estimated quickly increases. To follow the principle of parsimony, it would then be wise to insert some constraints on the parameters of the model to make the estimation of the remaining ones easier. As our attention is focused on the effects of the squeeze by age, we constrain all other β_1 parameters referring to regions to be equal over each time interval[19]. Several trials have been conducted to optimise the split of the time interval: for men we then chose a 6-intervals split of the time axis, while for women we chose 8 different intervals. The results are reported in table 4.9 for men and 4.10 for women. It emerges that for both sexes and either taking into consideration the region of birth or the region of residence the effect of the squeeze is non-monotonic over the age (see also figures 4.8, 4.9, 4.10, 4.11).

For men the effect of the squeeze is positive and significant for every age and is particularly high at younger and older ages. Looking at Model II in table 4.9, for instance, we find that the coefficient of the age pattern of the squeeze effect in the marriage market is positive and very high, 30.9848 before age 23, then it drops to -0.7147 between age 23 and 25 years (but is not significant), and then rises steadily to positive values (all significant) up 20.2260 in the age group older than 32 years. Therefore, for men, there is a clear U-shaped effect by age of the imbalance in the marriage market.

This means that, if the marriage market conditions are bad for women, then men are advantaged, especially when they are younger than 23 years and when they are older than, say, 29 (table 4.9 and figures 4.8 and 4.10). In those age intervals, they have a high transition rate to marriage, so that the squeeze anticipates (accelerates) their transition to first marriage. Therefore, a positive squeeze represents an advantage, with respect to a situation when there is no imbalance, especially for young men, for which only small information is available. In turn, men older than 25 years profit from their relatively smaller uncertainty in the marriage market due to the fact that they could have built their position in longer time. Apart from the age group 23-25, from which men seem to suffer a relative disadvantage, but estimate is not significant, the outcome continues to be the same also if we consider

[19]However, also models without constraints have been produced to check the goodness of the estimates of the one without constraints. It emerges that adding constraints for each region improves the estimates of the effects by age of the measure of the squeeze. We do not include the results of the model without constraints.

Table 4.9: Piecewise-constant exponential model with period specific effects: MEN, ITALY

REGION OF RESIDENCE AT THE TIME OF THE SURVEY

MEN	Model I			Model II			Model III		
	Coeff	S.E.	Signif	Coeff	S.E.	Signif	Coeff	S.E.	Signif
AGE									
[15,23)	-6.6998	0.0730	1.0000	-6.6998	0.0730	1.0000	-6.6878	0.0727	1.0000
[23,25)	-4.8721	0.0757	1.0000	-4.8721	0.0757	1.0000	-4.8776	0.0760	1.0000
[25,27)	-4.5203	0.0734	1.0000	-4.5203	0.0734	1.0000	-4.5266	0.0738	1.0000
[27,29)	-4.2996	0.0699	1.0000	-4.2996	0.0699	1.0000	-4.3028	0.0701	1.0000
[29,32)	-4.2919	0.0695	1.0000	-4.2919	0.0695	1.0000	-4.2967	0.0694	1.0000
[32,+)	-4.4582	0.0874	1.0000	-4.4582	0.0874	1.0000	-4.4625	0.0872	1.0000
Piedmont (base)									
Vaa	-0.4645	0.1388	0.9992	-0.4645	0.1388	0.9992	-0.4580	0.1384	0.9991
Lom	0.0105	0.0809	0.1028	0.0105	0.0809	0.1028	0.0117	0.0809	0.1152
Taa	-0.1120	0.1014	0.7305	-0.1120	0.1014	0.7305	-0.1108	0.1013	0.7260
Ven	-0.0505	0.0893	0.4282	-0.0505	0.0893	0.4282	-0.0485	0.0893	0.4131
Fvg	-0.0575	0.1077	0.4067	-0.0575	0.1077	0.4066	-0.0576	0.1077	0.4070
Lig	-0.3359	0.1128	0.9971	-0.3359	0.1128	0.9971	-0.3341	0.1128	0.9969
Tos	-0.0560	0.0910	0.4615	-0.0559	0.0910	0.4615	-0.0525	0.0908	0.4369
Umb	-0.1264	0.1088	0.7545	-0.1264	0.1088	0.7545	-0.1243	0.1088	0.7468
Er	-0.2302	0.0973	0.9820	-0.2302	0.0973	0.9820	-0.2279	0.0972	0.9810
Mar	-0.1332	0.0981	0.8254	-0.1332	0.0981	0.8254	-0.1352	0.0981	0.8319
Laz	-0.2105	0.0989	0.9667	-0.2105	0.0989	0.9667	-0.2062	0.0984	0.9639
Abr	0.0689	0.0958	0.5282	0.0689	0.0958	0.5283	0.0707	0.0958	0.5397
Mol	0.1468	0.1051	0.8377	0.1468	0.1051	0.8377	0.1520	0.1051	0.8520
Cam	0.0488	0.0846	0.4356	0.0488	0.0846	0.4356	0.0561	0.0846	0.4930
Pug	0.1182	0.0852	0.8346	0.1182	0.0852	0.8346	0.1149	0.0853	0.8217
Bas	-0.1327	0.1147	0.7527	-0.1327	0.1147	0.7527	-0.1278	0.1147	0.7348
Cal	0.1548	0.0897	0.9156	0.1548	0.0897	0.9156	0.1601	0.0897	0.9258
Sic	0.0209	0.0885	0.1863	0.0209	0.0885	0.1863	0.0056	0.0892	0.0504
Sar	-0.1388	0.0995	0.8370	-0.1388	0.0995	0.8370	-0.1378	0.0995	0.8338
SQUEEZE S									
[15,23)	15.5000	2.0054	1.0000						
[23,25)	-0.3581	2.3487	0.1212						
[25,27)	4.5422	2.2201	0.9592						
[27,29)	3.3575	1.9393	0.9166						
[29,32)	7.1682	1.7405	1.0000						
[32,+)	10.1162	2.5252	0.9999						
SQUEEZE I									
[15,23)				30.9848	4.0088	1.0000			
[23,25)				-0.7147	4.6958	0.1210			
[25,27)				9.0825	4.4387	0.9593			
[27,29)				6.7128	3.8775	0.9166			
[29,32)				14.3321	3.4802	1.0000			
[32,+)				20.2260	5.0490	0.9999			
SQUEEZE I_{freq}									
[15,23)							23.1581	2.9950	1.0000
[23,25)							-0.0718	3.7971	0.0151
[25,27)							7.8450	3.6383	0.9689
[27,29)							5.7256	3.2404	0.9228
[29,32)							12.3579	2.9723	1.0000
[32,+)							17.5220	4.4029	0.9999
n.of parameters	126			126			126		
n.of constraints	95			95			95		
n. events	3921								
Log-likelihood:	-22854.44			-22854.44			-22853.61		
BIC:	-15423.207			-15423.208			-15424.861		

REGION OF RESIDENCE AT BIRTH

MEN	Model I			Model II			Model III		
	Coeff	S.E.	Signif	Coeff	S.E.	Signif	Coeff	S.E.	Signif
AGE									
[15,23)	-6.8039	0.0795	1.0000	-6.8039	0.0795	1.0000	-6.7906	0.0792	1.0000
[23,25)	-4.9555	0.0817	1.0000	-4.9555	0.0817	1.0000	-4.9633	0.0820	1.0000
[25,27)	-4.5769	0.0788	1.0000	-4.5769	0.0788	1.0000	-4.5821	0.0791	1.0000
[27,29)	-4.3645	0.0757	1.0000	-4.3645	0.0757	1.0000	-4.3677	0.0758	1.0000
[29,32)	-4.3611	0.0752	1.0000	-4.3611	0.0752	1.0000	-4.3662	0.0751	1.0000
[32,+)	-4.5553	0.0932	1.0000	-4.5553	0.0932	1.0000	-4.5583	0.0930	1.0000
Piedmont (base)									
Vaa	-0.5386	0.1770	0.9977	-0.5386	0.1770	0.9977	-0.5318	0.1767	0.9974
Lom	0.0181	0.0889	0.1617	0.0181	0.0889	0.1617	0.0193	0.0888	0.1724
Taa	-0.1093	0.1101	0.6790	-0.1093	0.1101	0.6789	-0.1081	0.1100	0.6743
Ven	0.0489	0.0962	0.3891	0.0489	0.0962	0.3892	0.0509	0.0962	0.4031
Fvg	-0.0768	0.1234	0.4664	-0.0768	0.1234	0.4663	-0.0771	0.1234	0.4681
Lig	-0.1963	0.1255	0.8822	-0.1964	0.1255	0.8822	-0.1946	0.1255	0.8789
Tos	0.0420	0.0983	0.3310	0.0420	0.0983	0.3310	0.0456	0.0981	0.3577
Umb	-0.0797	0.1151	0.5111	-0.0797	0.1151	0.5110	-0.0775	0.1151	0.4992
Er	-0.2344	0.1055	0.9737	-0.2344	0.1055	0.9737	-0.2322	0.1054	0.9724
Mar	-0.0257	0.1065	0.1908	-0.0257	0.1065	0.1908	-0.0276	0.1065	0.2047
Laz	-0.1175	0.1037	0.7427	-0.1175	0.1038	0.7428	-0.1129	0.1032	0.7262
Abr	0.0954	0.1044	0.6395	0.0954	0.1044	0.6395	0.0971	0.1043	0.6480
Mol	0.1695	0.1112	0.8725	0.1695	0.1112	0.8725	0.1745	0.1112	0.8834
Cam	0.1994	0.0854	0.9805	0.1994	0.0854	0.9805	0.2069	0.0853	0.9847
Pug	0.1904	0.0882	0.9690	0.1904	0.0882	0.9690	0.1873	0.0884	0.9659
Bas	-0.0692	0.1149	0.4529	-0.0692	0.1149	0.4529	-0.0641	0.1150	0.4228
Cal	0.2252	0.0913	0.9864	0.2252	0.0913	0.9864	0.2304	0.0912	0.9884
Sic	0.1651	0.0897	0.9342	0.1651	0.0897	0.9342	0.1499	0.0904	0.9027
Sar	0.0104	0.1000	0.0829	0.0104	0.1000	0.0829	0.0114	0.1000	0.0908
SQUEEZE S									
[15,23)	16.7126	2.1203	1.0000						
[23,25)	-0.2424	2.418	0.0799						
[25,27)	3.7406	2.2599	0.9021						
[27,29)	3.1239	1.9913	0.8833						
[29,32)	8.1291	1.8121	1.0000						
[32,+)	9.9729	2.7077	0.9998						
SQUEEZE I									
[15,23)				33.4109	4.2387	1.0000			
[23,25)				-0.4843	4.8345	0.0798			
[25,27)				7.4787	4.5184	0.9021			
[27,29)				6.2462	3.9815	0.8833			
[29,32)				16.2541	3.6232	1.0000			
[32,+)				19.9404	5.4140	0.9998			
SQUEEZE I_{freq}									
[15,23)							24.6767	3.1503	1.0000
[23,25)							0.3664	3.8883	0.0751
[25,27)							6.4339	3.6823	0.9194
[27,29)							5.3523	3.3108	0.8940
[29,32)							13.9793	3.0811	1.0000
[32,+)							17.331	4.7132	0.9998
n.of parameters	126			126			126		
n.of constraints	95			95			95		
n. events	3787								
Log-likelihood:	-22029.79			-22029.79			-22029.37		
BIC:	-14653.941			-14653.950			-14654.795		

Table 4.10: Piecewise-constant exponential model with period specific effects: WOMEN, ITALY

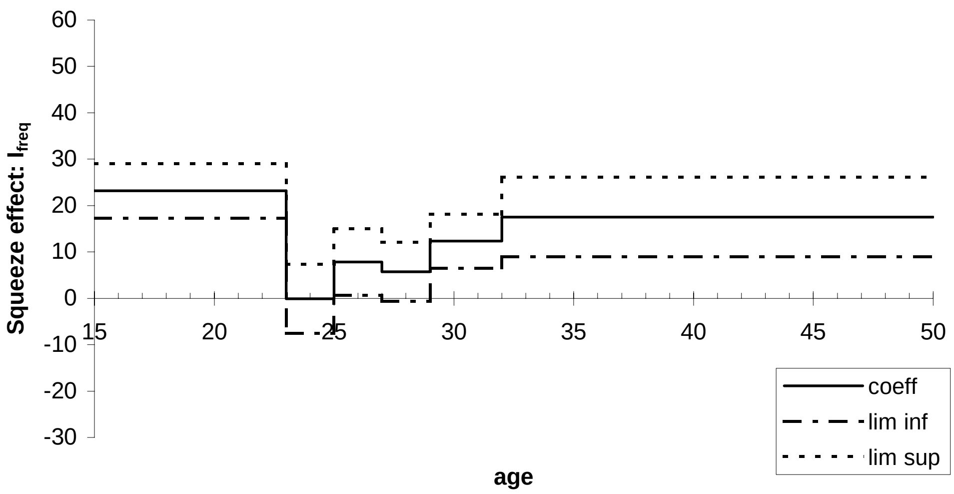
REGION OF RESIDENCE AT THE TIME OF THE SURVEY

WOMEN	Model I			Model II			Model III		
	Coeff	S.E.	Signif	Coeff	S.E.	Signif	Coeff	S.E.	Signif
[15,18)	-6.8350	0.0939	1.0000	-6.8350	0.0939	1.0000	-6.8342	0.0942	1.0000
[18,20)	-4.9077	0.0637	1.0000	-4.9077	0.0637	1.0000	-4.9098	0.0637	1.0000
[20,22)	-4.4650	0.0626	1.0000	-4.4650	0.0626	1.0000	-4.4658	0.0625	1.0000
[22,24)	-4.1840	0.0662	1.0000	-4.1840	0.0662	1.0000	-4.1837	0.0662	1.0000
[24,26)	-4.0914	0.0720	1.0000	-4.0914	0.0720	1.0000	-4.0946	0.0724	1.0000
[26,28)	-4.0949	0.0726	1.0000	-4.0949	0.0726	1.0000	-4.0893	0.0729	1.0000
[28,30)	-4.2311	0.0771	1.0000	-4.2311	0.0771	1.0000	-4.2297	0.0772	1.0000
[30,+)	-4.5950	0.0798	1.0000	-4.5950	0.0798	1.0000	-4.5935	0.0794	1.0000
Piedmont (base)									
Vaa	-0.2505	0.1186	0.9653	-0.2506	0.1187	0.9653	-0.2581	0.1185	0.9706
Lom	-0.1171	0.0743	0.8850	-0.1171	0.0743	0.8850	-0.1213	0.0742	0.8979
Taa	-0.3862	0.0944	1.0000	-0.3862	0.0944	1.0000	-0.3799	0.0942	0.9999
Ven	-0.1997	0.0832	0.9837	-0.1997	0.0832	0.9837	-0.2007	0.0832	0.9842
Fvg	-0.1682	0.0965	0.9186	-0.1683	0.0965	0.9188	-0.1641	0.0965	0.9112
Lig	-0.4948	0.1025	1.0000	-0.4948	0.1025	1.0000	-0.4936	0.1025	1.0000
Tos	-0.0068	0.0822	0.0660	-0.0068	0.0822	0.0661	-0.0143	0.0820	0.1384
Umb	-0.2178	0.1012	0.9687	-0.2178	0.1012	0.9687	-0.2244	0.1011	0.9735
Er	-0.1324	0.0843	0.8839	-0.1324	0.0843	0.8840	-0.1392	0.0841	0.9019
Mar	0.0187	0.0895	0.1655	0.0187	0.0895	0.1654	0.0158	0.0895	0.1397
Laz	0.0227	0.0902	0.1983	0.0227	0.0902	0.1984	0.0077	0.0896	0.0688
Abr	0.0233	0.0862	0.2126	0.0233	0.0862	0.2125	0.0181	0.0862	0.1667
Mol	-0.1414	0.1024	0.8325	-0.1414	0.1024	0.8325	-0.1409	0.1025	0.8311
Cam	-0.0549	0.0801	0.5072	-0.0549	0.0801	0.5072	-0.0590	0.0801	0.5385
Pug	0.0900	0.0803	0.7381	0.0900	0.0803	0.7381	0.0885	0.0803	0.7299
Bas	-0.1031	0.1062	0.6680	-0.1031	0.1062	0.6680	-0.1027	0.1063	0.6662
Cal	0.0258	0.0834	0.2432	0.0258	0.0834	0.2433	0.0272	0.0834	0.2556
Sic	0.0915	0.0812	0.7400	0.0915	0.0812	0.7399	0.0975	0.0818	0.7670
Sar	-0.2542	0.0926	0.9939	-0.2542	0.0926	0.9939	-0.2550	0.0926	0.9941
SQUEEZE S:									
[15,18)	-5.9446	3.0664	0.9475						
[18,20)	-4.9083	1.5994	0.9979						
[20,22)	-6.3585	1.6250	0.9999						
[22,24)	-8.2922	1.9518	1.0000						
[24,26)	-3.0892	2.3766	0.8063						
[26,28)	-5.6456	2.4860	0.9769						
[28,30)	1.4487	2.5252	0.4338						
[30,+)	4.0421	2.3205	0.9185						
SQUEEZE I									
[15,18)				-11.8765	6.1254	0.9475			
[18,20)				-9.8112	3.1961	0.9979			
[20,22)				-12.7124	3.2484	0.9999			
[22,24)				-16.5785	3.9022	1.0000			
[24,26)				-6.1772	4.7516	0.8064			
[26,28)				-11.2887	4.9706	0.9769			
[28,30)				2.8965	5.0491	0.4338			
[30,+)				8.0822	4.6397	0.9185			
SQUEEZE I_{freq}									
[15,18)							-7.6441	4.0971	0.9379
[18,20)							-6.6493	2.3063	0.9961
[20,22)							-9.8210	2.4960	0.9999
[22,24)							-13.0536	3.1230	1.0000
[24,26)							-4.3732	3.8868	0.7395
[26,28)							-9.5185	4.1324	0.9787
[28,30)							2.6148	4.2812	0.4586
[30,+)							7.1140	4.0218	0.9231
n.of parameters	168			168			168		
n.of constraints	133			133			133		
n. events	4530								
Log-likelihood:	-25375.39			-25375.39			-25375.89		
BIC:	-19588.926			-19588.933			-19587.934		

REGION OF RESIDENCE AT BIRTH

WOMEN	Model I			Model II			Model III		
	Coeff	S.E.	Signif	Coeff	S.E.	Signif	Coeff	S.E.	Signif
[15,18)	-6.8938	0.0978	1.0000	-6.8939	0.0978	1.0000	-6.8927	0.0981	1.0000
[18,20)	-4.9655	0.0691	1.0000	-4.9655	0.0691	1.0000	-4.9683	0.0691	1.0000
[20,22)	-4.5435	0.0684	1.0000	-4.5435	0.0684	1.0000	-4.5446	0.0683	1.0000
[22,24)	-4.2540	0.0716	1.0000	-4.2540	0.0716	1.0000	-4.2546	0.0716	1.0000
[24,26)	-4.1611	0.0766	1.0000	-4.1611	0.0766	1.0000	-4.1634	0.0770	1.0000
[26,28)	-4.1534	0.0773	1.0000	-4.1534	0.0773	1.0000	-4.1476	0.0776	1.0000
[28,30)	-4.3401	0.0830	1.0000	-4.3401	0.0830	1.0000	-4.3389	0.0831	1.0000
[30,+)	-4.6729	0.0852	1.0000	-4.6729	0.0852	1.0000	-4.6713	0.0849	1.0000
Piedmont (base)									
Vaa	-0.0813	0.1398	0.4393	-0.0814	0.1398	0.4396	-0.0887	0.1396	0.4746
Lom	-0.0373	0.0811	0.3545	-0.0373	0.0811	0.3545	-0.0420	0.0811	0.3955
Taa	-0.3522	0.0998	0.9996	-0.3522	0.0998	0.9996	-0.3443	0.0996	0.9995
Ven	-0.0619	0.0884	0.5162	-0.0619	0.0884	0.5162	-0.0625	0.0884	0.5207
Fvg	-0.1566	0.1098	0.8460	-0.1566	0.1098	0.8462	-0.1500	0.1097	0.8284
Lig	-0.3995	0.1128	0.9996	-0.3995	0.1128	0.9996	-0.3975	0.1128	0.9996
Tos	0.0563	0.0906	0.4652	0.0562	0.0906	0.4652	0.0480	0.0905	0.4041
Umb	-0.1332	0.1066	0.7888	-0.1332	0.1066	0.7888	-0.1398	0.1065	0.8107
Er	-0.1157	0.0933	0.7851	-0.1157	0.0933	0.7851	-0.1231	0.0932	0.8135
Mar	0.0568	0.0960	0.4464	0.0568	0.0960	0.4464	0.0530	0.0959	0.4196
Laz	0.0806	0.0971	0.5932	0.0806	0.0971	0.5934	0.0642	0.0964	0.4946
Abr	0.1052	0.0955	0.7291	0.1052	0.0955	0.7291	0.0998	0.0955	0.7040
Mol	-0.0180	0.1080	0.1323	-0.0180	0.1080	0.1322	-0.0168	0.1080	0.1239
Cam	0.0501	0.0798	0.4697	0.0501	0.0798	0.4696	0.0459	0.0797	0.4347
Pug	0.1423	0.0830	0.9133	0.1423	0.0830	0.9133	0.1396	0.0831	0.9071
Bas	-0.0258	0.1078	0.1893	-0.0258	0.1078	0.1893	-0.0253	0.1078	0.1859
Cal	0.0925	0.0847	0.7249	0.0925	0.0847	0.7250	0.0953	0.0848	0.7389
Sic	0.1963	0.0829	0.9822	0.1963	0.0829	0.9822	0.2013	0.0834	0.9842
Sar	-0.0851	0.0930	0.6399	-0.0851	0.0930	0.6399	-0.0862	0.0930	0.6461
SQUEEZE S									
[15,18)	-5.0689	3.1902	0.8879						
[18,20)	-5.6897	1.6695	0.9993						
[20,22)	-5.7989	1.7178	0.9993						
[22,24)	-8.7189	2.0545	1.0000						
[24,26)	-3.1683	2.4527	0.8036						
[26,28)	-6.6629	2.5741	0.9904						
[28,30)	1.7350	2.6866	0.4816						
[30,+)	4.5850	2.4936	0.9340						
SQUEEZE I									
[15,18)				-10.1249	6.3735	0.8878			
[18,20)				-11.3752	3.3365	0.9993			
[20,22)				-11.5928	3.4340	0.9993			
[22,24)				-17.4318	4.1077	1.0000			
[24,26)				-6.3371	4.9038	0.8037			
[26,28)				-13.3233	5.1469	0.9904			
[28,30)				3.4681	5.3718	0.4815			
[30,+)				9.1680	4.9860	0.9340			
SQUEEZE I_{freq}									
[15,18)							-6.3819	4.2421	0.8675
[18,20)							-7.6100	2.3950	0.9985
[20,22)							-8.8044	2.6323	0.9992
[22,24)							-13.5769	3.2684	1.0000
[24,26)							-4.5591	3.9873	0.7471
[26,28)							-11.1269	4.2583	0.9910
[28,30)							3.0437	4.5334	0.4980
[30,+)							8.0636	4.3071	0.9388
n.of parameters	168			168			168		
n.of constraints	133			133			133		
n. events	4318								
Log-likelihood:	-24158.96			-24159.0			-24159.82		
BIC:	-18282.336			-18282.343			-18280.611		

Figure 4.8: Effect of the squeeze by age and region of residence (coefficient of the piecewise constant exponential model): MEN



the region of birth and, in both cases, the best model is the one using I_{freq} as macro level of the imbalance (Model III shows the lowest BIC. See also figure 4.8 and 4.10 where we report the estimation of the coefficient and their confidence interval).

As regards women, the effect of the squeeze is of -0.76441 from age 15 to 18 and it decreases steadily down to the minimum coefficient of -13.0536 for the age group 22-24 years, and, since then, there is a shift in its sign from negative values to positive and significant ones (table 4.10). If for men we said that the age pattern of the imbalance effect is U-shaped and always positive (figure 4.8 and 4.10), here it can be said that it assumes a kind of J-shape and it takes positive values only after age 28 (figure 4.9 and 4.11). Whichever is the measure adopted to describe the imbalance (table 4.10), the squeeze has a negative effect up to age 28 and positive, but not significative, after that age. This means that an imbalance in the marriage market causes a postponement of the entry into first marriage and a sort of catch up process towards age 30 years. This result does not change if we take into account the region of birth of the women, instead of their region of residence. The lowest BIC for women is the one obtained from Model II, based on the imbalance I (See also figure 4.9 and 4.11 where we report the estimation of the coefficient and their confidence interval).

Moreover we should say that nested models reported in tables 4.5, 4.6, 4.7, 4.8,

Figure 4.9: Effect of the squeeze by age and region of residence (coefficient of the piecewise constant exponential model): WOMEN

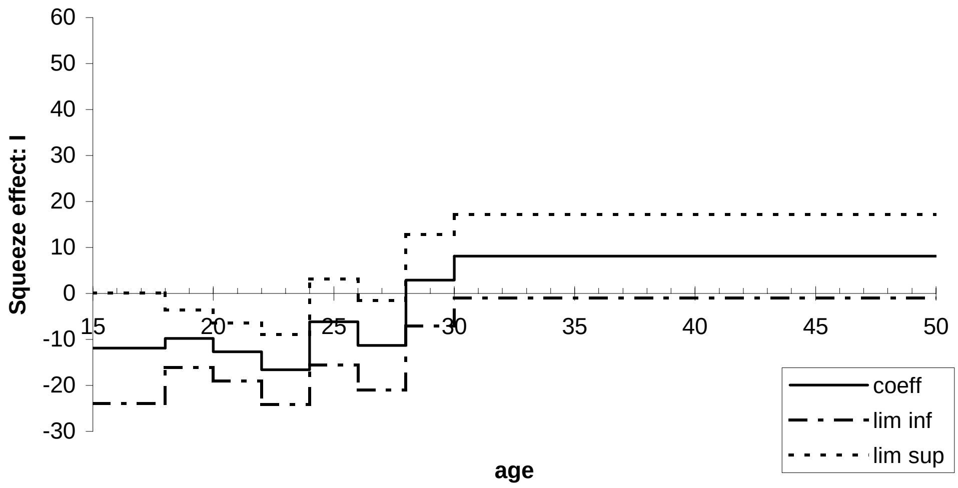


Figure 4.10: Effect of the squeeze by age and region of birth (coefficient of the piecewise constant exponential model): MEN

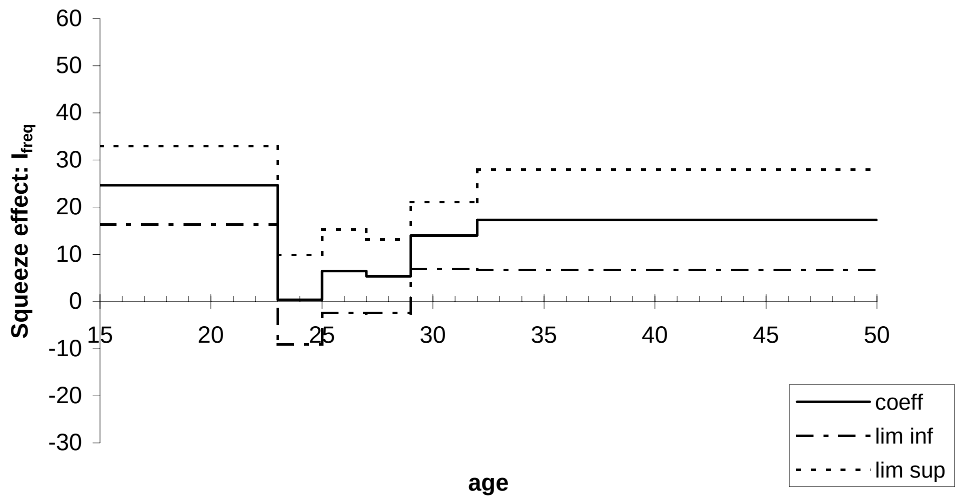
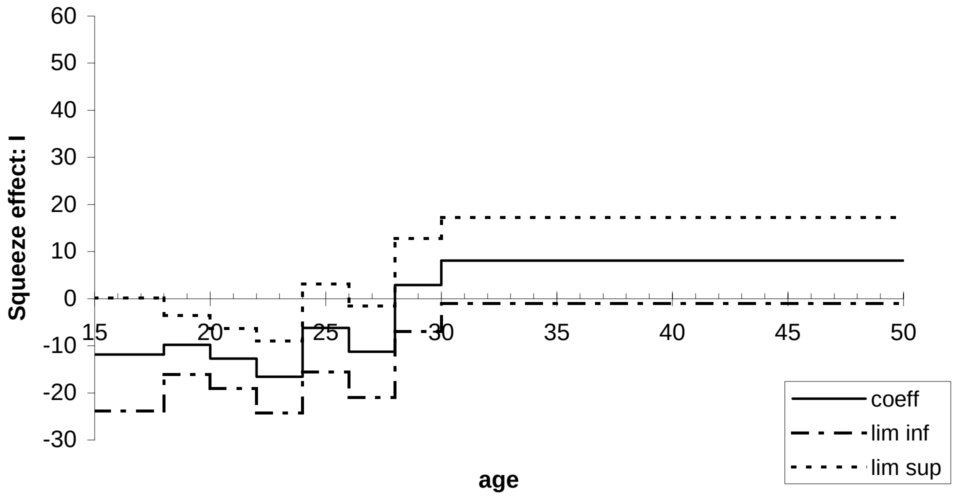


Figure 4.11: Effect of the squeeze by age and region of birth (coefficient of the piecewise constant exponential model): WOMEN



4.9, 4.10 have been compared separately for men and women, for region of birth and of residence. In table 4.11, log-likelihood, number of parameters, constraints and events of every model are reported. In the second part only nested models are compared by means of the log-likelihood ratio. By looking at the log-likelihood ratio, an improvement of the models with finer specification of the rate emerges. However, models A II, A III and A IV compared to the model A I (without the effect of the squeeze), do show an improvement for women (p-value=0.000), whereas for men they do not work well: but this is understandable, given that, for men, the effect of the squeeze obtained by applying the Cox model was not significant. Also, moving from the proportional hazards models to the piecewise constant ones, there is a sensitive improvement in the log-likelihood ratio: this means that the piecewise constant exponential model, which includes the parameters referred to each of the sub-intervals, succeeds in representing the non-monotonicity of the process (therefore we refuse the null hypothesis according to which the exceeding parameters are not statistically significant). The same occurs comparing the models in tables 4.9 and 4.10 to the one without period effect of the squeeze (tables 4.7 and 4.8). It should also be noted that some trials have been conducted to see what happens including the indicators of the squeeze referring to the region of birth and to the region of residence. For most of the individuals region of birth an region of residence will

Table 4.11: Summary of the introduced models and of the comparison by sex, region: nested and nonnested models

MODELS:	MEN								WOMEN							
	Region of Residence				Region of Birth				Region of Residence				Region of Birth			
	Log-likel.	*par.*	*cons.*	*n*	*Log-likel.*	*par.*	*cons.*	*n*	*Log-likel.*	*par.*	*cons.*	*n*	*Log-likel.*	*par.*	*cons.*	*n*
A) Cox Models																
I - Proportional Hazards	-30587.60	19		3921	-29378.23	19		3787	-35199.10	19		4530	-33329.21	19		4318
II - I + squeeze S	-30586.71	20		3921	-29377.21	20		3787	-35182.91	20		4530	-33314.04	20		4318
III - I+ squeeze I	-30586.71	20		3921	-29377.21	20		3787	-35182.91	20		4530	-33314.04	20		4318
IV - I+ squeeze I_{freq}	-30586.83	20		3921	-29377.25	20		3787	-35183.04	20		4530	-33314.41	20		4318
B1) Piecewise Constant Exponential Models:																
I - baseline + squeeze S	-22721.943	27		3921	-21900.56	27		3787	-25388.16	28		4530	-24171.901	28		4318
II - baseline + squeeze I	-22721.942	27		3921	-21900.56	27		3787	-25388.153	28		4530	-24171.896	28		4318
III - baseline + squeeze I_{freq}	-22720.852	27		3921	-21899.33	27		3787	-25387.853	28		4530	-24171.808	28		4318
B2) Piecewise Constant Exponential Models with period specific effects:																
I - baseline + squeeze S	-22854.438	126	95	3921	-22029.793	126	95	3787	-25375.392	168	133	4530	-24158.957	168	133	4318
II - baseline + squeeze I	-22854.438	126	95	3921	-22029.788	126	95	3787	-25375.389	168	133	4530	-24158.953	168	133	4318
III - baseline + squeeze I_{freq}	-22853.611	126	95	3921	-22029.366	126	95	3787	-25375.888	168	133	4530	-24159.819	168	133	4318

Comparison of Nested models:	MEN						WOMEN					
	Region of Residence			Region of Birth			Region of Residence			Region of Birth		
	log-Likeli. Ratio	df	P	log-Likeli. Ratio	df	P	log-Likeli. Ratio	df	P	log-Likeli. Ratio	df	P
A II vs A I	1.79	1	0.181	2.05	1	0.152	32.38	1	0.000	30.33	1	0.000
A III vs A I	1.79	1	0.181	2.05	1	0.152	32.39	1	0.000	30.34	1	0.000
A IV vs A I	1.55	1	0.213	1.96	1	0.162	32.12	1	0.000	29.60	1	0.000
B1 I vs A I	15731.32	8	0.000	14955.34	8	0.000	19621.89	9	0.000	18314.61	9	0.000
B1 II vs A I	15731.32	8	0.000	14955.35	8	0.000	19621.90	9	0.000	18314.62	9	0.000
B1 III vs A I	15733.50	8	0.000	14957.82	8	0.000	19622.50	9	0.000	18314.80	9	0.000
B1 I vs A II	15729.53	7	0.000	14953.29	7	0.000	19589.51	8	0.000	18284.28	8	0.000
B1 II vs A III	15729.53	7	0.000	14953.29	7	0.000	19589.51	8	0.000	18284.28	8	0.000
B1 III vs A IV	15731.95	7	0.000	14955.86	7	0.000	19590.38	8	0.000	18285.20	8	0.000
B2 I vs A I	15466.33	12	0.000	14696.88	12	0.000	19647.42	16	0.000	18340.50	16	0.000
B2 II vs A I	15466.33	12	0.000	14696.89	12	0.000	19647.43	16	0.000	18340.51	16	0.000
B2 III vs A I	15467.98	12	0.000	14697.74	12	0.000	19646.43	16	0.000	18338.78	16	0.000
B2 I vs A II	15464.54	11	0.000	14694.83	11	0.000	19615.04	15	0.000	18310.17	15	0.000
B2 II vs A III	15464.54	11	0.000	14694.84	11	0.000	19615.04	15	0.000	18310.16	15	0.000
B2 III vs A IV	15466.43	11	0.000	14695.78	11	0.000	19614.31	15	0.000	18309.18	15	0.000

Comparison of Nonnested models:	MEN				WOMEN			
	Region of Residence		Region of Birth		Region of Residence		Region of Birth	
	BIC	df	BIC	df	BIC	df	BIC	df
A II vs A I	1.80	1	1.53	1	-28.72	1	-26.70	1
A III vs A I	1.80	1	1.53	1	-28.73	1	-26.71	1
A IV vs A I	2.04	1	1.62	1	-28.47	1	-25.96	1
B1 I vs A I	-15702.57	8	-14926.72	8	-19588.99	9	-18281.89	9
B1 II vs A I	-15702.57	8	-14926.72	8	-19589.00	9	-18281.90	9
B1 III vs A I	-15704.75	8	-14929.19	8	-19589.60	9	-18282.08	9
B2 I vs A I	-15423.21	12	-14653.94	12	-19588.93	16	-18282.34	16
B2 II vs A I	-15423.21	12	-14653.95	12	-19588.93	16	-18282.34	16
B2 III vs A I	-15424.86	12	-14654.80	12	-19587.93	16	-18280.61	16

coincide and this can bring about problems in the estimations of the parameters. The inclusion of both indicators does not improve the models: the effects are not significant, neither for women nor for men, although their signs are positive for men and negative for women, confirming the previous models. Cox and piecewise constant exponential models where we include both region of birth and region of residence are reported in the appendix.

Some concluding remarks for the comparison between the piecewise constant exponential rate model and the semi-parametric model of Cox regression can be reminded: both of them are proportional hazards models. The difference is due to the fact that the Cox model leaves the baseline hazard rate completely unspecified, while the piecewise constant model tries to approximate it with a series of period-specific constants. It is worth noting that, with an increasing number of intervals of decreasing width of time periods, a piecewise constant model basically becomes a Cox model providing direct estimation of the baseline hazard rate (Blossfeld and Rowher, 1995[24]). The advantage of using the piecewise constant model instead of the Cox model is that it offers direct estimates of the baseline rate.

4.6 Marriage squeeze and other determinants of the transition to marriage

Up to now, the role of compositional constraints in the process of transition to first marriage has been analysed without considering other characteristics of the individual life-courses. What is now interesting is to see whether including other covariates, regarding birth cohort, region of birth, employment and education, makes the effects of the imbalance on the marriage market disappearing. The models we are going to introduce, take into account the following explanatory variables for each sex:

- marriage market: continuous time-varying covariate;

- birth cohort: $1955-1959, 1960-1964, 1965-1969, >= 1970$ time independent;

- region of birth: time independent;

- educational attainment: time independent;

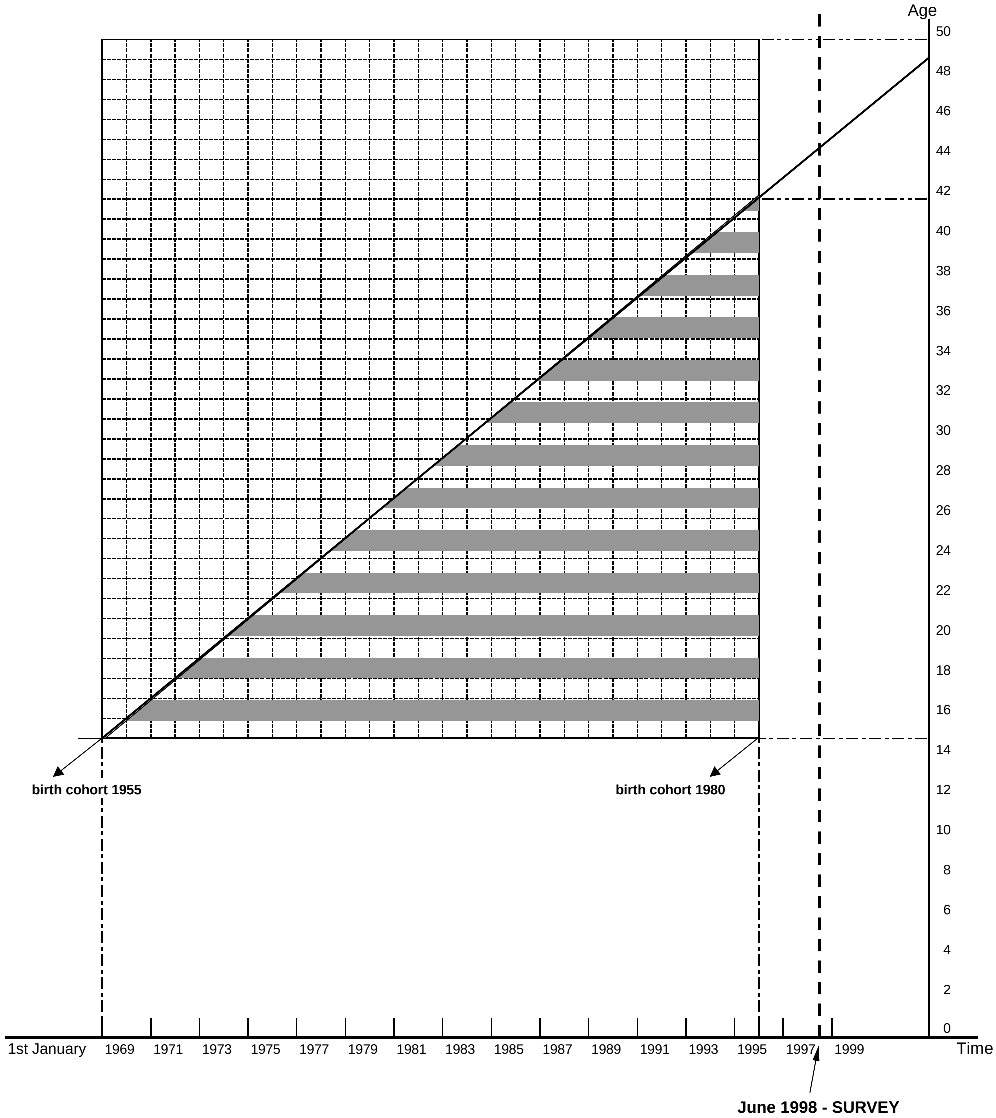
- first job: time-varying covariate;

As macro variable for the marriage opportunities we include squeeze measures, which preliminarily showed an age dependent effect on both men and women. In the first part of this chapter, the descriptive analysis of the transition to first marriage by birth cohort showed that there has been a changing pattern in the marital behaviour of Italian cohorts for both sexes. We introduce them in our analysis by dividing individuals into 5-years group cohorts from 1955 to 1970 and more (last cohort being born in 1980). Individuals subject of this part of analysis are those whose life-courses can be represented in the grey triangle reported in the following diagram (figure 4.12). As the region of residence at the time of the survey may not coincide with that of residence at the marriage time, we prefer to consider only the region of birth. To control for cohort effect on marriage decision we used 3 dummy variables for the 4 cohorts (reference group is the cohort 1955-59).

During the discussion about the data quality, the problem arising from the lack of information on the educational career has already been shown: it prevents us from considering education as a time dependent explanatory variable. Therefore, the level of attained education at the time of the survey has been included as a time independent variable[20]. Education is normally considered highly explicative of the family formation process, as it expresses the amount of human capital reached and the postponement effect due to both the longer involvement in the educational system and to the change in the orientation's values. In the economic approach to marriage, highly educated women are expected to postpone not only fertility behaviour, but also marriage (Becker, 1981[10]). Higher educated men gain high attractiveness on the marriage market: higher education increases job opportunities for them and therefore it reduces the uncertainty in their respect. Instead, high educated women gain less from marriage than if they had not been studying so long: higher education might, in fact, increase the female economic autonomy and therefore weaken the dependence on a partner or on marriage and would therefore induce greater union instability and less marriage. It is commonly spread opinion in demographic and sociological literature that women's growing economic independence is the major

[20] It should be observed that, of course, the youngest cohorts, due to the censoring problem, are underrepresented as regards the highest levels of education.

Figure 4.12: Diagram of the link between the nuptiality data-base and the 1998 Household Survey: cohort born after 1955



factor in the rise in delayed marriage and marital instability (Qian and Preston, 1993[147]; Goldscheider and Waite, 1986[85]). Besides the increase in the amount of women's human capital investments, the enrollment in the educational system itself yields a delaying effect in the process of family formation (Blossfeld and Huinink, 1991[25]). According to the search-theoretic framework (Oppenheimer, 1988[141]) the greater independence of women is not the cause of the reduced-gains-to-marriage in general, but allows women to set a higher standard for the minimally acceptable match. Therefore there is a reduction of the gains to some poor-quality marriages. The consequence can be a delayed marriage and also a kind of increase in the risk of non marriage as well as instability. But still, this is consistent with continued high gains to marriage as well as with continued desire to marry.

Attending school, university, or vocational training programs is often incompatible with adult family roles and activities and it can cause a postponement of the family formation process besides increasing the economic dependence on parents. The lack of knowledge regarding the date of end of the study period does not allow us to reconstruct the length of the life span spent as a student for every respondent, regardless of their final educational attainment. However, the level of education will affect not only the period of transition into adulthood, but will have a persistent impact also on later stages of the individual's life. Individuals with higher education and better career opportunity increasingly delay or avoid marriage (and the same conclusion also keeps in relation to the decision to have children). However, if marriage becomes less traditional it could be sensible to expect a declining effect of the educational attainment on entry into marriage (Blossfeld, 1995[69]). In a comparative studies among European countries has emerged that in Italy the family system is still traditional as the impact of educational attainment on entry into marriage is very strong (Pinnelli and De Rose, 1995[145]).

With regard to labour market opportunities, the conflicting role to the process of union formation should be stressed again. As for education, economic theories emphasise the gender difference outcome of a labour force participation. New Home Economic theory, consider the earning power of the husband highly attractive and disregard the wife's one as being conflicting with her household production. Moreover, as we said in the first chapter, in traditional societies, when women do not earn any income and their value in the marriage market depends only on their ability in household production, they have no interest in marrying late, while men who need more time to become economically successful, postpone marriage. As a result, the more desirable women are expected to marry the older successful men and the less desirable women marry the young men (Oppenheimer, 1988[141]; Bergstrom and Bagnoli, 1993[13]) .

Economic theories also focus on gender differential towards marriage when wage rates increase: if the wage rates are higher for men than for women, an additional increase of the wage rate for men will result in marrying younger, while an increase in the wage rate for women will increase their optimal marriage age (Keeley, 1977[117]). Sociological theories stress the importance of the attractiveness of the labour force participation for both sexes (Oppenheimer, 1988[141]). Here it should be noted also that we are not measuring the duration of the labour force participation, which would require taking into account every spell of employment. Our time dependent covariate for the job measures if one has ever worked before marrying or before the survey time. As cohorts included at this point in the analysis are relatively recent born cohorts (after 1955), we expect that a considerable proportion of women managed to enter the labour market at least once in their life. Two income families are quite spread in Italy[21] and the participation to the labour force for the women before marriage and after the end of study represents one of the most frequent models of transition to adulthood (together with the more traditional one characterised by the sequence: end of education and, at the same time, leaving parental home and first union (Billari, 2000[18])). We expect that including the labour force experience explanatory variable in the model of transition to first marriage will have a positive impact on men and women, even though the outcome might also vary according to age.

We do not control for premarital cohabitations, given that our aim is to study the impact of the imbalance in the marriage market in the direct entry into first marriage, and that they virtually play a competitive role to the latter on the marriage market. In the same way, also premarital pregnancies and births are excluded from

[21] Employment rate for women is of about 63,7 % for woman alone and 29,7% for a women in couple with 3 or more children (ISTAT, 2000[108])

the model because they can be basically considered as the natural outcome of the access to sexual intercourses before marriage .

4.6.1 Transition to the first job

Previous studies have shown that marriage is also strictly intertwined to other aspects characterising the phase of transition into adulthood (Billari, 2000[18]; Billari and Rohwer, 1998[20]; Blossfeld, 1995[69]; Smeenk 1998[169]). Among these, end of education and entry into the labour market represent two fundamental steps. As we already explained above, the analysis regarding the transition to the end of study is affected by the lack of knowledge about the exact date of exit from study period. Furthermore, we noticed that we do not have a states set at survey comparable to the one attained. As we will see later, we can anyway control in our models for the level of education attained by the individual. In table 4.12 we present the distribution of the population by educational attainment resulting from the survey[22]. In the

Table 4.12: Population aged >= 15 by level of education and sex. ITALY, 1998

	MEN	WOMEN
tertiary	25.5	33.5
middle	34.8	28.9
primary	39.7	37.6
total	**100.0**	**100.0**
n	***23576***	***24820***

following lines we describe the general trend of first job among three major cohorts: before 1934, 1935-64, after 1965. In this case, the birth cohort classification is quite rough, as our aim is only to highlight the general shifts occurred between cohorts in the level of the survivor function of this process, and not to analyse in depth changes in labour force participation. This actually goes beyond our purposes. We also skip a discussion of the selection possibly going on. As regards employment, a peculiar aspect of the Italian labour market emerges: particularly high is the proportion of women who virtually never enter the labour market (figure 4.13 and

[22] The educational level has been simplified in the following way: elementary or primary school is for those who studied less than 5 years; middle is for those who studied for an amount of time equal to 6-8 years (it can be regarded as lower secondary school) and, finally, all those who studied for more than 8 years are gathered in the last class (more than high school, which corresponds to upper secondary education together with tertiary education)

Table 4.13: Survivor function quartiles. First job. ITALY

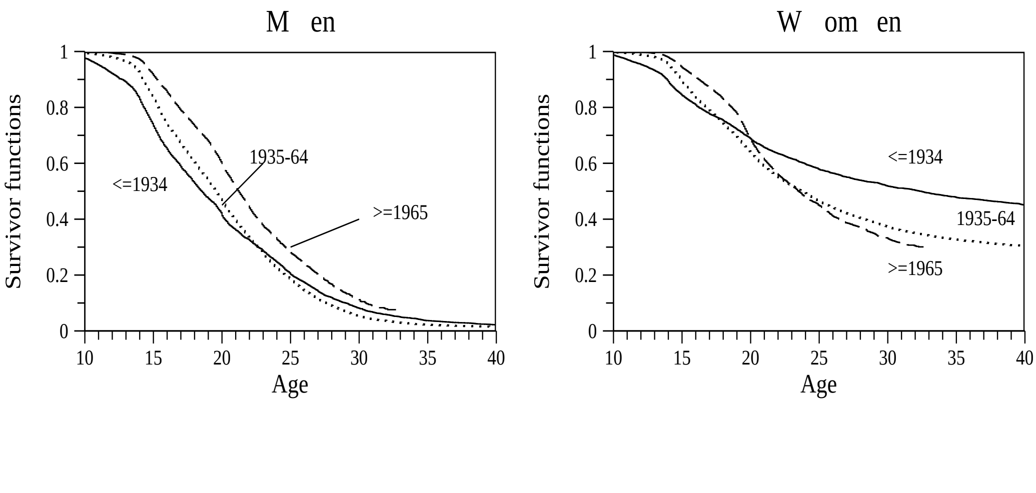
	MEN					WOMEN				
quartiles	**<=1934**	**1935-44**	**1945-54**	**1955-64**	**>=1965**	**<=1934**	**1935-44**	**1945-54**	**1955-64**	**>=1965**
1st quartile	14.8	15.2	15.8	16.7	17.7	18.1	17.7	17.4	18.2	19.3
median	18.5	18.4	19.5	20.1	21.2	32.3	26.7	23.5	22.8	23.5
3rd quartile	23.9	22.7	23.6	23.8	25.8				42.2	

Table 4.14: Survivor function at selected ages. First job. ITALY

	MEN					WOMEN				
survivors at age	**<=1934**	**1935-44**	**1945-54**	**1955-64**	**>=1965**	**<=1934**	**1935-44**	**1945-54**	**1955-64**	**>=1965**
S(15)	0.733	0.763	0.831	0.880	0.915	0.843	0.864	0.879	0.925	0.943
S(20)	0.412	0.396	0.465	0.508	0.596	0.687	0.663	0.632	0.629	0.685
S(25)	0.202	0.160	0.184	0.202	0.280	0.578	0.525	0.457	0.430	0.449
S(30)	0.081	0.044	0.046	0.066	0.112	0.518	0.463	0.363	0.324	0.331
S(35)	0.037	0.016	0.020	0.028		0.478	0.423	0.317	0.276	

tables 4.13 and 4.14). At every age, the proportion of women still outside the labour market is high, even if decreasing across cohorts just after age 25, say after the end of study. As a consequence, whereas only 4% of men born before 1934 never entered the labour market, 48% of the women of the same cohort stayed outside the labour market. Every quartile of the female distribution is reached at ages always older than the male ones, but a relevant change in the median age at first employment should be observed from the cohort born up to 1934 (reached at 32.3 years) and that born in 1935-64 (reached at age 23.5, table 4.13). However, for every age, women have experienced an increasing participation in the labour force from one cohort to the following, therefore diminishing the gap, still high, with the proportion of male labour force participation (table 4.14 and figure 4.13). As regard the timing of the

Figure 4.13: Survivor functions by sex, cohort of birth. First job. ITALY



process, the increase in the median age at first job for men is about 2.7 years (from 18.5 to 21.2) while for women it passes from age 32.3 for the cohort born earlier than 1934, to 23.5 for the cohort born from 1965.

4.6.2 Introducing other covariates

As we already did for the previous analysis of the transition to first marriage, here we continue to present the results obtained by comparing nonnested models with alternative measure of the imbalance on the marriage market (table 4.15). Let us start by studying the effects of our explanatory variables in the Cox models. Birth cohorts younger than the 1955-59 one have a lower transition to first marriage, especially the youngest (which is composed by censored life-courses). As we already noted, the cohort of individuals born at the turn of the 1960s is characterised by a postponement of the marital behaviour, given the higher proportion of survivals at every ages to this event (see also Pinnelli and De Rose, 1995[145], and Castiglioni, 1999[45]). Compared to Piedmont, being born in one of the northern regions of Italy or in Sardinia implies a slower transition for both men and women, while being born in the South has a positive effect meaning a higher marriage frequency. The negative and significant effect of middle and above high school education for both sexes, in comparison to the lowest level (primary school, in Italy, is less than 5 years of study) can be observed: those with a higher level of education, enter later into first marriage, especially if women. Evidence from previous studies showed the negative relations between educational attainment and nuptiality behaviour (Castiglioni, 1993[44]). Labour market participation does not confirm the economic theories reflecting the conflict with the process of family formation (Becker, 1981[10], Keeley, 1977[117]): both men and women take advantage in the marriage market if they have experienced a first job, though for women it is fairly weak. This confirms the high attractiveness played on the marital opportunities by the employment (Oppenheimer, 1988[141]). The female disadvantage in the marriage market confirms our previous outcomes, at least in the sign of the effect. In particular, the Cox model reveals that men experience an improvement of their opportunities (though the effect is not significant), while women are affected by worse conditions (negative and significant effect). Even controlling for more covariates the effect of the squeeze still

Table 4.15: First marriage: Cox models by sex and for alternative measures of the squeeze

MEN

	Model I			Model II			Model III			Model IV		
Variable	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
birth cohort (base=1955-59):												
1960-64	-0.1165	0.0332	0.9996	-0.1062	0.0345	0.9979	-0.1063	0.0345	0.9979	-0.1069	0.0345	0.9980
1965-69	-0.3843	0.0418	1.0000	-0.3521	0.0513	1.0000	-0.3521	0.0513	1.0000	-0.3543	0.0512	1.0000
>=1970	-1.0939	0.0968	1.0000	-1.0463	0.1064	1.0000	-1.0463	0.1064	1.0000	-1.0501	0.1061	1.0000
region of birth (base=Piedmont):												
Vaa	-0.3189	0.1457	0.9714	-0.3498	0.1485	0.9815	-0.3498	0.1485	0.9815	-0.3465	0.1483	0.9806
Lom	-0.0118	0.0782	0.1197	-0.0162	0.0783	0.1641	-0.0162	0.0783	0.1641	-0.0158	0.0783	0.1604
Taa	-0.1507	0.0926	0.8963	-0.1318	0.0942	0.8381	-0.1318	0.0942	0.8381	-0.1333	0.0941	0.8433
Ven	-0.0426	0.0837	0.3895	-0.0348	0.0840	0.3215	-0.0348	0.0840	0.3215	-0.0356	0.0840	0.3278
Fvg	-0.0998	0.1062	0.6526	-0.0943	0.1063	0.6251	-0.0943	0.1063	0.6251	-0.0947	0.1063	0.6272
Lig	-0.1228	0.1074	0.7467	-0.1137	0.1078	0.7084	-0.1137	0.1078	0.7084	-0.1143	0.1078	0.7109
Tos	0.1559	0.0859	0.9305	0.1387	0.0873	0.8876	0.1387	0.0873	0.8876	0.1404	0.0872	0.8926
Umb	0.0346	0.1027	0.2639	0.0120	0.1048	0.0913	0.0120	0.1048	0.0914	0.0142	0.1046	0.1082
Er	-0.2171	0.0940	0.9791	-0.2263	0.0944	0.9835	-0.2263	0.0944	0.9835	-0.2255	0.0944	0.9832
Mar	0.0461	0.0940	0.3762	0.0292	0.0953	0.2408	0.0292	0.0953	0.2408	0.0302	0.0953	0.2489
Laz	0.0990	0.0859	0.7509	0.0604	0.0930	0.4843	0.0604	0.0930	0.4843	0.0641	0.0925	0.5118
Abr	0.2327	0.0898	0.9904	0.2086	0.0925	0.9758	0.2086	0.0925	0.9758	0.2107	0.0924	0.9774
Mol	0.1603	0.0980	0.8980	0.1639	0.0981	0.9053	0.1639	0.0981	0.9053	0.1645	0.0981	0.9065
Cam	0.3183	0.0756	1.0000	0.3108	0.0759	1.0000	0.3108	0.0759	1.0000	0.3124	0.0758	1.0000
Pug	0.3843	0.0752	1.0000	0.3640	0.0775	1.0000	0.3640	0.0775	1.0000	0.3651	0.0776	1.0000
Bas	0.0440	0.0999	0.3402	0.0461	0.0999	0.3554	0.0461	0.0999	0.3554	0.0469	0.1000	0.3614
Cal	0.2375	0.0797	0.9971	0.2446	0.0800	0.9978	0.2446	0.0800	0.9978	0.2448	0.0801	0.9978
Sic	0.4147	0.0755	1.0000	0.3891	0.0791	1.0000	0.3891	0.0791	1.0000	0.3890	0.0796	1.0000
Sar	-0.0956	0.0895	0.7140	-0.0935	0.0896	0.7035	-0.0935	0.0896	0.7035	-0.0933	0.0896	0.7024
education (base= primary):												
Minf	-0.0908	0.0567	0.8908	-0.0904	0.0567	0.8894	-0.0904	0.0567	0.8894	-0.0905	0.0567	0.8897
Msup	-0.4549	0.0562	1.0000	-0.4548	0.0562	1.0000	-0.4548	0.0562	1.0000	-0.4549	0.0562	1.0000
job:												
yes	0.5853	0.0343	1.0000	0.5850	0.0343	1.0000	0.5850	0.0343	1.0000	0.5850	0.0343	1.0000
SQUEEZE:												
S				1.1037	1.0167	0.7224						
I							2.2064	2.0327	0.7223			
I_{freq}										1.7207	1.6901	0.6914
param.	25			26			26			26		
events:	4798			4798			4798			4798		
Log likeli.	-38883			-38882.45			-38882.5			-38882.5		
BIC:				2.499			2.500			2.641		

WOMEN

	Model I			Model II			Model III			Model IV		
Variable	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
birth cohort (base=1955-59):												
1960-64	-0.1138	0.0308	0.9998	-0.0991	0.0311	0.9985	-0.0991	0.0311	0.9985	-0.0962	0.0312	0.9979
1965-69	-0.4348	0.0351	1.0000	-0.4588	0.0358	1.0000	-0.4588	0.0358	1.0000	-0.4565	0.0356	1.0000
>=1970	-0.8932	0.0506	1.0000	-0.9629	0.0544	1.0000	-0.9629	0.0543	1.0000	-0.9592	0.0535	1.0000
region of birth (base=Piedmont):												
Vaa	-0.1286	0.1108	0.7543	-0.0730	0.1118	0.4859	-0.0730	0.1118	0.4860	-0.0770	0.1115	0.5099
Lom	-0.1654	0.0661	0.9877	-0.1508	0.0662	0.9772	-0.1508	0.0662	0.9772	-0.1510	0.0662	0.9775
Taa	-0.2891	0.0784	0.9998	-0.3385	0.0797	1.0000	-0.3385	0.0797	1.0000	-0.3403	0.0797	1.0000
Ven	-0.1845	0.0721	0.9895	-0.2013	0.0723	0.9946	-0.2013	0.0723	0.9946	-0.2023	0.0723	0.9949
Fvg	-0.1551	0.0903	0.9142	-0.1842	0.0907	0.9578	-0.1843	0.0907	0.9578	-0.1871	0.0907	0.9607
Lig	-0.3033	0.0933	0.9988	-0.3259	0.0936	0.9995	-0.3259	0.0936	0.9995	-0.3267	0.0936	0.9995
Tos	-0.0254	0.0751	0.2650	0.0116	0.0758	0.1216	0.0116	0.0758	0.1217	0.0105	0.0757	0.1107
Umb	-0.1529	0.0906	0.9085	-0.1096	0.0914	0.7694	-0.1096	0.0914	0.7694	-0.1118	0.0913	0.7795
Er	-0.2958	0.0796	0.9998	-0.2705	0.0799	0.9993	-0.2705	0.0799	0.9993	-0.2701	0.0799	0.9993
Mar	-0.0577	0.0794	0.5329	-0.0167	0.0803	0.1646	-0.0167	0.0803	0.1646	-0.0150	0.0803	0.1481
Laz	-0.0883	0.0756	0.7575	0.0026	0.0800	0.0258	0.0026	0.0800	0.0261	0.0019	0.0795	0.0190
Abr	0.1537	0.0772	0.9536	0.2019	0.0784	0.9900	0.2019	0.0784	0.9900	0.2009	0.0782	0.9897
Mol	0.1256	0.0872	0.8505	0.1122	0.0873	0.8015	0.1122	0.0873	0.8015	0.1089	0.0873	0.7879
Cam	0.1368	0.0657	0.9627	0.1557	0.0659	0.9818	0.1557	0.0659	0.9818	0.1529	0.0659	0.9798
Pug	0.0794	0.0660	0.7711	0.1330	0.0678	0.9503	0.1330	0.0678	0.9504	0.1356	0.0677	0.9547
Bas	0.0613	0.0871	0.5184	0.0638	0.0871	0.5359	0.0638	0.0871	0.5359	0.0626	0.0871	0.5274
Cal	0.2426	0.0691	0.9996	0.2178	0.0695	0.9983	0.2177	0.0695	0.9983	0.2136	0.0696	0.9979
Sic	0.1955	0.0655	0.9972	0.2602	0.0682	0.9999	0.2602	0.0682	0.9999	0.2678	0.0684	0.9999
Sar	-0.2014	0.0785	0.9896	-0.2008	0.0785	0.9894	-0.2008	0.0785	0.9894	-0.2008	0.0785	0.9894
education (base= primary):												
Minf	-0.1633	0.0478	0.9994	-0.1591	0.0478	0.9991	-0.1591	0.0478	0.9991	-0.1590	0.0478	0.9991
Msup	-0.7583	0.0469	1.0000	-0.7534	0.0469	1.0000	-0.7534	0.0469	1.0000	-0.7531	0.0469	1.0000
job:												
yes	0.1861	0.0283	1.0000	0.1856	0.0283	1.0000	0.1856	0.0283	1.0000	0.1856	0.0282	1.0000
SQUEEZE:												
S				-2.6411	0.7644	0.9994						
I							-5.2818	1.5282	0.9995			
I_{freq}										-4.4543	1.2147	0.9998
param.	25			26			26			26		
events:	6279			6279			6279			6279		
Log likeli.	-51860.86			-51854.9			-51854.9			-51854.2		
BIC:				-8.087			-8.095			-9.550		

holds. The comparison between Model II, III and IV shows that the best, according to the BIC criterion is, for men the one using S as a squeeze measure and for women the one based on I_{freq} (table 4.15).

The outcomes provided by the piecewise constant exponential model go in the same direction emerged and show the same effects and sign of the explanatory variables obtained from the Cox model. Younger cohorts have a much lower rate of transition than old ones. People born in the South marry earlier than those born in the North. Studying longer, therefore attaining a higher level of education, means a delaying effect on first marriage (due to a negative and significant effect) for men and women: there is an increasing delay in marrying for younger birth cohorts in comparison to the 1955-59 one. In particular, men with middle education have practically the same conditions of those with elementary level of education. Given that our set of individuals is composed by relatively young people (born after 1955) for which there has been an increasing involvement in longer period of study, but men always had a higher participation in the educational system, the two groups (with elementary and middle education) might include very selected men. Their position is quite bad with respect to the education attained and, as a consequence their position in the marriage market is also very disadvantaged. Experiencing a job for men means increasing marriage opportunities and a decreasing (negative but weaker coefficients) for female transition to first marriage (in both cases it has a significant effect). The age pattern described by the piecewise constant function is bell-shaped. Men and women differ in the effect of the squeeze, as it can make the former marry earlier and the latter later. From the BIC statistic the best model, for women, is the one obtained by using the measure I_{freq}, and for men as well (tables 4.16 and 4.17, Model III). Lastly, a piecewise constant exponential model with period specific effects for the same set of covariates has been modeled (tables 4.18 and 4.19).

It was not possible to estimate the age effect for the birth cohorts under study because they include too young individuals. As shown in figure 4.12, at the end of 1995, those born in 1970 are no more than 25 years old and, as a consequence, it is not possible to estimate the coefficient above that age. For comparative purposes and to avoid right censoring problems, the youngest cohorts should be disregarded. If we eliminate those born after 1970, then we can estimate the coefficient, divided into

Table 4.16: First marriage: effect of the imbalance in the marriage market estimated by the piecewise constant exponential models: MEN

MEN

	Model I			**Model II**			**Model III**		
Variable	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
[15,23)	-6.8239	0.0875	1.0000	-6.8239	0.0875	1.0000	-6.8253	0.0875	1.0000
[23,25)	-5.2360	0.0889	1.0000	-5.2360	0.0889	1.0000	-5.2409	0.0889	1.0000
[25,27)	-4.8745	0.0885	1.0000	-4.8745	0.0885	1.0000	-4.8788	0.0886	1.0000
[27,29)	-4.6463	0.0893	1.0000	-4.6463	0.0893	1.0000	-4.6492	0.0893	1.0000
[29,32)	-4.6916	0.0908	1.0000	-4.6916	0.0908	1.0000	-4.6926	0.0908	1.0000
[32,+)	-5.0464	0.0985	1.0000	-5.0464	0.0985	1.0000	-5.0451	0.0982	1.0000
birth cohort (base=1955-59):									
1960-64	-0.0686	0.0343	0.9542	-0.0686	0.0343	0.9542	-0.0669	0.0343	0.9491
1965-69	-0.2689	0.0486	1.0000	-0.2689	0.0486	1.0000	-0.2646	0.0482	1.0000
>=1970	-1.1661	0.1028	1.0000	-1.1661	0.1028	1.0000	-1.1618	0.1024	1.0000
region of birth (base=Piedmont):									
Vaa	-0.4283	0.1483	0.9961	-0.4284	0.1483	0.9961	-0.4298	0.1480	0.9963
Lom	-0.0212	0.0783	0.2130	-0.0212	0.0783	0.2130	-0.0217	0.0783	0.2185
Taa	-0.0874	0.0940	0.6472	-0.0874	0.0940	0.6471	-0.0842	0.0940	0.6299
Ven	-0.0203	0.0840	0.1914	-0.0203	0.0840	0.1913	-0.0189	0.0840	0.1779
Fvg	-0.0794	0.1063	0.5451	-0.0794	0.1063	0.5451	-0.0778	0.1063	0.5359
Lig	-0.0950	0.1077	0.6222	-0.0950	0.1077	0.6222	-0.0930	0.1077	0.6122
Tos	0.1106	0.0871	0.7958	0.1106	0.0871	0.7958	0.1095	0.0870	0.7919
Umb	-0.0309	0.1044	0.2323	-0.0309	0.1044	0.2323	-0.0325	0.1043	0.2450
Er	-0.2518	0.0943	0.9924	-0.2518	0.0943	0.9924	-0.2531	0.0943	0.9927
Mar	-0.0015	0.0951	0.0124	-0.0015	0.0951	0.0125	-0.0053	0.0950	0.0447
Laz	-0.0094	0.0920	0.0814	-0.0094	0.0920	0.0816	-0.0135	0.0914	0.1172
Abr	0.1734	0.0921	0.9403	0.1734	0.0921	0.9403	0.1709	0.0919	0.9370
Mol	0.1860	0.0980	0.9421	0.1860	0.0980	0.9421	0.1902	0.0981	0.9475
Cam	0.3170	0.0758	1.0000	0.3170	0.0758	1.0000	0.3195	0.0757	1.0000
Pug	0.3369	0.0773	1.0000	0.3369	0.0773	1.0000	0.3314	0.0773	1.0000
Bas	0.0651	0.0999	0.4851	0.0651	0.0999	0.4851	0.0686	0.0999	0.5072
Cal	0.2736	0.0800	0.9994	0.2736	0.0800	0.9994	0.2783	0.0800	0.9995
Sic	0.3449	0.0786	1.0000	0.3449	0.0786	1.0000	0.3326	0.0790	1.0000
Sar	-0.0789	0.0896	0.6217	-0.0789	0.0896	0.6217	-0.0778	0.0896	0.6149
education (base <=elementary):									
middle	-0.0956	0.0567	0.9083	-0.0956	0.0567	0.9083	-0.0956	0.0567	0.9085
>=high school	-0.4495	0.0562	1.0000	-0.4495	0.0562	1.0000	-0.4495	0.0562	1.0000
Squeeze S by region of birth				*Squeeze I by region of birth*			*Squeeze I_{freq} by region of birth*		
SmuB	3.4864	0.9417	0.9998	6.9716	1.8829	0.9998	6.1800	1.5404	0.9999
Job									
yes	0.7564	0.0355	1.0000	0.7564	0.0355	1.0000	0.7558	0.0355	1.0000
n. parameters	32			32			32		
n. constraints									
n. events	4798			4798			4798		
n. episodes	116515			116515			116515		
Log-likelihood:	-28288.94			-28288.94			-28287.7		
BIC:	-21162.43			-21162.44			-21164.92		

Table 4.17: First marriage: effect of the imbalance in the marriage market estimated by the piecewise constant exponential models: WOMEN

WOMEN

	Model I			**Model II**			**Model III**		
Variable	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
[15,18)	-6.5732	0.0918	1.0000	-6.5732	0.0918	1.0000	-6.5778	0.0919	1.0000
[18,20)	-4.5732	0.0730	1.0000	-4.5732	0.0730	1.0000	-4.5756	0.0730	1.0000
[20,22)	-4.1095	0.0727	1.0000	-4.1095	0.0727	1.0000	-4.1100	0.0727	1.0000
[22,24)	-3.8532	0.0738	1.0000	-3.8532	0.0738	1.0000	-3.8532	0.0738	1.0000
[24,26)	-3.6626	0.0757	1.0000	-3.6627	0.0757	1.0000	-3.6628	0.0757	1.0000
[26,28)	-3.7063	0.0801	1.0000	-3.7063	0.0801	1.0000	-3.7069	0.0801	1.0000
[28,30)	-3.8089	0.0871	1.0000	-3.8089	0.0871	1.0000	-3.8100	0.0871	1.0000
[30,+)	-4.3098	0.0893	1.0000	-4.3098	0.0893	1.0000	-4.3115	0.0891	1.0000
birth cohort (base=1955-59):									
1960-64	-0.0790	0.0311	0.9889	-0.0790	0.0311	0.9889	-0.0765	0.0312	0.9857
1965-69	-0.4309	0.0358	1.0000	-0.4309	0.0358	1.0000	-0.4302	0.0356	1.0000
>=1970	-0.9227	0.0543	1.0000	-0.9228	0.0543	1.0000	-0.9226	0.0535	1.0000
region of birth (base=Piedmont):									
Vaa	-0.0931	0.1119	0.5948	-0.0931	0.1119	0.5948	-0.0940	0.1116	0.6003
Lom	-0.1580	0.0662	0.9830	-0.1579	0.0662	0.9830	-0.1576	0.0662	0.9827
Taa	-0.3239	0.0797	1.0000	-0.3240	0.0797	1.0000	-0.3269	0.0796	1.0000
Ven	-0.1998	0.0723	0.9943	-0.1998	0.0723	0.9943	-0.2011	0.0723	0.9946
Fvg	-0.1755	0.0907	0.9471	-0.1755	0.0907	0.9472	-0.1785	0.0907	0.9510
Lig	-0.3169	0.0936	0.9993	-0.3169	0.0936	0.9993	-0.3183	0.0936	0.9993
Tos	-0.0005	0.0758	0.0056	-0.0005	0.0758	0.0055	0.0000	0.0757	0.0001
Umb	-0.1241	0.0915	0.8252	-0.1241	0.0915	0.8252	-0.1241	0.0913	0.8261
Er	-0.2837	0.0799	0.9996	-0.2837	0.0799	0.9996	-0.2825	0.0799	0.9996
Mar	-0.0307	0.0803	0.2974	-0.0306	0.0803	0.2973	-0.0280	0.0802	0.2728
Laz	-0.0334	0.0800	0.3235	-0.0333	0.0800	0.3231	-0.0307	0.0794	0.3004
Abr	0.1874	0.0784	0.9831	0.1874	0.0784	0.9831	0.1883	0.0782	0.9839
Mol	0.1133	0.0872	0.8061	0.1133	0.0872	0.8061	0.1105	0.0873	0.7946
Cam	0.1466	0.0659	0.9738	0.1466	0.0659	0.9738	0.1453	0.0659	0.9727
Pug	0.1127	0.0677	0.9038	0.1127	0.0677	0.9038	0.1164	0.0677	0.9145
Bas	0.0523	0.0871	0.4518	0.0523	0.0871	0.4518	0.0515	0.0871	0.4456
Cal	0.2218	0.0695	0.9986	0.2218	0.0695	0.9986	0.2179	0.0696	0.9983
Sic	0.2377	0.0681	0.9995	0.2377	0.0681	0.9995	0.2454	0.0684	0.9997
Sar	-0.2011	0.0785	0.9896	-0.2011	0.0785	0.9896	-0.2011	0.0785	0.9895
education (base <=elementary):									
middle	-0.1637	0.0478	0.9994	-0.1637	0.0478	0.9994	-0.1635	0.0478	0.9994
>=high school	-0.7579	0.0469	1.0000	-0.7579	0.0469	1.0000	-0.7575	0.0469	1.0000
Squeeze S by region of birth				*Squeeze I by region of birth*			*Squeeze I_{freq} by region of birth*		
SmuB	-1.8123	0.7627	0.9825	-3.6251	1.5247	0.9826	-3.2149	1.2133	0.9919
Job									
yes	0.1836	0.0283	1.0000	0.1836	0.0283	1.0000	0.1836	0.0283	1.0000
n. parameters	34			34			34		
n. constraints									
n. events	6279			6279			6279		
n. episodes	98533			98533			98533		
Log-likelihood:	-35769.8			-35769.8			-35769.13		
BIC:	-32147.93			-32147.94			-32149.29		

age subgroups, for all other cohorts up to age 25. Even so, the gains of estimating the other covariates would not improve much, and this leads us to consider the general effect associated to a given birth cohort. The effect of this birth cohort follows what we said above for the previous models.

Men with middle educational level, especially if younger than 23 years, have a transition to first marriage lower than those with the elementary level up to age 27, after that age the transition rate has an incresing effect (positive coefficient) and in comparison to those with lower education they show a catching up effect. The same behaviour, as it emerged for middle educated men, is shared by those in the highest category of education (more than high education). There is no forgoing in marriage, but a postponement effect.

As regards the effect of the imbalance in the marriage market , men have always a positive and U-shaped effect, regardless of the age groups 23-25 and 27-29 when it is negative but not significant. The experience of a first job for men is always significant and induces them to marry earlier than those without job. The very high coefficient 1.2289 for the men in age group 15-23, needs some comments. This group is compared to young men who never worked up to age 23. Therefore, the group which they are compared to is mainly composed by students or, selected men (for instance, if they are not students, they might be ill or in the military service). They represent a very selected group of individuals, and in their respect men who enter in a first job also have greater marriage opportunities. All other age groups of men take advantage of the positive and significant effect of the first job experience, therefore they marry earlier. In all these cases the effect is not very strong, probably because in these age groups, only few men have never worked at all: we are comparing the effect of transition to first marriage of men who entered the labour market at least once, to a selected and small group of individuals out of the labour market (for instance, ill people). The transition rates for both sexes are reported in figure 4.14: the age-pattern associated to first marriage and described by the piecewise constant, is bell shaped.

As regard women, the effect of the birth cohort, as well as that of region of birth is the same as for men. The age effects of the attained level of education are quite interesting. For each level of education attained by the women, there is a

Table 4.18: First marriage: age effect of the imbalance in the marriage market estimated by the piecewise constant exponential models: MEN

MEN

	Model I			Model II			Model III		
Variable	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
[15,23)	-6.4741	0.1156	1.0000	-6.4740	0.1156	1.0000	-6.4715	0.1156	1.0000
[23,25)	-4.8476	0.1317	1.0000	-4.8476	0.1317	1.0000	-4.8485	0.1319	1.0000
[25,27)	-4.6796	0.1380	1.0000	-4.6796	0.1380	1.0000	-4.6832	0.1382	1.0000
[27,29)	-4.9667	0.1804	1.0000	-4.9666	0.1804	1.0000	-4.9677	0.1805	1.0000
[29,32)	-4.9080	0.1913	1.0000	-4.9080	0.1913	1.0000	-4.9106	0.1914	1.0000
[32,+)	-6.2036	0.3270	1.0000	-6.2036	0.3270	1.0000	-6.2035	0.3270	1.0000
birth cohort (base=1955-59):									
1960-64	-0.0886	0.0362	0.9856	-0.0886	0.0362	0.9856	-0.0885	0.0364	0.9851
1965-69	-0.3288	0.0528	1.0000	-0.3288	0.0528	1.0000	-0.3278	0.0529	1.0000
>=1970	-1.0909	0.1049	1.0000	-1.0909	0.1049	1.0000	-1.0942	0.1044	1.0000
region of birth (base=Piedmont):									
Vaa	-0.4109	0.1486	0.9943	-0.4109	0.1486	0.9943	-0.4084	0.1484	0.9941
Lom	-0.0272	0.0783	0.2715	-0.0272	0.0783	0.2714	-0.0267	0.0783	0.2671
Taa	-0.0982	0.0942	0.7029	-0.0982	0.0942	0.7029	-0.0970	0.0941	0.6972
Ven	-0.0236	0.0840	0.2210	-0.0236	0.0840	0.2210	-0.0223	0.0840	0.2091
Fvg	-0.0687	0.1063	0.4814	-0.0686	0.1063	0.4814	-0.0682	0.1063	0.4784
Lig	-0.0965	0.1078	0.6295	-0.0965	0.1078	0.6295	-0.0957	0.1078	0.6252
Tos	0.1127	0.0873	0.8035	0.1127	0.0873	0.8035	0.1136	0.0872	0.8075
Umb	-0.0090	0.1048	0.0682	-0.0090	0.1048	0.0681	-0.0081	0.1048	0.0619
Er	-0.2283	0.0944	0.9844	-0.2283	0.0944	0.9844	-0.2285	0.0944	0.9846
Mar	-0.0030	0.0951	0.0250	-0.0030	0.0951	0.0250	-0.0046	0.0951	0.0386
Laz	0.0005	0.0923	0.0047	0.0005	0.0923	0.0046	0.0007	0.0920	0.0060
Abr	0.1921	0.0924	0.9624	0.1921	0.0924	0.9624	0.1926	0.0923	0.9630
Mol	0.1631	0.0982	0.9034	0.1631	0.0982	0.9034	0.1663	0.0982	0.9096
Cam	0.2942	0.0759	0.9999	0.2942	0.0759	0.9999	0.2979	0.0758	0.9999
Pug	0.3101	0.0774	0.9999	0.3101	0.0774	0.9999	0.3079	0.0775	0.9999
Bas	0.0418	0.1000	0.3241	0.0418	0.1000	0.3240	0.0444	0.1000	0.3426
Cal	0.2650	0.0802	0.9990	0.2650	0.0802	0.9990	0.2687	0.0802	0.9992
Sic	0.3284	0.0789	1.0000	0.3284	0.0789	1.0000	0.3203	0.0794	0.9999
Sar	-0.0743	0.0896	0.5928	-0.0743	0.0896	0.5928	-0.0739	0.0896	0.5904
education (base <=elementary):									
Middle									
[15,23)	-0.6098	0.1013	1.0000	-0.6098	0.1013	1.0000	-0.6106	0.1013	1.0000
[23,25)	-0.1455	0.1158	0.7910	-0.1455	0.1158	0.7910	-0.1455	0.1158	0.7910
[25,27)	-0.2062	0.1221	0.9087	-0.2062	0.1221	0.9087	-0.2058	0.1221	0.9080
[27,29)	0.3490	0.1695	0.9605	0.3490	0.1695	0.9605	0.3497	0.1695	0.9609
[29,32)	0.3811	0.1870	0.9585	0.3811	0.1870	0.9585	0.3816	0.1870	0.9587
[32,+)	1.0349	0.3200	0.9988	1.0349	0.3200	0.9988	1.0334	0.3200	0.9988
>=high school									
[15,23)	-1.3523	0.1135	1.0000	-1.3523	0.1135	1.0000	-1.3529	0.1135	1.0000
[23,25)	-0.8300	0.1189	1.0000	-0.8300	0.1189	1.0000	-0.8300	0.1189	1.0000
[25,27)	-0.4954	0.1203	1.0000	-0.4954	0.1203	1.0000	-0.4951	0.1203	1.0000
[27,29)	0.1189	0.1670	0.5235	0.1189	0.1670	0.5235	0.1194	0.1670	0.5253
[29,32)	0.3227	0.1826	0.9228	0.3227	0.1826	0.9228	0.3231	0.1826	0.9231
[32,+)	1.3055	0.3133	1.0000	1.3055	0.3133	1.0000	1.3047	0.3133	1.0000
Squeeze S by region of birth				*Squeeze I by region of birth*			*Squeeze I_{freq} by region of birth*		
[15,23)	7.3306	1.7718	1.0000	14.6583	3.5420	1.0000	11.8231	2.6925	1.0000
[23,25)	-0.4510	1.7403	0.2045	-0.9020	3.4795	0.2045	-0.5550	2.8624	0.1537
[25,27)	3.3720	1.6017	0.9647	6.7415	3.2025	0.9647	5.6693	2.6747	0.9660
[27,29)	-0.1808	1.6130	0.0892	-0.3615	3.2250	0.0892	-0.1515	2.7321	0.0442
[29,32)	4.6714	1.7728	0.9916	9.3399	3.5446	0.9916	8.1337	3.0316	0.9927
[32,+)	7.6609	2.6855	0.9957	15.3179	5.3696	0.9957	13.2364	4.6788	0.9953
Job									
[15,23)	1.2289	0.0739	1.0000	1.2289	0.0739	1.0000	1.2263	0.0739	1.0000
[23,25)	0.5512	0.0719	1.0000	0.5512	0.0719	1.0000	0.5512	0.0719	1.0000
[25,27)	0.6321	0.0728	1.0000	0.6321	0.0728	1.0000	0.6322	0.0728	1.0000
[27,29)	0.5915	0.0838	1.0000	0.5915	0.0838	1.0000	0.5915	0.0838	1.0000
[29,32)	0.2941	0.0939	0.9983	0.2941	0.0939	0.9983	0.2938	0.0939	0.9982
[32,+)	0.5240	0.1749	0.9973	0.5240	0.1749	0.9973	0.5223	0.1749	0.9972
n. parameters	162			162			162		
n. constraints	110			110			110		
n. events	4798			4798			4798		
n. episodes	116515			116515			116515		
Log-likelihood:	-28134.98			-28134.97			-28133.86		
BIC:	-21396.74			-21396.75			-21398.98		

postponement effect (negative and significant coefficient) up to around age 26; after that age, coefficients, even if weak, are positive. Women with the middle level of education have a transition rate lower then the one for those with the elementary level, up to age 26; then, the coefficient of the rate becomes positive: actually, the differences with low educated women are not striking and also the effects are not very significant. On the contrary, for those with high level of education there is a clear, significant and negative effect up to age 26 (but those in the age group 15-18 are still involved in studying, at least for the lowest level of this category). After that age, the attained educational level has a high impact on the experience of first marriage if compared to the one with elementary level. Women age more than 30 years and high level of education could also represents a selected group, given the relatively small number of members with high education.

Despite the lack of information about the end of study, which prevents us from including the amount of years spent in the educational system and their ending time, the model shows the postponement effect associated with every level of education. It is not clear whether the postponement will eventually also cause a lower proportion of total marriages for those with, for instance, high education. Increasing human capital discourages early marriages, but is not incompatible to marriage (Oppenheimer, 1988[141]).

The effect of the squeeze by region of birth for women, even though not signifi-

Figure 4.14: Transition rate for the piecewise constant exponential model by sex: Piedmont, birth cohort 1955-1964

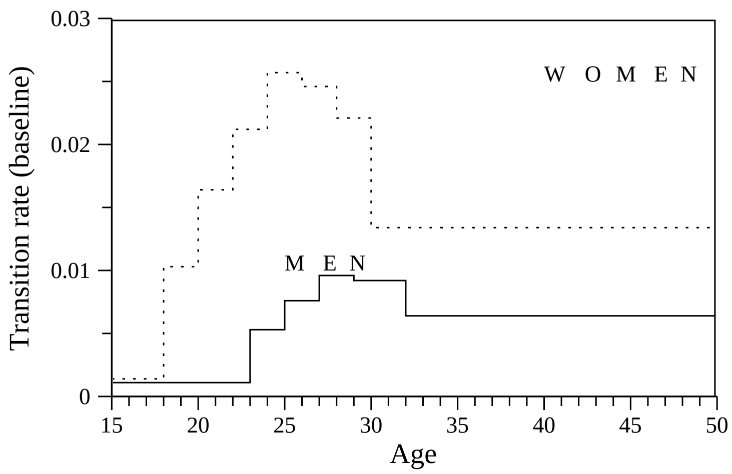


Table 4.19: First marriage: age effect of the imbalance in the marriage market estimated by the piecewise constant exponential models: WOMEN

WOMEN

	Model I			Model II			Model III		
Variable	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**	**Coeff**	**S.E.**	**Signif**
[15,18)	-6.1449	0.1596	1.0000	-6.1449	0.1596	1.0000	-6.1516	0.1601	1.0000
[18,20)	-4.0020	0.0905	1.0000	-4.0020	0.0905	1.0000	-4.0040	0.0906	1.0000
[20,22)	-4.0382	0.1066	1.0000	-4.0382	0.1066	1.0000	-4.0378	0.1066	1.0000
[22,24)	-4.0158	0.1244	1.0000	-4.0158	0.1244	1.0000	-4.0130	0.1245	1.0000
[24,26)	-3.9258	0.1430	1.0000	-3.9258	0.1430	1.0000	-3.9248	0.1432	1.0000
[26,28)	-4.3820	0.2177	1.0000	-4.3820	0.2177	1.0000	-4.3778	0.2178	1.0000
[28,30)	-4.6835	0.2861	1.0000	-4.6835	0.2861	1.0000	-4.6836	0.2862	1.0000
[30,+)	-4.7362	0.2447	1.0000	-4.7362	0.2447	1.0000	-4.7376	0.2446	1.0000
birth cohort (base=1955-59):									
1960-64	-0.0781	0.0331	0.9818	-0.0781	0.0331	0.9818	-0.0766	0.0332	0.9790
1965-69	-0.4393	0.0395	1.0000	-0.4392	0.0395	1.0000	-0.4409	0.0396	1.0000
>=1970	-0.8713	0.0556	1.0000	-0.8713	0.0556	1.0000	-0.8738	0.0550	1.0000
region of birth (base=Piedmont):									
Vaa	-0.1085	0.1123	0.6660	-0.1085	0.1123	0.6660	-0.1072	0.1121	0.6611
Lom	-0.1587	0.0662	0.9834	-0.1587	0.0662	0.9834	-0.1581	0.0662	0.9830
Taa	-0.3251	0.0798	1.0000	-0.3251	0.0798	1.0000	-0.3283	0.0798	1.0000
Ven	-0.1917	0.0723	0.9920	-0.1917	0.0723	0.9920	-0.1929	0.0723	0.9924
Fvg	-0.1898	0.0908	0.9633	-0.1898	0.0908	0.9633	-0.1921	0.0909	0.9656
Lig	-0.3323	0.0936	0.9996	-0.3323	0.0936	0.9996	-0.3340	0.0936	0.9996
Tos	-0.0215	0.0759	0.2228	-0.0215	0.0759	0.2227	-0.0203	0.0758	0.2112
Umb	-0.1429	0.0917	0.8808	-0.1429	0.0917	0.8808	-0.1421	0.0916	0.8791
Er	-0.2867	0.0800	0.9997	-0.2867	0.0800	0.9997	-0.2855	0.0800	0.9996
Mar	-0.0580	0.0803	0.5298	-0.0580	0.0803	0.5297	-0.0551	0.0803	0.5076
Laz	-0.0751	0.0803	0.6506	-0.0751	0.0803	0.6504	-0.0715	0.0798	0.6299
Abr	0.1611	0.0786	0.9595	0.1611	0.0786	0.9595	0.1631	0.0785	0.9622
Mol	0.0775	0.0874	0.6249	0.0775	0.0874	0.6249	0.0751	0.0874	0.6098
Cam	0.1137	0.0661	0.9147	0.1137	0.0661	0.9147	0.1132	0.0660	0.9135
Pug	0.0847	0.0681	0.7868	0.0847	0.0681	0.7869	0.0887	0.0680	0.8081
Bas	0.0210	0.0871	0.1900	0.0210	0.0871	0.1900	0.0200	0.0871	0.1813
Cal	0.1850	0.0698	0.9919	0.1850	0.0698	0.9919	0.1819	0.0699	0.9908
Sic	0.1908	0.0684	0.9947	0.1908	0.0684	0.9948	0.1984	0.0687	0.9961
Sar	-0.2164	0.0786	0.9941	-0.2164	0.0786	0.9941	-0.2167	0.0786	0.9942
education (base <=elementary):									
Middle									
[15,18)	-0.2269	0.1704	0.8171	-0.2269	0.1704	0.8171	-0.2234	0.1705	0.8100
[18,20)	-0.4540	0.0838	1.0000	-0.4540	0.0838	1.0000	-0.4529	0.0838	1.0000
[20,22)	-0.1018	0.0998	0.6923	-0.1018	0.0998	0.6923	-0.1008	0.0998	0.6877
[22,24)	0.0477	0.1194	0.3105	0.0477	0.1194	0.3105	0.0475	0.1194	0.3090
[24,26)	-0.0829	0.1417	0.4413	-0.0829	0.1417	0.4413	-0.0833	0.1418	0.4431
[26,28)	0.3292	0.2230	0.8600	0.3292	0.2230	0.8600	0.3261	0.2231	0.8563
[28,30)	0.0299	0.3039	0.0784	0.0299	0.3039	0.0783	0.0285	0.3039	0.0747
[30,+)	0.2797	0.2599	0.7182	0.2797	0.2599	0.7182	0.2795	0.2599	0.7178
>=high school									
[15,18)	-1.9527	0.2105	1.0000	-1.9527	0.2105	1.0000	-1.9488	0.2106	1.0000
[18,20)	-1.8147	0.0946	1.0000	-1.8146	0.0946	1.0000	-1.8133	0.0946	1.0000
[20,22)	-0.8984	0.0999	1.0000	-0.8984	0.0999	1.0000	-0.8976	0.0999	1.0000
[22,24)	-0.5582	0.1170	1.0000	-0.5582	0.1170	1.0000	-0.5582	0.1170	1.0000
[24,26)	-0.3614	0.1356	0.9923	-0.3614	0.1356	0.9923	-0.3617	0.1356	0.9923
[26,28)	0.1766	0.2153	0.5879	0.1766	0.2153	0.5879	0.1743	0.2153	0.5819
[28,30)	0.4024	0.2861	0.8404	0.4024	0.2861	0.8404	0.4013	0.2861	0.8393
[30,+)	0.3723	0.2529	0.8590	0.3723	0.2529	0.8590	0.3715	0.2529	0.8581
Squeeze S by region of birth				*Squeeze I by region of birth*			*Squeeze I_{freq} by region of birth*		
[15,18)	-3.1731	2.6450	0.7697	-6.3424	5.2855	0.7698	-4.6874	3.6949	0.7954
[18,20)	-0.6474	1.4488	0.3450	-1.2993	2.8958	0.3463	-1.1192	2.1627	0.3952
[20,22)	-0.8796	1.4248	0.4630	-1.7599	2.8486	0.4633	-1.8722	2.2626	0.5920
[22,24)	-3.1832	1.4478	0.9721	-6.3655	2.8948	0.9721	-5.6722	2.3801	0.9828
[24,26)	-1.5998	1.4888	0.7174	-3.1999	2.9768	0.7176	-2.8242	2.4899	0.7433
[26,28)	-3.3933	1.7284	0.9504	-6.7856	3.4559	0.9504	-6.1420	2.9257	0.9642
[28,30)	-1.0479	2.1540	0.3734	-2.0955	4.3068	0.3734	-2.0437	3.6819	0.4212
[30,+)	2.4262	2.4889	0.6703	4.8510	4.9765	0.6703	4.1908	4.2991	0.6704
Job									
[15,18)	-0.2967	0.2769	0.7160	-0.2967	0.2769	0.7160	-0.2976	0.2769	0.7175
[18,20)	-0.0197	0.0779	0.1999	-0.0197	0.0779	0.2000	-0.0198	0.0779	0.2003
[20,22)	0.1215	0.0593	0.9596	0.1215	0.0593	0.9596	0.1212	0.0593	0.9591
[22,24)	0.1793	0.0579	0.9980	0.1793	0.0579	0.9980	0.1791	0.0579	0.9980
[24,26)	0.2204	0.0630	0.9995	0.2204	0.0630	0.9995	0.2208	0.0630	0.9995
[26,28)	0.1016	0.0802	0.7948	0.1016	0.0802	0.7948	0.1016	0.0802	0.7947
[28,30)	0.2710	0.1124	0.9841	0.2710	0.1124	0.9841	0.2715	0.1124	0.9843
[30,+)	-0.2998	0.1203	0.9873	-0.2998	0.1203	0.9873	-0.3001	0.1203	0.9874
n. parameters	216			216			216		
n. constraints	154			154			154		
n. events	6279			6279			6279		
n. episodes	98533			98533			98533		
Log-likelihood:	-35546			-35546.12			-35546.12		
BIC:	-32489.20			-32488.97			-32488.97		

cant, is always negative, the sign confirms the outcomes of the previous models.

Participating in the labour force at least once in life, has a delaying effect up to age 20, but not significant; those who enter the labour market after that age increase their probability of marrying, even though the effect (positive and significant) is not very strong (the highest value is estimated for the age group 24-26 years, when it assumes the value 0.2204). Finally, having a first job experience after age 30 decreases the chances of marriage. This seems to suggest that the effect of entry into the labour market for a very young woman works as a competing risk, but it should be observed that it is not significant. Maybe their position on the labour market is not very powerful, and, moreover, they are compared to a quite large number of women, who, at that ages, are still studying. Those who enter in the labour market after age 20, are also encouraged to enter a marital union, so that they take advantage of both favourable conditions on the labour market and on the marriage market. Entering the labour market after age 30 has a negative impact for women: the outcomes seem to suggest the selectivity problem in the reference group: women who never worked up to age 30 and, maybe, they are very traditional women, highly attached to the family's values in the sense that they prefer to stay out of the labour market. To their respect, having a first job after age 30, without being married, may have further negative effects on first marriage decision.

According to the BIC criterion the best model among the three is the one based on the measure I_{freq} both for men and for women.

4.7 Summary and discussion

The situation of the marriage market has been introduced as a macro time-varying covariate in a micro-level analysis of the transition into first marriage in Italy. We find that structural constraints in the marriage market affect the timing of the transition to first marriage. In particular, increasing the imbalance on the marriage market (that is to say, moving from a situation characterised by unfavourable conditions for men to a situation characterised by unfavourable conditions for women) brings about a higher marriage rate for men over all ages. The positive effects of a favourable imbalance in the marriage market are quite weak for men in their central ages (23-25 years even though there they are not significative): this age group repre-

Table 4.20: Summary of the introduced models and of the comparison by sex, region: nested and nonnested models

MODELS:	MEN Region of Birth				WOMEN Region of Residence			
	Log-likel.	par.	cons.	n	Log-likel.	par.	cons.	n
A) Cox Models								
I - Proportional Hazards	-38883.04	25		4798	-51860.86	25		6279
II - I + squeeze S	-38882.45	26		4798	-51854.92	26		6279
III - I+ squeeze I	-38882.45	26		4798	-51854.92	26		6279
IV - I+ squeeze I_{freq}	-38882.52	26		4798	-51854.19	26		6279
B1) Piecewise Constant Exponential Models:								
I - baseline + squeeze S	-28288.94	32		4798	-35769.80	34		6279
II - baseline + squeeze I	-28288.94	32		4798	-35769.801	34		6279
III - baseline + squeeze I_{freq}	-28287.70	32		4798	-35769.127	34		6279
B2) Piecewise Constant Exponential Models with period specific effects:								
I - baseline + squeeze S	-28134.976	162	110	4798	-35546.00	216	154	6279
II - baseline + squeeze I	-28134.972	162	110	4798	-35546.12	216	154	6279
III - baseline + squeeze I_{freq}	-28133.858	162	110	4798	-35546.12	216	154	6279

COMPARISON OF NESTED MODELS:	MEN Region of Residence			WOMEN Region of Residence		
	log-Likeli. Ratio	df	P	log-Likeli. Ratio	df	P
A II vs A I	1.18	1	0.277	11.88	1	0.001
A III vs A I	1.18	1	0.277	11.89	1	0.001
A IV vs A I	1.04	1	0.308	13.35	1	0.000
B1 I vs A I	21188.20	7	0.000	32182.12	9	0.000
B1 II vs A I	21188.21	7	0.000	32182.12	9	0.000
B1 III vs A I	21190.69	7	0.000	32183.47	9	0.000
B1 I vs A II	21187.02	6	0.000	32170.23	8	0.000
B1 II vs A III	21187.02	6	0.000	32170.23	8	0.000
B1 III vs A IV	21189.65	6	0.000	32170.12	8	0.000
B2 I vs A I	21496.13	27	0.000	32629.72	37	0.000
B2 II vs A I	21496.14	27	0.000	32629.49	37	0.000
B2 III vs A I	21498.37	27	0.000	32629.49	37	0.000
B2 I vs A II	21494.95	26	0.000	32617.84	36	0.000
B2 II vs A III	21494.96	26	0.000	32617.60	36	0.000
B2 III vs A IV	21497.33	26	0.000	32616.14	36	0.000

COMPARISON OF NONNESTED MODELS:	MEN Region of Residence		WOMEN Region of Residence	
	BIC	df	BIC	df
A II vs A I	2.50	1	-8.09	1
A III vs A I	2.50	1	-8.09	1
A IV vs A I	2.64	1	-9.55	1
B1 I vs A I	-21162.43	8	-32147.93	9
B1 II vs A I	-21162.44	8	-32147.94	9
B1 III vs A I	-21164.92	8	-32149.29	9
B2 I vs A I	-21396.74	27	-32489.20	37
B2 II vs A I	-21396.75	27	-32488.97	37
B2 III vs A I	-21398.98	27	-32488.97	37

sents a stage in their life characterised by high uncertainty on the marriage market (for instance, due to the fact that they still do not have a secure economic position on the labour market). For the other ages there is a clear positive effect for men. In particular, relatively young men (before age 23) as well as the relatively old men (after age 25) can receive the major profit from that: the young easily overcome the 'revelation problem' due to the uncertainty of their future and unknown position. On the other hand, older men, have already acquired a position which will very likely correspond to the future one. Overall, for men a positive and U-shaped effect over ages of favorable imbalances emerges.

On the contrary, women are affected by the squeeze against them which causes a negative effect for all ages up to 28 years. After that, the effect of the squeeze changes in sign, addressing a positive (but not significative) transition rate to marriage and a catch up process. For women a change in sign and a J-shaped effect emerges over ages.

These outcomes hold when we introduce birth cohort, regions of birth, entry into first job and education attainment as additional covariates.

Women facing a disadvantage in the marriage market show to have a lower transition rate, so that it takes more time before they find a partner. This postponement effect appears in every model, and keeps also when we look at its age pattern (there is only a slight loss in the significance, even though the negative sign is confirmed, for the last model that controls for other covariates). As concerns men, we already mentioned the fact that the proportional hazards model finds a weak, not significant effect. Afterwards, when we allowed for an age pattern, the increasing rate of first marriage for men emerged clearly.

However, as it emerged from the previous chapter, the current Italian marriage market is characterised by an increasing disadvantage for males (the squeeze measures are all negative). This means that we should interpret the age-specific effect of the marriage squeeze on the transition to first marriage in light of negative values of the marriage squeeze variables. Given the current conditions on the marriage market, the impact of the squeeze on male transition to first marriage is thus shaped as a reversed U and that of female is shaped as a reversed J. This means that men younger than 23 as well as men older than 25 are and will be affected most.

The impact of the marriage squeeze on the transition to first marriage is particulary relevant if we think that in a country like Italy fertility occurs mainly in the institution of marriage and birth out-of-wedlock represents only a low proportion of all births.

Other variables relevant to the analysis of the marriage market could be introduced. For instance, the increasing proportion of divorced people may alter the marriage market given that a greater number of eligible partners is available anew. Despite its spread, divorce in Italy is still a marginal phenomenon, when compared to its features in other western countries. Moreover, from the 1998 survey it emerges that only a small proportion of divorced people remarry, and these are often divorced men which marry single women. Therefore especially divorced men reenter the marriage market, widening the pools of eligibles for the spinsters and further 0 affecting the marital chances of the bachelors. If we link this to the decreasing fertility occurred in Italy since, at least, the second half of the 1980s, we should stress that the relative position of men on the marriage market will worsen soon.

Another component that would be worthy to control for, is a kind of macro variable expressing the economic conditions of our country. Since marriage decisions are strictly linked to expectations about future plans and situations, made by each individual, this would allow us to control for period effects of the economic cycle. Here the need is not to include just one single variable, but a synthesis of a set of economic time series. Such an attempt has been made in the case of the Federal Republic of Germany by the introduction of the Index of economic development, which results to have a significant influence on family decisions (Blossfeld and Huinink, 1991[25]).

Chapter 5

Trends in homogamy

5.1 Introduction

The preceding chapters focused on a 30-years analysis of first marriage in Italy (chapter 2) and of the impact of imbalances on the marriage market on both sexes' marital opportunities (chapters 3 and 4). This allowed us to evaluate, *if* and *when* people married in Italy. Furthermore, the trend in the marriage squeeze examined for Italy allowed us to study the transition to first marriage accounting for possible shifts in the age-sex population composition.

Another crucial question, in studying marriage, is the one regarding the characteristics of the partners: the interest in this chapter is turned to *who marries whom*. The perspective then moves from the analysis of the quantitative features of marriages to the assessment of their qualitative aspects. As we already said, only first marriages are the subject of our analysis [1].

In this part of the work we aim at including the possibility of choosing a partner with peculiar traits. Becker (1981[10]) argues that the utility of marriage is directly proportional to the degree of assortative mating. The role of the postmarital socialisation process as a corrective matching mechanism is declining, and more emphasis is today given to the assortative mate selection for producing good matches. This shift causes an increase in the age at first marriage, because more knowledge is required in order to decide to marry. It also implies a growth in the instability of marriages, because, especially when contracted early, marriages are now function of

[1] This is because second marriages present quite peculiar association between partners' traits (Bozon, 1990[30]; Bozon and Héran, 1988[35], Oppenheimer, 1988[141]), but also because of the limited relevance of second marriages in Italy.

both partners' characteristics (Oppenheimer, 1998[141]).

As we said in the first chapter, the concept used to explain why people marry persons close in status is that of homogamy, while we use to talk about endogamy when we refer to people marrying within their group. The opposite phenomena are dubbed as heterogamy and exogamy. The terms hypergamy or hypogamy refer in turns to the situation when the spouse have a higher or lower status than one's own.

Homogamy does not express a systematic and mechanic research of the closest partner. It rather represents a broader outcome of social interactions: similar people associate frequently as a result of more intensive currents of exchange among groups (different but close inside the social space). At the same time, homogamy is also a result of the repulsion among some other social classes, some of which never cross each other (Bozon and Héran, 1987[33], 1988[35]; Kalmijn, 1998[113]). Therefore, the formation of a couple is considered to be a very crucial moment for social reproduction, as it represents the conjunction of two social trajectories (Bozon, 1991[32]). Many researchers confirmed that, on the marriage market, couples are not formed by chance, given the strong homogamy observed between social class of fathers' spouses[2] (Girard, 1981[80]; Haller, 1981[94]; Bozon and Héran, 1987[33], 1988[35]; De Singly, 1987[66]; Smeenk, 1998[169]; Cobalti and Schizzerotto, 1994[52]).

The centrality of the interest for this research topic in demography is also well witnessed by contributions to this field of research yield at the very beginning of the century by two Italian scholars. Benini (1901[12]) proposed to analyse homogamy by using the 'index of marriage attraction', while Gini (1915[76]) introduced the so-called 'homogamy index' [3].

Research on homogamy is traditionally based on the method of 'marriage tables', obtained by cross-classifying the actual (or last) characteristics of the husband with

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[2]Marriage mobility is a particular aspect of social mobility. The mobility of a social system does not end in passages between classes of the individuals due to changes in their occupations, but it involves, through marital links, the whole family. Therefore, intergenerational mobility is composed by mobility through the occupation in the labour market and mobility through marriage. The last on is a typical channel of intergenerational mobility especially for women.

[3]These studies were aimed at evaluating homogamy according to several status characteristics in different countries and/or periods. Yet, these measures are affected by the different marginal distributions in a double entry table. The percentage of couples in the primary diagonal represents only the absolute homogamy, while the relative homogamy is the measure of the different chances to marry.

the actual (or last) characteristics of the wife[4]. It is well known that from such tables the existence of a strong association between partners' traits emerges: it results from a very high proportion of couples in the primary diagonal of the table. Log-linear models on qualitative cross-classified variables have then usually been applied (for instance, as regard occupational homogamy in Italy see Schadee and Schizzerotto,1990[161]; Schadee and Saviori, 1993[160]; Cobalti and Schizzerotto, 1994[52]).

However, methods based on the 'marriage table' have some drawbacks. First of all, they lack an explanation led at the cohort level of analysis: it becomes extremely complicated to distinguish the pattern of homogamy among cohort. Second they are based on *ex-post facto* analysis of married couples. This means that they start from already existing marriages and attempt to retrospectively reconstruct and thereby explain patterns of marriage behaviour on the basis of individual characteristics of both spouses. Third, they only focus on those who eventually marry, therefore excluding those who stay single. Fourth, being based on the features of the couples at the time of the survey, they provide a static analysis. This it because they are only centered on couple's characteristics achieved at the survey time so that, changes occurred during the individual life-courses are not considered in a dynamic perspective[5].

Our aim is to study changes in homogamy patterns at the individual level across cohorts; the dimensions according to which we look at are homogamy by age, region of birth and level of education. We first conduct a descriptive analysis and then we use some models to assess cohort dynamics and evaluate the impact of the imbalances on the marriage market, measured as we did before with the marriage squeeze indicators, on the competing risks to marry. Following the perspective characterising previous chapters, here we are going to conduct an event history analysis which includes being single as an explicit outcome of the marriage process.

This chapter is organised as follows. Next section (5.2) contains a review of the main theories regarding homogamy. In particular we will separately refer to those

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[4]Marriage tables are also performed by cross-classified family's characteristics.

[5]This can also be misleading: the individual's trajectory might be mixed with that of the partner, resulting from their interaction along the life-courses starting from their marriage to the survey time (Bernardi, 1999[14]; Bernasco, 1994[16]).

concerning the characteristics for which we study homogamy and the potential effects of imbalances on the marriage market (5.2.1, 5.2.2, 5.2.3 for age, region of birth and educational homogamy respectively). Section 5.3 refers to the kind of approach of the analysis that will be performed here: that is to say, by using multiple destinations models we present, in a first phase, a descriptive analysis of the trends in homogamy by sex (Section 5.4), and in a second step we perform some parametric models to evaluate also the impact of the marriage market trend on homogamy (separately for each of the dimensions: sections 5.5.1, 5.5.2, 5.5.3 for age, region of birth and education respectively). Last section (5.6) is devoted to discussion and summary.

5.2 Theoretical background

Although there exists a vast literature regarding the factors affecting homogamy, our main aim here is to provide some elements of interpretation of the changes in the pattern of homogamy in Italy, with special attention to the evaluation of the impact of the imbalances on the marriage market as concerns the choice of the partner.

According to the Second Demographic Transition theory, the process of modernisation experienced by the western countries has been characterised, as already summarised in the first chapter, by industrialisation, urbanisation, individualism, freedom of choice, independence from the parental behalf, rise of the welfare state, emancipation (Van de Kaa, 1987[184]; Lesthaeghe and Surkyn, 1988[124]). Accordingly, many changes in the institution of marriage, including those aspects related to partnership have taken place: the role and interests of parents and families has decreased and the possibilities of intermarrying across social borders has risen. Romantic-love based marriages are interpreted as the sign of an increased freedom of choice and greater independence of the partners. In the popular opinion, chances to marry someone who belongs to a completely different social group have increased[6]. From this point of view we expect that the increased possibilities to marry someone belonging to a different social group will also result in declining proportion of homogamous couples across cohorts. This could be true especially if we think to the increased mobility over the territory (also accompanied by the spread of the ways of

[6]One of the most famous tale for children is 'Cinderella'. The story focuses on the social mobility *via marriage* of a poor, low-class girl. This tale has been for instance recently used for the marriage of the future king of Norway with a 'single mother'.

communication) that accelerates the possibility of meeting among once far people.

However, the consequences of the modernisation process do not go only towards one direction (decrease in homogamy), but they have to be considered one at time because they assume different meanings according to the partner's traits we are talking about. Here we make an effort to clarify our general expectation concerning the trend in each kind of homogamy, including the potential effect of the squeeze on the marital choice.

Therefore, the theoretical background and a short review of the literature is presented with respect to the possible effects of the modernisation process on age, region of birth and educational homogamy patterns.

5.2.1 Homogamy by age

Many social, economic and cultural factors affect the age difference between partners. Of course, changes in age homogamy cannot be viewed in isolation from other traits, given that they are strictly linked to changes in socio-economic and cultural relationships between segments of the population. According to the modernisation theory, increased equality, democracy, emancipation and gender equalisation may have increased the proportion of more age-balanced couples, and reduced the prevalence of the traditional typology of husband-older couples[7]. In this context, we would then expect in western countries a rise, across cohorts, of age-homogamous couples.

Historical studies on this topic in The Netherlands have revealed the increased age homogamy trends of modern societies, even though its effect did not spread uniformly over all the population. As a matter of fact, the working-class emerged as first and main actor of this movement towards age homogamy (see for The Netherlands van Poppel et al., 1998[185]). Upper class, bourgeoise and administrators followed the same pattern only some decades later. These changes in age-homogamy have been partly linked to the evolution of the preferences for more balanced ages, but have been partly attributed to the increased meeting opportunities and to changes in social norms, too.

Another reason for increasing age homogamy could be seen in the increased

[7]Strong age differences in the developing countries seems to be more linked to the women's status than to age structure constraints (Casterline et al., 1986[42]; Danziger and Neuman, 1999[59]).

contact opportunities between the peers. From this perspective also the emerging role of youngsters' groups represented a factor influencing the assortative mating of same-age couples. In fact, if opportunities for social interactions between age peers increase, then also a rise in the level of age homogamy is to be expected. Increased length of formal education for all social groups, during the modernisation period, enhances these opportunities (Beekink et al., 1998[11]). Moreover, students' life-styles enjoy of the increased structural opportunities (attending social places for students) to meet a partner with the same level of education (Blossfeld and Timm, 1999[23]; Bernardi, 1999[15]). Yet, this outcome could be considered as an effect of this peculiar marriage market: the school creates a network highly homogeneous as regard age and level of education. Uunk (1996[182]) also shows that in the Netherlands, after World War II, the tendency to marry within one's academic discipline is stronger than the tendency to marry a person from another academic discipline distinguishing between 'cultural' and 'economic elite'. Also the workplace is extremely important as a marriage market, even though its effect concerning age differences between partners is less clear. In fact, the increased labour force participation of women, as well as the rise in their educational attainment, may play a double effect on the pattern of age homogamy. Given the attractiveness in the marriage market gained by working women (Oppenheimer, 1988[141]), an increasing preference for partners in the same occupational position can also be expected. This is also true for high educated women. The workplace, on one hand, encourages the meetings between same-age partners, given that co-workers often share the same educational credentials but also the same labour market entry cohort; on the other hand, it facilitates age gap between couple's partners, because, as it often happens, newcomers women face with already working, and probably older, men in an existing organisation (Smeenk, 1998[169]). In sum, nowadays both school and workplace represent the most relevant marriage markets even though, the former is very efficient in matching same-age couples, while the second is especially successful in the case of husband-older matches (Bozon and Héran, 1987[33]). The neighbourhood constitutes another marriage market, but it has to be kept distinct from school and workplace: in fact, a neighbourhood is homogeneous with respect to factors such as ethnicity, race, religion and family background, and characteristics are transmitted by parents. Thereby the neighbourhood promotes the ethnic endogamy and homogamy of family background more than school do (Kalmijn, 1998[113]). The role of neighbourhood is today probably a minor one in comparison to school and workplace given that people spend more time in these last two social spaces.

Gender segregated roles play in favour of a high age gap between partners (Becker, 1981[10]; Kalmijn, 1998[113]), while high human capital encourages more balance between the ages. The reason is that education generates a shift in the attitudes and individuals become more prone to change and less attached to traditional age differences characterising the couple. However, it could be observed also that a bit of overlap over the dimensions of homogamy exists: for instance education and social background are correlated. Because the various social dimensions on which individuals select one another are correlated, and because people are believed to take all these dimensions into account when choosing a spouse, the question arises if and to what extent homogamy in one group dimension is the by-product of selection in another group dimension (Kalmijn, 1998[113]). According to the *by-product hypothesis* of assortative mating, it could be that the preference for partner with the same level of education determines also an increase in same-age couple (Blossfeld and Timm, 1999[23]; Kalmijn, 1998[113]).

Also *exchange theory* provides an interpretation of the age-difference between partners (Collins and Coltrane, 1991[56]; Kalmijn, 1998[113]). This theory predicts that men and women trade characteristics when choosing a partner. The most debated case is the one regarding members of an ethnic group in low prestige position that have better chances of marrying outside their group if this improves their socio-economic status[8], but there are also numerous other kinds of exchange (such as physical attractiveness of women and occupational prestige of men, socioeconomic status and participation in high culture).

It has also been argued that the labour force participation of one or both partners of the couple might explain part of the age difference. For instance, if only the husband works, then the couple will conform to the husband-older type, otherwise if the wife only works, then the wife will more likely be older than the husband;

[8]The most evident case for the Unites States is that regarding white women that marry up more often when marrying a black man than when marrying a white man. Here black men exploit their high eduction to marry outside their ethnic group (Kalmijn, 1993[111]).

lastly, if both partners work or both do not, then they more likely be of the same age (Smeenk, 1998[169]). However, these considerations are not clear in terms of cause and effect relations.

Furthermore, another factor affecting the pattern of homogamy by age could be recognised in the attachment of the individuals to traditionality: more religious or traditional couples may also be more prone to husband-older typology of the couple. With respect to this the socialisation process of the children plays a crucial role as it influences children's attitude and orientation towards an ideal and appropriate (normative) age gap with the future partner (Smeenk, 1998[169]; Kalmijn, 1998[113]).

However, it is sometimes very hard to distinguish between marriage market effects from purely personal factors in decision to marry[9]. It is also hard to define the consequences of the norms in the process of homogamy. For example it has emerged that the shrinking pool of eligible men for women who marry later than 30 leads to atypical or nonnormative marriage market, in the sense that those women entry into the marriage market of previously married men, marry hypergamously by age and hypogamously by educational status (Lichter, 1990[126]).

As concerns Italy, we can expect an increasing age homogamy and declining traditional husband-older couples, though we argue that some regional differences still holds. De Rose and Rufo (1994[62]) observe an increase in the index of Gini and Benini as regards age homogamy in Italy between 1951 and 1981. In particular, we expect to find a higher propensity to marry more traditionally in the South. The impact of the squeeze, when men have an advantage on the marriage market, could worsen women's marital opportunities in whichever direction (i.e. their opportunities to marry a man of any age). In chapter 4 in fact we observed a postponement of first marriage for women when a male advantage was introduced. This means that we would expect for women lower hypogamous, homogamous and heterogamous marriages. It could also be argued that, especially marriages with a younger men are expected to diminish (for men in fact the pool among which to pick up a women

[9]For instance an overrepresentation, unlike their male counterpart, of old female medical doctors in the never-married population has emerged. It is not trivial to disentangle whether this is because old, unmarried, well educated men are scarce or because such women decide not to marry, for same professional or personal reasons (Uhlenberg and Cooney, 1990[180]).

results to be enlarged).

5.2.2 Homogamy by region of birth

From an historical perspective, homogamy by place of origin was probably prevalent. Due to the fact that marriages were often based on family's interests it was necessary to know well the family with which stipulate the linkage. Yet, in some cases, concerning for instance noble and royal families, heterogamous marriages mirrored the need to establish powerful alliances. Conversely, it should also be added that the level of mobility on the territory for the majority of the population was very low and therefore it hampered the possibility of out-marriage. However, the modernisation process has broken, even in this context, the traditional rules. The acceleration of communication has been a propulsive factor of the increased mobility and, as a consequence, of the geographical intermarriage. At the same time, the urbanisation process has led people coming from different areas to share the same territory and to meet more often than before. This has increased the chances of intermarriages between different social groups.

Many factors affect homogamy by place of origin, first of all the distance between social groups. For instance, if a group is small and isolated, then it should result a low level of heterogamous marriages while if the group is small but not isolated and it is difficult to marry within the group, then it is highly likely to marry outside that group (outmarrying): as Kalmijn (1998[113]) states, the smaller the group size the more difficult it is to marry within the group.

Given that distance may hamper the chances to meet and therefore to marry, until some decades ago, at the level of the rural municipalities, the role of the country feasts was considered a crucial moment for the process of couple formation: it represented a special occasion as the population of the closest villages used to gather and meet (Bozon and Héran, 1987[33]). The role of these feasts was central especially for lower social classes, given that the higher ones preserved their preferential channels of exchange, mainly based on the private contacts to which get acquainted (personal and parental contacts).

Of course, homogamy by place of origin directly depends on the scale of measurement of the geographical areas we are looking at. In this context, we study the pattern of homogamy by region of birth of the spouses. As we said in the previous chapter, we do not have the possibility to include the marriage squeeze encountered by the individuals along their life courses. We believe that the marriage market of the place of origin still holds a relevant role even in later stages of one own's life.

During the last decades, Italy has experienced, as we already said, a diminution of the migratory flux towards abroad, which has also been accompanied by a higher short term mobility. Literature on homogamy in Italy by place of origin is even rarer than the one on homogamy by age or education. It is worth noting that in 1961 Golini [86]) studied the characteristics of place of origins between partners observed during the years 1955-57. From the regional analysis he points out that the prevailing factor in determining the high homogamy place of origin is the geographical isolation of some regions. This is responsible for about 80% of observed homogamy, while the remaining 20 % could be attributed to psychological factors. Moreover, he also argues that the geographical isolation (that characterises especially southern regions and rural ares) can also be extended to include the isolation experienced by group of immigrants that, because of the segregation in the destination places, have a high index of homogamy, too. In the 1980s, trends in marrying a partner coming from the same region, according to Gini and Benini indexes, have increased. This conformed the hypothesis of a higher isolation of southern regions where homogamy is indeed stronger. The slight decrease in homogamy has been interpreted as a result of increased roads in the South and of the deplacement of industries in the South. Despite the reduction in outmigratory movements, since the 1980s, it is very important to remind that in the southern regions homogamy is a constant factor (De Rose and Rufo, 1994[62]).

Overall, we expect to find a diminishing transition to same-region-of-birth marriages. Moreover, we expect that the smaller the group, the more difficult it is to marry within the group. The improved marital conditions of men (increase of the squeeze) might ease their transition to first marriage in both directions (same or different place of origin).

5.2.3 Homogamy by education

The association between the educational levels of the partners of a couple is probably the topic, for which more literature is available. This is probably due to the fact that education is strictly related to the the family background and it is also a key determinant of social mobility labor market success and of other aspects of lifestyle (Oppenheimer, 1988[141]; Kalmijn, 1998[113]). Industrialisation, burocratisation and the expansion of the welfare state were also accompanied by deep changes in the educational system (Blossfeld and Timm, 1999[23]). Throughout the twentieth century, industrial societies acknowledge increasing importance to the role of education. Also long-term growth in the enrollment of women and men in the educational system has increased. Above all, the educational attainment of women has increased during the twenty century and their labour force participation is relatively high in modern societies (Blossfeld, 1995[69]; Pinnelli and De Rose, 1995[145]).

According to the modernisation theory, there could be different outcomes regarding the trends of educational homogamy. The *status attainment* hypothesis highlights the importance acquired and acknowledged in modern societies to the role of education, which then becomes an increasingly important factor of selection, (factor on which the choice of the partner relies): from this perspective, educational homogamy should increase. Besides that, it should also be observed that through the rise in urbanisation, the greater geographical mobility, the growth of welfare state, and the spread of mass communication, the boundaries between all social groups have become more permeable, so that basically, decreasing educational homogamy is expected. Lastly, a combination between the two hypotheses could lead to predict the level of homogamy as an inverted U-shaped trend: this would, in fact, result from the increase in the educational homogamy during the first phase of the modernisation process and from its subsequent decline, later (Smits et al., 2000[171]).

While there is a certain agreement of the outcomes of studies regarding social background homogamy (there is a decline in the importance of social background for marriage choice), trends in educational homogamy in the industrialised countries do no point in one direction only. To explain these differentiated trends, an attempt is that of Smith et al. (1998[170]) who, comparing 64 industrialised countries provides direct support for the inverted-U shaped relationship between educational homogamy and the level of industrialisation.

As we also said in the first chapter, individuals desire (more) to marry an economically resourceful spouse, independently on one's own resources, but, with respect to cultural resources they prefer to marry someone who is similar to them. The former hypothesis is also known as *economic competition hypothesis*, according to which people prefer to marry someone with high economic status (Mare, 1991[130]) and the latter is known as *cultural matching hypothesis* and relies on the idea that people prefer to marry someone with similar cultural status (DiMaggio and Mohr, 1985[68]). This is in accordance with the great relevance given to the similarity in values, opinions, tastes, view of the world, which ease the communication and enhance the mutual understanding between partners. Kalmijn (1994[112]) finds that in the United States, assortative mating by cultural status[10] is more important than assortative mating by economic status, even though the economic dimension, measured by occupational earnings is not trivial and has become more important over time.

Marriage between persons with the similar amount of schooling depends both on their preferences and on the structure of the marriage market. Mare (1991[130]) observes that the timing of the transition out of school and into marriage is very relevant. Indeed, the longer this time gap is, the greater the chances are that couples will form educationally heterogamous marriages. Furthermore, the hierarchical organisation of the school system is such that it creates barriers between the attained levels. Barriers to educational intermarriage are weaker at lower levels of schooling than at higher levels. Moreover, the time gap between school departure and marriage on educational homogamy is greater at high levels of schooling than at lower levels: for those who study longer there is a greater acquaintance with students' groups and there are higher chances to marry soon homogamously, which is less likely if the time gap is greater (in this case people are more likely to escape an educationally homogenous circle of acquaintances). However, after controlling for the length of

[10]He refers to occupational schooling, which emphasises the educational requirements of some employment compared to their economic earnings. For instance, managers of manufacturing firms and financial sales representatives have high economic status but relatively low cultural status, whereas occupations like teachers and artists have high cultural status but low economic status.

time between school leaving and marriage, some evidence of increased homogamy from the 1930s and the 1980s in the United States remains (Mare, 1991[130]).

As we already stressed in previous chapters, modern societies are however characterised by a marked gender-specific division of labour and the ensuing mutual dependency between the sexes. In traditional societies the complementarity of men's and women's roles shape also their investment in education (Becker, 1981[10]). A good education is important especially for men because from that, men's income position and the concomitant social status of the entire family are determined. On the other hand, there is more ambiguity as concerns female education in the traditional family model. In fact, men are more attracted by women who have not invested too much in their own career and therefore in their market-related education. Moreover, women in a traditionally oriented society have low attachment to formal education, so that often have lower level of education and are younger than their husbands (Oppenheimer, 1988[141]). The outcome of this model is then a men's tendency towards education hypogamy and women's towards education hypergamy. However the traditional gender-specific pattern regarding educational attainment of the partners, is weakened by their increasing market-based employment and also increasingly become a central component of wives's conception of life. Women have increasingly taken over part of the role of breadwinner in family and men in each successive younger generation will increasingly prefer higher qualified women (Blossfeld and Timm, 1999[23]; Mare, 1991[130]). The outcome of the competition for highly educated women and the increased chances to meet people of equal qualification are expected to raise the level of educational homogamy across cohort and reduce the education hypergamy of women.

However, the cultural norm of educational hypergamy for the women implies that the pool of the marriageable declines as women's education increases (Mare, 1991[130]; Lichter, 1990[126]).

In the United States the lower gender inequality in education and employment among blacks than among whites may imply that the economic gains from marriage are greater for white women than they are for black women (Lichter at al., 1992[128]).

Some studies focused on the problem of how sex ratio imbalances might affect marital sorting (Lichter et al., 1995[127]; Qian and Preston, 1993[147]). Most such analyses have been conducted at an aggregate level and attempted to estimate propensities toward homogamy over time, net of the shifting population composition. The general outcome of these researches is that sex ratios imbalances have some effects although they do not govern trends or aggregate patterns of variation in marriage (Qian and Preston, 1993[147]). In communities with advantageous sex ratios some evidence is found that marriage rates are higher for women (South and Lloyd, 1992[175]). Moreover the availability of longitudinal data on individual's geographical location has been exploited to evaluate the effects of local marriage markets on marriage formation (Lewis and Oppenheimer, 2000[125]; Lichter et al., 1992[128]). It emerged that sex ratios affects individual level marriage probabilities (Lichter et al. 1992[128], 1995[127]), but it does not seem to affect educational sorting (Lichter et al. 1995[127]). Thus the aggregate results suggest that sex ratios influence sorting, while individual results suggest that it is at best uncertain whether local conditions (at least sex ratios) do so. In a recent paper, Lewis and Oppenheimer (2000[125]) study whether educational concentration, besides sex ratios, affects educational sorting and marriage timing. They find that the chances of educational hypogamy for non-Hispanic white women do not depend on local education-specific sex ratio. Furthermore, educational concentration affects educational sorting and its age pattern. Thus, they believe that market conditions affect marital sorting in a subtler way, by affecting the relation between sorting and timing: their chances to marry downwards rather than homogamously or upwards increase more with age if they live in educationally sparse marriage market (Lewis and Oppenheimer, 2000[125]).

A recent study on homogamy in Italy (Bernardi 1999[15]) revealed that the absolute incidence of homogamous marriages has declined across cohorts, even though the youngest one observe a new rise in homogamy. Yet, controlling for the structural opportunities faced in order to meet partner of the same level of education (studied by analysing the generalised odds ratios for a single cohort) Bernardi evidenced the increase in the chances of educational homogamy in Italy. Moreover, event history analysis reveals that low educated individuals have the highest propensity to homogamy, but if one looks at the cohorts born after Second World War, then the highest chances to marry a partner with same level of education are observed for the more qualified subjects. This study also finds the negative effect of the duration since the exit from school on the transition to homogamous and upward marriages for the highly educated: this confirms the catch-up process of those who study longer, meet in the educational system and as soon as they finish they marry. This study takes into account also other characteristics (such as those concerning the family of origin). Overall, Bernardi states that the in Italy the hypotheses of a decreasing level of homogamy and of more openness in the marriage market drawn by the modernisation theory are not confirmed. On the other hand, the increasing segmentation of the marriage opportunities is in accordance with the existence of different levels of education. The increasing homogamy for the highly educated increases also the inequalities across household, given both partners' socio-economic resources pooling effects. Moreover these inequalities may also increase along the life course of the individuals given the reciprocal support and benefit in improving their position in the labour market (Bernardi, 1999[15]; Bernasco et al., 1998[16]).

In comparison to the study just cited concerning educational homogamy (Bernardi, 1999[15]), our work here focuses on a different survey sample, on younger birth cohorts (born after 1955) and it includes also the region of birth as covariate. Besides that, we also want to evaluate the impact of the marriage squeeze introduced as a time-varying covariate on individual life courses. As we will show later, we only consider two origin and two destination states, and expect to find increasing homogamy for the highly educated across cohorts. As regards the effects of the squeeze we expect an strong negative effect for the low educated (which is anyway composed by a decreasing proportion of individuals). In particular, low educated men represents a fairly disadvantaged group for which is not clear whether the increase in the squeeze (a male advantage) could turns out to have a speeding effect on lateral or upward marriages. The impact of the squeeze against women for high educated men, should be positive in every direction, especially lateral; on the other way round, for highly educated women, we expect to find a negative impact for marriages in every destinations, especially for the lateral (so they are forced to marry down).

Thus, we look at, as for the previous two homogamy aspects, the trends in educational homogamy by sex and cohort. In addition, our models will also attempt to evaluate the effect of the marriage squeeze on the chances to marry upward (hypergamy), lateral (homogamy) and downward (hypogamy). We expect that the worsening of the marriage market conditions against women will affect especially homogamous and upward mobility. Lower educated men and women, should suffer for their very disadvantageous positions. Worsening marriage market conditions for the women will then worsen the marital conditions of hypergamous marriages and will let unchanged the marital opportunities of those marrying homogamously. Women are expected to be negatively affected, especially in upward marriages.

5.3 An event history approach to homogamy

In order to study the pattern of homogamy in Italy, the life courses of the individuals that eventually marry have been linked: for every wife/husband, still in his/her first marriage at survey time, we attach the information regarding her/his partner's traits at marriage time. In particular we link the two records as concerns their age at marriage, their region of birth and their level of education.

Evidently, while age differences between partners as well as region of birth differences do not vary along their life courses, the level of education achieved at the time of the survey could be different (in particular higher) than the ones at marriages. Although there could be people that decide to interrupt studying in order to marry, in Italy the normative model is characterised by a quite strong sequence of stages which comprises the end of education as one of the main steps. In particular, for men, end of education seems to be a highly appreciated prerequisite while women are maybe slightly more prone to postpone after marriage the end of their study. If this is the case, given that we assume the level of education of the partner being the one observed at survey time, we would overestimate the education attained at marriage, especially for women and this could underestimate homogamy in each directions. However, from previous researches the normative models has emerged as the prevalent one in Italy (Billari, 1998[18]; Pinnelli and De Rose, 1995[145]; Blossfeld and De Rose, 1992[22]).

It is necessary to observe that, as concerns homogamy, we only rely on once-married individuals, still in their first union at the time of the survey (table 5.1). Individual with past experience of first marriage and no longer into a union (that means separated, divorced and widowed) are excluded from the analysis: given that no information about their previous partner's traits are available (table 5.2). Yet,

Table 5.1: Individuals under study by sex and marital status (percentage distribution)

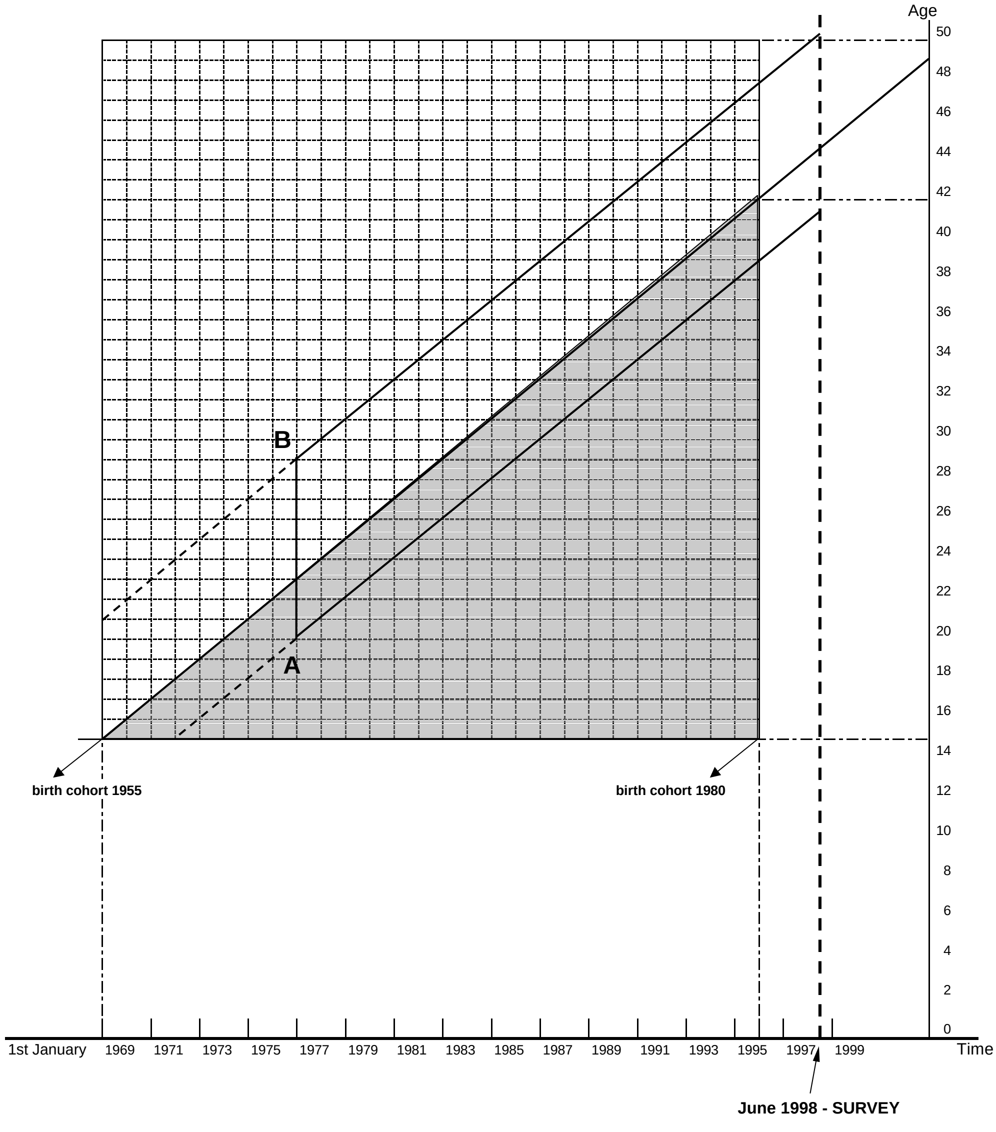
	men	women	
Unmarried	342	238	580
Married	4539	5459	9998
	4881	5697	10578

Table 5.2: Married men and women under study by sex and birth cohort (percentage distribution)

Birth cohort	men	women
1955-59	43.7	35.8
1960-64	37.7	39.1
1965-69	18.6	25.1
tot	100.0	100.0
n	*4539*	*5459*

samples of intact married couples maybe biased if the 'selection' out of marriage (and out of the sample) through divorce and mortality is associated with marital heterogamy. For instance, a problem in assessing age heterogamy is that differential male mortality in husband-older marriages downwardly biases the measured prevalence of husband age-ascendant marriages. Heterogamous marriages also are more likely to end in divorce. Observed marital homogamy may thus increase with duration of the marriage and age, as heterogamous marriages are differentially removed from the sample through divorce. Fortunately, any bias will have a conservative effect on the results; they will minimise rather than accentuate the likelihood of finding age-at-marriage effects on heterogamy. Moreover, it should be observed that we only look at cohort born after 1955 and this means that our sub-sample is restricted to woman and men who married up to their 41 in 1995 birthday (figure 5.1). As regards mortality, we can expect a low effect for those ages, and as regards divorce, Italy still have low total divorce rates. The pattern of homogamy will be evaluated by accounting also for the marriage squeeze conditions: this is included as a time-varying covariate of the transition into first marriage. It is worth to note that we study the life courses A included in the grey area in figure 5.1, even when the current partner B is out (because older) of the observation area. Indeed the link between A-B partners traits (age, region of origin, education) has been accomplished

Figure 5.1: Linkage between partners' traits on the observation area



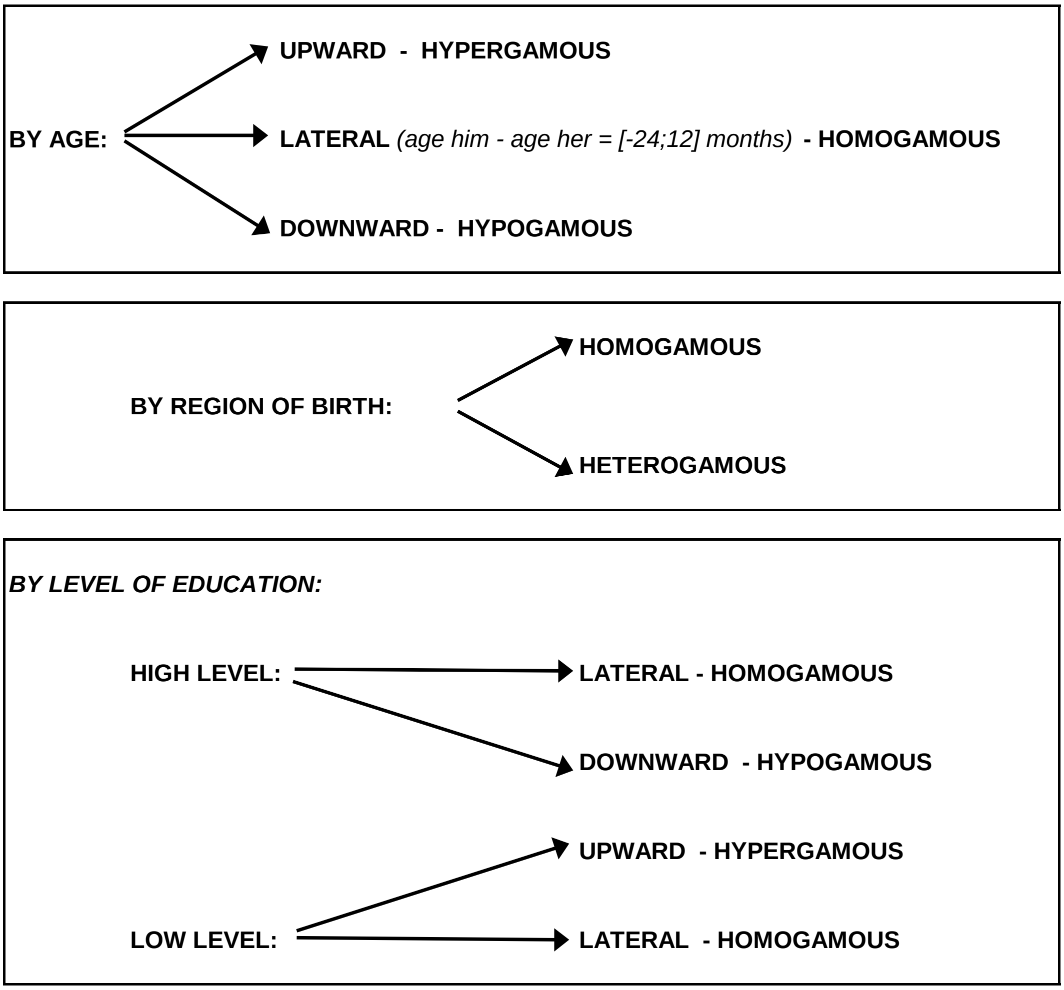
A and B are partners that marry in a given point in time. Their life-courses are linked at the time of their marriage. Only A will be include in the analysis, as s/he belongs to the grey area for which we have the possibility to include the squeeze effect. Thus A maintains the information concerning age, region of birth, level of education of the partner B.

before selecting for the cohort born after 1955 and younger than 41 in 1995.

Then the analysis is conducted in two steps. The first provides a description by sex and birth cohorts of the homogamy pattern by using the Nelson-Aalen estimator of the integrated hazard function. The second part of the analysis aims at modeling the transition rates to the alternative destinations by sex. The covariates we are going to include in the models are: birth cohort (only the cohorts 1955-59, 1960-64 and 1965-69 are included), region of birth, and a time-varying covariate expressing the conditions of the marriage market.

The destinations that we consider depend on the type of homogamy we are studying. To exemplify, in figure 5.2 we report the sketch of the multiple destinations we are going to present here. Each individual A will have the opportunity to marry B in one of the alternative destinations, according to its origin state. In figure 5.2 we exemplify the multiple possible destinations that A is going to face. As we can see in studying age homogamy between partners we calculate the age difference for those married (in months) and we distinguish among three possible destinations. Age is a continuous variable, and we assume that one can always marry someone older/younger than her/himself; therefore we leave open the upward and the downward age interval. In this way we allow for the 3 alternative destinations: marrying upward (the partner is older: hypergamy), lateral (the partner is about the same age; homogamy) and downward (the partner is younger: hypogamy). Age homogamous couples are here defined as those where the age difference among partner is such that she is older than him of at most one year or he is older than her of 2 years. The second case (figure 5.2) consists in studying by homogamy place of origin: here we look at the region of birth of both partners. Region of birth is a qualitative variable. Here we have that each individual can either marry a parter born in the same region (homogamy) or marry a partner coming from a different place of birth (heterogamy). Of course, we exclude all respondents who are born abroad. Lastly, our concern is in studying homogamy by educational attainment. Apart from the lack of information concerning the year of end of studying, another crucial problem rises in adopting a particular classification of education. Given that the level of education attained distinguishes individuals along a ladder, it is relevant to consider the step where one is located. Table 5.3 reports men and women in their

Figure 5.2: Sketch of the multiple destinations by age, region of birth and level of education



first marriage, by level of attained education at the time of the survey. As can be noted, only a very small percentage of individuals have a level of education lower than the primary education (less than 10% of men and women). The educational distribution that we adopt here is the following (table 5.4): low education includes no and primary education (*scuola elementare*) and lower secondary education (that is the compulsory school *scuola media*) and, high education encompasses all higher levels of education, including vocational, technical and general school (2-3 or 4-5 years), university (2-3 or 4-5 years), masters and PhD. Therefore, we adopt a very simple classification by mainly dividing individuals between those who studied up to the compulsory school (an amount of time equals to 8 years at most) and those who studied longer than that, attaining a further level of education. Of course, the

Table 5.3: Percentage distribution of married men and women aged 15+ and born in 1955-69 by educational level distribution

Level of attained education:	men	women
PhD	0.8	0.3
University degree (4-5 yrs)	6.6	6.5
Intermediate university degree (2-3 yrs)	0.9	1.4
Upper secondary (4-5 yrs)	30.8	33.2
Upper secondary (2-3 yrs)	9.5	10.3
Lower secondary education	43.6	38.9
Primary education	7.0	8.9
no education - able r/w	0.6	0.5
no education - not able r/w	0.2	0.1
total	100.0	100.0
n	*4539*	*5459*

Table 5.4: Percentage distribution of married men and women aged 15+ and born in 1955-69 by the educational level used in the analysis

Level of attained education:	men	women
> Lower secondary (8+ yrs schooling)	48.7	51.7
<= Lower secondary (max 8 yrs schooling)	51.4	48.3
total	100.0	100.0
n	*4539*	*5459*

possible destinations that these groups are going to achieve are different. Everybody can marry homogamously according to education (that means a lateral movement involving a partner in the same level of education); in addition, low educated can marry up (if the partner studied longer) and high educated can marry down (if the partner studied shorter) (figure 5.2).

5.4 Marriage opportunity and homogamy trends

A general description of the trends in homogamy for men and women is here presented (figures 5.3, 5.4, 5.5, 5.6) by using the Nelson-Aalen estimator of the integrated hazard function. The transition rate for a single episode can naturally be extended in the presence of several destinations. The transition-specific hazard function is defined as:

$$r_k(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t, D = k | T \geq t)}{\Delta t} \qquad k = 1, \ldots, K. \qquad (5.1)$$

The corresponding cumulative hazard function for the multiple destinations case is given by:

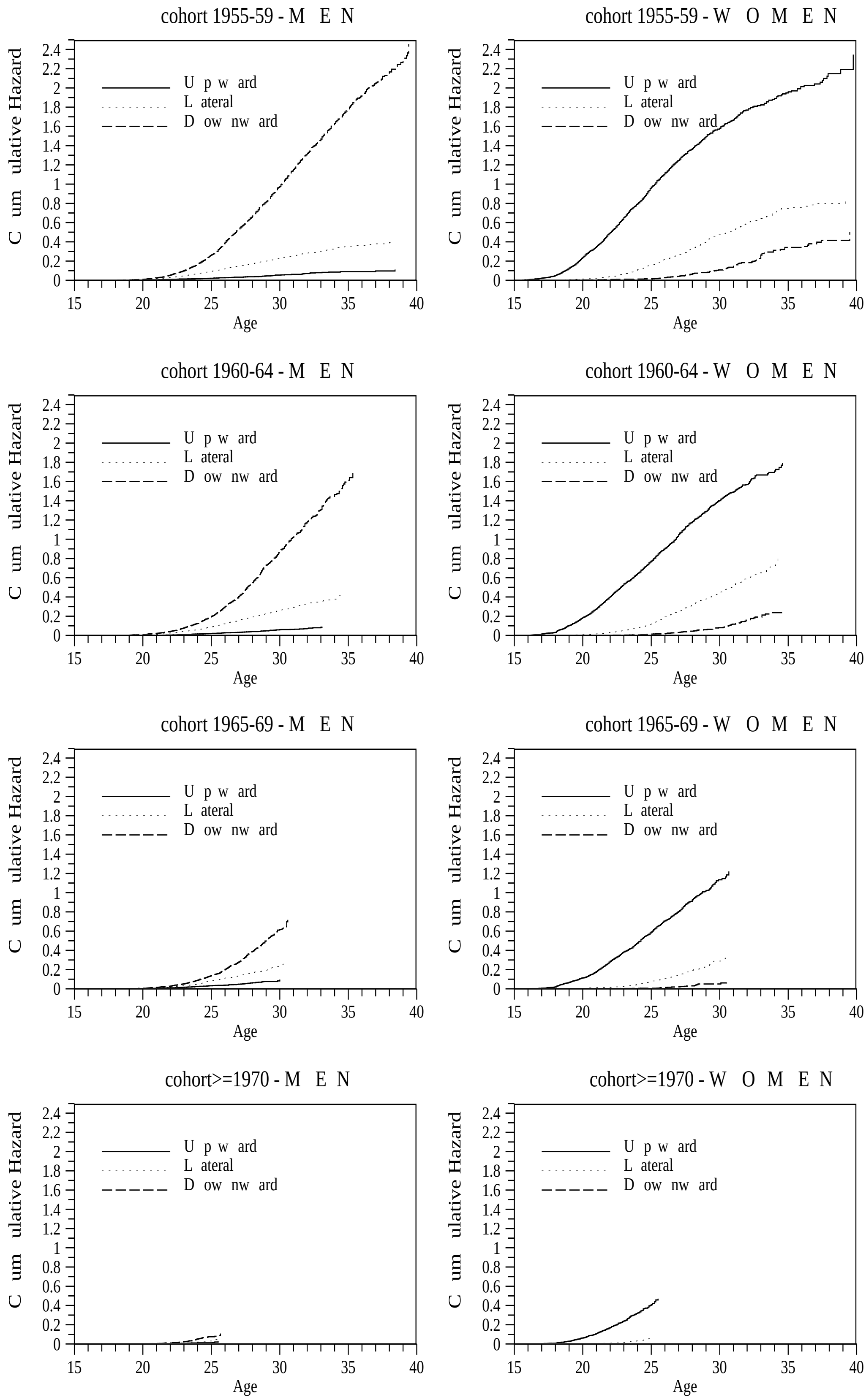
$$H_k(t) = \int_0^t r_k(\tau)d\tau \tag{5.2}$$

The cumulative hazard function is obtained by the Nelson-Aalen estimator (Pötter and Rohwer, 1999[95]). Cumulative hazard functions represent, at each point in time, the integral of the transition rate referred to each competing risk. In each instant the additive contribution to the cumulative transition rate is either zero or equal to number of event/subjects at risk. Therefore the estimated cumulative transition rate is represented by an increasing step function with jumps at each distinct event occurrence. Its interpretation is as follows: periods in which the instantaneous rate keeps fairly constant correspond to linear increments of the cumulative hazard curve. Conversely, a non-linear increment will be observed when the rate increases or decreases. For example, we can roughly estimate the rate, as the slope approximating the curve in that period (Marubini and Valsecchi, 1995[131]). This is because, formally, the derivative of the cumulative hazard function in each time point is the rate. Each cumulative hazard function is sensitive to either the occurrence of the event and to the occurrence of the competing events. Therefore a diminution in the slope is partly due to the decrease in the propensity to marry and to the propensity to marry according to the other alternative destinations.

5.4.1 Homogamy by age

Comparing men and women across cohorts as regards age homogamy, it is possible to see that the prevailing model of marriage, over all the cohorts under study, is the traditional one with an older husband (figure 5.3). In particular, men who marry younger women (downward) enter at about age 20 and since age 25 experience a constant rate of transition to marriage while women marrying upward experience a quick increase in the transition rate first, and then a diminishing effect. Men who marry lateral, to women of approximately the same age group, enter marriage at about the same moment of men who marry down, while the very few men who marry up, enter later into union. As concerns women, those who marry upward enter earlier into this kind of 'traditional' union when compared to homogamous and, above all, downward women.

Figure 5.3: Homogamy by age: cumulative hazard function by sex, cohort of birth. ITALY

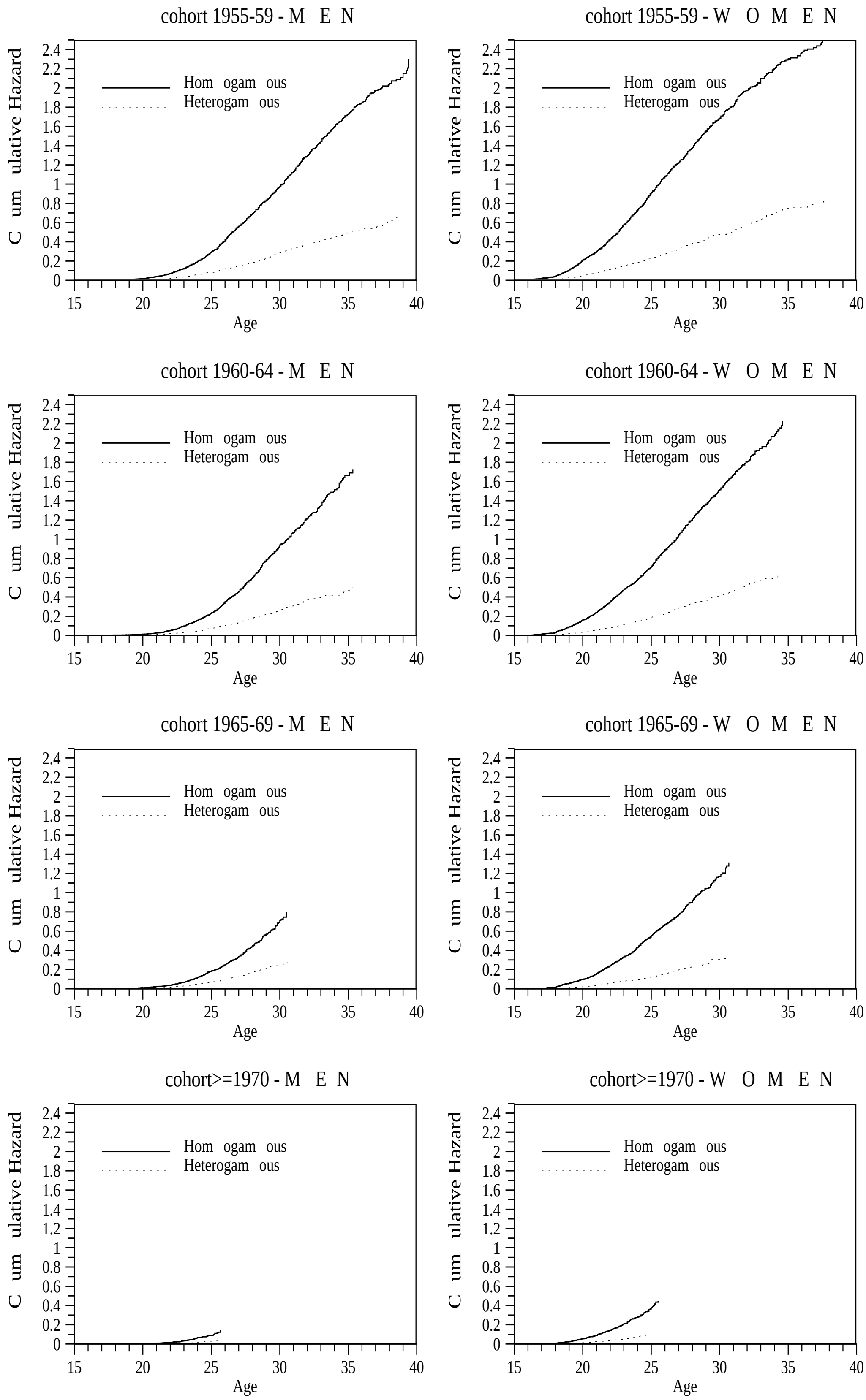


When we look at the dynamics across cohorts we note that the cumulative hazard rate for the downward movement of men at age 30 decreased from 0.98 for the 1955-59 cohort, to 0.88 for the 1960-64 cohort and down to 0.62 for the 1965-69 cohort. This decrease is also accompanied by a slight increase of the upward movement: the integral of the transition rate to wife-older marriages passed from 0.06 for the oldest cohort to 0.10 for the cohort 1965-69. This means a relative decrease of the transition rate for the traditional downward age destination and a slight increase of the 'atypical' mates characterised by women older than their men. As regards women, it worth noting that lateral transitions occur later than upward ones and, again, downward movements occur even later than the lateral ones. This is because women who marry young reflect the preference for an age gap with the partner larger than 2 years, while older women are more prone to marry men of approximately the same age or even younger. While for men we could notice an increase in upward marriages across cohorts, it is not possible to say much about women who marry down: in order to see this, we need them to become older so to include younger men. Indeed, it is also interesting to note the shift in the cumulative hazard for downward marriages around age 33, for the oldest cohort of women (born in 1955-59). The step suggests that there was a sudden increase in the downward transition rate. Caution should be used in assessing an increment in the proportion of those experiencing marriage, because when the exposed to risk are relatively few, the occurrence of small number of events may be magnified in the graphical representation of the rate.

5.4.2 Homogamy by place of origin

Let us now look at the dynamics of homogamy by place of origin. The graphs are reported in figure 5.4. Men and women marry more often someone coming from the same region of birth: the cumulative hazards, of homogamous marriages is linearly increasing for both sexes, meaning a constant rate of transition to first marriage to a partner born in the same region. At age 30 the homogamous cumulative hazards declines over the cohorts: for men born in 1955-59 it is 0.97, then it reaches 0.94 for the birth cohort 1960-64 and 0.71 for those born in 1965-69. In the same way the cumulative rate for homogamous marriages for women is around 1.7 for those

Figure 5.4: Homogamy by place of origin: cumulative hazard function by sex, cohort of birth. ITALY



born in 1955-59, it then declines to 1.5 for the following birth cohort (1960-64) and it eventually reaches 1.2. Also the pattern of heterogamous marriages declines: for male cohort, at about age 30 the cumulative hazard equals 0.29 for those born in 1955-59, then it reaches 0.26 in the following birth cohort, and then declines down to 0.25. Also women experience a decline: the older birth cohort had a cumulative hazard of 0.48 at age 30 and it reaches 0.41 and then 0.31. Overall, the falling down of nuptiality, as observed in previous chapters, is also accompanied by a reduction in marriages by place of origin, in both directions. Nevertheless, the decline in homogamous marriage appears to be much faster than the decline in marriage rates for couples of partners coming from different regions of birth.

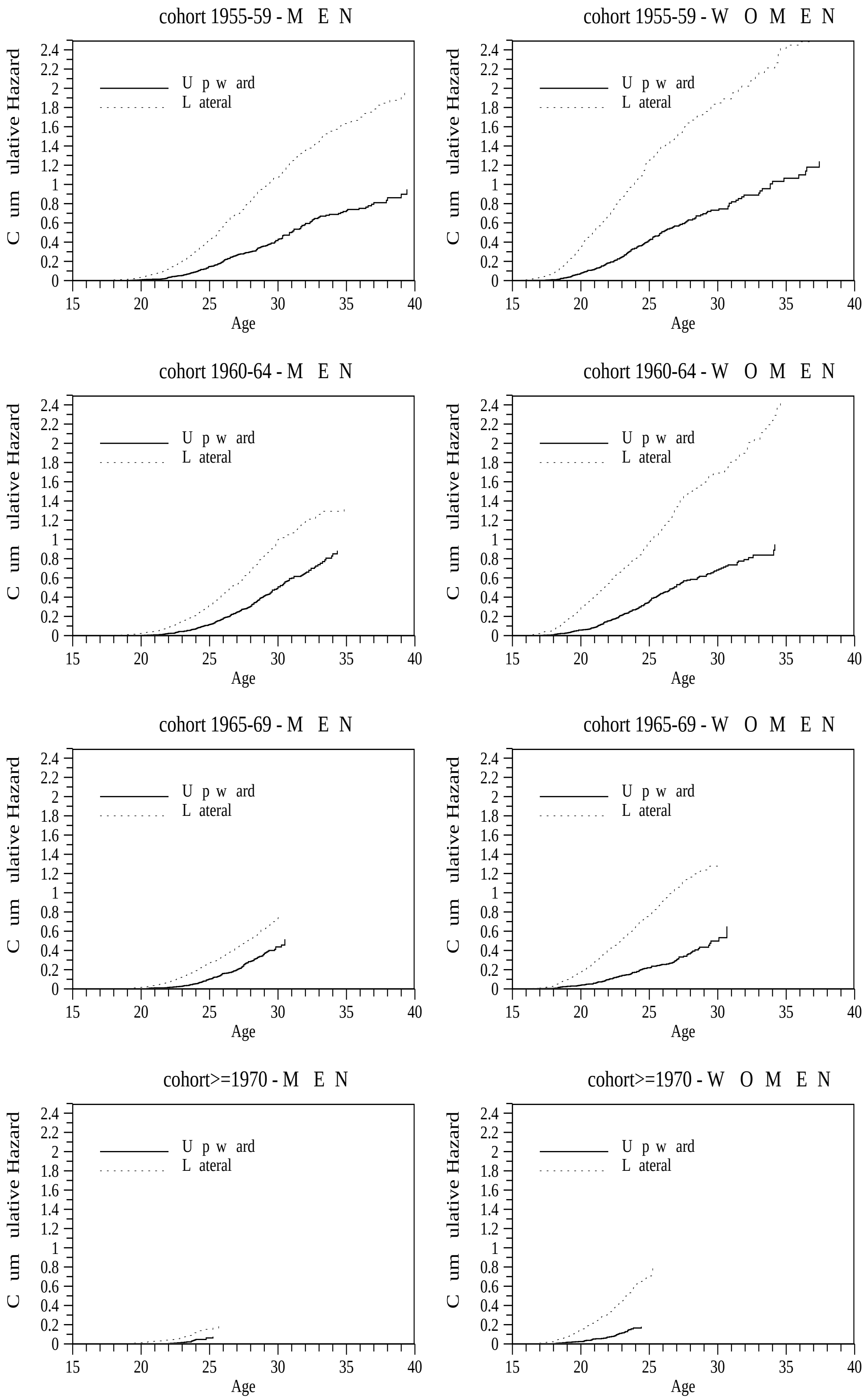
5.4.3 Homogamy by level of education

As regard homogamy by level of education, there are 2 separated cases.

Let us start with the descriptive analysis of those with a *low level of education* (figure 5.5). The group under study is composed by those who attained the compulsory school: here we have 48.7% (i.e. 2331) of all married men and 51.7 % (i.e. 2638) of all married women (table 5.4). The oldest cohort (1955-59) presents a linear increase of the slope referred to lateral marriages, while, the slope describing marriages with a higher educated partner is a non-monotonic one. Across cohorts it is possible to envisage a reduction in the level of the cumulative rate at any age and for both sexes. The only exception is represented by men born in 1960-64 moving upward. This birth cohort (1960-64) shows an increase for men in the slope of upward marriages and a slight decrease in the lateral. At age 30 the 1960-64 birth cohort in comparison to the 1955-59 has an increase the cumulative hazard from from 0.43 to 0.51 and a decrease in the lateral one (from 1.1 to 1 at age 30) for men. However, the following birth cohort shows a decline in the cumulative hazard both in upward and lateral movements for men (reaching 0.44 and 0.74 respectively).

Women experience a decrease from the first to the second birth cohort in the cumulative hazard referred to lateral movement (i.e. to a same education husband): the slope of the curve for lateral marriages describes a constant transition rate up to about age 25, and then it indicates a slight decrease in the speed of the transition rate. The following birth cohort (1960-64) is instead characterised by a slightly

Figure 5.5: Homogamy by level of education: cumulative hazard function by sex, cohort of birth. Up to compulsory school - ITALY



faster transition to first marriage to men with the same educational attainment starting from age 18. However, at age 30 the level of the cumulative hazard for lateral marriages is 1.84, 1.69 and 1.28 for the birth cohort 1955-59, 1960-64 and 1965-69 respectively. In the same way also the slope of the curve referred to upward marriages decreases over time: it is about 0.73 at age 30 for the 1955-59 cohort and it falls to 0.68 and 0.50 for the birth cohort 1-60-64 and 1965-69 respectively.

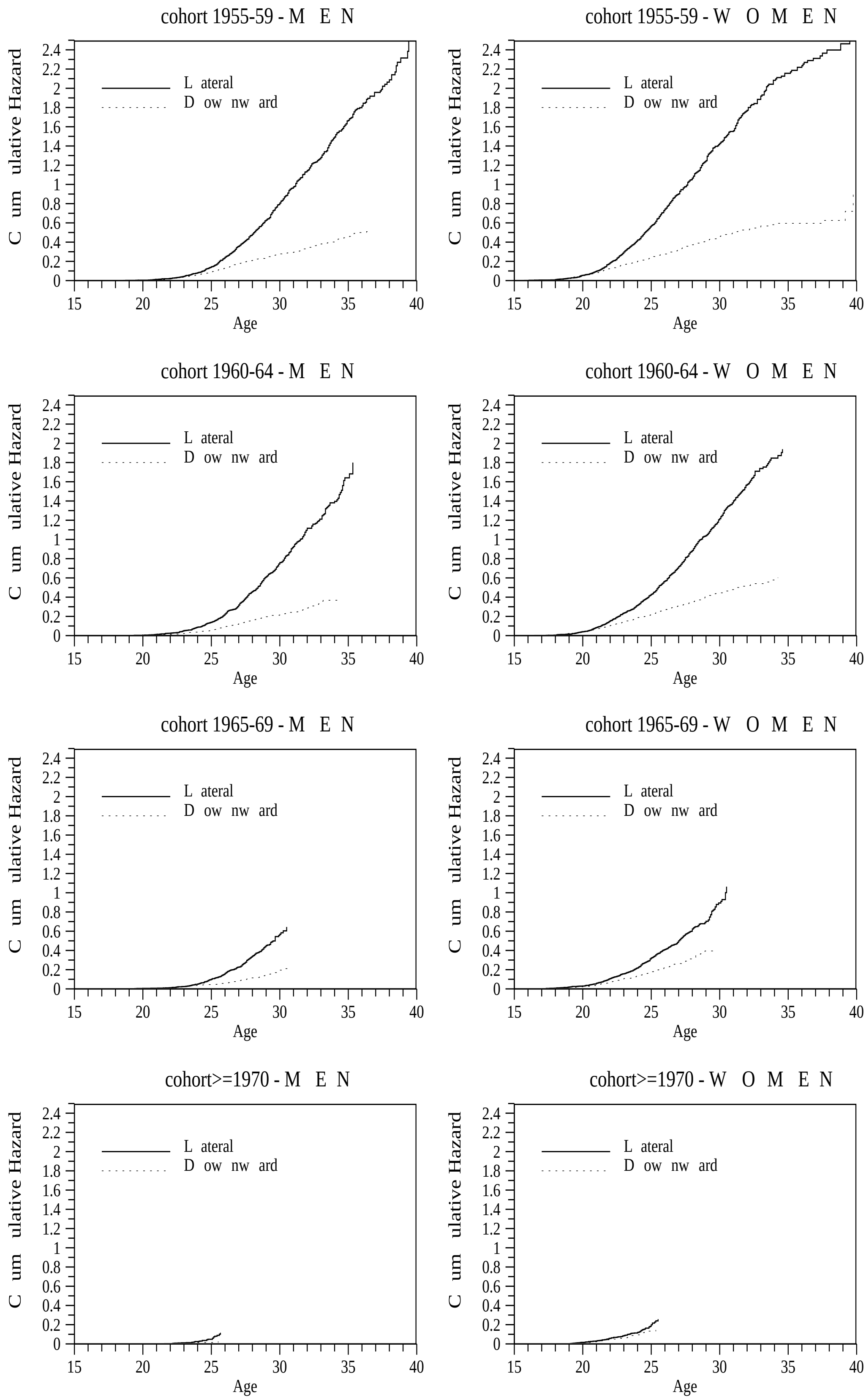
The second group of analysis is composed by those with *high education*: here there are 51% of married men and 48.3 % of married women (table 5.4). They face the possibility to marry someone with the same or lower level of education. Despite the reduction of the level of the curves across cohorts, homogamous couples with high education prevail. At age 30 the cumulative hazards has declined for men, from 0.81 for the 1955-59 cohort to 0.76 for the 1960-64 cohort, down to 0.57 for the 1965-69. Female cumulative hazards for lateral movements has declined as well from 1.43 to 1.22, down to 0.89. However it should be observed that the deepest reduction of the curve, occurring between the second and the third cohort for men in lateral movements, is also accompanied by a small reduction of the in the curve referred to downward marriages. Downward marriages have declined less, considered that the cumulative hazards for women have decreased a little from the birth cohort 1955-59 (0.46) to the birth cohort 1960-64 (0.44). It is worth to note, that to observe downward marriages for women it is necessary to have a longer period of observation. We can argue an increasing pattern but it can not be said much more at the moment.

Overall, for highly educated, a reduction of the slope towards lateral and downward marriages can be envisaged across cohorts, even though downward marriages show a slow down for both sexes.

5.5 Modeling homogamy

As we already said in the introduction to this chapter, our second step consists in studying the pattern of homogamy and its dynamics by using semi-parametric event history models. This implies modeling the destination-specific hazard as a function of a covariates vector: $\mathbf{X}_1$ for the birth cohort (with dummy coding), $\mathbf{X}_2$ for the region of birth (with dummy coding) and $\mathbf{X}_3$ for the marriage market conditions

Figure 5.6: Homogamy by level of education: cumulative hazard function by sex, cohort of birth. Higher than compulsory school - ITALY



(unidimensional value as a continuous variable):

$$r_k(t) = r_{0k}(t)\exp(\beta_{1k}\mathbf{X}_1 + \beta_{2k}\mathbf{X}_2 + \beta_{3k}\mathbf{X}_3) \tag{5.3}$$

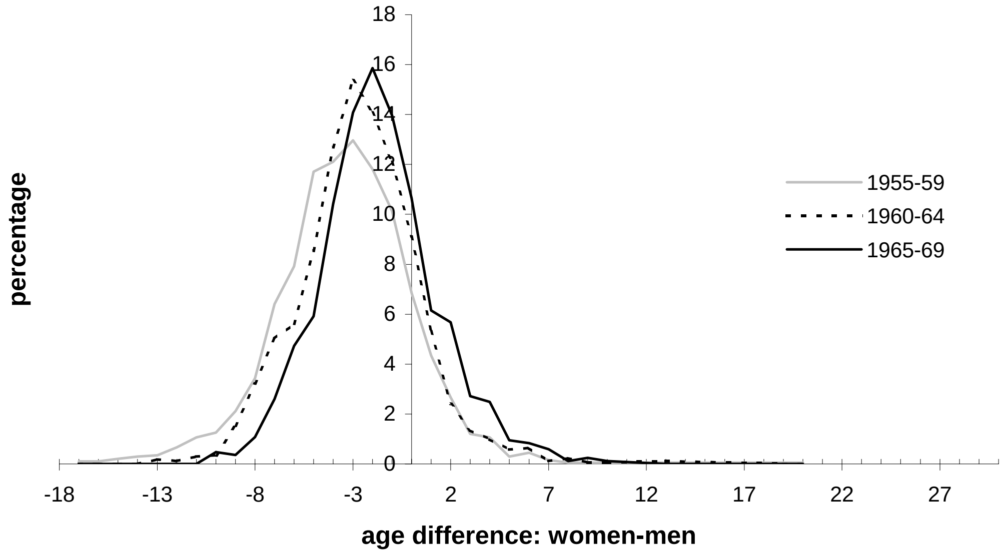
This is a straightforward extension of single transition semi-parametric model used in the previous chapter; however it is worth noting that both the baseline r_{0k} and the vector of regression coefficients β_{ik} are now specific to each destination. The baseline function is the the hazard function of an individual with all covariates of value zero and in this case is referred to an individual born in 1955-59, in Piedmont and in a balanced marriage market. Following the sketch given in figure 5.2 we perform multiple destination models on the rate of marrying a partner with given traits. The case of educational homogamy will need to distinguish, as we did in the descriptive analysis, two different models each of them referred to the same set of individuals.

The approach that we follow is fairly new in the panorama of the techniques of analysis used in studying homogamy. Recently, event history analysis has been applied in particular to study homogamy by educational level, but less attention has been paid to the dynamics of age and place of origin homogamy. As far as the review of the literature we presented is concerned, we note that only few attempts have been made to include a compositional factor in the analysis of homogamy. In our case, it represents the yearly imbalances of the marriage market of the region where individuals were born.

5.5.1 Homogamy by age

In section 5.3 we said that, to compare partners' age, we have that each individual may marry in one of the three possible destinations: i.e. s/he can marry a older (upward), same-age (lateral) or younger (downward) partner. Focusing on the birth cohorts born between 1955 and 1965, table 5.5 summarises the frequencies for each direction of age homogamy by sex: it emerges that, for women, the proportion of hypergamous marriage declines a little bit and then it rises; for men, either homogamous and hypergamous marriages have increased. The distribution of the age differences for men and for women is reported in figures 5.7 and 5.8: the frequency of marriages with lower age difference rises. The age-partner difference over time appears more stable when we look at women. We should note that the difference

Figure 5.7: Age differences between partners; by married men, cohorts 1955-69 - ITALY



between the two cases is due to the fact that, if we select married individuals born in the cohort 1955-69, we observe a slightly higher frequency of married women (5459) than of married men (4539). Therefore, men much older than their women are slightly under-represented. In tables 5.6 and 5.7 we report the Cox models for multiple destinations, with birth cohort and region of birth as covariate (Model 1) and we add the effect of the squeeze in the lower part (Model 2). The measures of the marriage market (S, I and I_{freq}) introduced in the previous chapter have been used in alternative models, but, as they yield the same results we only present the outcome referred to the model with the best BIC (Model 2 in all tables differs from Model 1 for the addition of the effect of the squeeze). In particular as concerns the age difference between partners the measure of the marriage market conditions here adopted for men is the one based on S the Schoen index and for women is the one based on the measure I. For the sake of simplicity, we do not present the estimation of the Cox models based on the other two measures, but the choice was checked on the basis of the lowest BIC statistics.

Men born in 1960-64 have almost the same competing risk to marry upward and lateral as those born a bit earlier (cohort 1955-59): the younger cohort has slightly slower transition to downward marriages (i.e. to marriage to a younger woman) than those born in 1955-59 (table 5.6). With respect to the reference cohort (1955-

Figure 5.8: Age differences between partners; by married women, cohorts 1955-69 - ITALY

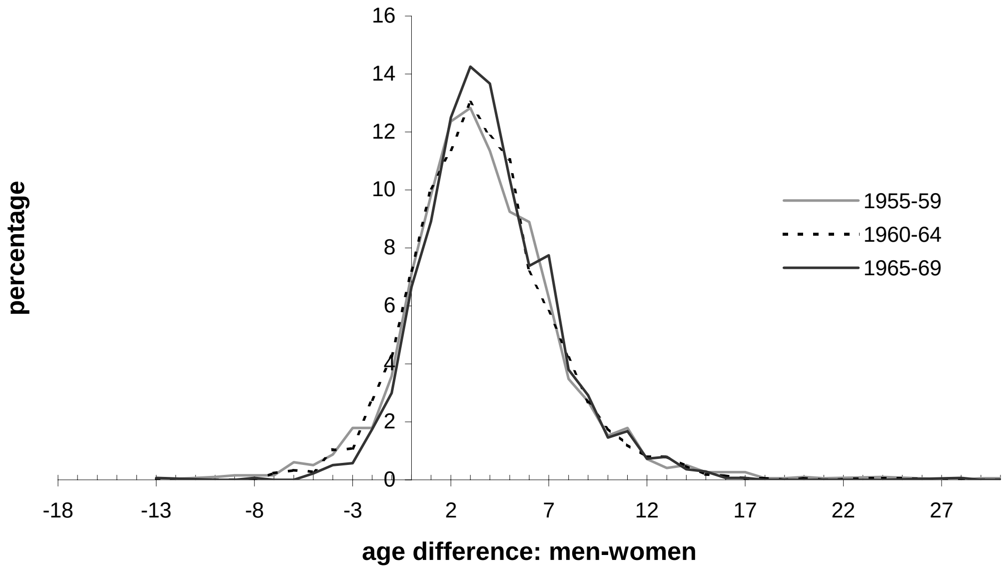


Table 5.5: Frequencies distribution of the married individuals by birth cohort, age homogamy, and sex (row percentages)

Birth cohort	WOMEN hypogamous	homogamous	hypergamous	Total	*n*
1955-59	4.4	22.3	73.4	100.0	*1956*
1960-64	3.0	24.3	72.7	100.0	*2135*
1965-69	1.5	20.3	78.2	100.0	*1368*
					5459

Birth cohort	MEN hypogamous	homogamous	hypergamous	Total	*n*
1955-59	60.7	33.2	6.2	100.0	*1982*
1960-64	52.9	40.6	6.5	100.0	*1712*
1965-69	39.6	46.6	13.7	100.0	*845*
					4539

Table 5.6: Multiple destinations for homogamy by age; Cox models' estimations-MEN

MODEL 1:

	UPWARD			LATERAL			DOWNWARD		
Variable	Coeff	S.E.	Signif (1-p)	Coeff	S.E.	Signif (1-p)	Coeff	S.E.	Signif (1-p)
Birth cohort (base=1955-59)									
1960-64	-0.0019	0.1545	0.0097	0.0965	0.0743	0.8063	-0.1305	0.0390	0.9992
1965-69	0.4423	0.1584	0.9948	-0.0285	0.0868	0.2575	-0.4908	0.0523	1.0000
Region of birth (base=Piedmont)									
Vaa	0.1574	0.5092	0.2428	0.0994	0.2741	0.2832	-0.4615	0.1932	0.9831
Lom	0.1291	0.3146	0.3184	0.0583	0.1672	0.2728	-0.0742	0.0967	0.5573
Taa	0.0455	0.3771	0.0960	0.0278	0.1985	0.1116	-0.0926	0.1143	0.5823
Ven	0.1891	0.3299	0.4335	-0.0869	0.1853	0.3610	-0.0521	0.1020	0.3907
Fvg	-0.4243	0.5088	0.5957	-0.1888	0.2442	0.5606	-0.0593	0.1285	0.3556
Lig	0.3802	0.3986	0.6598	0.2549	0.2177	0.7584	-0.2124	0.1404	0.8696
Tos	0.2438	0.3486	0.5158	0.3055	0.1776	0.9146	-0.0199	0.1071	0.1476
Umb	0.4860	0.3689	0.8123	0.0274	0.2178	0.1002	-0.1840	0.1290	0.8462
Er	-0.2603	0.3989	0.4860	-0.1660	0.2015	0.5900	-0.3856	0.1165	0.9991
Mar	-0.4565	0.4491	0.6906	-0.0735	0.2060	0.2787	-0.0579	0.1137	0.3891
Laz	-0.1507	0.3772	0.3105	0.0583	0.1853	0.2468	-0.0150	0.1045	0.1142
Abr	-0.1486	0.4123	0.2814	-0.1232	0.2135	0.4362	0.2624	0.1061	0.9866
Mol	-0.2671	0.4492	0.4478	-0.2222	0.2306	0.6646	0.0863	0.1168	0.5399
Cam	0.0970	0.3265	0.2337	0.0968	0.1698	0.4316	0.2939	0.0909	0.9988
Pug	0.2703	0.3146	0.6097	-0.1016	0.1776	0.4325	0.3707	0.0896	1.0000
Bas	-0.3598	0.4749	0.5513	-0.0761	0.2250	0.2649	0.0645	0.1184	0.4142
Cal	-0.2022	0.3688	0.4165	-0.0578	0.1837	0.2471	0.2190	0.0947	0.9793
Sic	-0.0713	0.3432	0.1645	0.2189	0.1667	0.8109	0.3327	0.0911	0.9997
Sar	-0.3902	0.4288	0.6372	0.1842	0.1881	0.6725	-0.0108	0.1102	0.0779
n.param.	63								
n.events	4539								
Log-like.	-35726.1								

MODEL 2:

	UPWARD			LATERAL			DOWNWARD		
Variable	Coeff	S.E.	Signif (1-p)	Coeff	S.E.	Signif (1-p)	Coeff	S.E.	Signif (1-p)
Birth cohort (base=1955-59)									
1960-64	-0.0012	0.1559	0.0061	0.0825	0.0751	0.7282	-0.1061	0.0413	0.9898
1965-69	0.4453	0.1845	0.9842	-0.0952	0.1020	0.6496	-0.4216	0.0651	1.0000
Region of birth (base=Piedmont)									
Vaa	0.1540	0.5202	0.2328	0.1675	0.2789	0.4518	-0.5255	0.1967	0.9925
Lom	0.1286	0.3149	0.3170	0.0691	0.1674	0.3205	-0.0836	0.0969	0.6122
Taa	0.0477	0.3833	0.0990	-0.0198	0.2022	0.0782	-0.0535	0.1164	0.3544
Ven	0.1900	0.3311	0.4339	-0.1058	0.1859	0.4306	-0.0360	0.1024	0.2749
Fvg	-0.4237	0.5092	0.5947	-0.2049	0.2445	0.5980	-0.0498	0.1286	0.3016
Lig	0.3812	0.3998	0.6596	0.2329	0.2184	0.7138	-0.1944	0.1408	0.8327
Tos	0.2419	0.3537	0.5061	0.3446	0.1804	0.9439	-0.0545	0.1088	0.3835
Umb	0.4836	0.3766	0.8009	0.0748	0.2211	0.2649	-0.2291	0.1315	0.9186
Er	-0.2614	0.4002	0.4863	-0.1427	0.2023	0.5193	-0.4051	0.1170	0.9995
Mar	-0.4584	0.4530	0.6884	-0.0343	0.2084	0.1307	-0.0924	0.1154	0.5770
Laz	-0.1551	0.4011	0.3010	0.1491	0.1992	0.5459	-0.0942	0.1135	0.5932
Abr	-0.1513	0.4209	0.2807	-0.0700	0.2177	0.2522	0.2136	0.1096	0.9488
Mol	-0.2667	0.4493	0.4472	-0.2336	0.2308	0.6885	0.0930	0.1168	0.5741
Cam	0.0962	0.3274	0.2311	0.1120	0.1702	0.4896	0.2798	0.0912	0.9979
Pug	0.2680	0.3226	0.5940	-0.0534	0.1818	0.2310	0.3294	0.0925	0.9996
Bas	-0.3597	0.4749	0.5511	-0.0814	0.2250	0.2826	0.0690	0.1184	0.4399
Cal	-0.2013	0.3698	0.4139	-0.0800	0.1846	0.3353	0.2344	0.0951	0.9863
Sic	-0.0742	0.3553	0.1655	0.2788	0.1737	0.8917	0.2809	0.0955	0.9967
Sar	-0.3900	0.4288	0.6369	0.1797	0.1881	0.6606	-0.0061	0.1102	0.0443
SQUEEZE									
S	0.1263	3.9300	0.0256	-2.6283	2.1152	0.7860	2.2506	1.2590	0.9262
n.param.	66								
n.events	4539								
Log-like.	-35723.7								

df	3
Likelihood Ratio	4.747
p-value:	0.191

Table 5.7: Multiple destinations for homogamy by age; Cox models' estimations - WOMEN

MODEL 1:

Variable	UPWARD Coeff	UPWARD S.E.	UPWARD Signif (1-p)	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)	DOWNWARD Coeff	DOWNWARD S.E.	DOWNWARD Signif (1-p)
Birth cohort (base=1955-59)									
1960-64	-0.1580	0.0357	1.0000	-0.0672	0.0749	0.6303	-0.3409	0.1553	0.9718
1965-69	-0.4258	0.0397	1.0000	-0.5704	0.0922	1.0000	-0.6791	0.2132	0.9986
Region of birth (base=Piedmont)									
Vaa	-0.0752	0.1411	0.4059	0.1419	0.2601	0.4147	0.7748	0.5583	0.8348
Lom	-0.1272	0.0803	0.8866	-0.1940	0.1661	0.7571	0.7005	0.3850	0.9312
Taa	-0.1843	0.0971	0.9423	-0.0998	0.1941	0.3929	1.0173	0.4126	0.9863
Ven	-0.0799	0.0874	0.6391	-0.0216	0.1771	0.0969	0.2915	0.4498	0.4830
Fvg	0.0188	0.1061	0.1409	-0.5548	0.2656	0.9633	0.5307	0.4863	0.7248
Lig	-0.4490	0.1215	0.9998	-0.5063	0.2418	0.9637	0.8011	0.4414	0.9304
Tos	-0.1497	0.0928	0.8932	0.0226	0.1803	0.1000	0.4077	0.4497	0.6353
Umb	-0.1706	0.1092	0.8818	-0.2429	0.2225	0.7251	0.3857	0.4863	0.5723
Er	-0.2773	0.0965	0.9960	-0.3989	0.1956	0.9586	-0.1111	0.4718	0.1861
Mar	-0.0975	0.0967	0.6864	-0.0542	0.1955	0.2186	0.1933	0.5041	0.2986
Laz	-0.0471	0.0907	0.3963	-0.1853	0.1928	0.6635	-0.0460	0.5041	0.0726
Abr	0.1417	0.0934	0.8709	0.0705	0.1999	0.2758	0.0709	0.5581	0.1010
Mol	0.1749	0.1027	0.9113	-0.2164	0.2418	0.6294	0.7120	0.4864	0.8567
Cam	0.1310	0.0780	0.9070	-0.0801	0.1672	0.3679	0.0063	0.4413	0.0114
Pug	0.1208	0.0777	0.8797	-0.2245	0.1735	0.8044	0.2973	0.4219	0.5190
Bas	0.0947	0.1042	0.6363	-0.3044	0.2458	0.7845	0.2266	0.5579	0.3153
Cal	0.2526	0.0810	0.9982	-0.3748	0.1956	0.9446	0.3552	0.4280	0.5935
Sic	0.1441	0.0787	0.9328	0.0770	0.1648	0.3597	0.0795	0.4497	0.1403
Sar	-0.1578	0.0968	0.8971	0.0769	0.1830	0.3258	0.4176	0.4598	0.6363
n.param.	63								
n.events	5459								
Log-like.	-43288.6								

MODEL 2:

Variable	UPWARD Coeff	UPWARD S.E.	UPWARD Signif (1-p)	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)	DOWNWARD Coeff	DOWNWARD S.E.	DOWNWARD Signif (1-p)
Birth cohort (base=1955-59)									
1960-64	-0.1208	0.0369	0.9990	-0.0756	0.0759	0.6807	-0.3649	0.1675	0.9706
1965-69	-0.4434	0.0400	1.0000	-0.6088	0.1082	1.0000	-0.7334	0.2565	0.9957
Region of birth (base=Piedmont)									
Vaa	-0.0017	0.1419	0.0097	0.1829	0.2667	0.5072	0.8230	0.5715	0.8501
Lom	-0.1034	0.0805	0.8010	-0.1855	0.1666	0.7346	0.7081	0.3855	0.9338
Taa	-0.2666	0.0990	0.9929	-0.1256	0.1978	0.4746	0.9887	0.4193	0.9816
Ven	-0.1092	0.0877	0.7869	-0.0334	0.1780	0.1489	0.2758	0.4517	0.4585
Fvg	-0.0441	0.1072	0.3193	-0.5650	0.2660	0.9663	0.5267	0.4864	0.7211
Lig	-0.4879	0.1218	0.9999	-0.5200	0.2426	0.9679	0.7856	0.4433	0.9237
Tos	-0.0974	0.0936	0.7021	0.0436	0.1829	0.1884	0.4322	0.4543	0.6586
Umb	-0.1209	0.1098	0.7291	-0.2153	0.2261	0.6588	0.4256	0.4974	0.6078
Er	-0.2359	0.0969	0.9851	-0.3895	0.1961	0.9530	-0.1062	0.4720	0.1780
Mar	-0.0396	0.0977	0.3147	-0.0334	0.1979	0.1341	0.2176	0.5081	0.3315
Laz	0.0894	0.0961	0.6476	-0.1353	0.2063	0.4881	0.0116	0.5263	0.0176
Abr	0.2026	0.0944	0.9681	0.0999	0.2045	0.3748	0.1096	0.5673	0.1532
Mol	0.1448	0.1030	0.8404	-0.2215	0.2419	0.6403	0.7111	0.4865	0.8562
Cam	0.1512	0.0781	0.9470	-0.0706	0.1678	0.3259	0.0210	0.4430	0.0378
Pug	0.2019	0.0800	0.9884	-0.1983	0.1777	0.7354	0.3269	0.4290	0.5540
Bas	0.0895	0.1042	0.6094	-0.3073	0.2458	0.7888	0.2269	0.5579	0.3157
Cal	0.1998	0.0819	0.9853	-0.3860	0.1963	0.9507	0.3501	0.4282	0.5865
Sic	0.2368	0.0817	0.9963	0.1102	0.1719	0.4786	0.1202	0.4623	0.2051
Sar	-0.1577	0.0968	0.8968	0.0724	0.1831	0.3076	0.4133	0.4599	0.6311
SQUEEZE									
I	-8.0643	1.8755	1.0000	-2.9197	4.2993	0.5029	-3.3508	8.7966	0.2967
n.param.	66								
n.events	5459								
Log-like.	-43279.1								

df	3
Likelihood Ratio	18.991
p-value:	0.000

59), men born in 1965-69 experience a higher transition rate (coefficient equals to 0.4423 and significant) to marriages to an older woman and a reduction in marriage transition to a younger woman (the coefficient is equal to -0.4908 and it is significant). This means that, across cohorts, especially from that born in 1965-69, a less traditional model regarding age difference between partners emerges. The relative decrease of the transition rate for the traditional downward age destination, together with the slight rise in upward movements, has also emerged earlier in the descriptive analysis based on the cumulative hazard functions (figure 5.3). Across cohorts, men experience a change in the model characterising age difference in the couple. Traditionally husband-older couples prevailed. The decrease in the downward rate, together with the increase in the upward one indicates the existence of a dynamics across cohorts which, for men, moves towards less traditional age-gap between partners. As concerns the region of birth, a clear distinction between central and northern regions on one hand with the exception of Piedmont and southern regions on the other hand emerges: the rate of downward transition is particularly low for Valle d'Aosta, Liguria, Umbria, Emilia Romagna while it is fairly high in Abruzzo, Campania, Apulia, Calabria and Sicily (table 5.6). In the same way, upward marriages for men characterise northern regions, confirming that the traditional custom of older-husband couple is preferred by men born in the South.

The introduction of the marriage squeeze as a time-varying covariate confirms the male advantage in all directions: either downward and upward marriages increase (even though in the second case the coefficient is not significant). In particular the male advantage in the marriage market accelerates downward transitions (the coefficient is 2.2506) more than upward marriages (coefficient is 0.1263). However, for men the squeeze measure, although yielding the lowest BIC when using the Schoen index S (with BIC=6.224), does not improve Model 1. As a matter of fact, the likelihood ratio test makes Model 2 more preferable to Model 1.

As concerns women (table 5.7), the decline in the transition rate to first marriage towards all directions is very strong across cohorts. This reduction is particularly noticeable in the case of downward marriages, while upward and especially lateral marriages have declined a little less for women born in 1960-64 in comparison to those born 5 years earlier. Also the following birth cohort accentuated the same declining pattern in transition rates. The lowest rate for the birth cohort 1965-69 is the one referred to downward marriages (-0.6791), then to lateral (-0.5704) and lastly to upward (-0.4258). However, the biggest relative reduction occurs between the second and the third birth cohort in lateral marriages (to a man of about the same age): here the rate decreases from -0.0672 for the 1960-64 birth cohort, to -0.5704 for the 1965-69 birth cohort. In figure 5.3 we already stressed the deep decline in the transition rates of the women for every destination, especially for lateral movements.

Almost all regions of birth have homogamous (lateral) rate lower than Piedmont, while upward and downward movements highlight the prevailing role of traditional husband-older couple in the South and the rise in atypical mating in the North (especially in Trentino Alto Adige, Lombardia, Liguria and Valle d'Aosta, table 5.7). For women the measure of the squeeze adopted is the index I, with $BIC = -7.779$. It is the case to remind that the measure I is obtained by dividing the difference between male and female proportions ever married by their sum. An increase in the index of the imbalance I reduces the transition rate to first marriage for women, towards all directions. In particular the rate of experiencing an upward marriage (with an older husband) is lowered more than that for homogamous or downward marriage. This means that favourable conditions of the marriage market to men may create a postponement effect for women, especially to marry to an older husband.

In sum, men show a shift in the characteristics of the assortative mating model concerning the age of the spouse. Across cohorts, an increase of upward marriages as well as a decline of downward marriages have emerged. Conversely for women a shift from more traditional patterns is not evident, although the youngest cohort shows a slowing down of the typology of marriage to an older man. Regional differences stress the existence of a traditional model, based on a high age-gap in the South; in the North, on the contrary, men and women are more prone to age-balanced relationships.

5.5.2 Homogamy by region of birth

Homogamy by place of origin is studied by distinguishing the possibilities to marry a partner born in the same region or born somewhere else (figure 5.2, table 5.8).

Across cohorts there is a reduction in the proportion of heterogamous marriages for women, and an increase in heterogamous marriages for men. The trend by cohort

Table 5.8: Frequencies distribution of the married individuals by birth cohort, place of birth homogamy, and sex (row percentages)

Birth cohort	WOMEN		Total	*n*
	homogamous	heterogamous		
1955-59	78.27	21.73	100	*1956*
1960-64	78.92	21.08	100	*2135*
1965-69	80.19	19.81	100	*1368*
				5459

Birth cohort	MEN		Total	*n*
	homogamous	heterogamous		
1955-59	77.8	22.2	100	*1982*
1960-64	77.39	22.61	100	*1712*
1965-69	72.66	27.34	100	*845*
				4539

reported in the Cox model confirms a reduction of the marital behaviour for men (table 5.9). Although men born in 1960-64 have just a slight decline in comparison to the previous birth cohort, men born in 1965-69 have a slower transition to first homogamous marriage than the reference group (cohort 1955-59) (coefficient =-0.3842) and also a slower transition to heterogamous marriages (-0.1060). Thus, the decline in the propensity to marry a woman born in the same region is stronger than the decline in the propensity to marry a woman born in a different region. Traditional homogamous (by place of origin - endogamous) marriages are more affected by the decline over cohorts than heterogamous marriages.

From table 5.9 it emerges that some regions at the borders of the country or in a particular position experience a reduction in the rate of outmarriage if compared to Piedmont: this is the case for Trentino Alto Adige (-0.5984), Valle d'Aosta (-0.2458), both islands (especially for Sardinia, -0.2708, while Sicily -0.0847), but also for some other regions on the east coast such as (Marches and Emilia Romagna). Conversely, being born in Liguria, for instance, determines a higher transition rate to heterogenous marriages (0.3439): a reason here could be envisaged in the small size of the population of that region. As we reported in the review of the literature, it happens that if the group is small but not isolated and it is difficult to marry within the group, then it is highly likely to marry outside that group. Moreover

Table 5.9: Multiple destinations for homogamy by region of birth; Cox models' estimations- MEN

MODEL 1:

Variable	HOMOGAMOUS Coeff	S.E.	Signif (1-p)	HETEROGAMOUS Coeff	S.E.	Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.0860	0.0382	0.9758	-0.0513	0.0711	0.5294
1965-69	-0.3842	0.0494	1.0000	-0.1060	0.0846	0.7896
Region of birth (base=Piedmont)						
Vaa	-0.2663	0.1725	0.8772	-0.2458	0.3033	0.5822
Lom	-0.0672	0.0936	0.5275	0.0793	0.1608	0.3782
Taa	0.0681	0.1059	0.4796	-0.5984	0.2344	0.9893
Ven	-0.0407	0.0988	0.3195	-0.0547	0.1762	0.2436
Fvg	-0.1944	0.1312	0.8614	0.1299	0.2086	0.4665
Lig	-0.2152	0.1372	0.8834	0.3439	0.2015	0.9121
Tos	0.0184	0.1030	0.1421	0.2432	0.1735	0.8389
Umb	-0.0844	0.1214	0.5132	-0.0837	0.2174	0.2999
Er	-0.3950	0.1143	0.9995	-0.1452	0.1893	0.5568
Mar	-0.0149	0.1091	0.1086	-0.3272	0.2149	0.8721
Laz	-0.1610	0.1059	0.8716	0.3688	0.1647	0.9748
Abr	0.1095	0.1076	0.6912	0.3234	0.1802	0.9273
Mol	0.0646	0.1140	0.4289	-0.2146	0.2223	0.6655
Cam	0.2834	0.0884	0.9987	0.0956	0.1639	0.4402
Pug	0.3459	0.0873	0.9999	0.0104	0.1672	0.0496
Bas	-0.0409	0.1194	0.2684	0.1707	0.1983	0.6107
Cal	0.1503	0.0936	0.8917	0.1251	0.1683	0.5427
Sic	0.3803	0.0875	1.0000	-0.0847	0.1729	0.3757
Sar	0.0922	0.1040	0.6249	-0.2708	0.2067	0.8099
n.param.	42					
n.events	4539					
Log-like.	-35742.4					

MODEL 2:

Variable	HOMOGAMOUS Coeff	S.E.	Signif (1-p)	HETEROGAMOUS Coeff	S.E.	Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.0732	0.0398	0.9340	-0.0333	0.0737	0.3490
1965-69	-0.3448	0.0605	1.0000	-0.0490	0.1042	0.3618
Region of birth (base=Piedmont)						
Vaa	-0.3036	0.1758	0.9157	-0.3017	0.3095	0.6703
Lom	-0.0728	0.0937	0.5629	0.0716	0.1610	0.3435
Taa	0.0917	0.1080	0.6044	-0.5639	0.2372	0.9825
Ven	-0.0311	0.0992	0.2458	-0.0403	0.1769	0.1802
Fvg	-0.1880	0.1314	0.8476	0.1384	0.2088	0.4925
Lig	-0.2043	0.1375	0.8627	0.3595	0.2022	0.9246
Tos	-0.0021	0.1046	0.0156	0.2131	0.1765	0.7729
Umb	-0.1107	0.1236	0.6293	-0.1229	0.2214	0.4213
Er	-0.4068	0.1148	0.9996	-0.1618	0.1901	0.6051
Mar	-0.0354	0.1107	0.2512	-0.3572	0.2173	0.8999
Laz	-0.2081	0.1139	0.9324	0.2998	0.1804	0.9035
Abr	0.0809	0.1105	0.5360	0.2806	0.1859	0.8688
Mol	0.0691	0.1140	0.4552	-0.2087	0.2224	0.6520
Cam	0.2752	0.0887	0.9981	0.0829	0.1644	0.3860
Pug	0.3212	0.0901	0.9996	-0.0255	0.1715	0.1184
Bas	-0.0383	0.1194	0.2514	0.1739	0.1984	0.6192
Cal	0.1601	0.0940	0.9115	0.1384	0.1688	0.5878
Sic	0.3494	0.0917	0.9999	-0.1304	0.1795	0.5322
Sar	0.0949	0.1040	0.6382	-0.2672	0.2067	0.8038
SQUEEZE						
S	1.3452	1.1957	0.7394	1.9732	2.1015	0.6522
n.param.	44					
n.events	4539					
Log-like.	-35741.32					

df	2
Likelihood Ratio	2.1556
p-value:	0.340

Table 5.10: Multiple destinations for homogamy by region of birth; Cox models' estimations - WOMEN

MODEL 1:

Variable	HOMOGAMOUS Coeff	S.E.	Signif (1-p)	HETEROGAMOUS Coeff	S.E.	Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.1319	0.0356	0.9998	-0.2032	0.0682	0.9971
1965-69	-0.4236	0.0402	1.0000	-0.5738	0.0794	1.0000
Region of birth (base=Piedmont)						
Vaa	0.0331	0.1416	0.1849	-0.0649	0.2304	0.2218
Lom	-0.1673	0.0853	0.9501	0.0310	0.1275	0.1921
Taa	0.0435	0.0956	0.3507	-0.6516	0.1876	0.9995
Ven	0.0159	0.0899	0.1403	-0.2623	0.1519	0.9159
Fvg	-0.0463	0.1140	0.3155	-0.0591	0.1782	0.2598
Lig	-0.4065	0.1247	0.9989	-0.3510	0.1894	0.9361
Tos	0.0010	0.0936	0.0086	-0.3790	0.1636	0.9794
Umb	-0.0043	0.1080	0.0317	-0.6989	0.2159	0.9988
Er	-0.1795	0.0977	0.9339	-0.6538	0.1757	0.9998
Mar	0.0410	0.0978	0.3249	-0.4567	0.1796	0.9890
Laz	-0.0886	0.0967	0.6404	-0.0339	0.1485	0.1804
Abr	0.2119	0.0968	0.9714	-0.1102	0.1675	0.4895
Mol	0.2975	0.1040	0.9958	-0.4506	0.2127	0.9658
Cam	0.2320	0.0805	0.9961	-0.3683	0.1442	0.9894
Pug	0.2650	0.0797	0.9991	-0.6712	0.1571	1.0000
Bas	0.1898	0.1064	0.9255	-0.4931	0.2127	0.9796
Cal	0.3400	0.0836	1.0000	-0.4772	0.1620	0.9968
Sic	0.3348	0.0799	1.0000	-0.6683	0.1610	1.0000
Sar	0.1167	0.0939	0.7862	-0.8884	0.2045	1.0000
n.param.	42					
n.events	5459					
Log-like.	-43255.23					

MODEL 2:

Variable	HOMOGAMOUS Coeff	S.E.	Signif (1-p)	HETEROGAMOUS Coeff	S.E.	Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.1126	0.0361	0.9982	-0.1857	0.0688	0.9930
1965-69	-0.4499	0.0410	1.0000	-0.6144	0.0818	1.0000
Region of birth (base=Piedmont)						
Vaa	0.0981	0.1426	0.5083	0.0092	0.2324	0.0315
Lom	-0.1486	0.0855	0.9179	0.0519	0.1278	0.3156
Taa	-0.0205	0.0974	0.1669	-0.7236	0.1906	0.9999
Ven	-0.0083	0.0902	0.0732	-0.2906	0.1525	0.9433
Fvg	-0.0906	0.1148	0.5701	-0.1070	0.1798	0.4481
Lig	-0.4374	0.1250	0.9995	-0.3865	0.1902	0.9579
Tos	0.0436	0.0944	0.3555	-0.3303	0.1652	0.9544
Umb	0.0403	0.1088	0.2891	-0.6463	0.2173	0.9971
Er	-0.1497	0.0981	0.8732	-0.6217	0.1763	0.9996
Mar	0.0871	0.0987	0.6228	-0.4043	0.1813	0.9743
Laz	0.0205	0.1017	0.1600	0.0898	0.1594	0.4270
Abr	0.2638	0.0980	0.9929	-0.0505	0.1698	0.2339
Mol	0.2761	0.1042	0.9920	-0.4737	0.2130	0.9738
Cam	0.2495	0.0807	0.9980	-0.3476	0.1445	0.9838
Pug	0.3284	0.0818	0.9999	-0.5998	0.1606	0.9998
Bas	0.1854	0.1064	0.9186	-0.4978	0.2127	0.9807
Cal	0.3021	0.0843	0.9997	-0.5175	0.1631	0.9985
Sic	0.4088	0.0828	1.0000	-0.5842	0.1659	0.9996
Sar	0.1149	0.0939	0.7791	-0.8912	0.2045	1.0000
SQUEEZE						
I	-6.4213	1.8658	0.9994	-7.2590	3.4095	0.9668
n.param.	44					
n.events	5459					
Log-like.	-43247.08					

df	2
Likelihood Ratio	16.287
p-value:	0.000

it is worth noting that overall, being born in one of the northern regions reduces, the competing risk of marrying a woman of the same place of origin in comparison to that of out-marrying, while being born in the South increases the chances to marry homogamously. It is also interesting to see that two big and very attractive (especially as concerns the labour market) regions, such as Lombardy and Lazio show to have a slower than Piedmont transition to same-region marriages and a shorter waiting time for different-region marriage. This is to say that men born in one of these two regions experience a rise in their chances to marry a woman born somewhere else, and a decline in the chances to marry one of the same region. This also confirms the hypothesis concerning the geographical isolation of some southern regions. Introducing the effect of the squeeze, S for men, determines an increase in the transition rate of both destinations, but heterogamous marriages are fairly higher than homogamous marriages (table 5.9 Model 2). If men have an advantage on the marriage market, then their chances to marry rise quickly, above all heterogamously. This could be attributed to their higher mobility which enhances their marriage market conditions, improving their chances to out-marrying.

As concerns women, each successive cohort shows to have a rate which indicates the slow down of the transition to first marriages in both directions (tables 5.10, Model 1): cohorts younger than the 1955-59 one, wait longer before marrying, especially if the partner was born in a different region (heterogamous). Women confirm also the tendency to marry a man from the same place of origin in the South more than in the North: being born in the South increases the transition to marriages with same-region partners, and decreases the competing risk to marry a man coming from a different region. This is equivalent to say that southern women accelerate their rate of marriage with a mate born in the same region, while heterogamous marriages are postponed, especially in the islands (when compared to Piedmont, Sicily has a coefficient for heterogamous marriages equal -0.6683 and Sardinia equals to -0.8884). Moreover, homogamous marriages are postponed by women only when born in Lombardy, Lazio, Emilia Romagna, Liguria, Friuli Venezia Giulia and Umbria: these represent attractive labour markets on one side and small regions on the other side. It is worth noting that women born both in Lazio and in Lombardy further reduce their transition to homogamous marriages. The disadvantage in the marriage market induces a further postponement of first marriages in both directions: either the hazard of homogamous (-6.4213) and that of heterogamous marriages (-7.2590) address a slow down of marriage occurrence, a bit larger for marriages to men born in a different region (table 5.10 Model 2).

In sum, the place of origin is loosing part of its relevant role as marriage market especially for men, which experience a comparatively higher decline in the transition to endogamous marriages than to exogamous. A major explanation for men could be attributed to their higher mobility (especially if born in some central and northern regions) which eases the meeting with women born in different regions enlarging the pool of availability. Women show to have a different dynamics: the marriage market in which they play a major role is represented by their region of birth: for women heterogamous marriages decline more than endogamous ones. Their lower mobility, narrowing their marriage market to that of their region of birth, also worsen their chances to out-marriage. The traditional model based on a stronger homogamy in the southern regions still holds. Some regions have also a peculiar attractive role which eases out-marriages, some other suffer for their isolation and the consequent difficulties.

5.5.3 Homogamy by education

Education is probably one of the most important trait for its potential capacity in attributing partners' future traits. Our attention is here particularly oriented towards the analysis of differences among cohorts and among regions: we are interested in studying trends in male and female homogamy by education and regional differences. In fact, a measure of the characteristics of the marriage market expressing the imbalance between the sexes in terms of achieved education is not available: the measures of the squeeze which we built are not education-specific and they could result not adequate to our purposes. However, one of our attempt is to see whether the imbalance in the marriage market, as expressed up to now could be meaningful to our educational homogamy analysis.

For low educated women (2628) increase the percentage of lateral marriages, for high educated women (2821) increases the percentage of downward marriages (table 5.11); men with low education (2331) have a slight decrease in lateral marriages and a U-shaped trend of downward marriages for high educated (2208) (table 5.11).

Let us start considering the competing risks to marry upward or lateral of 2331 men with a level of education not higher than the compulsory school (table 5.12, Model 1). Across cohorts, it is possible to observe a declining transition to first marriage in any directions: both upward and lateral marriage transition rates for the birth cohorts younger than the 1955-59 cohort are low. This means that each cohort of men younger than the reference (1955-59) experiences a slower transition to first marriage, especially in the lateral direction, where the competing risk is strongly diminishing (-0.4136). Therefore the shift towards higher level of education creates, for low educated men, also a relatively lower decline in upward than in the lateral marriages.

In addition to this, being born in a southern region, determines an accelerating effect in lateral marriages, while the effect on upward marriages is less clear. A man born in the North has a slower* transition to marriage with an equally low educated woman (lateral marriage) and an almost null effect on upwards marriages. Only Liguria shows a positive and pretty high transition rate, addressing a fast transition to marriage with high educated women but it is null the one referred to same education women. The region of birth seems to cause in general a longer duration for upward marriages. Men born in a southern region, particularly if born in Apulia, Sicily, Campania and Calabria, marry more to a woman with the same

Table 5.11: Frequencies distribution of the married individuals by birth cohort, level of education, and sex (row percentages)

	WOMEN					
Birth	Low educated			high educated		
cohort	Upward	Lateral	Total	Lateral	Downward	Total
1955-59	25.08	74.92	100	73.36	26.64	100
1960-64	25.83	74.17	100	71.17	28.83	100
1965-69	23.05	76.95	100	65.78	34.22	100
n	*656*	*1982*	*2638*	*1991*	*830*	*2821*

	MEN					
Birth	Low educated			high educated		
cohort	Upward	Lateral	Total	Lateral	Downward	Total
1955-59	28.33	71.67	100	75.26	24.74	100
1960-64	33.52	66.48	100	77.49	22.51	100
1965-69	33.98	66.02	100	73.94	26.06	100
n	*735*	*1596*	*2331*	*1676*	*532*	*2208*

level of education than to a woman with a higher level of education. Adding the covariate describing the effect of the marriage market conditions, does not improve the model specification: the loglikelihood ratio is very low and the $p-value = 0.491$ is very high (table 5.12, Model 2). Here the measure of the marriage market is not adequate to study the evolution of the homogamy for low educated men.

The competing risks to marry a women with the same high level of education or with a lower one, is reported in table 5.13 (Model 1 and 2): here we have 2208 high educated men. From Model 1 we notice that men, especially if born after 1960-64, have an increasing waiting time for marriages towards any directions: transition to downward marriages is particularly diminished. Across cohorts, there is a relatively smaller reduction in the rate of marrying a high educated woman (homogamously) with respect to the rate of marrying a low educated one (hypogamously). As concerns the region of birth two groups of effects can be mentioned: the transition rate to marriages with a highly educated woman (lateral marriage) is higher in the South, than in the North. All regions have a high transition to downward marriages; lateral marriages, instead, is negative for those born in the central northern regions. Men born in the South are not sensitively affected in lateral movement but have a little higher transition to marry a woman with lower education. The addition of the indicator of the marriage market conditions in this case turns out to have an accelerating effect on the transition to first marriage of the men, especially on lateral marriages (the coefficient is here equal to 7.5630, table 5.13, Model 2). The male advantage on the marriage market ease the transition to first marriage to women with any level of attained education.

Let us now look at women: first we consider the group of 2638 low educated women and then we study the multiple destinations model for 2821 women with high education. Transition rates to first marriage for women with low education are reported in table 5.14: women with a level of education up to the compulsory school can either marry a men in the same educational group or with a higher one (upper secondary, university, PhD, and so on). Over time both upward and lateral transitions decreases, although the fastest shift occurs between the two youngest cohort born in 1960-64 and 1965-69. In particular, the cohort of women born in 1965-69 has first marriage transition rates towards any directions much lower than

Table 5.12: Multiple destinations for homogamy by education; Cox models' estimations - Low educated MEN

MODEL 1:

Variable	UPWARD Coeff	UPWARD S.E.	UPWARD Signif (1-p)	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	0.0601	0.0864	0.5135	-0.1823	0.0574	0.9985
1965-69	-0.1010	0.1014	0.6807	-0.4136	0.0683	1.0000
Region of birth (base=Piedmont)						
Vaa	0.2008	0.2804	0.5260	-0.2989	0.2730	0.7265
Lom	-0.0988	0.1921	0.3929	0.1263	0.1426	0.6244
Taa	-0.0723	0.2216	0.2557	-0.0826	0.1735	0.3657
Ven	-0.0460	0.2011	0.1810	0.0836	0.1517	0.4185
Fvg	-0.0682	0.2743	0.1964	-0.2636	0.2315	0.7452
Lig	0.7293	0.2381	0.9978	-0.0426	0.2440	0.1385
Tos	0.1337	0.2036	0.4887	-0.0269	0.1660	0.1288
Umb	-0.1191	0.2803	0.3290	-0.1120	0.2184	0.3918
Er	-0.0650	0.2149	0.2378	-0.6455	0.2036	0.9985
Mar	-0.3062	0.2639	0.7541	0.0844	0.1798	0.3613
Laz	-0.2075	0.2235	0.6468	0.0975	0.1595	0.4589
Abr	0.3732	0.2036	0.9333	0.0168	0.1736	0.0770
Mol	-0.0753	0.2477	0.2388	0.2925	0.1708	0.9132
Cam	-0.1747	0.2024	0.6118	0.5920	0.1328	1.0000
Pug	-0.0983	0.2017	0.3740	0.7176	0.1306	1.0000
Bas	0.0843	0.2411	0.2734	0.1881	0.1810	0.7012
Cal	-0.0993	0.2016	0.3778	0.3757	0.1399	0.9928
Sic	-0.0121	0.1929	0.0502	0.5850	0.1324	1.0000
Sar	-0.4550	0.2256	0.9563	0.1129	0.1510	0.5453
n.param.	42					
n.events	2331					
Log-like.	-16694.6					

MODEL 2:

Variable	UPWARD Coeff	UPWARD S.E.	UPWARD Signif (1-p)	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	0.0335	0.0892	0.2931	-0.1803	0.0578	0.9982
1965-69	-0.1867	0.1251	0.8646	-0.4031	0.0788	1.0000
Region of birth (base=Piedmont)						
Vaa	0.2820	0.2881	0.6724	-0.3113	0.2769	0.7390
Lom	-0.0905	0.1922	0.3624	0.1245	0.1427	0.6169
Taa	-0.1213	0.2256	0.4094	-0.0745	0.1761	0.3278
Ven	-0.0699	0.2022	0.2703	0.0870	0.1522	0.4324
Fvg	-0.0809	0.2745	0.2318	-0.2601	0.2319	0.7381
Lig	0.7066	0.2389	0.9969	-0.0388	0.2444	0.1260
Tos	0.1750	0.2067	0.6030	-0.0333	0.1677	0.1573
Umb	-0.0585	0.2851	0.1626	-0.1200	0.2205	0.4138
Er	-0.0411	0.2159	0.1510	-0.6498	0.2042	0.9985
Mar	-0.2614	0.2667	0.6731	0.0775	0.1817	0.3301
Laz	-0.1113	0.2382	0.3597	0.0825	0.1691	0.3744
Abr	0.4359	0.2105	0.9616	0.0082	0.1765	0.0372
Mol	-0.0879	0.2479	0.2771	0.2954	0.1711	0.9157
Cam	-0.1602	0.2029	0.5704	0.5903	0.1329	1.0000
Pug	-0.0430	0.2072	0.1645	0.7084	0.1351	1.0000
Bas	0.0752	0.2412	0.2448	0.1897	0.1811	0.7051
Cal	-0.1202	0.2025	0.4473	0.3802	0.1409	0.9930
Sic	0.0601	0.2027	0.2332	0.5739	0.1388	1.0000
Sar	-0.4622	0.2257	0.9595	0.1139	0.1510	0.5493
SQUEEZE						
Ifreq	-4.8863	4.1877	0.7567	0.7540	2.8328	0.2099
n.param.	44					
n.events	2331					
Log-like.	-16693.9					

df	2
Likelihood Ratio	1.421
p-value:	0.491

Table 5.13: Multiple destinations for homogamy by education; Cox models' estimations - High educated MEN

MODEL 1:

Variable	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)	DOWNWARD Coeff	DOWNWARD S.E.	DOWNWARD Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.0301	0.0546	0.4183	-0.2150	0.0974	0.9728
1965-69	-0.3418	0.0766	1.0000	-0.5091	0.1282	0.9999
Region of birth (base=Piedmont)						
Vaa	-0.6470	0.2748	0.9814	-0.2545	0.4847	0.4005
Lom	-0.1659	0.1298	0.7988	0.0977	0.2443	0.3109
Taa	-0.2008	0.1585	0.7950	0.4324	0.2627	0.9002
Ven	-0.3199	0.1436	0.9741	0.3173	0.2467	0.8016
Fvg	-0.1457	0.1672	0.6165	0.3489	0.2866	0.7766
Lig	-0.2120	0.1673	0.7951	-0.4274	0.3669	0.7560
Tos	0.0219	0.1399	0.1244	0.3966	0.2529	0.8832
Umb	-0.0417	0.1538	0.2139	0.0826	0.2953	0.2201
Er	-0.3373	0.1497	0.9757	-0.0487	0.2793	0.1384
Mar	-0.1751	0.1484	0.7619	0.1978	0.2675	0.5405
Laz	0.0347	0.1344	0.2038	-0.1655	0.2828	0.4417
Abr	0.1831	0.1446	0.7947	0.1068	0.2907	0.2865
Mol	-0.1776	0.1641	0.7209	-0.2097	0.3339	0.4699
Cam	0.0191	0.1261	0.1204	0.2857	0.2372	0.7717
Pug	-0.0451	0.1269	0.2776	0.1494	0.2427	0.4618
Bas	-0.1156	0.1612	0.5266	-0.1105	0.3255	0.2658
Cal	-0.0423	0.1347	0.2468	0.2908	0.2481	0.7589
Sic	0.0759	0.1277	0.4475	0.2601	0.2441	0.7134
Sar	-0.0792	0.1672	0.3644	0.5034	0.2760	0.9318
n.param.	42					
n.events	2208					
Log-like.	-15846.3					

MODEL 2:

Variable	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)	DOWNWARD Coeff	DOWNWARD S.E.	DOWNWARD Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	0.0359	0.0612	0.4429	-0.1988	0.1011	0.9508
1965-69	-0.1813	0.1014	0.9261	-0.4546	0.1569	0.9962
Region of birth (base=Piedmont)						
Vaa	-0.7698	0.2802	0.9940	-0.3002	0.4910	0.4591
Lom	-0.1862	0.1300	0.8478	0.0886	0.2448	0.2826
Taa	-0.1253	0.1615	0.5622	0.4653	0.2683	0.9171
Ven	-0.2915	0.1441	0.9570	0.3283	0.2473	0.8156
Fvg	-0.1374	0.1672	0.5886	0.3584	0.2870	0.7883
Lig	-0.1775	0.1679	0.7095	-0.4117	0.3678	0.7370
Tos	-0.0510	0.1432	0.2783	0.3689	0.2571	0.8487
Umb	-0.1378	0.1589	0.6142	0.0512	0.3000	0.1354
Er	-0.3728	0.1505	0.9868	-0.0655	0.2807	0.1844
Mar	-0.2447	0.1512	0.8944	0.1698	0.2715	0.4684
Laz	-0.1236	0.1494	0.5918	-0.2289	0.3018	0.5518
Abr	0.0777	0.1510	0.3931	0.0698	0.2972	0.1858
Mol	-0.1724	0.1641	0.7065	-0.2013	0.3342	0.4530
Cam	-0.0106	0.1267	0.0665	0.2763	0.2377	0.7549
Pug	-0.1231	0.1310	0.6527	0.1154	0.2492	0.3566
Bas	-0.1062	0.1612	0.4900	-0.1046	0.3257	0.2520
Cal	-0.0183	0.1350	0.1075	0.3078	0.2496	0.7824
Sic	-0.0403	0.1363	0.2323	0.2145	0.2555	0.5987
Sar	-0.0690	0.1672	0.3202	0.5070	0.2761	0.9337
SQUEEZE						
Ifreq	7.5630	3.1227	0.9846	3.0656	5.0941	0.4527
n.param.	44					
n.events	2208					
Log-like.	-15843.2					
df		2				
Likelihood Ratio		6.291				
p-value:		0.043				

the reference cohort (women born in 1955-59). While for the birth cohort 1960-64 the reduction in the rate affects almost equally both destinations and it is not particularly relevant, for the women born in 1965-69 especially upward marriages are postponed. Compared to those born in 1955-59, the transition rate for the 1965-69 women is -0.5463 for marrying a higher educated partner and it is -0.4507 for a same-schooling mate (table 5.14). Therefore, low educated women, experience over time a comparatively higher decline in upward marriages (to more educated men) than in lateral marriages (to a man with same education).

Being born in one of the southern regions seems to determine a slightly higher transition rate to marry an equally low educated men (lateral) and lower rate of marriage to a highly educated men. Low educated women born in the northern-central regions have in general low transition rates both to marry a men with the same level of education (lateral) or a more educated one (upward), but the former rate is always lower than the latter one.

Including the measure of the marriage squeeze determines a small improvement of the log-likelihood but it does not have a clear effect. Lateral movements are strongly postponed in the case of a female disadvantage on the marriage market (the coefficient is equal to -11.5104 and it is significant), while upward marriage seems to be enhanced by the squeeze's increase. Caution should be used in this case, given that the coefficient of the squeeze to marry up is not significant and that we are talking about an amount of only 656 women (those marrying up). In sum, younger cohort of low educated women reduce their transition to first marriage, in particular upwardly; lateral movements are higher in the southern regions while in the North they are comparatively lower than the upward ones. The male advantage on the marriage market strongly reduced the chances to marry a man with the same low education, while it is not clear the effect on upward movements.

Let us now look at the women with a high education (including more than 8 years schooling): here we have 2821 women, 1991 of which married a man with longer than 8 years schooling as well, and 830 married a man who studied shorter (table 5.15). In comparison to the older birth cohort, younger women have a longer duration of the waiting time for the first marriage. Moreover, in each younger cohort compared to the 1955-59 one, the competing risk of marrying a high educated man (lateral

Table 5.14: Multiple destinations for homogamy by education; Cox models' estimations - Low educated WOMEN

MODEL 1:

Variable	UPWARD Coeff	UPWARD S.E.	UPWARD Signif (1-p)	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.1323	0.0904	0.8566	-0.1699	0.0526	0.9988
1965-69	-0.5463	0.1059	1.0000	-0.4507	0.0589	1.0000
Region of birth (base=Piedmont)						
Vaa	-0.1692	0.3566	0.3649	0.0672	0.2042	0.2578
Lom	-0.2796	0.2179	0.8006	-0.0606	0.1301	0.3589
Taa	-0.0599	0.2380	0.1988	-0.1235	0.1506	0.5880
Ven	-0.0695	0.2222	0.2455	-0.0025	0.1358	0.0147
Fvg	0.4638	0.2438	0.9429	-0.0854	0.1769	0.3706
Lig	-0.2154	0.3325	0.4829	-0.3990	0.2247	0.9242
Tos	0.0397	0.2483	0.1272	0.0183	0.1548	0.0939
Umb	0.3187	0.2662	0.7688	-0.2286	0.1998	0.7475
Er	-0.0293	0.2419	0.0965	-0.2897	0.1648	0.9213
Mar	0.1968	0.2399	0.5880	-0.0251	0.1574	0.1268
Laz	0.0032	0.2437	0.0105	0.1190	0.1460	0.5850
Abr	0.2894	0.2511	0.7509	0.2293	0.1561	0.8581
Mol	-0.2876	0.3140	0.6404	0.3935	0.1542	0.9893
Cam	-0.0235	0.2144	0.0874	0.3050	0.1247	0.9856
Pug	-0.1723	0.2105	0.5870	0.1504	0.1235	0.7768
Bas	-0.5923	0.3435	0.9153	0.2969	0.1566	0.9420
Cal	0.2373	0.2152	0.7298	0.3917	0.1287	0.9977
Sic	-0.0128	0.2193	0.0467	0.3880	0.1249	0.9981
Sar	-0.4507	0.2562	0.9214	0.0429	0.1398	0.2412
n.param.	42					
n.events	2638					
Log-like.	-18748.4					

MODEL 2:

Variable	UPWARD Coeff	UPWARD S.E.	UPWARD Signif (1-p)	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.1395	0.0928	0.8671	-0.0976	0.0557	0.9204
1965-69	-0.5422	0.1066	1.0000	-0.4412	0.0592	1.0000
Region of birth (base=Piedmont)						
Vaa	-0.1845	0.3596	0.3922	0.1225	0.2044	0.4510
Lom	-0.2838	0.2182	0.8065	-0.0297	0.1303	0.1804
Taa	-0.0431	0.2432	0.1406	-0.2484	0.1537	0.8940
Ven	-0.0653	0.2225	0.2308	-0.0354	0.1361	0.2050
Fvg	0.4764	0.2466	0.9466	-0.1985	0.1793	0.7318
Lig	-0.2069	0.3335	0.4651	-0.4574	0.2251	0.9578
Tos	0.0286	0.2505	0.0910	0.0940	0.1559	0.4535
Umb	0.3086	0.2678	0.7508	-0.1703	0.2003	0.6048
Er	-0.0367	0.2428	0.1200	-0.2299	0.1654	0.8357
Mar	0.1838	0.2429	0.5508	0.0680	0.1590	0.3311
Laz	-0.0239	0.2565	0.0743	0.3132	0.1533	0.9590
Abr	0.2785	0.2531	0.7288	0.2987	0.1571	0.9428
Mol	-0.2817	0.3144	0.6297	0.3455	0.1547	0.9745
Cam	-0.0276	0.2147	0.1021	0.3340	0.1249	0.9925
Pug	-0.1886	0.2159	0.6176	0.2724	0.1269	0.9681
Bas	-0.5922	0.3435	0.9153	0.3038	0.1566	0.9476
Cal	0.2465	0.2169	0.7442	0.3162	0.1300	0.9850
Sic	-0.0314	0.2260	0.1106	0.5267	0.1294	1.0000
Sar	-0.4511	0.2562	0.9217	0.0564	0.1398	0.3132
SQUEEZE						
I	1.6125	4.7561	0.2654	-11.5104	2.7793	1.0000
n.param.	44					
n.events	2638					
Log-like.	-18739.8					

df	2
Likelihood Ratio	17.18
p-value:	0.000

marriage) is much lower than that of marrying a lower educated man (downward marriage). So high educated women have a longer waiting time for marrying a man with the same educational attainment: we do not not whether this will bring about postponing or giving up to marriages of a certain 'quality' (a given destination). The growth in the female educational attainment can increase the difficulties for women in finding a partner with the same (high) level of education among the pool of eligibles. Most of the regions of birth have a lower rate for downward marriages than for lateral. So women have a lower risk to marry down than educationally homogamous. Moreover central regions represent a group with very low rate to downward marriage. Besides that, some of the southern regions (namely Campania, Apulia, Abruzzo and Molise) have a positive effect to marry laterally and high and negative to marry downwardly. It is worth noting that highly educated women born in these regions, have a very high reduction in the risk of marrying downwardly (the coefficient being significant and equal to -0.6228 and -0.6297 for Campania and Apulia) and a small, although not significant, increase in the risk of marrying lateral than in Piedmont. Also other regions (Umbria, Liguria Marches, Lazio) experience a strong postponement of downward marriage, but the same reduction occurs also for lateral marriages. The introduction of the time-varying covariate squeeze (S) improves the log-likelihood and addresses the existence of a disadvantage in marrying a lower educated mate (lateral). The chances of a woman to marry a men of the same level of education do not seem to be affected by the squeeze against women (the coefficient is virtually null). Conversely, it is clear that the male advantage in the marriage market further postpones downward marriages for women with high education.

5.6 Summary and discussion

In this chapter we presented an analysis of marriage in Italy, under a different perspective: we looked at characteristics of the partners at their first marriage and studied the trends in homogamy by age, place of origin and education of the spouses. Coherently to what accomplished in preceding chapters, the approach we pursed is that of an event history analysis.

Overall, the prevailing patterns of marriage are the more traditional ones: the

Table 5.15: Multiple destinations for homogamy by education; Cox models' estimations - High educated WOMEN

MODEL 1:

Variable	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)	DOWNWARD Coeff	DOWNWARD S.E.	DOWNWARD Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.1566	0.0521	0.9974	-0.0742	0.0840	0.6230
1965-69	-0.5059	0.0610	1.0000	-0.2512	0.0909	0.9943
Region of birth (base=Piedmont)						
Vaa	-0.4785	0.2436	0.9505	0.4312	0.2341	0.9345
Lom	-0.1515	0.1130	0.8200	-0.1684	0.1597	0.7082
Taa	-0.2111	0.1402	0.8680	-0.2609	0.2003	0.8073
Ven	-0.2194	0.1314	0.9051	-0.2196	0.1833	0.7691
Fvg	-0.2254	0.1588	0.8443	-0.3790	0.2421	0.8825
Lig	-0.4288	0.1547	0.9944	-0.3632	0.2181	0.9041
Tos	-0.1784	0.1261	0.8428	-0.1837	0.1786	0.6964
Umb	-0.0577	0.1384	0.3231	-0.7524	0.2563	0.9967
Er	-0.4560	0.1363	0.9992	-0.2364	0.1830	0.8036
Mar	-0.0785	0.1324	0.4468	-0.6456	0.2270	0.9955
Laz	-0.1618	0.1282	0.7931	-0.4090	0.1966	0.9625
Abr	0.0784	0.1306	0.4516	-0.1001	0.1934	0.3953
Mol	0.0227	0.1518	0.1186	-0.2520	0.2380	0.7104
Cam	0.0658	0.1098	0.4510	-0.6228	0.1878	0.9991
Pug	0.1442	0.1117	0.8033	-0.6297	0.1950	0.9988
Bas	-0.0887	0.1565	0.4291	-0.2052	0.2303	0.6272
Cal	-0.0645	0.1223	0.4021	-0.2099	0.1820	0.7512
Sic	-0.0103	0.1130	0.0727	-0.3239	0.1739	0.9374
Sar	-0.4658	0.1577	0.9969	0.0519	0.1893	0.2160
n.param.	42					
n.events	2821					
Log-like.	-20689.1					

MODEL 2:

Variable	LATERAL Coeff	LATERAL S.E.	LATERAL Signif (1-p)	DOWNWARD Coeff	DOWNWARD S.E.	DOWNWARD Signif (1-p)
Birth cohort (base=1955-59)						
1960-64	-0.1565	0.0521	0.9973	-0.0309	0.0853	0.2828
1965-69	-0.5051	0.0680	1.0000	-0.3358	0.0939	0.9996
Region of birth (base=Piedmont)						
Vaa	-0.4796	0.2473	0.9475	0.6092	0.2373	0.9897
Lom	-0.1518	0.1135	0.8188	-0.1205	0.1602	0.5480
Taa	-0.2105	0.1424	0.8605	-0.4001	0.2037	0.9505
Ven	-0.2190	0.1320	0.9030	-0.2818	0.1841	0.8741
Fvg	-0.2251	0.1592	0.8428	-0.4685	0.2435	0.9456
Lig	-0.4285	0.1553	0.9942	-0.4319	0.2189	0.9516
Tos	-0.1789	0.1278	0.8384	-0.0819	0.1806	0.3496
Umb	-0.0584	0.1409	0.3213	-0.6388	0.2581	0.9867
Er	-0.4564	0.1368	0.9991	-0.1651	0.1839	0.6305
Mar	-0.0790	0.1340	0.4447	-0.5392	0.2288	0.9816
Laz	-0.1631	0.1378	0.7635	-0.1493	0.2085	0.5260
Abr	0.0776	0.1339	0.4380	0.0379	0.1968	0.1527
Mol	0.0228	0.1519	0.1193	-0.2970	0.2384	0.7873
Cam	0.0656	0.1102	0.4482	-0.5778	0.1883	0.9978
Pug	0.1435	0.1150	0.7880	-0.4848	0.1988	0.9852
Bas	-0.0886	0.1566	0.4286	-0.2195	0.2303	0.6594
Cal	-0.0641	0.1231	0.3978	-0.2983	0.1836	0.8958
Sic	-0.0112	0.1180	0.0754	-0.1465	0.1806	0.5828
Sar	-0.4657	0.1577	0.9968	0.0401	0.1894	0.1675
SQUEEZE						
S	0.0373	1.4696	0.0203	-7.6235	2.0506	0.9998
n.param.	44					
n.events	2821					
Log-like.	-20682.3					
df		2				
Likelihood Ratio		13.65				
p-value:		0.001				

prevailing propensity is towards a marriage where the husband is older than the wife, where they both are born in the same region of birth and where they have attained, broadly speaking, the same level of education. Despite of the persistency of the traditional patterns of homogamy, some new features in the process of assortative mating are rising in Italy. In particular, the modernisation theory provides us with some useful tools of interpretation of the recent developments in homogamy patterns. For instance, more age-balanced couples are the natural outcome of a reduced gender division and a higher equalisation of the roles in the couple. As concerns Italy, men experience a relative decrease of the transition rate for the traditional age-gap between partners, and a slight increase of the atypical matches characterised by higher age of the woman. Conversely, for women the traditional pattern is the only one, although the youngest cohorts show a slowing down of the process which could determine next years a change in the sign, thereby an emerging of more age-balanced union. Men and women born in the North are more oriented to this new typology of age-balance between couple, reflecting also a higher gender equalisation, while southern men hold a higher attachment to large age differences between partners.

The diminishing role of the place of origin in assortative mating is found as expected. There is a stronger decline of marriages between partners coming from the same regions, especially for men whose mobility enlarges their pool and enhances their chances to marry heterogamously. Women on the other hand, have bigger difficulties in out-marrying, especially if they are born in the South, where the general level of mobility is small in comparison to the central and northern regions. Furthermore it emerges the role of some regions at the borders of the country with decreasing heterogamy, as well as that of more attractive regions characterised also by greater heterogamous marriages.

It is puzzling to understand whether in the future the effects of the globalisation, of the easiness of the communication and of the speedy of mobility will increasingly enlarge the opportunities to out-marry, involving both sexes: it could be expected a growing 'loss of meaning' of the region of birth as determinant of the marriage opportunities.

Homogamy by level of education is a bit less clear. For men, a slight growth in the propensity to marry to women with education higher than theirs can be noticed: this emerges from the fact that men with high education reduce less the rate of homogamous marriages, while men with low education reduce less the rate of upward rate. This is the outcome of a grown attractiveness of women with longer schooling. However low educated men born in the southern regions are more prone to marry laterally: therefore they face more difficulties in marry a women with higher education. This could potentially increases the disadvantage and the inequalities of women. Men born in the North are affected positively in downward marriages and negatively in lateral marriages. Men born in the South are not sensitively affected in lateral movement but are a little bit more prone to marry a woman with lower education.

Low educated women, over time, reduce comparatively more their transition to upward marriages (to more educated men) than to lateral marriages (to a man with some education). Lateral movements are higher in the southern regions (as for men) while in the North they are comparatively lower than the upward ones. Lateral movements are strongly postponed in the case of a male advantage on the marriage market, while upward marriages seem to take advantage of the squeeze.

For the women who studied more than 8 years, the falling risk of marrying a men with same level of education is higher than that to marry a partner who studied less. The region of birth in some cases may bring women to postpone marriage to low educated men. The squeeze against women provokes a postponement for this highly educated women, as if they are less prone to accept an educationally downward marriage.

It is interesting to observe that for men, a high educational attainment brings about more reduction in the downward movements, than in the lateral one, while high educated women reduce more their chances to marry homogamously than downwardly. This means that when women study longer they face more difficulties in marry a men with the same level of education and they more often marry a men with lower level of education. In the next years, the increase in prolonged studies of both men and women could bring to growing couples formation inside the highest level of the educational system: it could be interesting to see whether women will follow men as concerns their greater attachment to high educated partner, therefore increasing educational homogamy at the highest steps of the ladder. However more in depth studies on this point are required: it could be interesting to see what happens when we look at a finer specification of the educational level.

The marriage market is introduced to evaluate the shifts on the pattern of homogamy. It results to add some explanations in the trends. For instance, when men are in an advantageous position in the marriage market they also accelerates their transition, especially marrying a younger women, instead of an older one and heterogamously more than homogamously by region of birth. Women facing disadvantageous conditions are squeezed comparatively more in marrying an older men, than a same age or a younger partner and are also more disadvantaged in marrying down if they are more educated and in marrying lateral if they are low educated. The effect of the squeeze is that of an enhancement of the male opportunities in every directions and for any level of education, with the only exception of low educated men in their upward movements.

In general, the addition of the squeeze in the male models does not improve the model itself, as it happens when we consider women. The measures of the marriage market introduced result to be more efficient in the evaluation of the homogamy by age and place of origin than by education. This is probably due to the fact that S, I, I_{freq} are built taking into account age and region of birth. So they are adequate in measuring the homogamy pheonomenon with respect to these aspects. Education has peculiar features that need further specification of the conditions of the marriage market. However, as we said in the review of the literature, there are contrasting results when one looks at the aggregate level instead of the individual level. In the first case, there is some evidence of the effect of the marriage probabilities, but, as in the second case, no influence in educational sorting. This suggests to investigate more deeply the functioning of the education-specific marriage market.

Chapter 6

Conclusions

To conclude, we first summarise the main findings of this study and then discuss some opportunities for future research.

6.1 Summary

Among other western countries, Italy represents an interesting case study in the study of recent family transformation processes. Marriage still represents, also for young generations, an important step in their life course.

In this project, we studied first marriage, its trend over the year 1969-1995 by sex, its link to the marriage market conditions and the dynamics of homogamy by age, place of origin and education.

After an introductory review of the relevant theoretical literature (chapter one), in chapter two we analysed occurrence and timing of first marriage in a cross-sectional and longitudinal perspective, jointly with an analysis based on Lexis' maps. We thus provided an overview of the nuptiality trends in Italy for the years 1969-1995. Contour maps resulted to be particularly informative on the broad features of first marriage for the overall period. After having adjusted age specific first marriage rates for the years 1976-78, the analysis of occurrence and intensity of marriage has been described mainly at the macroregional level. The period under study has been characterised by a continuous reduction of the quantum of nuptiality: over 30 years, the Total First Marriage Rate has halved. The mean age at marriage has first declined for both sexes (from 1969 up to the first half of the 1970s), from then onwards (from the first half of the 1980s) women and men have experienced a constant increase in the age at first marriage.

Chapter three addresses the ways of measuring and analysing the state of a marriage market. A theoretical approach based on the 'two-sex problem' is here adopted to study the marriage market in Italy. Besides Schoen's index of the marriage squeeze, we propose two other simple new measures: they constitute an alternative tool of analysis of the marriage squeeze. The application of such measures, one of which is based on reduced events only, showed their substantial effectiveness.

Our main finding is that there is an imbalance on the Italian marriage market that stems from significant variations in the number of births. Some cohorts of women find themselves in a marriage squeeze (basically during the 1980s) while other cohorts of men, especially those born after the post-war rise in births or after the baby-boom, face this same unfavourable situation. The squeeze has been particularly strong for women in the Centre and the South of Italy in the early 1970s and the 1980s, while the same has been true for men, especially in the North, during the 1970s and since the beginning of the 1990s.

In addition, we showed that interregional migration, especially differential emigration by sex, has had a crucial role in determining the extent of the marriage squeeze at a regional level. Some evidence was also found for an influence of the institutional setting, namely legal norms determining the minimum age at marriage.

Our results are particularly important in light of current 'roller-coaster' course of the number of births in Italy (and in other European countries, as well). We showed that, if there is no influence of migration, a tight marriage squeeze for men can be expected for the coming decades. Immigration may change this, of course, depending on the sex composition of the migrants. In any case, it seems that a marriage squeeze resulting from a decline in births might itself be the cause of a subsequent decline in births, especially in those countries where marriage is still crucial for reproduction.

In chapter four, we evaluated the impact of macro variables regarding the availability of eligible partners in shaping the process of transition to first marriage, in an integrated micro-macro perspective. The process of transition to first marriage in Italy, was studied using individual level data of the 1998 Multipurpose Household Survey and event-history models. The effect of the marriage squeeze was introduced as a time-dependent covariate both for the region of birth and for that of residence at the interview.

Our findings show that structural constraints in the marriage market affect the timing of the transition to first marriage, and this holds differently for men and women. In particular, we find an U-shaped effect over ages for men when the marriage market is at their advantage. However, the current situation for Italy is that of a male disadvantage on the marriage market. This affects particularly relatively young men (before their 23rd birthday) and relatively old men (after age 25). At the same time, the effect of the current marriage market conditions for women is relatively constant up to age 28 years. After that age, a J-reversed effect by age for women emerges, addressing the slow down of their transition to first marriage. These results are stable when we introduce birth cohort, regions of birth, entry into first job and educational attainment as additional covariates.

Another crucial question, in studying marriage, regards the characteristics of the partners: *who marries whom*. In chapter five, we shifted the perspective from the analysis of the quantitative features of marriages to the assessment of their qualitative aspects.

Overall, traditional marriages are the prevailing ones in our sample. In such marriages, men are often older than their women, both partners are born in the same region of birth and they have attained, broadly speaking, the same level of education. Despite of the persistency of the traditional patterns of homogamy, some new features in the process of assortative mating are rising in Italy. More age-balanced couples are the natural outcome of a reduced gender division and a higher equalisation of roles in the couple. Men experience a relatively high decrease of the transition rate to marriages with a traditional age-gap between partners, and a slight increase of the atypical matches characterised by higher age of the woman. Conversely, for women the traditional pattern is the only one, although the youngest cohorts show a slowing down of the process, which in the next years could bring more age-balanced unions. Men and women born in the North are more oriented to this new typology of age-balance between couple, reflecting also a higher gender equalisation, while southern people hold a higher attachment to large age differences between partners.

The diminishing role of the place of origin in assortative mating was found as expected. There is a stronger decline of marriages between partners coming from the same regions, especially for men whose mobility enlarges their pool and enhances their chances to marry heterogamously. Women on the other hand, have bigger difficulties in out-marrying, especially if they are born in the South, where the general level of mobility is small in comparison to the central and northern regions.

As concerns the level of education, it is interesting to observe that for men, a high educational attainment brings about more reduction in downward movements, than in the lateral one, while high educated women reduce more their chances to marry homogamously than downwardly. This means that when women study longer they face more difficulties in marry a man with the same level of education and they more often marry a man with lower level of education.

6.2 Prospects for future research

Many streams of research may arise from this study. Although we adopted a broad approach, many issues were not covered. Prospects for future research can be broadly divided into two groups: one refers to methodological enhancements and the other aims at the enlargement of the contents.

The improvement of the methodology might move towards three directions. First of all, it should concern the specification of measures of the marriage market according to other relevant dimensions of populations. The measures used here did not consider, for instance, the specificity by age and by social category in the marriage market. In particular, the imbalance in the marriage market characterising at some stages in the life-courses might be particularly decisive even for future 'catch-up' behaviour. Therefore, there is a need for more in-depth analysis aiming at evaluating age and sex-specific impact of the structural constraints arising from an unsteady growth of the population. A basis for this is in the availability of good statistics on the distribution of the population by age and marital status. Moreover, as for the case of educational homogamy, better measures of the marriage squeeze according to other social features are required. The best approach would be to develop a multidimensional measure of the marriage market which could well describe several characteristics at the same time. It is, however, sensible to deal with the complexity of this problem of research in various steps, starting from the specification of the availability of potential partners with specified traits (for instance the level of education). These measures could then be close together to the features of local marriage markets.

A second methodological aspect regards the possible use of other statistical models. Our models studied the impact of the marriage squeeze on the transition to first marriage at the regional level. However, there could be additional unobserved heterogeneity at the regional level, and it might therefore be necessary to adopt a multilevel approach. In the experiments we conducted so far with such models, the residual variance at the regional level was not statistically significant. This aspect deserves to be better ascertained in the future. In particular it should be devoted more attention to the estimation of multilevel effect of the marriage squeeze on the transition to first marriage. However, as concerns the impact of the squeezes on the marriage market, it should be stressed that multilevel models will not change the signs of the coefficients, although it will affect the estimated standard errors.

Moreover, a third methodological improvement might rise from a better specification of the information obtained by longitudinal, prospective and retrospective, survey data. Here, an effort should be devoted to the collection of information on educational, working, migratory and marital careers. In an ideal situation, in order to evaluate the impact of the marriage market on the individual marriage opportunities, we would need to follow territorial movements between regions, or more detailed geographical divisions. Moreover there is a need for greater homogeneity regarding the variables (in the survey under study there was a slight inconsistence among the possible answers regarding the educational status and the educational attainment). It would also be useful to collect information regarding histories of the unions independently from the marital status of the individuals. If the aim is to distinguish between different paths followed by the individuals belonging to a population, it should be sensible to go in depth in their 'biography' as concern the history of their unions. In general, the process of assortative mating is strictly linked to other aspects of one own's life-path, and therefore greater effort should be devoted to the enrichment of the collection of information about the timing of the events experienced. Nevertheless it might be that panel surveys represents a better instrument for this purpose.

The second line of research is directed to the enlargement of our knowledge regarding the concepts an the contents of the analysis.

First of all, our research on homogamy focused here on age differences, place of origin and education of the partners. However, other dimensions need to be investigated in deeper detail if we want to understand whether and to what extent Italy is characterised by marriage mobility, with respect to occupational status (horizontally) and social class of the families (vertical). The first dimension needs to link the employment careers of both partners, the second the statuses of the individuals and that of their families.

The increase in prolonged studies of both men and women could bring to growing couples formation inside the highest level of the educational system: it could be interesting to see whether, and to what extent, high educated women will develop their preference for the education traits of the partner. However, more in depth studies on this point are required to see what happens when we look at a finer specification of the educational level, especially at the highest steps of the ladder (high cultural homogamy).

Of course, international comparative studies would enrich our knowledge of the mechanisms underlying the dynamics of marital behaviour. A first attempt has been here pursued in the case of two Italian regions. The comparative perspective could be enlarged either at the level of different territorial levels, and to other countries, to highlight the peculiarity of Italy as concerns the attachment to marriage as well as the interrelations between the pattern of fertility as well as of migration experienced abroad. Overall, we noticed the lack of studies in Europe for this field of research.

Also the development of the link between the individual level and the macro level represents another crucial aspect. Here the marriage market represents a first innovative attempt, but more can be done. Other macro variables relevant to the analysis of the marriage market could be introduced, such as those referred to the labour market as well as the housing market or the proportion and the features of education within a given population. The information about the divorced population should also help in clarifying the concept and the measure of the pool of eligibles. It should be observed that, although still of little relevance in Italy, the increase in the divorce is interrelated to the marriage market. It may either be the outcome of the attractiveness played by the high proportion of unmarried still in surplus, and it could also be the cause of the enlarging pool of available partners (this is the case of divorced men which often reenter the marriage market). Another component that would be worthy to control for, are macro variable expressing the economic conditions at the country level. Since marriage decisions are strictly linked to expectations about future plans and situations, made by each individual, this would allow us to control for period effects of the economic cycle.

Lastly, the consequences of the shift in the minimum age at marriage introduced by law in 1975 represent an interesting aspect to develop. At a first glance, sensitive shifts emerged in the timing of marriage for women in the South, namely Calabria and Sicily. First it would be necessary to ascertain if this new law affected the marital behaviour of other regions, as well. It would also be interesting to understand whether, and to what extent, this could affect gender roles in the sense of a greater age balance between partners, or of a strengthening of the existing traditional behaviour (for instance, the increase in the premarital cohabitations in the South, if they have been forced to marry slightly later).

Chapter 7

Abstract in italiano

Questo lavoro è stato svolto nell'ambito del Dottorato di ricerca in Demografia presso il Dipartimento di Scienze Demografiche dell'Università di Roma 'La Sapienza', con sedi consorziate l'Università degli studi di Firenze e l'Università degli studi di Padova. Sono supervisori della tesi la Professoressa Viviana Egidi e il Dottor Francesco C. Billari. Buona parte della tesi è stata sviluppata durante un perido di soggiorno presso il Max Planck Institute for Demographic Research di Rostock. La scelta della redazione in lingua inglese, che ha comportato un notevole impegno personale, ha però reso possibile una maggiore interazione con ricercatori stranieri.

Riportiamo qui di seguito i risultati principali del lavoro condotto.

Come è ben noto, le peculiarità del nostro paese in termini di trasformazione dei processi di formazione della famiglia fa si che esso rappresenti un interessante caso di studio. In Italia, anche per i più giovani, il matrimonio rappresenta ancora un passo decisivo della propria vita.

Questo lavoro prende in esame il primo matrimonio in Italia e le sue caratteristiche nell'arco degli ultimi decenni (1969-1995), il suo andamento per sesso, i suoi legami con le condizioni del mercato matrimoniale e le dinamiche dell'omogamia per età, luogo di origine e istruzione.

Dopo un'introduzione riguardante i contributi più salienti della letteratura teorica su questo argomento (capitolo uno), passiamo ad analizzare intensità e cadenza del primo matrimonio in Italia, congiuntamente ad un'analisi basata su mappe di Lexis. Queste ultime, essendo particolarmente informative delle caratteristiche generali di un fenomeno demografico, permettono di avere una visione d'insieme del primo matrimonio in Italia nel periodo 1969-1995 e per entrambi i sessi. La base dati a disposizione è rappresentata dai tassi di primo nuzialità per età, sesso, regione di residenza degli sposi, anni 1969-1995 (ISTAT).

Una volta effettuata la correzione dei tassi specifici di primo nuzialità per gli anni 1976-78, presentiamo un'analisi delle modificazioni dell'intensità e della cadenza del matrimonio, prevalentemente a livello di ripartizione territoriale. Il periodo in esame appare caratterizzato da una continua riduzione del *quantum* della nuzialità italiana: nell'arco di 30 anni infatti il Tasso di Primo Nuzialità Totale si dimezza. L'età media al matrimonio declina in una prima fase sia per gli uomini che per le donne (dal 1969 fino alla fine del 1970), da allora in poi (dalla prima metà degli anni '80) entrambi i sessi sperimentano un incremento costante nell'età media al primo matrimonio.

Il terzo capitolo affronta il problema della misura e dell'analisi del mercato matrimoniale. In particolare in questo lavoro ci mettiamo nell'ottica metodologica dell'approccio al problema dei due sessi e all'interno di tale ottica adottiamo la soluzione proposta da Schoen. Accanto a tale indice del mercato matrimoniale, proponiamo anche due nuove misure che si rivelano di maggiore semplicità ed altrettanta efficacia. Il principale risultato cui perveniamo è che lo squilibrio sul mercato matrimoniale sorge dalla variazione nel numero di nati. Alcune coorti di donne si trovano in una situazione di *squeeze*, di pressione matrimoniale (soprattutto negli anni '80) mentre altre coorti di uomini (quelle nate dopo la ripresa del secondo dopoguerra e dopo il baby boom) affrontano analogamente una situazione di svantaggio. Tale squilibrio è stato particolarmente accentuato per le donne al Centro e al Sud d'Italia all'inizio degli anni' 70 e negli anni '80, mentre ha riguardato di più gli uomini nel Nord, durante gli anni '70 e l'inizio degli anni '90.

Inoltre, il ruolo delle migrazioni interregionali per sesso è stato cruciale nel modificare l'assetto dei mercati matrimoniali a livello regionale. anche emersa l'influenza che l'innalzamento dell'età minima al primo matrimonio, introdotto con la legge di riforma del diritto di famiglia, ha avuto per le donne nel Mezzogiorno.

Le variazioni a cui è soggetto il mercato matrimoniale risulta essere particolarmente importante se si considera che l'Italia, come pure altri paesi europei, ha sperimentato un andamento tutt'altro che lineare delle nascite. In effetti, risulta che anche se non ci sarà alcuna influenza della migratorietà, la pressione sul mercato matrimoniale dei prossimi decenni sarà particolarmente acuta nei confronti degli uomini. Ovviamente l'immigrazione, a seconda della composizione per sesso ed età dei suoi flussi, può modificare questo scenario. Ad ogni modo, possiamo affermare che lo *squeeze* del mercato matrimoniale risultante dal declino delle nascite possa essere esso stesso causa di una ulteriore riduzione delle nascite, soprattutto in quei paesi dove il matrimonio è ancora cruciale per la riproduzione.

Nel capitolo quarto abbiamo valutato l'impatto delle macrovariabili riguardanti la disponibilità di partner nel modificare il processo di transizione al primo matrimonio, in una prospettiva micro-macro integrata. Il processo di transizione al primo matrimonio in Italia è stato studiato con i dati desunti dall'Indagine Multiscopo sulle Famiglie del 1998 (ISTAT) e per mezzo di modelli di analisi delle biografie. La pressione sul mercato matrimoniale viene introdotta come covariata tempo-dipendente e il suo effetto viene studiato sia per la regione di nascita che per quella di residenza al momento dell'intervista. Emerge un effetto dei vincoli strutturali del mercato matrimoniale sulla cadenza della transizione al primo matrimonio e ciò si presenta in modo diverso sui due sessi. In particolare, l'effetto dello squilibrio sul mercato matrimoniale che avvantaggia gli uomini, si presenta con un andamento per età ad U. Data la situazione attuale del mercato italiano, che attribuisce uno svantaggio agli uomini, saranno soprattutto gli uomini relativamente giovani (prima del loro 23-mo compleanno) e quelli relativamente adulti (dopo i 25 anni) a risultare più svantaggiati. Allo stesso modo anche l'effetto del mercato matrimoniale attuale per le donne è relativamente costante fino all'età 28 anni. In seguito infatti, emmerge un effetto per età a J-rovesciata indicando un rallentamento del processo di transizione al primo matrimonio. Tali risultati rimangono confermati anche quando si introducono altre covariate, relative alla coorte di nascita, alla regione di nascita, al primo lavoro e al livello di istruzione.

Un altro aspetto cruciale nella ricerca sul matrimonio riguarda lo studio delle caratteristiche dei partner. Lo studio si *chi sposa chi*, o dell'omogamia, presentata nel capitolo cinque, richiede un cambiamento di prospettiva dall'analisi delle caratteristiche quantitative dei matrimoni ai loro aspetti qualitativi.

In generale i matrimoni tradizionali sono i prevalenti nel nostro campione: lui più adulto di lei, entrambi nati nella stessa regione ed entrambi con, all'incirca, lo stesso titolo di studio. Nonostante il persistere di tale modello tradizionale di omogamia, alcune nuove caratteristiche nel processo di scelta del partner stanno emergendo in Italia. Le coppie in cui la differenza d'età tra i due coniugi è minore rappresentano un segnale della riduzione della divisione di genere dei ruoli nella coppia. Gli uomini sperimentano una riduzione relativamente alta del tasso di transizione a matrimoni caratterizzati da una elevata differenza d'età tra coniugi e un leggero incremento delle combinazioni d'età più atipiche (intendendo con questo coppie in cui lei risulta più grande di lui). Al contrario, per le donne il modello tradizionale è ancora l'unico a prevalere, sebbene le coorti più giovani mostrano un rallentamento del processo di transizione in questa direzione, che potrebbe portare nei prossimi anni ad un aumento delle unioni con maggiore equilibro per età. Gli uomini e le donne del Nord sembrano più orientati a questa nuova tipologia di coppia con età simili tra partner, e ciò va attribuito ad una maggiore equalizzazione di genere, mentre al Sud le differenze per età tra i coniugi si mantengono più alte.

Il luogo di origine degli sposi perde via via di importanza nel processo di scelta del partner. Calano i matrimoni tra conterranei, soprattutto per gli uomini la cui mobiltià sul territorio permette loro di allargare il bacino matrimoniale cui attingere e di aumentare le chances di sposarsi eterogami rispetto alla propria regione di nascita. Le donne, sopprattutto se nate al Sud, risentono di più della loro scarsa mobilità ed hanno percio' maggiori difficoltà a sposare un partner nato in altra regione.

Per quanto concerne il livello di istruzione, va osservato che gli uomini più istruiti hanno una maggiore riduzione dei movimenti verso il basso (cioè nel matrimonio con una partner meno istruita) che non lateralmente (con una partner con lo stesso livello di istruzione); le donne più istruite riducono di più le loro possibilità di sposarsi omogame che verso il basso. Ciò significa che le donne che studiano di più hanno maggiori difficoltà a sposare un uomo con lo stesso titolo di studio e che più spesso sposano un uomo meno istruito.

Appendix A

Scales in the Lexis map

In the case of a linear scale it is possible either to insert a scalar or a 3x1 vector. In the case of scalar, the scale is an additive sequence with the following values for the starting element, increment and number of elements:

a) the number of elements is equal to the so-called linear scale parameter,

b) the increment is equal to (maximum - minimum element of data matrix)/(number of elements + 1),

c) the starting element is equal to the minimum element of the matrix plus the increment.

In the case of a 3x1 vector, it is necessary to indicate the starting value, the increment and the number of elements. In both cases, the following restrictions are applied: the minimum element of the data matrix must be strictly less than the maximum and the increment and number of element must be positive.
Also the multiplicative scale can be a scalar or a 3x1 vector. In the first case, the scale is a multiplicative sequence with the following values for the starting element, increment and number of elements:

a) the number of elements is equal to the so-called multiplicative scale parameter,

b) the increment is equal to Exp((ln(maximum) - ln(minimum element of data matrix))/(number of elements + 1)

c) the starting element is equal to the minimum element multiplied by the increment.

In the case of a 3x1 vector, it is necessary to indicate the starting value, the factor and the number of elements. In both cases, the following restrictions are applied: the minimum element of the data matrix must be strictly less than the maximum element; the matrix value must be strictly positive, no zeros allowed; the factor must be greater than one; and number of elements must be greater than zero.

Appendix B

Nuptiality tables

B.1 The nuptiality table

As described in the previous chapter, the Italian data-base for the years 1969-1995 contains the unconditional first marriage rates while, Schoen's indexes of marriage market are based on occurrence-exposure rates of first marriage. Therefore, it is first necessary to transform the unconditional rates into the probability of first marriage for those still single at each age: to this aim we need to calculate the conditional rates by dividing the number of marriages for each age and sex by the person-years lived by the population at risk. To this aim one would need the population distribution by marital status, which is available at the time of a census. A reconstruction of the population distribution by marital status, age and sex is available for the inter-censual period and at the national level for the years 1952-1981 (Castiglioni, 1989[43]). Yet, this reconstruction can not be used for building of the denominator of the conditional rates of first marriage at regional level, which represents what we need.

It is then necessary to pursue a different strategy. In fact, in that case it is possible to compute the person-years lived from age x and $x+1$ by those who are still single at the beginning of the age group: this quantity represents the denominator we are looking for.

For the sake of simplicity let us rename ${}^{k}m(x,t) = m_x$, that represents the first marriage rate for region of residence k, for spouses of each sex aged $(x, x+1)$ during year t. Starting from an initial birth cohort whose radix is $l_0 = 1000$ people, all of them singles at age 15:

$$S_0 = l_0 m_0 \tag{B.1}$$

represents, for the first age, the number of marriages of males (or females) aged 15. At the beginning of the following year, those who are at risk of marrying will be given by the difference:

$$l_1 = l_0 - S_0 \tag{B.2}$$

Then, for subsequent ages we should apply the rate of first marriage to those still single at the beginning of age x:

$$S_x = l_x m_x \tag{B.3}$$

is the number of marriages contracted from exact age x and exact age $x+1$ by those still single at the beginning of that age, and therefore the number of survivors to marriage at age $x+1$ is given by:

$$l_{x+1} = l_x - S_x \tag{B.4}$$

Now, one should also note that our starting unconditional first marriage rate, is a rate comparable to that of a rectangular population:

$$m_x = \frac{M_x}{l_0} \tag{B.5}$$

where M_x is the number of marriages at age x and l_0 is the radix of the table, as usual, but in this particular case is the same for every age. Therefore, to build the new probability of marrying at age x one should need to divide the number of marriages in the age group $(x, x+1)$ of a nuptiality table by those who survive single at the beginning of age x:

$$n_x = \frac{M_x}{l_x} = \frac{M_x}{l_0}\frac{l_0}{l_x} \tag{B.6}$$

Therefore, once computed the survivors to marriage at age x, it is easy to adjust the unconditional first marriage rates (B.5) by substituting the coefficient:

$$c_x = \frac{l_0}{l_x} \tag{B.7}$$

in equation (B.6):

$$n_x = m_x c_x \tag{B.8}$$

Then, n_x represents the conditional probability of marriage from age x to age $x+1$ and its complementary value $1-n_x$ represents the probability of remaining single from age x to age $x+1$. Starting from a cohort radix equal to $l_0^{'} = 1000$ at age 15, the survivors to the next age are given by:

$$l_{x+1}^{'} = l_x^{'}(1-n_x) \tag{B.9}$$

which shows that to build a nuptiality table, it is necessary to apply the complementary values of (B.6) to unity, to the survivors in the status of single at each age.

Therefore, basic elements of the nuptiality tables are: the survivors at marriage $l_x^{'}$ (B.9), the conditional probability between exact ages, n_x (B.6), the number of marriages at each age given by multiplying $l_x^{'}$ by n_x:

$$S_x^{'} = l_x^{'} n_x \tag{B.10}$$

It is now possible to compute the rate of first marriage in two different way: on one hand, assuming that marriages are linearly or uniformly distributed over the age group x to $x+1$, by using the following formula:

$$\nu_x = \frac{S_x^{'}}{l_x^{'} - \frac{1}{2}S_x^{'}}$$

On the other hand, under the assumption that the rate are constant in the age group, one can calculate the rate in continuous time, as the following relation holds:

$$n_x = 1 - e^{-\nu_x} \tag{B.11}$$

thus, by rearranging,

$$\nu_x = -log(1-n_x) \tag{B.12}$$

where n_x is the occurrence/exposure rate[1].

B.1.1 Building the nuptiality tables for Italy, 1969-1995

The procedure described up to now has been applied to our data so that nuptiality tables for every region and year and for both sexes, have been computed. In this

[1] One should also note that the sum over the ages of the conditional probabilities is not directly interpretable, while reduced events are additive (Leridon and Toulemon, 1992, p.92[121]).

appendix we include the two one-sex tables for the national level selected for every 5-years in the period 1969-1995, while the tables relative to the Italy as a whole, for the period 1969-1995 and for both sexes are available in the **floppy disk included at the bottom of this work**.

In order to measure the imbalance between the sexes on the marriage market, it is previously worth to build the nuptiality tables for both sexes, from age 15 to 49, for regions 1-24 and for the period 1969-1995. Let us now focus on the major changes observed for Italy as a whole from the beginning and to the end of the period.

Figures B.1 and B.2 compare the pattern of conditional and unconditional rates of first marriages. Conditional rates are higher than unconditional ones, given that the former have been adjusted in their denominator to include only those who have not yet get married, which therefore are less than the total population of that age. From 1969 to 1995 the overall decrease of the level of the rates involves all ages at first marriage and both sexes.

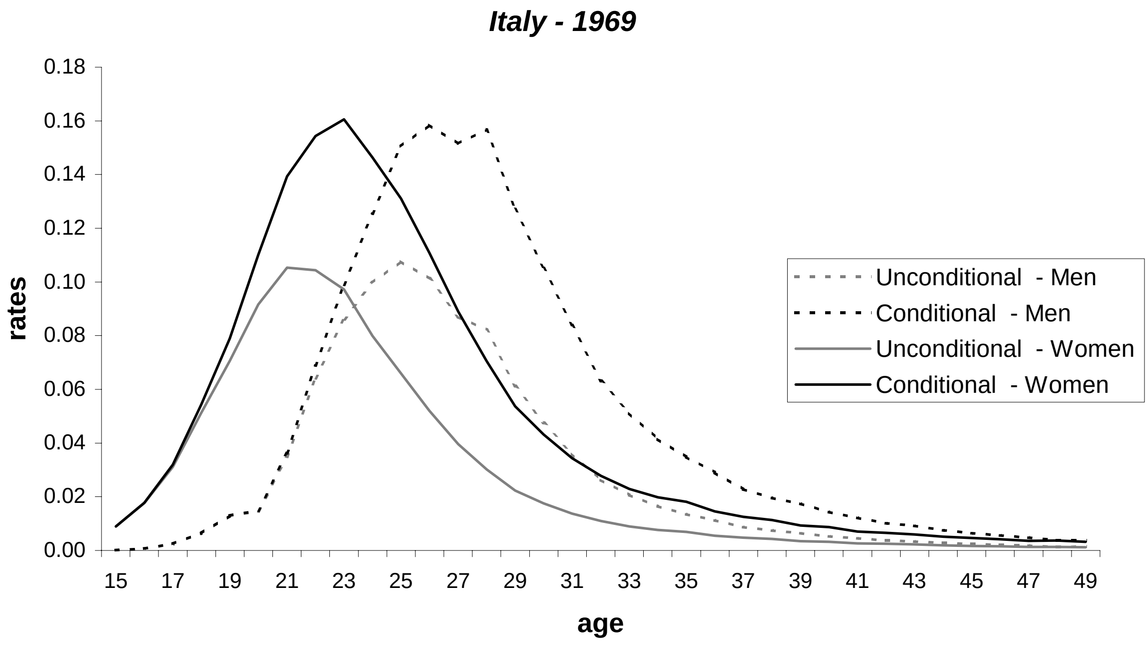


Figure B.1: Conditional and Unconditional rates of first marriage, by age and sex.

Moreover, while decreasing over time, the conditional and unconditional rates get closer: in Italy, in 1969 the conditional rates reached the level of 0.16 (at age 23 for women and 27 for men), in 1995 they halved at around 0.08 for both sexes (26 for women and 28 for men), while, during the same period, the unconditional rates declined from a maximum of 0.10 in 1969 (at age 21 for women and 25 for men) to a maximum of about 0.06 (at age 25 for women, and 28 for men). Of course, one should also note the postponement of the timing of first marriage pattern in 25 years of observation.

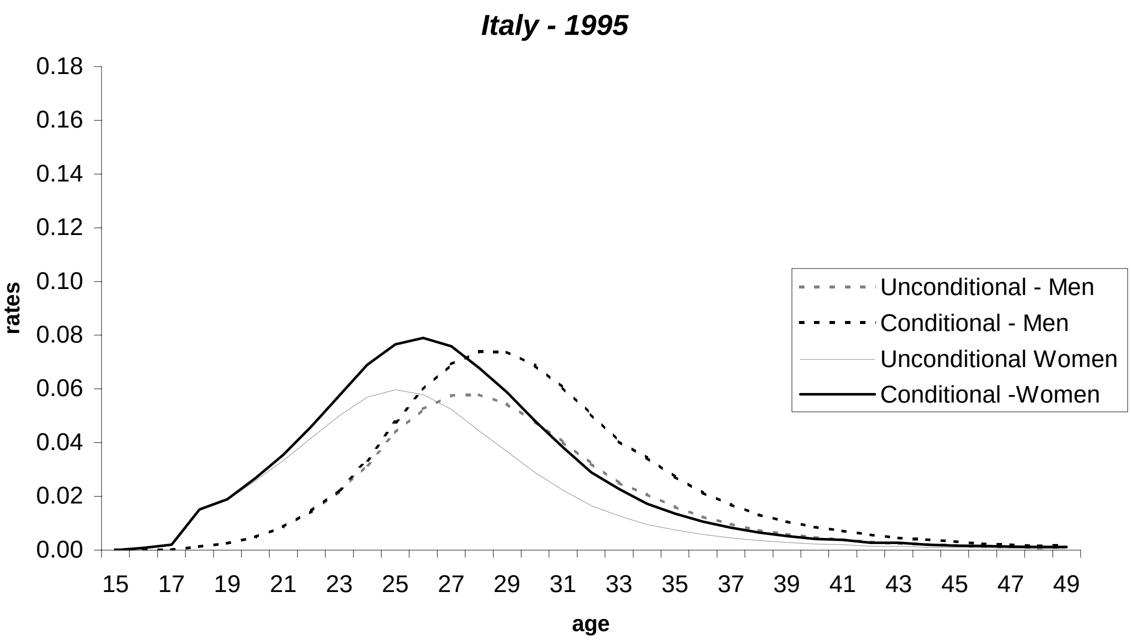


Figure B.2: Conditional and Unconditional rates of first marriage, by age and sex.

Table B.1: Nuptiality table for Italy, 1969

1969:Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00009	0.00009	1000.00	0.00009	0.09	0.00889	0.00889	1000.00	0.00893	8.89
16	0.00075	0.00075	999.91	0.00075	0.75	0.01765	0.01781	991.11	0.01797	17.65
17	0.00244	0.00245	999.16	0.00245	2.44	0.03108	0.03193	973.46	0.03245	31.08
18	0.00638	0.00640	996.72	0.00642	6.38	0.05127	0.05435	942.38	0.05588	51.21
19	0.01286	0.01299	990.34	0.01307	12.86	0.07062	0.07891	891.17	0.08220	70.32
20	0.01460	0.01494	977.47	0.01505	14.60	0.09156	0.11007	820.85	0.11662	90.35
21	0.03478	0.03610	962.87	0.03677	34.76	0.10532	0.13938	730.49	0.15010	101.82
22	0.06405	0.06888	928.11	0.07136	63.93	0.10438	0.15440	628.68	0.16771	97.07
23	0.08611	0.09895	864.18	0.10419	85.51	0.09719	0.16051	531.61	0.17496	85.33
24	0.09974	0.12540	778.68	0.13399	97.65	0.07997	0.14630	446.28	0.15818	65.29
25	0.10775	0.15049	681.03	0.16309	102.49	0.06591	0.13106	380.99	0.14049	49.93
26	0.10127	0.15851	578.54	0.17258	91.71	0.05204	0.11078	331.05	0.11742	36.68
27	0.08699	0.15151	486.84	0.16429	73.76	0.03964	0.08901	294.38	0.09322	26.20
28	0.08215	0.15670	413.08	0.17043	64.73	0.03016	0.07052	268.18	0.07313	18.91
29	0.06119	0.12717	348.35	0.13602	44.30	0.02228	0.05372	249.26	0.05522	13.39
30	0.04752	0.10520	304.05	0.11116	31.99	0.01751	0.04319	235.87	0.04415	10.19
31	0.03607	0.08384	272.06	0.08756	22.81	0.01371	0.03441	225.69	0.03501	7.77
32	0.02619	0.06316	249.25	0.06524	15.74	0.01094	0.02783	217.92	0.02822	6.06
33	0.02068	0.05120	233.51	0.05256	11.96	0.00889	0.02288	211.86	0.02314	4.85
34	0.01643	0.04153	221.56	0.04242	9.20	0.00763	0.01980	207.01	0.02000	4.10
35	0.01354	0.03480	212.35	0.03542	7.39	0.00693	0.01812	202.91	0.01829	3.68
36	0.01119	0.02916	204.96	0.02959	5.98	0.00551	0.01452	199.24	0.01463	2.89
37	0.00866	0.02283	198.99	0.02309	4.54	0.00474	0.01256	196.34	0.01264	2.47
38	0.00738	0.01961	194.45	0.01981	3.81	0.00426	0.01135	193.88	0.01141	2.20
39	0.00649	0.01739	190.63	0.01755	3.32	0.00350	0.00936	191.68	0.00941	1.79
40	0.00531	0.01430	187.32	0.01440	2.68	0.00326	0.00875	189.88	0.00879	1.66
41	0.00450	0.01220	184.64	0.01227	2.25	0.00259	0.00698	188.22	0.00701	1.31
42	0.00372	0.01013	182.39	0.01019	1.85	0.00245	0.00662	186.91	0.00664	1.24
43	0.00334	0.00913	180.54	0.00917	1.65	0.00223	0.00602	185.67	0.00604	1.12
44	0.00274	0.00752	178.89	0.00755	1.35	0.00188	0.00508	184.55	0.00510	0.94
45	0.00235	0.00645	177.54	0.00647	1.14	0.00171	0.00465	183.61	0.00466	0.85
46	0.00205	0.00566	176.40	0.00568	1.00	0.00152	0.00415	182.76	0.00416	0.76
47	0.00175	0.00482	175.40	0.00483	0.85	0.00129	0.00352	182.00	0.00353	0.64
48	0.00136	0.00376	174.55	0.00377	0.66	0.00137	0.00374	181.36	0.00375	0.68
49	0.00139	0.00384	173.90	0.00385	0.67	0.00117	0.00321	180.68	0.00321	0.58

Table B.2: Nuptiality table for Italy, 1970

1970: Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00009	0.00009	1000.00	0.00009	0.09	0.00962	0.00962	1000.00	0.00967	9.62
16	0.00069	0.00070	999.91	0.00070	0.69	0.01926	0.01945	990.38	0.01964	19.26
17	0.00247	0.00247	999.21	0.00247	2.47	0.03386	0.03486	971.12	0.03548	33.85
18	0.00656	0.00658	996.74	0.00661	6.56	0.05196	0.05537	937.26	0.05696	51.89
19	0.01392	0.01406	990.18	0.01416	13.92	0.07407	0.08326	885.37	0.08693	73.71
20	0.01478	0.01513	976.26	0.01525	14.78	0.09373	0.11378	811.65	0.12079	92.35
21	0.03542	0.03682	961.48	0.03751	35.40	0.10795	0.14460	719.30	0.15618	104.01
22	0.06449	0.06950	926.08	0.07203	64.36	0.10651	0.15994	615.29	0.17428	98.41
23	0.09079	0.10459	861.72	0.11048	90.13	0.09792	0.16456	516.88	0.17980	85.06
24	0.10630	0.13468	771.59	0.14466	103.92	0.08554	0.15937	431.82	0.17360	68.82
25	0.10922	0.15484	667.67	0.16822	103.38	0.06728	0.13707	363.00	0.14742	49.76
26	0.10612	0.16889	564.29	0.18500	95.31	0.05328	0.11638	313.25	0.12373	36.46
27	0.09221	0.16417	468.99	0.17933	76.99	0.04044	0.09330	276.79	0.09794	25.82
28	0.08138	0.15961	391.99	0.17389	62.57	0.03021	0.07265	250.97	0.07542	18.23
29	0.06411	0.13689	329.43	0.14721	45.10	0.02362	0.05856	232.73	0.06035	13.63
30	0.04757	0.10851	284.33	0.11486	30.85	0.01704	0.04328	219.10	0.04424	9.48
31	0.03549	0.08501	253.48	0.08885	21.55	0.01349	0.03486	209.62	0.03548	7.31
32	0.02781	0.06907	231.93	0.07157	16.02	0.01105	0.02894	202.31	0.02937	5.86
33	0.02052	0.05241	215.91	0.05383	11.32	0.00851	0.02252	196.46	0.02278	4.42
34	0.01640	0.04277	204.60	0.04371	8.75	0.00730	0.01950	192.03	0.01969	3.74
35	0.01316	0.03489	195.85	0.03551	6.83	0.00621	0.01670	188.29	0.01685	3.15
36	0.01058	0.02843	189.01	0.02884	5.37	0.00535	0.01448	185.14	0.01459	2.68
37	0.00874	0.02374	183.64	0.02403	4.36	0.00475	0.01293	182.46	0.01302	2.36
38	0.00715	0.01960	179.28	0.01979	3.51	0.00402	0.01101	180.10	0.01107	1.98
39	0.00630	0.01738	175.77	0.01753	3.06	0.00359	0.00986	178.12	0.00991	1.76
40	0.00518	0.01440	172.71	0.01450	2.49	0.00323	0.00891	176.37	0.00895	1.57
41	0.00424	0.01183	170.22	0.01190	2.01	0.00269	0.00743	174.80	0.00745	1.30
42	0.00352	0.00986	168.21	0.00991	1.66	0.00230	0.00637	173.50	0.00639	1.10
43	0.00308	0.00866	166.55	0.00870	1.44	0.00213	0.00592	172.39	0.00594	1.02
44	0.00271	0.00764	165.11	0.00767	1.26	0.00194	0.00541	171.37	0.00543	0.93
45	0.00223	0.00632	163.85	0.00634	1.04	0.00167	0.00465	170.44	0.00466	0.79
46	0.00195	0.00553	162.81	0.00555	0.90	0.00155	0.00433	169.65	0.00434	0.74
47	0.00177	0.00503	161.91	0.00505	0.82	0.00147	0.00411	168.92	0.00412	0.69
48	0.00150	0.00428	161.10	0.00429	0.69	0.00121	0.00339	168.22	0.00340	0.57
49	0.00124	0.00354	160.41	0.00354	0.57	0.00107	0.00300	167.65	0.00300	0.50

1975: Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00079	0.00079	1000.00	0.00079	0.79	0.00905	0.00905	1000.00	0.00909	9.05
16	0.00120	0.00120	999.21	0.00120	1.20	0.01887	0.01904	990.95	0.01923	18.87
17	0.00299	0.00299	998.01	0.00300	2.99	0.03388	0.03485	972.08	0.03547	33.88
18	0.00755	0.00759	995.02	0.00762	7.55	0.05996	0.06383	938.20	0.06596	59.89
19	0.01583	0.01603	987.47	0.01616	15.83	0.08038	0.09104	878.32	0.09545	79.96
20	0.02109	0.02170	971.64	0.02194	21.08	0.09584	0.11803	798.36	0.12560	94.23
21	0.03792	0.03986	950.56	0.04068	37.89	0.10264	0.13980	704.13	0.15059	98.43
22	0.06652	0.07267	912.67	0.07545	66.33	0.10110	0.15346	605.69	0.16659	92.95
23	0.08432	0.09869	846.34	0.10390	83.52	0.09512	0.16061	512.75	0.17508	82.35
24	0.09574	0.12237	762.82	0.13053	93.35	0.07122	0.13290	430.40	0.14260	57.20
25	0.10539	0.14897	669.47	0.16131	99.73	0.05751	0.11555	373.19	0.12279	43.12
26	0.10645	0.16819	569.74	0.18415	95.82	0.04569	0.09739	330.07	0.10247	32.15
27	0.07821	0.13829	473.92	0.14883	65.54	0.03250	0.07259	297.92	0.07536	21.63
28	0.06274	0.12035	408.38	0.12823	49.15	0.02469	0.05701	276.30	0.05870	15.75
29	0.04919	0.10068	359.23	0.10612	36.17	0.01956	0.04631	260.54	0.04742	12.07
30	0.03644	0.07843	323.07	0.08168	25.34	0.01511	0.03649	248.48	0.03717	9.07
31	0.02789	0.06231	297.73	0.06433	18.55	0.01161	0.02846	239.41	0.02887	6.81
32	0.02160	0.04963	279.18	0.05091	13.86	0.00923	0.02290	232.60	0.02316	5.33
33	0.01687	0.03962	265.32	0.04043	10.51	0.00774	0.01938	227.27	0.01957	4.40
34	0.01362	0.03253	254.81	0.03307	8.29	0.00604	0.01523	222.87	0.01535	3.39
35	0.01037	0.02512	246.52	0.02544	6.19	0.00533	0.01353	219.47	0.01363	2.97
36	0.00868	0.02123	240.33	0.02146	5.10	0.00456	0.01165	216.50	0.01171	2.52
37	0.00701	0.01732	235.22	0.01747	4.07	0.00397	0.01017	213.98	0.01022	2.18
38	0.00584	0.01451	231.15	0.01462	3.35	0.00360	0.00926	211.80	0.00930	1.96
39	0.00468	0.01169	227.80	0.01176	2.66	0.00299	0.00773	209.84	0.00776	1.62
40	0.00402	0.01011	225.13	0.01016	2.28	0.00290	0.00751	208.22	0.00754	1.56
41	0.00365	0.00921	222.86	0.00926	2.05	0.00260	0.00674	206.66	0.00677	1.39
42	0.00305	0.00772	220.80	0.00775	1.70	0.00235	0.00612	205.26	0.00614	1.26
43	0.00256	0.00649	219.10	0.00651	1.42	0.00218	0.00570	204.01	0.00571	1.16
44	0.00226	0.00575	217.68	0.00576	1.25	0.00183	0.00478	202.85	0.00479	0.97
45	0.00202	0.00515	216.43	0.00516	1.11	0.00179	0.00469	201.88	0.00470	0.95
46	0.00171	0.00439	215.31	0.00439	0.94	0.00160	0.00419	200.93	0.00420	0.84
47	0.00152	0.00388	214.37	0.00389	0.83	0.00153	0.00403	200.09	0.00403	0.81
48	0.00128	0.00327	213.54	0.00328	0.70	0.00142	0.00375	199.28	0.00376	0.75
49	0.00122	0.00313	212.84	0.00313	0.67	0.00145	0.00381	198.53	0.00382	0.76

Table B.3: Nuptiality table for Italy, 1975

Table B.4: Nuptiality table for Italy, 1980

1980: Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00009	0.00009	1000.00	0.00009	0.09	0.00080	0.00080	1000.00	0.00080	0.80
16	0.00017	0.00017	999.91	0.00017	0.17	0.00906	0.00907	999.20	0.00911	9.06
17	0.00055	0.00055	999.74	0.00055	0.55	0.01340	0.01353	990.14	0.01362	13.40
18	0.00427	0.00427	999.18	0.00428	4.27	0.06302	0.06451	976.74	0.06669	63.01
19	0.00842	0.00847	994.92	0.00850	8.42	0.06662	0.07278	913.73	0.07557	66.50
20	0.01703	0.01726	986.49	0.01741	17.03	0.07997	0.09361	847.23	0.09828	79.31
21	0.03499	0.03608	969.46	0.03675	34.98	0.08562	0.10892	767.92	0.11532	83.64
22	0.05511	0.05889	934.49	0.06070	55.03	0.08211	0.11425	684.28	0.12132	78.18
23	0.07435	0.08409	879.46	0.08784	73.95	0.07314	0.11087	606.10	0.11751	67.20
24	0.08626	0.10539	805.50	0.11136	84.89	0.06302	0.10307	538.90	0.10878	55.55
25	0.08847	0.11829	720.61	0.12589	85.24	0.05128	0.08951	483.36	0.09377	43.27
26	0.08239	0.12086	635.37	0.12881	76.79	0.04097	0.07537	440.09	0.07836	33.17
27	0.07119	0.11380	558.58	0.12082	63.57	0.03087	0.05921	406.92	0.06104	24.10
28	0.05879	0.10118	495.01	0.10667	50.08	0.02279	0.04512	382.83	0.04617	17.27
29	0.04552	0.08323	444.93	0.08690	37.03	0.01729	0.03502	365.55	0.03565	12.80
30	0.03460	0.06629	407.90	0.06859	27.04	0.01357	0.02798	352.75	0.02838	9.87
31	0.02466	0.04893	380.86	0.05017	18.64	0.00965	0.02016	342.88	0.02037	6.91
32	0.01884	0.03833	362.22	0.03909	13.88	0.00778	0.01642	335.97	0.01655	5.52
33	0.01393	0.02888	348.34	0.02931	10.06	0.00602	0.01281	330.45	0.01289	4.23
34	0.01109	0.02332	338.28	0.02359	7.89	0.00517	0.01107	326.22	0.01113	3.61
35	0.00877	0.01865	330.39	0.01883	6.16	0.00414	0.00889	322.61	0.00893	2.87
36	0.00714	0.01532	324.23	0.01544	4.97	0.00349	0.00754	319.74	0.00757	2.41
37	0.00593	0.01282	319.26	0.01290	4.09	0.00312	0.00675	317.33	0.00678	2.14
38	0.00468	0.01018	315.17	0.01023	3.21	0.00266	0.00578	315.19	0.00580	1.82
39	0.00412	0.00899	311.96	0.00903	2.80	0.00222	0.00483	313.36	0.00485	1.51
40	0.00331	0.00726	309.16	0.00728	2.24	0.00197	0.00430	311.85	0.00431	1.34
41	0.00286	0.00629	306.91	0.00631	1.93	0.00167	0.00366	310.51	0.00367	1.14
42	0.00248	0.00547	304.98	0.00548	1.67	0.00144	0.00317	309.37	0.00317	0.98
43	0.00204	0.00451	303.31	0.00452	1.37	0.00132	0.00289	308.39	0.00289	0.89
44	0.00181	0.00401	301.94	0.00402	1.21	0.00129	0.00284	307.50	0.00284	0.87
45	0.00161	0.00357	300.73	0.00358	1.07	0.00127	0.00279	306.63	0.00279	0.86
46	0.00143	0.00319	299.66	0.00319	0.95	0.00128	0.00283	305.77	0.00283	0.86
47	0.00117	0.00261	298.70	0.00261	0.78	0.00115	0.00254	304.91	0.00254	0.77
48	0.00110	0.00245	297.93	0.00246	0.73	0.00105	0.00232	304.13	0.00233	0.71
49	0.00093	0.00209	297.19	0.00209	0.62	0.00105	0.00233	303.42	0.00233	0.71

Table B.5: Nuptiality table for Italy, 1985

1985: Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00000	0.00000	1000.00	0.00000	0.00	0.00000	0.00000	1000.00	0.00000	0.00
16	0.00008	0.00008	1000.00	0.00008	0.08	0.00416	0.00416	1000.00	0.00417	4.16
17	0.00029	0.00029	999.92	0.00029	0.29	0.00648	0.00651	995.84	0.00653	6.48
18	0.00282	0.00282	999.63	0.00283	2.82	0.03749	0.03789	989.36	0.03862	37.48
19	0.00486	0.00488	996.80	0.00489	4.86	0.04248	0.04461	951.88	0.04563	42.46
20	0.01174	0.01183	991.94	0.01190	11.73	0.05676	0.06224	909.42	0.06427	56.61
21	0.02328	0.02375	980.21	0.02403	23.28	0.06649	0.07731	852.81	0.08046	65.93
22	0.03789	0.03957	956.93	0.04038	37.87	0.07145	0.08899	786.88	0.09320	70.02
23	0.05507	0.05978	919.06	0.06164	54.94	0.07028	0.09427	716.86	0.09901	67.58
24	0.06710	0.07709	864.12	0.08022	66.61	0.06336	0.09141	649.28	0.09586	59.35
25	0.07559	0.09308	797.51	0.09771	74.24	0.05468	0.08423	589.93	0.08799	49.69
26	0.07493	0.09981	723.27	0.10515	72.19	0.04460	0.07266	540.24	0.07544	39.26
27	0.06702	0.09651	651.08	0.10149	62.83	0.03484	0.05942	500.99	0.06125	29.77
28	0.05763	0.08895	588.25	0.09316	52.33	0.02639	0.04663	471.22	0.04775	21.97
29	0.04777	0.07824	535.92	0.08147	41.93	0.01993	0.03618	449.25	0.03685	16.25
30	0.03803	0.06541	493.99	0.06765	32.31	0.01498	0.02774	432.99	0.02814	12.01
31	0.02848	0.05092	461.68	0.05227	23.51	0.01114	0.02094	420.98	0.02116	8.81
32	0.02138	0.03934	438.17	0.04013	17.24	0.00821	0.01560	412.17	0.01572	6.43
33	0.01594	0.02997	420.93	0.03043	12.62	0.00644	0.01234	405.74	0.01241	5.01
34	0.01256	0.02400	408.32	0.02429	9.80	0.00507	0.00977	400.73	0.00982	3.92
35	0.00921	0.01782	398.52	0.01798	7.10	0.00426	0.00826	396.81	0.00829	3.28
36	0.00705	0.01378	391.41	0.01388	5.39	0.00328	0.00639	393.54	0.00641	2.52
37	0.00545	0.01073	386.02	0.01079	4.14	0.00267	0.00521	391.02	0.00522	2.04
38	0.00453	0.00896	381.88	0.00900	3.42	0.00233	0.00456	388.99	0.00457	1.77
39	0.00362	0.00718	378.46	0.00721	2.72	0.00210	0.00413	387.21	0.00414	1.60
40	0.00295	0.00588	375.74	0.00590	2.21	0.00164	0.00322	385.61	0.00323	1.24
41	0.00254	0.00508	373.53	0.00509	1.90	0.00132	0.00260	384.37	0.00261	1.00
42	0.00206	0.00414	371.63	0.00415	1.54	0.00130	0.00257	383.37	0.00257	0.99
43	0.00189	0.00380	370.09	0.00381	1.41	0.00099	0.00196	382.38	0.00196	0.75
44	0.00157	0.00316	368.68	0.00316	1.16	0.00094	0.00187	381.64	0.00187	0.71
45	0.00144	0.00290	367.52	0.00290	1.06	0.00093	0.00183	380.92	0.00184	0.70
46	0.00117	0.00236	366.46	0.00236	0.86	0.00083	0.00165	380.22	0.00165	0.63
47	0.00097	0.00196	365.59	0.00197	0.72	0.00071	0.00141	379.60	0.00141	0.54
48	0.00086	0.00173	364.87	0.00173	0.63	0.00066	0.00130	379.06	0.00130	0.49
49	0.00075	0.00151	364.24	0.00152	0.55	0.00061	0.00121	378.57	0.00121	0.46

Table B.6: Nuptiality table for Italy, 1990

1990: Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00000	0.00000	1000.00	0.00000	0.00	0.00000	0.00000	1000.00	0.00000	0.00
16	0.00003	0.00003	1000.00	0.00003	0.03	0.00183	0.00183	1000.00	0.00183	1.83
17	0.00015	0.00015	999.97	0.00015	0.15	0.00357	0.00358	998.17	0.00359	3.57
18	0.00195	0.00195	999.81	0.00195	1.95	0.02427	0.02441	994.60	0.02471	24.27
19	0.00365	0.00366	997.87	0.00367	3.65	0.02958	0.03048	970.33	0.03095	29.57
20	0.00743	0.00748	994.22	0.00750	7.43	0.04125	0.04380	940.75	0.04479	41.20
21	0.01530	0.01551	986.78	0.01563	15.30	0.05242	0.05805	899.55	0.05980	52.22
22	0.02572	0.02647	971.48	0.02683	25.71	0.06205	0.07253	847.33	0.07529	61.45
23	0.03879	0.04098	945.77	0.04184	38.75	0.06689	0.08336	785.88	0.08704	65.51
24	0.05274	0.05796	907.01	0.05971	52.57	0.06823	0.09112	720.37	0.09554	65.64
25	0.06564	0.07615	854.44	0.07920	65.06	0.06516	0.09340	654.73	0.09805	61.15
26	0.07155	0.08883	789.38	0.09303	70.12	0.05800	0.08892	593.58	0.09313	52.78
27	0.06879	0.09198	719.26	0.09649	66.16	0.04741	0.07716	540.80	0.08030	41.73
28	0.06362	0.09135	653.10	0.09580	59.66	0.03763	0.06430	499.07	0.06646	32.09
29	0.05480	0.08405	593.44	0.08779	49.88	0.02924	0.05191	466.98	0.05331	24.24
30	0.04709	0.07640	543.56	0.07948	41.53	0.02290	0.04188	442.73	0.04279	18.54
31	0.03600	0.06129	502.03	0.06325	30.77	0.01642	0.03073	424.19	0.03121	13.03
32	0.02828	0.04995	471.26	0.05124	23.54	0.01198	0.02281	411.16	0.02307	9.38
33	0.02110	0.03835	447.72	0.03910	17.17	0.00909	0.01751	401.78	0.01766	7.04
34	0.01681	0.03121	430.55	0.03171	13.44	0.00734	0.01428	394.74	0.01438	5.64
35	0.01309	0.02472	417.11	0.02503	10.31	0.00562	0.01101	389.11	0.01107	4.28
36	0.01052	0.02012	406.80	0.02033	8.19	0.00461	0.00909	384.83	0.00913	3.50
37	0.00763	0.01475	398.62	0.01486	5.88	0.00347	0.00687	381.33	0.00689	2.62
38	0.00620	0.01208	392.74	0.01215	4.74	0.00285	0.00567	378.71	0.00568	2.15
39	0.00493	0.00966	387.99	0.00971	3.75	0.00238	0.00474	376.56	0.00475	1.79
40	0.00382	0.00753	384.25	0.00755	2.89	0.00204	0.00406	374.78	0.00407	1.52
41	0.00323	0.00638	381.35	0.00640	2.43	0.00168	0.00335	373.26	0.00336	1.25
42	0.00252	0.00500	378.92	0.00501	1.89	0.00125	0.00249	372.01	0.00250	0.93
43	0.00200	0.00397	377.03	0.00398	1.50	0.00118	0.00236	371.08	0.00237	0.88
44	0.00172	0.00344	375.53	0.00344	1.29	0.00108	0.00217	370.20	0.00217	0.80
45	0.00149	0.00297	374.24	0.00298	1.11	0.00100	0.00201	369.40	0.00201	0.74
46	0.00122	0.00243	373.13	0.00243	0.91	0.00084	0.00170	368.66	0.00170	0.63
47	0.00129	0.00258	372.22	0.00259	0.96	0.00073	0.00147	368.03	0.00147	0.54
48	0.00100	0.00200	371.26	0.00200	0.74	0.00075	0.00152	367.49	0.00152	0.56
49	0.00081	0.00163	370.52	0.00163	0.60	0.00059	0.00120	366.93	0.00120	0.44

Table B.7: Nuptiality table for Italy, 1995

1995: Nuptiality Tables by sex, ITALY

	MEN					WOMEN				
age	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages	Unconditional rate	Conditional rate (probability)	Survivors as Singles	Continuous rate	marriages
x	m_x	n_x	l'_x	v_x	S'_x	m_x	n_x	l'_x	v_x	S'_x
15	0.00000	0.00000	1000.00	0.00000	0.00	0.00000	0.00000	1000.00	0.00000	0.00
16	0.00001	0.00001	1000.00	0.00001	0.01	0.00089	0.00089	1000.00	0.00089	0.89
17	0.00011	0.00011	999.99	0.00011	0.11	0.00203	0.00203	999.11	0.00203	2.03
18	0.00134	0.00134	999.88	0.00134	1.34	0.01510	0.01514	997.08	0.01526	15.10
19	0.00252	0.00252	998.54	0.00252	2.52	0.01862	0.01896	981.99	0.01914	18.62
20	0.00486	0.00487	996.03	0.00489	4.86	0.02587	0.02684	963.37	0.02721	25.86
21	0.00864	0.00872	991.17	0.00876	8.64	0.03332	0.03549	937.51	0.03614	33.28
22	0.01440	0.01466	982.53	0.01476	14.40	0.04181	0.04607	904.23	0.04716	41.65
23	0.02174	0.02245	968.13	0.02271	21.74	0.05005	0.05755	862.58	0.05928	49.64
24	0.03169	0.03345	946.39	0.03402	31.65	0.05694	0.06893	812.94	0.07142	56.04
25	0.04371	0.04765	914.74	0.04882	43.58	0.05963	0.07655	756.90	0.07964	57.94
26	0.05250	0.05984	871.16	0.06170	52.13	0.05790	0.07903	698.96	0.08233	55.24
27	0.05756	0.06924	819.03	0.07176	56.71	0.05240	0.07593	643.72	0.07897	48.88
28	0.05789	0.07390	762.32	0.07677	56.34	0.04436	0.06783	594.84	0.07024	40.35
29	0.05443	0.07375	705.98	0.07661	52.07	0.03670	0.05873	554.49	0.06052	32.56
30	0.04793	0.06869	653.91	0.07116	44.92	0.02888	0.04797	521.93	0.04916	25.04
31	0.04023	0.06055	609.00	0.06246	36.87	0.02234	0.03820	496.89	0.03895	18.98
32	0.03229	0.05064	572.13	0.05197	28.97	0.01658	0.02901	477.91	0.02943	13.86
33	0.02501	0.04054	543.15	0.04138	22.02	0.01278	0.02273	464.05	0.02299	10.55
34	0.02072	0.03445	521.14	0.03505	17.95	0.00956	0.01723	453.50	0.01738	7.81
35	0.01610	0.02733	503.19	0.02771	13.75	0.00746	0.01356	445.69	0.01366	6.05
36	0.01237	0.02134	489.43	0.02157	10.44	0.00578	0.01060	439.64	0.01065	4.66
37	0.00966	0.01688	478.99	0.01702	8.08	0.00451	0.00832	434.98	0.00835	3.62
38	0.00743	0.01311	470.91	0.01319	6.17	0.00352	0.00652	431.37	0.00654	2.81
39	0.00598	0.01063	464.74	0.01069	4.94	0.00281	0.00523	428.55	0.00524	2.24
40	0.00480	0.00859	459.79	0.00863	3.95	0.00221	0.00412	426.31	0.00413	1.76
41	0.00396	0.00712	455.85	0.00714	3.24	0.00201	0.00375	424.56	0.00376	1.59
42	0.00315	0.00568	452.60	0.00570	2.57	0.00145	0.00272	422.96	0.00272	1.15
43	0.00253	0.00457	450.03	0.00458	2.06	0.00144	0.00270	421.81	0.00271	1.14
44	0.00218	0.00395	447.97	0.00396	1.77	0.00107	0.00201	420.68	0.00201	0.84
45	0.00174	0.00316	446.20	0.00317	1.41	0.00091	0.00171	419.83	0.00172	0.72
46	0.00131	0.00238	444.79	0.00238	1.06	0.00085	0.00159	419.11	0.00159	0.67
47	0.00113	0.00207	443.73	0.00207	0.92	0.00071	0.00133	418.44	0.00133	0.56
48	0.00088	0.00160	442.82	0.00161	0.71	0.00062	0.00117	417.89	0.00117	0.49
49	0.00092	0.00167	442.11	0.00167	0.74	0.00061	0.00115	417.40	0.00115	0.48

Appendix C

Event history analysis techniques

C.1 Introduction

In this appendix we recall some elements of *Event History Analysis* in continuous time. In particular, we discuss nonparametric methods (the Kaplan-Meier method) for single transition. Parametric and semi-parametric methods are dealt in the case used in our analyses. Finally we include also a brief description of the estimation methods especially focusing on one type of transition: single state destination. Multiple destinations methods are dealt with in the next chapter. Plenty of manuals and reference books can be easily found in literature. See for instance: Collett (1997[55]), Blossfeld and Rohwer (1995[24]), Rohwer and Pötter (1998[150]), Yamaguchi (1991[191]), Allison (1984[2]), Tuma and Hannan (1984[179]).

C.2 Continuous time

Formally, let T be a random variable for duration of the risk period for an event and let T be defined only for positive values t:

$$T : \Omega \rightarrow [0, +\infty)$$

When t equals 0 then T express the entry into the risk period, while when t is greater than 0 then T measures the distance between the entry into the risk period and the occurrence of the event under study. A definition of $T : \Omega \rightarrow (0, +\infty)$ is sometimes used. Therefore, the random variable T assumes also the following meanings: waiting time before experiencing an event, duration for non observing an event, length of an episode. The *survivor function* $S(t)$ is given as

$$S(t) = P(T \geq t) \tag{C.1}$$

and it represents the probability of not having the event prior to time t, which is also the probability of observing an event after that time t or the probability that the episode's duration is at least t. Equivalently, its complementary value to unity of equation (C.1) is the *cumulative distribution function* or simply *distribution function*:

$$F(t) = P(T < t) = 1 - P(T \geq t) = 1 - S(t) \tag{C.2}$$

and it represents the probability that the episode's duration is less than t, or, put otherwise, the probability that the events happens in the time interval between 0 and t (Collett, 1997[55]). The *unconditional instantaneous probability* of having the event at time t, $f(t)$, which is also called the *probability density function* (p.d.f.) of T, is given as:

$$\begin{aligned} f(t) &= \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t)}{\Delta t} = \lim_{\Delta t \to 0} \frac{F(t+\Delta t) - F(t)}{\Delta t} \\ &= \lim_{\Delta t \to 0} \frac{1 - S(t+\Delta t) - 1 + S(t)}{\Delta t} = -\frac{dS(t)}{dt} \end{aligned} \tag{C.3}$$

where $S(t) = \int_0^t f(\tau)d\tau$ and $\int_0^{+\infty} f(t)dt = 1$. Now, let us consider the probability that the random variable associated with an individual's survival time T lies between t and $t + \Delta t$, conditional on T being greater than or equal to t, the hazard function $r(t)$ is then the limiting value of this probability divided by the time interval Δt, as Δt tends to zero. This represents the most used function in the event history analysis and it is also known as the *transition rate* or *hazard rate*, *intensity rate*, *failure rate*, *transition intensity*, *risk function rate*, *mortality rate*. It is formally given as:

$$r(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t | T \geq t)}{\Delta t} = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t)}{\Delta t} \frac{1}{P(T \geq t)} = \frac{f(t)}{S(t)} \tag{C.4}$$

Equation (C.4) represents the probability that the event occurs during the time $(t, t + \Delta t)$ *given that the event did not occur prior to time t*. It therefore represents a conditional density function, i.e. the density function $f(t)$ divided through the survivor function $S(t)$. The transition rate gives a local description of the development of the process: one needs information about the local probability density for events at t, given by $f(t)$, and about the development of the process up to time t, given by $S(t)$. Every transition rate gives us a description of the evolution of the process in that relative time interval, therefore if we know the transition rate for all possible points in time we have a description of the entire process, which is equivalent to having a complete description of the distribution of T (Blossfeld and Rohwer, 1995).

In most cases event history analysis models the transition rate $r(t)$ instead of $S(t)$ or $f(t)$ (Yamaguchi[191], 1991). This is due to several reasons. First, it is important to consider the risk attached to a person of experiencing an event at a given time, given that the individual has not had the event by that time; second, when this risk depends on certain time-dependents covariates, it is easy to model the effects of the 'current' values of the covariates on hazard rates; and third, the class of the proportional hazard models can be applied without specifying the a functional form for the effect of time (or duration) in hazard rates. The following relationships are true:

$$r(t) = \frac{f(t)}{S(t)} = \frac{-\frac{dS(t)}{dt}}{S(t)} = -\frac{S'(t)}{S(t)} = -\frac{d \log S(T)}{dt} \tag{C.5}$$

therefore the transition rate is equivalent to the opposite of the logarithmic derivative of the survivor function. By integrating both sides of equation (C.5)

$$S(t) = \exp\left\{ -\int_o^t r(\tau)d\tau \right\}. \tag{C.6}$$

From equation (C.3) we also have:

$$-S'(t) = f(t) \tag{C.7}$$

and when it is substituted inside equation (C.4), gives us the following relation:

$$r(t) = -\frac{S'(t)}{S(t)} \tag{C.8}$$

and, by integrating both sides we get:

$$-\int_0^t r(\tau)d\tau = \int_0^t \frac{S'(t)}{S(t)} = lnS(\tau)\Big|_0^t = lnS(t)$$

Therefore the survivor function can be calculated by starting from the transition rate in the following way:

$$S(t) = \exp\left\{-\int_0^t r(\tau)d\tau\right\} = \exp\{-H(t)\} \tag{C.9}$$

having called $H(t) = -\int_0^t r(\tau)d\tau$ the *cumulative hazard function*. In sum,

$$r(t) = \frac{f(t)}{S(t)} \qquad or \qquad r(t)S(t) = f(t) \tag{C.10}$$

that is to say: if a conditional measure is multiplied by the probability of obtaining the condition, then the corresponding unconditional measure will result. Specifically:

$$\begin{aligned} & (conditional\ density\ of\ failure\ at\ time\ t,\ given\ survival\ to\ time\ t) \times \\ \times\ & (probability\ of\ survival\ to\ time\ t)\ = \\ =\ & (unconditional\ density\ of\ failure\ at\ time\ t) \end{aligned} \tag{C.11}$$

(London, 1997[129]).

C.3 Nonparametric methods for single transition

These methods of description of the process under study do not make any assumption about the distribution of the process itself. They consist of the *Life table* and the *Kaplan-Meier* (or *product-limit*) methods. The difference between the two methods is essentially that the first needs a definition of the time intervals to be adopted in the analysis, whereas the second do not need any. Therefore, in the first case, the choice of the discrete time intervals made by the researchers should guarantee a relatively high number of episodes, so that the estimates conditional for each interval are reliable. Today, given the hardware and software capabilities, there is no more reason to prefer the former method to the latter one. Here we present only the Kaplan-Meier method.

C.3.1 The Kaplan-Meier method for the estimation of the survival functions

In the approach also known as *product-limit* the choice of the time interval is not left arbitrarily to the researcher but it derives directly from the observed durations. In fact, at every point in time where at least an event occurs, the risk set is calculated. In such a way the information contained in a set of episodes is optimally used. To this aim, one also need to sort all episodes, characterised by an origin state and a destination state, by their ending (and starting) times. Moreover, here the estimators are maximum-likelihood estimators of the survivor function.

Let us assume a sample of N episodes, all having the same origin state and either having a destination state at some point in time or being right censored. The points where at least one episode ends with an event are:

$$t_1 < t_2 < t_3 < \dots$$

Let $I_i = \{t : t_i \leq t < t_{i+1}\}$, and $i = 1, 2, \ldots, n$, be the interval where at least one event has been observed in correspondence of the extremes t_i ; moreover $I_0 = \{t : 0 \leq t < t_1\}$. Let us define the following basic quantities:

- E_i = the number of episodes with events occurring at t_i;
- Z_i = the number of censored episodes ending in $[t_{i-1}, t_i)$;
- R_i = the number of episodes in the risk set at t_i, i.e. the number of episodes with starting time less than t_i and ending time $\geq t_i$. Therefore $R_i = N_i$ is the amount of people presents at time t_i.

Also note that the risk set at t_i includes also episodes that are censored at this point in time. It is assumed that a censored episode contains the information that there was no event up to, *and including*, the observed ending time of the episode: that is to say *censoring takes place an infinitesimal amount to the right of the observed ending time.* The product-limit estimator of the survivor function is defined as:

$$\hat{S}_i = \prod_{j=1}^{i-1} \left(1 - \frac{E_j}{R_j}\right) \tag{C.12}$$

The survivor function is a step function at the points in time t_i:

$$\hat{S}(t) = \hat{S}_i \qquad t_i \leq t < t_{i+1}$$

Normally, the following formula is used to calculate estimates of standard errors for the survivor function:

$$S.E.(\hat{S}(t)) = \hat{S}(t) \left[\sum_{i:t_i<t} \frac{E_i}{R_i(R_i - E_i)} \right]^{1/2}$$

In addition to survivor function estimates, the product-limit method gives a simple estimate of the cumulated transition rate:

$$\hat{H}_i = -\log(\hat{S}_i)$$

The major drawback is that this method does not allow to directly obtain the estimation of the transition rate. Moreover the representations of the product-limit estimation into a table, given the very high number of intervals is not easy. However, this can be solved by including in a table only some selected durations, or by drawing the plots. Moreover, the product-limit method is particularly good in case of a comparison between subgroups of the population. Comparisons between the plots resulting from the life table method and product-limit method show that the first method provides a kind of smoothing curve of the second plot.

C.4 Parametric models: Single-episode model

Even though the nonparametric methods can be applied to subgroups of the population, it soon becomes hard to handle an increasing number of them: there could be, in fact, only a small number of cases left in the various subgroups. Even when the subgroups keeps a reasonable number of cases, so that it is still possible to estimate their survivor functions, it then becomes difficult to interpret the results. Moreover, using quantitative variables (such as age, income, ...) one needs to group them into classes, therefore loosing information, to be able to estimate and compare survivor functions. Finally multi-episode processes can hardly be analysed with nonparametric methods. For all these reasons (Blossfeld and

Rohwer, 1995[24]) over the last 20 years, event history analysis has been mainly based on parametric transition rate models, using nonparametric methods as descriptive tools. Transition rate models offer also the possibility to include in the model the dependence on a set of covariates.

C.4.1 Maximum Likelihood Estimates

The general feature of the models will be explained in two steps: first we look at the case of single transition where there is a single random variable T and then we look at the case of multiple destinations with a two-dimensional random variables (this case will be exploited in the next chapter, but it is useful to introduce the concept right now) (Blossfeld and Rohwer, 1995[24], Rohwer and Pötter, 1998[150]).

Let us start with the simplest case. To derive the model, one has to assume a known parametric distribution for the duration variable T, whose parameters are $a, b, c, \ldots$ The cumulative distribution function is:

$$F(t; a, b, c, \ldots) = \int_0^t f(\tau; a, b, c, \ldots) d\tau$$

the survivor function is:

$$S(t; a, b, c, \ldots) = 1 - F(t; a, b, c, \ldots)$$

and the transition rate is given by:

$$r(t; a, b, c, \ldots) = \frac{f(t; a, b, c, \ldots)}{S(t; a, b, c, \ldots)}$$

In the case of *single transition* we want to study the transition rate from origin state $j \in \mathcal{O}$ to destination state in ,$\mathcal{D}_j$, which represents the set of all possible destination states for episodes having an origin state j. Let

- $\mathcal{N}_j$ the set of all episodes with origin state j,
- $\mathcal{Z}_j$ the set of all censored episodes having an origin state j,
- $\mathcal{E}_{jk}$ the set of all episodes with origin state j and destination state k that have an event $(j \neq k)$.

To simplify notation let us omit the dependence on the set of parameters. In the case of a single transition (j, k) the likelihood can be written as:

$$\mathcal{L}_{jk} = \prod_{i \in \mathcal{E}_{jk}} f(t_i) \prod_{i \in \mathcal{Z}_j} S(t_i) = \prod_{i \in \mathcal{E}_{jk}} r(t_i) \prod_{i \in \mathcal{N}_j} S(t_i) \tag{C.13}$$

As the usual notation: $f(t)$ is the density function and $S(t)$ is the survivor function for the single transition (j, k). Therefore if the episode has one event at t_i, its contribution to the likelihood is given by the density function, calculated at the ending time t_i; if the episode is censored, its contribution to the likelihood is given by the survivor function evaluated at the ending time t_i, but possibly depends on covariates changing their values during the episode. Thus the likelihood function can be expressed by using only the transition rate and the survivor function. Also covariates, that may change their values during the episode can be included in the model.

In case of transitions to *multiple destinations*, transition rates describe the movements from an origin state $j \in \mathcal{O}$ to two or more destination states $k \in \mathcal{D}_j$, which represent the set of all possible destination states for episodes having an origin state j. In this case there is a two-dimensional random variable (T_j, D_j), with T_j the duration in the origin state and D_j the destination state after leaving the origin state. Generalising the concept of transition rate to this case we define the *transition-specific rates* by:

$$r_{jk}(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t, D_j = k | T \geq t)}{\Delta t} = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t, D_j = k)}{\Delta t} \frac{1}{P(T \geq t)} \tag{C.14}$$

Thus, assuming that all the transition rates r_{jk} have the same mathematical form, there is only the need to generalise the single-transition case to a situation with alternative destination states. In particular, we can define the transition specific rate as a single-transition case and provide the possibility for transition-specific parameters:

$$r_{jk}(t; a_{jk}, b_{jk}, c_{jk}, \ldots) = r(t; a_{jk}, b_{jk}, c_{jk}, \ldots)$$

where the parameters are transition-specific and $r(t; \ldots)$ is taken from the single-transition case. The survivor functions $S_j(t)$ for the duration in the given origin state $j \in \mathcal{O}$ can be derived from the *pseudo-survivor functions* specific for each transition

$$\tilde{S}_{jk}(t) = \exp\left\{ -\int_0^t r_{jk}(\tau) d\tau \right\}.$$

Given that the transition rate has the same mathematical form for each kind of transition as the corresponding single-transition case, we have

$$\tilde{S}_j(t) = \prod_{k \in \mathcal{D}_j} \tilde{S}_{jk}(t) \tag{C.15}$$

Model estimations generally assumes that the individuals episodes are statistically independent and this might not be true especially in the case of multiple episodes, when each individual can contribute to more than one episode. But this requirement is conditional on covariates, and can be often met by using covariates to capture information about the past history of the individual episodes. The likelihood can be written as:

$$\mathcal{L}_j = \prod_{k \in \mathcal{D}_j} \prod_{i \in \mathcal{E}_{jk}} \tilde{f}_{jk}(t_i) \prod_{i \in \mathcal{Z}_j} S_j(t_i) = \prod_{k \in \mathcal{D}_j} \prod_{i \in \mathcal{E}_{jk}} r_{jk}(t_i) \prod_{i \in \mathcal{N}_j} S_j(t_i) \tag{C.16}$$

$$\mathcal{L}_j = \prod_{k \in \mathcal{D}_j} \prod_{i \in \mathcal{E}_{jk}} r_{jk}(t_i) \prod_{k \in \mathcal{D}_j} \prod_{i \in \mathcal{N}_j} \tilde{S}_{jk}(t_i) \tag{C.17}$$

where, in the second passage, $S_j(t_i)$ has been substituted according to equation (C.15). By rearranging we obtain the likelihood function in the case of multiple destinations from the origin state j.

$$\mathcal{L}_j = \prod_{k \in \mathcal{D}_j} \left\{ \prod_{i \in \mathcal{E}_{jk}} r_{jk}(t_i) \prod_{i \in \mathcal{N}_j} \tilde{S}_{jk}(t_i) \right\} \tag{C.18}$$

Lastly, the third step is to account for more than a single origin state. In this case, it is necessary to multiply the (C.18) by the product over all the possible origin states j:

$$\mathcal{L} = \prod_{j \in \mathcal{O}} \mathcal{L}_j = \prod_{j \in \mathcal{O}} \prod_{k \in \mathcal{D}_j} \prod_{i \in \mathcal{E}_{jk}} r_{jk}(t_i) \prod_{i \in \mathcal{N}_j} \tilde{S}_{jk}(t_i) \tag{C.19}$$

The last equation (C.19) represents the most general form of the likelihood: in the case of a single origin state and a single destination state it becomes (C.13) and in the multiple destinations case it becomes (C.18). The total log-likelihood function is :

$$\ell = \sum_{j \in \mathcal{O}} \sum_{k \in \mathcal{D}_j} \sum_{i \in \mathcal{E}_{jk}} \log\{r_{jk}(t_i)\} + \sum_{i \in \mathcal{N}_j} \log\{\tilde{S}_{jk}(t_i)\} \tag{C.20}$$

The fact that the total likelihood (C.19) can result from the product of transition-specific factors implies that, in the case of several transitions, a model for each transition can be estimated separately[1]. To estimate the single transition (j, k), the episode with starting state j will be taken into account; then those ending in the destination state k are considered as having an event, and *all other* events are regarded as censored. Moreover, the factorisation of the total likelihood allows also for the choice of different specification of the rates for different transitions.

C.4.2 The piecewise constant exponential model

This model represents a generalisation of the exponential model (which we do not describe here), and provide a very useful tool of description of the transition rate. The basic idea is to split the time axis into periods and assume that transition rates are constant in each period but may vary across them

In particular, if we specify a set of covariates we have two different options. On one hand we can assume that only a baseline rate, given by period-specific constants can vary across time-periods but the covariates have the same (proportional) effects in each period. On the other hand, we could allow for period-specific effects of covariates also.

In the first case, when the effects of the covariates do not change across time periods, let us imagine dividing the time-axis into m time periods, then the distribution of durations has m parameters[2]:

$$0 = \tau_1 < \tau_2 < \tau_3 < \ldots < \tau_m = \infty$$

according to which we also have:

$$I_l = \{t | \tau_l \leq t < \tau_{l+1}\} \qquad l = 1, 2, \ldots, m.$$

Therefore, the transition rate from origin state j to destination state k is given by:

$$r_{jk}(t) = \exp\{\bar{\beta}_l^{(jk)} + \mathbf{A}^{(jk)}\beta^{(jk)}\} \qquad if\ t\ \in I_l.$$

For each transition (j, k), $\bar{\beta}_l^{(jk)}$ is a constant coefficient associated with the lth time period, therefore it represents the time varying components of the rate. $\mathbf{A}^{(jk)}$ is a row vector of covariates and $\beta^{(jk)}$ is an associated vector of coefficients assumed not to vary across time periods. The model must not contain a separate constant (it can be included in constant part of the component). If we do not specify any covariate (that is we do not include any $\mathbf{A}^{(jk)}$ component), then the model estimate only the parameters for the baseline rate (given by $\exp \bar{\beta}^{(jk)}$).

In the second case, we allow the effect of the covariates to change across time. Now, case the transition rate relative to transition (jk) becomes:

$$r_{jk}(t) = \exp\{\bar{\beta}_l^{(jk)} + \mathbf{A}^{(jk)}\beta_l^{(jk)}\} \qquad if\ t\ \in I_l.$$

[1] Of course, this is only possible if there are no constraints on parameters across different transitions. To provide for this possibility is the main reason for using the likelihood (Rohwer and Pötter, 1998[150]).

[2] The choice of an appropriate number of intervals is subject to specific considerations. Evidently, the more the intervals, the best the approximation of the unknown baseline rate, but this implies a large number of coefficients to be estimated. On the other hand, a small number of intervals is less problematic as concern the estimations, but provides a rough approximation of the baseline rate. Therefore, it is wise to search for a compromise between the two alternatives. Another obvious requirements is building intervals with ending times for some episodes: that is to say, intervals should contain events.

In fact, we now have $\beta_l^{(jk)}$ which depends on time as $\bar{\beta}_l^{(jk)}$ and is specific for the lth interval. As can be noted this case represents a generalisation of the previous which can in fact be obtained by constraining to be equal the parameters $\beta_l^{(jk)}$ values across time periods.

C.5 Semi-Parametric transition rate models: Proportional Hazards Model

Up to now our aim was to describe the duration of an episode (using a nonparametric analysis) or to model the transition rate of an episode by allowing for its dependence on time (and on a set of covariates as well). One of the problem in social sciences is that theories only rarely offer the possibility to introduce a specific parametric model for the phenomenon under study. We shall therefore very carefully choose and apply a specific model as it need to know 'how' the hazard rate depends on time (its shape). From this point of view, also the checks on the goodness-of-fit which may provide some hints on discerning which class of model might be preferable, do not give us the certainty of supporting a specific parametric model. The adequacy of parametric models could be evaluated by heuristic models (graphical comparisons, or comparison with nonparametric functions)(Blossfeld and Rohwer, 1995[24]). An alternative procedure could be to specify only the functional form for the influence of covariates but to leave the shape of the transition rate as unspecified as possible.

This model is characterised by a robustness given that it can estimate the coefficients even though the baseline hazard is unspecified. Moreover, the exponential factor, in the second right hand of the equation, ensures that the fitted model will give non-negative hazards.

The *proportional hazards model*, also known as *Cox regression model*, has been introduced in the medical research to evaluate the effect of covariates (age, blood pressure, life styles, etc.) on the duration of an episode (particularly on the risk of death). Its aim is therefore to evaluate which combination of potential explanatory variables affect the form of the hazard function (Collett, 1997[55]). It may be written as

$$r(t) = r_0(t) \exp(\beta_1 \mathbf{X}_1 + \beta_2 \mathbf{X}_2(t) + \ldots) \tag{C.21}$$

so that the transition rate $r(t)$ can be written as the product of an unspecified *baseline rate* $r_0(t)$ and a second term specifying the possible influence of a set of covariates (they might also depend on time). The β coefficients express the effect of the covariates as in the parametric models. We talk about *proportional* hazard model because the increase of a unit of the generic covariate $\mathbf{X}_i$ produces a proportional shift in the transition rate but cannot change its shape: the rate will be equal to the product between the baseline rate and the factor $\exp(\beta_i)$.

It should be stressed that the Cox model is sensible only when a set of covariates are introduced: in fact it does not even produce the value of an intercept (all constant effects are included in the baseline). The use of the Cox model is particularly appropriate in the following situations: for instance when the researcher has no clear idea about the shape of time dependence, or when the theory does not support any specific model, or when the trend of the process is known but it is not known the distribution of the fluctuations, or, lastly, when the interest is on the evaluation of the magnitude and the direction of the effects of the covariates, controlling for time-dependence (Blossefeld and Rohwer, 1995[24]).

Two basic assumptions are involved in proportional hazards models (Namboodiri and Suchindran, 1987[140]):

1) all individuals with a given configuration of values for the covariates $x_1, x_2, \ldots$ have identical hazards functions,

2) the hazards functions of any two individuals differing in the configuration of values of the covariates have parallel age (time) patterns (*proportionality assumption*).

C.5.1 Partial Likelihood Estimation

Let us imagine that among n individuals we observe a total number of events equals to r and a total number of censoring equals to $n - r$. The basis of the argument used in the construction of a likelihood function for the proportional hazards model is that intervals between successive events times convey no information about the effect of explanatory variables on the transition rate (in particular we refer here to Collett, 1997[55]). The reason is that, as the hazard has an arbitrary form, it could also be $r_0(t) = 0$ and hence $r(t) = 0$ in those time intervals in which there are no events. As a results, these intervals do not give any information about the values of the β parameters. Now, we indicate as follows the times where one event is observed:

$$t_{(1)}, t_{(2)}, \ldots, t_{(r)}$$

and the vector of the covariate for the individual experiencing one event at $t_{(j)}$ is $X_{(j)} = [X_{1(j)}\ X_{2(j)} \ldots X_{c(j)}]$. Therefore:

$$\begin{aligned} & P[\textit{individual with variables } \mathbf{X}_{(j)} \textit{ has an event at } t_{(j)} | \textit{there is anevent in } t_{(j)}] = \\ = \quad & \frac{P[\textit{individual with variables}\mathbf{X}_{(j)} \textit{ has an event at } t_{(j)}]}{P[\textit{there is an event in } t_{(j)}]} \end{aligned} \tag{C.22}$$

The numerator of the above expression is simply the hazard of the transition in $t_{(j)}$ for those who have the specified vector of covariates. The denominator is the sum of the hazards of the event at time $t_{(j)}$ over all individuals who are at risk of events at this time. This is the sum of the values $r_l(t_{(j)})$ over those indexes by l in the risk set at time $t_{(j)}$, $R(t_{(j)})$:

$$\sum_{i \in R(t_{(j)})} r_l(t_(j)) = \sum_{i \in R(t_{(j)})} r_0(t_{(j)}) \exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)$$

Therefore the previous expression becomes:

$$\frac{\exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)}{\sum_{i \in R(t_{(j)})} \exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)}$$

This is the contribution to the partial likelihood of the ith individual. Finally, taking the product of these conditional probabilities over the r times where an event occurs gives the partial likelihood function:

$$\mathcal{L}^p(\beta_1, \beta_2, \ldots) = \prod_{j=1}^{r} \frac{\exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)}{\sum_{i \in R(t_{(j)})} \exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)} \tag{C.23}$$

The likelihood obtained is not a true likelihood, since it does not make direct use of the actual censored and uncensored survival times, and for this reason it is called *partial* likelihood function.

The major problem of the proportional hazards model for survival data is that it assumes that tied survival times (events occurring at the same time) are not possible. In fact it assumes that in each time point only an event occurs. In order to accommodate tied observations, the likelihood function in equation C.23 has to be modified in some way.

Kalbfleisch and Prentice (1980[110]) provides a likelihood function which takes into account the problem of the tied observations, but its computation is very time consuming, especially when there are a lot of tied observations. We can then recur to one of the approximation to the likelihood function, as, for instance, the one suggested by Breslow (1974) according to which, if in time $t_(j)$ we have d_j events belonging to the set D_j, the partial likelihood can be approximated by:

$$\frac{\sum_{j\in D_j}\exp(\beta_1 X_{1(i)}+\beta_2 X_{2(i)}+\ldots)}{\sum_{j\in R(t_{(i)})}\exp(\beta_1 X_{1(i)}+\beta_2 X_{2(i)}+\ldots)}=\prod_{j=1}^{r}\frac{\exp(\beta_1 X_{1(i)}+\beta_2 X_{2(i)}+\ldots)}{\sum_{j\in R(t_{(i)})}\exp(\beta_1 X_{1(i)}+\beta_2 X_{2(i)}+\ldots)} \tag{C.24}$$

This approximation is an adequate approximation when the number of tied observations at any one event time is not too large.

C.5.2 Interpretation of the parameters

The coefficient of the explanatory variables in the model can be interpreted as logarithms of the ratio of the hazard of the event to the baseline hazard. The interpretation of the parameters corresponds to different types of term in the proportional hazard model. For instance, if we have a *model with variate*, a single continuous variable X which assumes the value x_i on the ith individual, the hazard function will be given by:

$$r_i(t)=\exp(\beta x_i)r_0(t)$$

where the coefficient of x_i can be interpreted as the logarithm of a hazard ratio. Now consider two individuals for which the value x and $x+1$ of the X variable have been recorded, the ratio of their hazards is given by:

$$\frac{\exp(\beta(x+1))}{\exp(\beta x)}=\exp(\beta)$$

so that $\hat{\beta}$ in the fitted proportional hazards model is the estimated change in the logarithm of the hazard ratio when the value of X is increased by one unit.

In the same way, when the value of the variable X is increased by c units, the estimated change in the log-hazard ratio is $c\hat{\beta}$, and the corresponding estimate of the hazard ratio is $\exp(\hat{c}\beta)$. The standard error of the estimated log-hazard ratio will be $cs.e.(\hat{\beta})$ form which confidence intervals for the true hazard ratio can be derived. As Collett highlights, the above argument shows that when a continuous variable $\mathbf{X}$ is included in a proportional hazards model, the hazard ratio when the value of $\mathbf{X}$ is changed by c does not depend on the actual value of $\mathbf{X}$. For example, if $\mathbf{X}$ refers to the age of an individual, the hazard ratio for an individual aged 70, relative to one aged 65, would be the same as that for an individual aged 20, relative to one aged 15. This feature is a direct result of fitting $\mathbf{X}$ as a linear term in the proportional hazards model. If there is doubt about the assumption of linearity, a factor whose levels correspond to different sets of values of $\mathbf{X}$ can be fitted. Moreover the linearity assumption can be checked.

When we have individuals divided into m groups according to the categories of a categorical variable, the groups can be indexed by the levels of a factor. The hazard function for an individual in the jth group, $j=1,2,\ldots,m$ is given by:

$$r_j(t)=\exp(\gamma_j)r_0(t),$$

where γ_j is the effect due to the jth level of the factor and $r_0(t)$ is the baseline hazard function. This model is overparametrized and so we take $\gamma_1=0$. The baseline hazard function then corresponds to the hazard of death at time t for an individual in the first group. The ratio of the hazards at time t for an individual in the jth groups, relative to an individual in the first group is then $\exp(\gamma_j)$. Consequently, the parameter γ_j is the logarithm of this relative hazard that is :

$$\gamma_j = \log r_j(t)/r_0(t).$$

A model which contains the terms γ_j, $j = 1, 2, \ldots, m$ with the $\gamma_1 = 0$ can be fitted by defining $m-1$ indicator variables $\mathbf{X}_2, \mathbf{X}_3, \ldots, \mathbf{X}_m$ as shown in....

C.5.3 The proportionality assumption

A basic feature of the Cox model is that transition rates for different values of covariates are proportional. If, for instance, we have two groups whose transition rates are $r(t)$ and $r'(t)$ and whose values of the ith covariate are x_i and x_i' respectively then

$$r(t) = \exp\{(x_i - x_i')\beta_i\}r'(t)$$

which expresses the proportionality assumption. To check the proportionality assumption one could adopt the graphical method.

$$S(t) = \exp(-\int_0^t r(\tau)d\tau) = \exp\{(x_i - x_i')\beta_i\}r'(t)$$

If, for some covariates, the proportionality assumption is not acceptable it is sometimes sensible to estimate a stratified model. This is only possible for categorical covariates where every groups constitutes a strata. In this way we can obtain a baseline function for each different group.

C.6 Comparing parametric models

To select the best model among a set of alternative *nested* ones (characterised by an incremental number of parameters) one uses the *likelihood ratio* test (Yamaguchi, 1991[191]). Let us imagine to have a model with k parameters and loglikelihood l_k to be compared to another more general one with $k+h$ parameters and whose loglikelihood is denoted by l_{k+h}. Two models ar nested if and only if one model is obtained by adding some parameter(s) to the other model. The likelihood-ratio test for comparing nested models, test the null hypothesis that expected values from the models are identical except for differences due to random variation.

$$-2\log\frac{L_k}{L_{k+h}} = -2(\ell_k - \ell_{k+h}) \sim \chi_h^2 \tag{C.25}$$

It follows that, if the difference in chi-square between two nested models is significant for a given difference in the degrees of freedom, we should reject the null hypothesis and conclude that the model that has more parameters improves the fit of the model with fewer parameters. On the other hand, if the difference in chi-square is insignificant, we cannot reject the null hypothesis. Then we should accept the model with fewer parameters as having a more parsimonious fit with the data than the model with more parameters.

In case of nonnested models, a different selection procedure has to be followed. Therefore models with different sets of covariates can be compared, for instance, by the *Akaike's Information Criterion* (AIC) or by the *Bayesian Information Criterion* (BIC), also known as the Schwartz's method. The first procedure gives:

$$AIC = -2\ell + 3p_k \tag{C.26}$$

where p_k is the number of unknown parameters and the criterion is based on the choice of the lowest AIC. The BIC procedure, which approximates the Bayes factor (Kass and Raftery, 1995[116]) is defined as:

$$BIC = -\chi^2_{k0} + p_k \log n \tag{C.27}$$

where χ^2_{k0} is the well-known likelihood ratio of the used model compared to the model without independent variables, p_k is the number of unknown parameters and n is the number of events. The choice will fall on the model with lowest BIC.

Appendix D

Notes on chapter 4

Proportional hazards model:

MEN

Variable	Coeff	Error	Signif
Region of birth:			
Vaa	-0.147	0.262	0.425
Lom	0.083	0.154	0.408
Taa	-0.219	0.254	0.612
Ven	0.218	0.197	0.731
Fvg	0.020	0.245	0.064
Lig	0.161	0.232	0.513
Tos	0.330	0.184	0.928
Umb	0.151	0.232	0.486
Er	-0.105	0.195	0.409
Mar	0.228	0.219	0.702
Laz	0.243	0.167	0.855
Abr	-0.186	0.236	0.571
Mol	0.001	0.281	0.003
Cam	0.557	0.162	0.999
Pug	0.299	0.158	0.942
Bas	0.076	0.224	0.265
Cal	0.230	0.183	0.790
Sic	0.659	0.166	1.000
Sar	0.563	0.218	0.990
Region of residence:			
Vaa	-0.249	0.209	0.768
Lom	-0.048	0.143	0.262
Taa	-0.019	0.238	0.062
Ven	-0.250	0.188	0.818
Fvg	-0.178	0.226	0.570
Lig	-0.456	0.214	0.967
Tos	-0.226	0.172	0.811
Umb	-0.154	0.224	0.508
Er	-0.088	0.183	0.371
Mar	-0.187	0.206	0.635
Laz	-0.204	0.161	0.794
Abr	0.384	0.223	0.914
Mol	0.131	0.274	0.368
Cam	-0.402	0.165	0.985
Pug	0.019	0.156	0.097
Bas	-0.155	0.227	0.505
Cal	-0.062	0.187	0.260
Sic	-0.419	0.168	0.987
Sar	-0.617	0.221	0.995
n. of parameters		38	
n.of constraints			
n.events		3787	
Log likelihood		-29361.46	
BIC:			

MEN

Variable	Coeff	Error	Signif
Region of birth:			
Vaa	-0.191	0.281	0.502
Lom	0.075	0.156	0.369
Taa	-0.190	0.261	0.534
Ven	0.234	0.198	0.762
Fvg	0.033	0.246	0.106
Lig	0.173	0.234	0.540
Tos	0.308	0.193	0.890
Umb	0.130	0.241	0.411
Er	-0.126	0.199	0.474
Mar	0.203	0.226	0.631
Laz	0.189	0.209	0.636
Abr	-0.215	0.245	0.621
Mol	0.006	0.282	0.017
Cam	0.548	0.163	0.999
Pug	0.270	0.173	0.882
Bas	0.084	0.225	0.292
Cal	0.239	0.186	0.801
Sic	0.628	0.184	0.999
Sar	0.564	0.218	0.990
Region of residence:			
Vaa	-0.250	0.231	0.723
Lom	-0.048	0.145	0.257
Taa	-0.017	0.245	0.054
Ven	-0.255	0.189	0.825
Fvg	-0.179	0.228	0.568
Lig	-0.451	0.216	0.963
Tos	-0.228	0.181	0.791
Umb	-0.160	0.233	0.509
Er	-0.082	0.187	0.341
Mar	-0.187	0.214	0.620
Laz	-0.206	0.202	0.692
Abr	0.381	0.232	0.900
Mol	0.137	0.274	0.382
Cam	-0.400	0.166	0.984
Pug	0.016	0.170	0.077
Bas	-0.157	0.227	0.511
Cal	-0.055	0.190	0.227
Sic	-0.422	0.185	0.978
Sar	-0.614	0.222	0.994
SQUEEZE by region of:			
Residence	0.172	3.513	0.039
Birth	1.472	3.606	0.317
n. of parameters		40	
n.of constraints			
n.events		3787	
Log likelihood		-29360.42	
BIC:			

Proportional hazards model:

WOMEN

Variable	Coeff	Error	Signif
Region of birth:			
Vaa	0.292	0.250	0.757
Lom	0.028	0.134	0.166
Taa	-0.196	0.249	0.571
Ven	0.163	0.167	0.672
Fvg	0.010	0.210	0.037
Lig	0.009	0.186	0.037
Tos	0.071	0.148	0.370
Umb	0.078	0.222	0.273
Er	-0.084	0.164	0.393
Mar	-0.044	0.185	0.187
Laz	0.136	0.147	0.642
Abr	0.179	0.182	0.675
Mol	0.291	0.221	0.812
Cam	0.272	0.134	0.958
Pug	0.035	0.149	0.188
Bas	0.149	0.196	0.553
Cal	0.287	0.147	0.948
Sic	0.284	0.148	0.944
Sar	0.441	0.172	0.990
Region of residence:			
Vaa	-0.447	0.218	0.960
Lom	-0.144	0.125	0.748
Taa	-0.082	0.243	0.263
Ven	-0.269	0.165	0.896
Fvg	-0.087	0.195	0.345
Lig	-0.454	0.172	0.992
Tos	-0.106	0.137	0.562
Umb	-0.286	0.217	0.812
Er	-0.130	0.153	0.605
Mar	0.002	0.178	0.009
Laz	-0.254	0.140	0.930
Abr	-0.166	0.170	0.671
Mol	-0.296	0.215	0.832
Cam	-0.311	0.138	0.976
Pug	-0.024	0.148	0.129
Bas	-0.211	0.197	0.714
Cal	-0.128	0.150	0.607
Sic	-0.252	0.152	0.904
Sar	-0.638	0.177	1.000
n. of parameters		38.000	
n.of constraints			
n.events		4318	
Log likelihood		-33315.95	
BIC:			

WOMEN

Variable	Coeff	Error	Signif
Region of birth:			
Vaa	0.333	0.251	0.815
Lom	0.048	0.135	0.275
Taa	-0.239	0.258	0.646
Ven	0.150	0.168	0.627
Fvg	-0.008	0.218	0.031
Lig	0.000	0.189	0.001
Tos	0.097	0.152	0.475
Umb	0.096	0.224	0.333
Er	-0.068	0.169	0.315
Mar	-0.016	0.191	0.068
Laz	0.202	0.177	0.746
Abr	0.197	0.186	0.710
Mol	0.263	0.222	0.763
Cam	0.281	0.134	0.964
Pug	0.080	0.160	0.381
Bas	0.159	0.196	0.583
Cal	0.258	0.155	0.903
Sic	0.322	0.162	0.953
Sar	0.454	0.173	0.992
Region of residence:			
Vaa	-0.396	0.220	0.928
Lom	-0.120	0.127	0.658
Taa	-0.161	0.252	0.476
Ven	-0.287	0.166	0.915
Fvg	-0.173	0.204	0.604
Lig	-0.501	0.176	0.996
Tos	-0.054	0.141	0.297
Umb	-0.244	0.219	0.733
Er	-0.080	0.157	0.386
Mar	0.062	0.184	0.262
Laz	-0.121	0.170	0.524
Abr	-0.108	0.175	0.462
Mol	-0.323	0.215	0.866
Cam	-0.297	0.138	0.968
Pug	0.053	0.159	0.262
Bas	-0.227	0.198	0.749
Cal	-0.185	0.157	0.762
Sic	-0.160	0.165	0.670
Sar	-0.650	0.177	1.000
SQUEEZE by region of:			
Residence	-3.844	2.874	0.819
Birth	-1.839	2.969	0.464
n. of parameters		40	
n.of constraints			
n.events		4318	
Log likelihood		-33299.92	
BIC:			

Figure D.1: Proportional hazards model for both sexes, including region of birth and region of residence

Figure D.2: Piecewise constant exponential model

Piecewise constant exponential model:
MEN

Variable	Coeff	Error	Signif
[15,22)	-7.124	0.086	1.000
[22,24)	-5.357	0.079	1.000
[24,26)	-4.750	0.075	1.000
[26,28)	-4.497	0.075	1.000
[28,30)	-4.331	0.077	1.000
[30,35)	-4.398	0.077	1.000
[35,+)	-4.844	0.127	1.000
Region of birth			
Vaa	-0.249	0.282	0.623
Lom	0.067	0.156	0.330
Taa	-0.155	0.262	0.447
Ven	0.264	0.198	0.818
Fvg	0.049	0.247	0.157
Lig	0.186	0.233	0.573
Tos	0.282	0.192	0.858
Umb	0.117	0.241	0.372
Er	-0.158	0.199	0.572
Mar	0.174	0.226	0.557
Laz	0.123	0.207	0.448
Abr	-0.256	0.245	0.705
Mol	0.004	0.283	0.012
Cam	0.533	0.163	0.999
Pug	0.235	0.173	0.827
Bas	0.092	0.224	0.317
Cal	0.234	0.186	0.792
Sic	0.590	0.184	0.999
Sar	0.563	0.218	0.990
Region of residence			
Vaa	-0.305	0.231	0.813
Lom	-0.057	0.145	0.303
Taa	0.024	0.245	0.078
Ven	-0.260	0.189	0.833
Fvg	-0.164	0.228	0.528
Lig	-0.427	0.216	0.952
Tos	-0.258	0.181	0.846
Umb	-0.209	0.232	0.633
Er	-0.091	0.187	0.375
Mar	-0.216	0.214	0.688
Laz	-0.270	0.201	0.822
Abr	0.352	0.232	0.871
Mol	0.165	0.275	0.450
Cam	-0.400	0.165	0.984
Pug	-0.021	0.170	0.099
Bas	-0.156	0.227	0.508
Cal	-0.008	0.190	0.034
Sic	-0.465	0.185	0.988
Sar	-0.605	0.222	0.994
SQUEEZE by region of:			
Residence	2.442	3.438	0.523
Birth	3.116	3.532	0.622
n. of parameters		47	
n.of constraints			
n.events		3787	
Log likelihood		-21883.28	
BIC:			

Variable	Coeff	Error	Signif
[15,23)	-6.786	0.080	1.000
[23,25)	-4.932	0.083	1.000
[25,27)	-4.561	0.080	1.000
[27,29)	-4.342	0.077	1.000
[29,32)	-4.338	0.076	1.000
[32,+)	-4.510	0.094	1.000
Squeeze by region of Residence			
[15,23)	7.234	5.116	0.843
[23,25)	-1.251	5.604	0.177
[25,27)	5.419	5.579	0.669
[27,29)	0.546	5.988	0.073
[29,32)	-4.226	6.006	0.518
[32,+)	15.955	6.889	0.979
Squeeze by region of Birth			
[15,23)	9.880	5.286	0.938
[23,25)	0.685	5.674	0.096
[25,27)	-1.391	5.628	0.195
[27,29)	2.499	6.045	0.321
[29,32)	12.197	6.103	0.954
[32,+)	-5.414	7.261	0.544
Region of birth			
Vaa	-0.232	0.287	0.582
Lom	0.060	0.157	0.299
Taa	-0.179	0.264	0.503
Ven	0.254	0.198	0.799
Fvg	0.045	0.247	0.144
Lig	0.176	0.233	0.550
Tos	0.270	0.193	0.838
Umb	0.102	0.243	0.325
Er	-0.152	0.200	0.553
Mar	0.162	0.227	0.525
Laz	0.104	0.209	0.381
Abr	-0.266	0.245	0.721
Mol	-0.004	0.283	0.010
Cam	0.524	0.163	0.999
Pug	0.215	0.173	0.785
Bas	0.072	0.225	0.252
Cal	0.235	0.187	0.791
Sic	0.549	0.185	0.997
Sar	0.553	0.218	0.989
Region of Residence			
Vaa	-0.335	0.237	0.843
Lom	-0.043	0.146	0.232
Taa	0.054	0.247	0.172
Ven	-0.238	0.189	0.792
Fvg	-0.140	0.228	0.460
Lig	-0.418	0.216	0.948
Tos	-0.251	0.182	0.833
Umb	-0.202	0.234	0.611
Er	-0.105	0.188	0.424
Mar	-0.218	0.214	0.690
Laz	-0.281	0.203	0.834
Abr	0.362	0.233	0.880
Mol	0.167	0.275	0.456
Cam	-0.405	0.166	0.985
Pug	-0.025	0.171	0.117
Bas	-0.168	0.227	0.541
Cal	-0.011	0.191	0.045
Sic	-0.458	0.186	0.986
Sar	-0.615	0.222	0.995
n. of parameters		246	
n.of constraints		190	
n.events		3787	
Log likelihood		-22008.6	
BIC:			

Figure D.3: Piecewise constant exponential model

Piecewise constant exponential model:
WOMEN

Variable	Coeff	Error	Signif
[15,18)	-6.848	0.096	1.000
[18,20)	-4.925	0.071	1.000
[20,22)	-4.515	0.069	1.000
[22,24)	-4.270	0.070	1.000
[24,26)	-4.097	0.072	1.000
[26,28)	-4.125	0.076	1.000
[28,30)	-4.275	0.084	1.000
[30,+)	-4.726	0.084	1.000
Region of birth			
Vaa	0.324	0.252	0.803
Lom	0.043	0.135	0.249
Taa	-0.219	0.257	0.604
Ven	0.152	0.168	0.635
Fvg	-0.004	0.218	0.015
Lig	0.012	0.189	0.049
Tos	0.086	0.152	0.426
Umb	0.075	0.224	0.261
Er	-0.092	0.168	0.418
Mar	-0.033	0.190	0.138
Laz	0.165	0.177	0.649
Abr	0.195	0.186	0.704
Mol	0.269	0.221	0.777
Cam	0.278	0.134	0.962
Pug	0.063	0.160	0.307
Bas	0.140	0.196	0.526
Cal	0.260	0.155	0.907
Sic	0.308	0.162	0.942
Sar	0.461	0.172	0.993
Region of residence			
Vaa	-0.423	0.220	0.945
Lom	-0.134	0.127	0.711
Taa	-0.155	0.252	0.462
Ven	-0.287	0.166	0.916
Fvg	-0.152	0.203	0.544
Lig	-0.497	0.176	0.995
Tos	-0.067	0.141	0.364
Umb	-0.241	0.219	0.728
Er	-0.083	0.157	0.405
Mar	0.050	0.183	0.215
Laz	-0.147	0.170	0.614
Abr	-0.129	0.175	0.538
Mol	-0.321	0.214	0.866
Cam	-0.305	0.138	0.973
Pug	0.030	0.160	0.151
Bas	-0.223	0.198	0.739
Cal	-0.170	0.156	0.724
Sic	-0.187	0.165	0.746
Sar	-0.659	0.177	1.000
SQUEEZE by region of:			
Residence	-3.078	2.861	0.718
Birth	-1.080	2.954	0.285
n. of parameters		48	
n.of constraints			
n.events		4318	
Log likelihood		-24157.66	
BIC:			

Variable	Coeff	Error	Signif
[15,18)	-6.863	0.099	1.000
[18,20)	-4.930	0.071	1.000
[20,22)	-4.505	0.070	1.000
[22,24)	-4.211	0.073	1.000
[24,26)	-4.119	0.079	1.000
[26,28)	-4.116	0.079	1.000
[28,30)	-4.295	0.085	1.000
[30,+)	-4.626	0.087	1.000
Squeeze by region of Residence			
[15,18)	-3.479	7.267	0.368
[18,20)	0.903	4.470	0.160
[20,22)	-7.745	4.384	0.923
[22,24)	-5.647	4.769	0.764
[24,26)	-2.309	5.288	0.338
[26,28)	2.860	6.188	0.356
[28,30)	-7.934	7.894	0.685
[30,+)	0.434	7.050	0.049
Squeeze by region of Birth			
[15,18)	-1.819	7.337	0.196
[18,20)	-6.452	4.572	0.842
[20,22)	1.507	4.511	0.262
[22,24)	-3.402	4.886	0.514
[24,26)	-0.958	5.357	0.142
[26,28)	-9.233	6.320	0.856
[28,30)	9.360	7.997	0.758
[30,+)	4.395	7.316	0.452
Region of birth			
Vaa	0.290	0.256	0.743
Lom	-0.015	0.133	0.087
Taa	-0.332	0.249	0.818
Ven	-0.033	0.146	0.177
Fvg	-0.110	0.215	0.390
Lig	-0.037	0.187	0.157
Tos	0.041	0.151	0.212
Umb	-0.001	0.225	0.002
Er	-0.122	0.167	0.537
Mar	-0.065	0.190	0.267
Laz	0.130	0.177	0.539
Abr	0.136	0.186	0.534
Mol	0.191	0.219	0.616
Cam	0.228	0.133	0.914
Pug	0.024	0.159	0.118
Bas	0.094	0.197	0.367
Cal	0.183	0.156	0.759
Sic	0.275	0.162	0.910
Sar	0.414	0.172	0.984
Region of Residence			
Vaa	-0.409	0.225	0.931
Lom	-0.056	0.124	0.349
Taa	-0.057	0.243	0.185
Ven	-0.072	0.146	0.379
Fvg	-0.079	0.200	0.307
Lig	-0.443	0.174	0.989
Tos	-0.006	0.140	0.032
Umb	-0.186	0.221	0.600
Er	-0.021	0.155	0.107
Mar	0.104	0.182	0.430
Laz	-0.086	0.170	0.387
Abr	-0.074	0.175	0.327
Mol	-0.259	0.212	0.778
Cam	-0.255	0.137	0.937
Pug	0.100	0.158	0.472
Bas	-0.172	0.198	0.616
Cal	-0.121	0.157	0.560
Sic	-0.140	0.165	0.603
Sar	-0.5979	0.1759	0.9993
n. of parameters		328	
n.of constraints		266	
n.events		4318	
Log likelihood		-24143.5	
BIC:			

Appendix E

Techniques for multiple destinations

E.1 Non parametric model for multiple destination states

The above section introduced the Kaplan-Meier method in the case of a single transition. Now, we can imagine the possibility to have multiple transitions: starting from one or more origin states, there is a set of competing risks that allow for different transitions. A generalisation of the single transition case require a redefinition of some of the basic functions, and a generalisation of equation C.12 which leads us to the product-limit estimates for the *pseudo-survivor function*.

First, the time axis is virtually divided according to each of the destinations. Calling $t_{i,k}$ the point in time where the ith event towards destination state k occurs, we define the interval:

$$I_{i,k} = \{t : t_{i,k} \leq t < t_{i+1,k}\} \qquad i = 1, 2, \ldots, n_k, \qquad k = 1, 2, \ldots, K$$

where $t_{n_k+1,k} = \infty$, $t_{i,k} > 0$, $\forall i$ are the points in time where at least one events is observed and $I_{0,k} = \{t : 0 \leq t < t_{1,k}\}$. The total number of events towards destination k, is given by n_k. Defining:

- $E_{i,k}$ number of episodes with a passage event to state k in $I_{i,k}$;
- $Z_{i,k}$ number of censored episodes in $I_{i,k}$ (because of a censoring or because of a passage to a different state $j \neq k$);
- $R_{i,k} = N_{t_k}$ exposed to risk, whose number does not depend on k but only from the chosen time instant t_k.

The transition rate is now the following:

$$r_k(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t, D = k | T \geq t)}{\Delta t}. \tag{E.1}$$

As we assume that destination states are competing states among them, we have:

$$r(t) = \sum_{k \in K} r_k(t) \tag{E.2}$$

The product-limit estimation of the pseudo-survivor function is given by:

$$S(t_{i,k}) = \prod_{j=1}^{i-1} \left(1 - \frac{E_{j,k}}{R_{j,k}}\right) \tag{E.3}$$

The reasoning is the same as the one presented for the single destination model.

E.1.1 Multiple origin and multiple destination states

To extend the concept just introduced to account for multiple origin and multiple destination state, we need to consider duration of the events conditional on given origin states. To this aim we need to define the risk set which has to be specified conditionally on the origin state. $R_j(t)$ is the risk set defined for all episode with origin state j provided that their starting time is less than t and their ending time is equal or greater than t. The partial likelihood function in the case of possibly more origin states and more destination states, then becomes:

$$\mathcal{L}^p = \prod_{j \in \mathcal{O}} \prod_{k \in \mathcal{D}_j} \prod_{i \in E_{jk}} \frac{\exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)}{\sum_{i \in R(t_{(i)})} \exp(\beta_1 X_{1(i)} + \beta_2 X_{2(i)} + \ldots)} \tag{E.4}$$

If the time-dependent covariates change their values only at some discrete points in time, the method of episode splitting can be used instead. The original episodes are split at every point in time where one of the time-dependent covariates changes its value. Each of the original episodes is replaced by a contiguous set of subepisodes (splits) with the appropriate values of the covariates. the last of these splits has the same exit status as the original episode: all other splits are regarded as right censored.

Bibliography

[1] Donald S. Akers. On measuring the marriage squeeze. *Demography*, 4(2):907–924, 1967.

[2] Paul D. Allison. *Event history analysis.* Quantitative Applications in the social sciences. Sage, USA, 1991.

[3] Kiril F. Andreev. *Demographic surfaces: Estimation, Assessment and Presentation, with application to Danish Mortality, 18351995.* Phd thesis, University of Southern Denmark, 1999.

[4] Ruth Anshen. *The Family: its function and destiny.* Harper, New York, 1949.

[5] Maxine P. Atkinson and Becky L. Glass. Marital age heterogamy and homogamy. *Journal of marriage and the family*, pages 685–691, August 1985.

[6] Marzio Barbagli. *Provando e Riprovando.* Contemporanea/35. Il Mulino, Bologna, 1990.

[7] Marzio Barbagli and Chiara Saraceno (eds.). *Lo stato delle famiglie in Italia.* Il Mulino, Bologna, 1997.

[8] Françoise Bartiaux. Dènatalité et marché matrimonial: le cas de l'Italie en 1930-1950. *Population*, (1):91–118, 1994.

[9] Gary S. Becker. *A theory of marriage*, pages 299–344. In [167], 1974.

[10] Gary S. Becker. *A treatise on the Family.* Harvard University Press, Cambridge, 1981.

[11] Erik Beekink, Aart C. Liefbroer, and Frans van Poppel. Changes in choice of spouse as an indicator of a society in a state of transition: Woerden, 1830-1930. *Historical Social Research*, 23(1/2):231–253, 1998.

[12] Rodolfo Benini. *Principi di Demografia.* Barbera, Firenze, 1901.

[13] T.C. Bergstrom and M. Bagnoli. Courtship as a waiting game. *Journal of Political Economy*, 101(1):185–202, 1993.

[14] Fabrizio Bernardi. Does the husband matter? married women and employment in Italy. *European Sociological Review*, 15(3):285–300, 1999.

[15] Fabrizio Bernardi. *Who marries whom in Italy: changes in educational homogamy across cohorts and over the life-course.* In [23], October 1999. forthcoming.

[16] Willem Bernasco. *Coupled careers: the effects of spouse's resources on success at work.* PhD thesis, Universiteit te Utrecht, Amsterdam, 1994.

[17] Mari Bhat and Shiva S. Halli. Demography of the bridprice and dowry: causes and consequences of the Indian marriage squeeze. *Population Studies*, (53):129–148, 1999.

[18] Francesco C. Billari. *L'analisi delle biografie e la transizione allo stato adulto. Aspetti metodologici e applicazioni ai dati della Seconda Indagine sulla Fecondità in Italia.* Number 7 in Ricerche - Tesi di dottorato. CLEUP, Padova, 2000.

[19] Francesco C. Billari and Giuseppe A. Micheli. Social norms and demographic events in contemporary Western societies: can we learn from the Southern Europe? October 1999. paper presented at the workshop on Social Interactions and Demographic Behaviour, Rostock.

[20] Francesco C. Billari and Götz Rohwer. *Some developments in methods for life course analysis and their applications*, chapter 6, pages 323–334. Volume I of [168], 1998.

[21] Debra L. Blackwell. Marital homogamy in the united states: the influence of individual and paternal education. *Social Science Research*, (27):159–188, 1998.

[22] Hans-Peter Blossfeld and Alessandra De Rose. Educational expansion and changes in entry into marriage and motherhood. the experience of Italian women. *Genus*, (47):73–89, 1992.

[23] Hans-Peter Blossfeld and Andreas Timm (eds.). *Who marries whom? Educational systems as marriage markets in modern societies.* Oxford University Press, Oxford, 1999. forthcoming.

[24] Hans-Peter Blossfeld and Götz Rohwer. *Techniques of events history modeling. New approaches to causal analysis.* Lawrence Erlbaum Associates, Mahwah, New Jersey, 1995.

[25] Hans-Peter Blossfeld and Johannes Huinink. Human capital investments or norms of role transition? how women's schooling and career affect the process of family formation. *American Journal of Sociology*, 97(1):143–168, July 1991.

[26] Alberto Bonaguidi (ed.). *Migrazioni e demografia regionale in Italia.* Franco Angeli, Milano, 1985.

[27] Alberto Bonaguidi (ed.). *Prospettive metodologiche nello studio della mobilità della popolazione.* Incontro di studio, Pisa, 13-14 ottobre 1988, Dipartimento di Statistica e Matematica Applicata all'Economia, Università. Pacini, Pisa, 1990.

[28] Corrado Bonifazi, Angela Chieppa, and Frank Heins. *Le migrazioni interne meridionali: un'analisi a livello provinciale*, chapter 11, pages 53–95. Volume 10/99 of *Monografie* [29], 1999.

[29] Corrado Bonifazi (ed). *Mezzogiorno e migrazioni interne*, volume 10/99 of *Monografie.* IRP-CNR, Roma, 1999.

[30] Michel Bozon. Les femmes et l'écart d'âge entre conjoints: une domination consentie. I: Types d'union et attentes en matière d'écart d'âge. *Population*, (2):327–360, 1990.

[31] Michel Bozon. Les femmes et l'écart d'âge entre conjoints: une domination consentie. II: Modes d'entrée dans la vie adulte et représentations du conjoint. *Population*, (3):565–602, 1990.

[32] Michel Bozon. *Apparence physique et choix du conjoint*, pages 91–110. Volume n.7 of *Congrès et Colloques* [101], 1991.

[33] Michel Bozon and Françoise Héran. La découverte du conjoint. I: évolution et morphologie des scènes de rencontre. *Population*, (6):943–986, 1987.

[34] Michel Bozon and Françoise Héran. L'aire de recrutement du conjoint. *Données sociales*, 1987.

[35] Michel Bozon and Françoise Héran. La découverte du conjoint. II: les scénes de rencontre dans l'espace social. *Population*, (1):121–150, 1988.

[36] L.J. Bumpass. What's happening to the family? interactions between demographic and institutional change. *Demography*, (27):483–498, 1990.

[37] David M. Buss. *The evolution of Desire: strategies of human mating.* BasicBooks, New York, 1994.

[38] J.C. Caldwell, P.H. Reddy, and Pat Caldwell. The causes of marriage change in South India. *Population Studies*, (37):343–361, 1983.

[39] G. Cantisani and Gianpiero Dalla Zuanna. Nuzialità e famiglie complessse in Italia. analisi territoriale di lungo periodo (1881-1981). *Statistica*, anno LVI(2):217–242, 1996.

[40] Graziella Caselli, Jacques Vallin, James W. Vaupel, and Anatoli I. Yashin. Age-specific mortality trends in France and Italy since 1900: period and cohort effects. *European Journal of Population*, 3:36–60, 1987.

[41] Graziella Caselli, James W. Vaupel, and Anatoli I. Yashin. Mortality in Italy: contours of a century of evolution. *Genus*, 41(1-2):39–55, 1985.

[42] John B. Casterline, Lindy Williams, and Peter McDonald. The age difference between spouses: variations among developing countries. *Population Studies*, (40):353–374, 1986.

[43] Maria Castiglioni. *Una ricostruzione della popolazione residente in Italia per sesso, età e stato civile, 1952-1981.* Istituto di Ricerche sulla Popolazione - IRP, Roma, 1989.

[44] Maria Castiglioni. *Analisi della nuzialità differenziale nelle generazioni di donne italiane nate fra 1919 e 1968 utilizzando dati individuali retrospettivi.* Number 1 in Tesi di dottorato. Dipartimento Statistico, Università degli studi di Firenze, Firenze, 1993.

[45] Maria Castiglioni. *Analisi differenziale della nuzialità*, chapter 22, pages 347–363. In [65], 1999.

[46] Maria Castiglioni and Gianpiero Dalla Zuanna. *Il matrimonio tardivo senza convivenza. La formazione delle unioni in Italia negli anni 80*, chapter 1, pages 13–41. In *Secondo Convegno dei Giovani Studiosi dei problemi di Popolazione* [79], 1996.

[47] Alessandro Cavalli and Oliver Galland (eds.). *L'allongement de la jeunesse.* Actes Sud, Paris, 1993.

[48] Alberto Cazzola. *L'ingresso nella sessualità adulta*, chapter 20, pages 311–326. In [65], 1999.

[49] H.T. Christiansen. Timing of the first pregnancy as a factor in divorce: a cross-cultural analysis. *Eugenics Quarterly*, September 1963.

[50] Luciano Ciucci and Filomena Racioppi (eds.). *Studi di popolazione. Nuovi approcci per la descrizione e l'interpretazione.* Convegno dei Giovani Studiosi dei Problemi di Popolazione. Dipartimento di Scienze Demografiche, Università degli studi di Roma"La Sapienza", Roma, 1994, Roma, 2-4 giugno 1993.

[51] Ansley Coale and D.R. McNeil. The distribution by age of the frequency of first marriage in a female cohort. *Journal of the American Statistical Association*, (67):743–749, 1972.

[52] Antonio Cobalti and Antonio Schizzerotto. *La mobilità sociale in Italia.* Il Mulino, Bologna, 1994.

[53] James Coleman. *Metatheory: explanation in Social Science*, chapter 1, pages 1–23. In [54], 1990.

[54] James S. Coleman. *Foundations of social theory.* MA: Harvard University Press, Cambridge, 1990.

[55] Dave Collett. *Modelling survival data in medical research.* Text in Statistical Science. Chapman and Hall, London, first edition, 1997.

[56] Randall Collins and Scott Coltrane. *Sociology of marriage and the family: gender, love and property.* The Nelson-Hall series in Sociology. Nelson-Hall publishers, Chicago, third edition, 1991.

[57] Bernardo Colombo. La conferenza di Bucarest sulla popolazione e il piano mondiale d'azione. *Le Scienze*, (79), 1975.

[58] John Dagsvik. Aggregation in matching markets. Discussion paper, Statistics Norway, Oslo, 1998.

[59] Leif Danziger and Shoshana Neuman. On the age at marriage: theory and evidence from Jews and Moslems in Israel. *Journal of Economic Behavior - Organization*, 40:179–193, 1999.

[60] Kingsley Davis. *The future of marriage*, chapter 1, pages 25–52. In [61], 1985.

[61] Kingsley Davis (ed.). *Contemporary Marriage: comparative perspective on a changing institution.* Russel Sage Foundation, New York, 1985.

[62] Alessandra De Rose and Cesidia Rufo. *Il mercato matrimoiale in Italia. Evoluzione della popolazione coniugabile e dei fattori di selezione della coppia*, pages 41–71. In *Convegno dei Giovani Studiosi dei Problemi di Popolazione* [50], 1994.

[63] Paolo De Sandre. Patterns of fertility in italy and factors of its decline. *Genus*, LVI(1-2):19–54, 2000.

[64] Paolo De Sandre, Fausta Ongaro, Rosella Rettaroli, and Silvana Salvini. *Matrimonio e figli: tra rinvio e rinuncia.* Studi e Ricerche. Il Mulino, Bologna, 1997.

[65] Paolo De Sandre, Antonella Pinnelli, and Antonio Santini (eds.). *Nuzialità e Fecondità in trasformazione: percorsi e fattori del cambiamento.* Il Mulino, Bologna, 1999.

[66] Françoise de Singly. Théorie critique de l'homogamie. *L'Année sociologique*, (37):181–205, 1987.

[67] Andreas Diekmann. *Diffusion and survival models for the process of entry into marriage*, chapter 9, pages 170–183. In [132], 1990.

[68] P. DiMaggio and J. Mohr. Cultural capital, educational attainment, and marital selection. *American Journal of Sociology*, (90):1231–61, 1985.

[69] Hans-Peter Blossfeld (ed.). *The new role of women. Family formation in modern societies.* Westview Press, 1995.

[70] T.J. Espenshade. Marriage trends in america: estimates, implications and underlying causes. *Population and Development Review*, 11(2):193–245, June 1985.

[71] EUROSTAT. *Yearbook '97.* Eurostat, 1997.

[72] Patrick Festy. Evolution de la nuptialité en Europe occidentale, depuis la guerre. *Population*, (2):331–379, 1971.

[73] Oliver Galland. *L'entrée dans la vie familiale*, pages 11–18. In [47], 1993.

[74] Bradley A. Gambill, James W. Vaupel, and Anatoli I. Yashin. The lexis computer program for creating shaded contour maps of the demographic surfaces. *International Insitute for Applied Systems Analysis*, Working Paper(WP-86-37), August 1986.

[75] Janet Z. Giele and Glen H. Elder Jr. (eds.). *Methods of life course research: qualitative and quantitative approaches.* Sage, London, 1998.

[76] Corrado Gini. Indici di omofilia e di rassomoglianza. *Atti del Regio Istituto Veneto*, pages 597–604, 1915.

[77] Paul Ginsborg. *Il 'miracolo economico'*, chapter 7, pages 283–343. In *Gli Struzzi* [78], 1989.

[78] Paul Ginsborg. *Storia d'Italia dal dopoguerra ad oggi.* Gli Struzzi. Einaudi, Torino, 1989.

[79] Piero Giorgi and Salvatore Strozza (eds.). *Studi di popolazione. Temi di Ricerca Nuova.* Secondo Convegno dei Giovani Studiosi dei problemi di Popolazione. Dipartimento di Scienze Demografiche - Universita' di Roma "La Sapienza", Roma, Roma, 25-27 giugno 1996.

[80] Alain Girard. *Le choix du conjoint: une enquête psycho-sociologique en France*, volume Cahier n.70 of *Travaux et Documents.* INED-PUF, Paris, third edition, 1981.

[81] D.V. Glass. *Population in History: Essay in Historical Demography.* Eversley D.E.C., London, 1965.

[82] Paul C. Glick. Fifty years of family demography: a record of social change. *Journal of Marriage and the Family*, (50):861–873, November 1988.

[83] Paul C. Glick, David M. Herr, and John C. Bersford. *Family formation and family composition: trends and prospects*, pages 30–40. In [178], second edition, 1963.

[84] Noreen Goldman, Charles F. Westoff, and Charles Hammerslough. Demography of the marriage market in the United States. *Population Index*, (50):5–25, 1984.

[85] Frances Kobrin Goldscheider and Linda Waite. Sex differences in the entry into marriage. *American Journal of Sociology*, 92(1):91–109, July 1986.

[86] Antonio Golini. Omogamia secondo il luogo d'origine in Italia. *Atti della Riunione Scientifica di Statistica*, pages 219–247, 1961.

[87] Antonio Golini. *Distribuzione della popolazione, migrazioni interne e urbanizzazione in Italia.* Istituto di Demografia, Rome, 1974.

[88] William J. Goode. *The family.* Foundations of Modern Sociology. Prentice-Hall, New Jersey, 1964.

[89] E. Grebenik, C. Höhn, and R. Mackensen (eds.). *Later Phases of the Family Cycle.* IUSSP. Clarendon Press, Oxford, reprinted in 1996 edition, 1989.

[90] Margaret E. Greene and Vijayendra Rao. The marriage squeeze and the rise in informal marriage in Brazil. *Social Biology*, 42(1-2):65–82, 1995.

[91] Amyra Grossbard-Shechtman. *Marriage Squeezes and the Marriage Market*, chapter 14, pages 375–395. In [61], 1985.

[92] M. Guttentag and P.F. Secord. *Too many women? The Sex Ratio question.* Sage, Beverly Hills, 1983.

[93] J. Hajnal. *European marriage patterns in perspective*, chapter 6, pages 101–143. In [81], 1965.

[94] Max Haller. Marriage, women and social stratification: a theoretical critique. *American Journal of Sociology*, 86(4):766–795, 1981.

[95] Ulrich Pötter and Götz Rohwer. Introduction. March 1999.

[96] Louis Henry. Nuptiality. *Theoretical population biology*, (3):135–152, 1972.

[97] Louis Henry. *Naissance d'une population de couples mariés*, pages 81–96. Volume 1-2 of [109], 1973.

[98] Louis Henry. Schéma d'évolution des marriages après de grandes variations des naissances. *Population*, (4-5):759–780, 1975.

[99] Gudmund Hernes. The process of entry into first marriage. *American Sociological Review*, 37:173–182, April 1972.

[100] David M. Herr and Amyra Grossbard-Shechtman. The impact of the female marriage squeeze and the contraceptive revolution on the sex roles and the women's liberation movement in the United States, 1960 to 1975. *Journal of Marriage and the Family*, February 1981.

[101] Thérèse Hibert and Louis Roussel (eds.). *La nuptialité: évolution récente en France at dans les pays développés*, volume n.7 of *Congrès et Colloques*. INED-Puf, Paris, 1991.

[102] Jan M. Hoem. Concepts of a bisexual theory of marriage formation. *Statistisk Tidskrift*, (4):295–300, 1969.

[103] Y. Hu and N. Goldman. Mortality differentials by marital status: an international comparison. *Demography*, 27(2), 1990.

[104] ISTAT. *La fecondità delle regioni italiane. Analisi per coorti. Anni 19952-1993.* Number 35 in Informazioni. Istat, Roma, 1997.

[105] ISTAT. La fecondità nelle regioni italiane. analisi per coorti. anni 1952-1993. *Informazioni*, (35), 1997.

[106] ISTAT. *Tavole di fecondità regionale.* In *Informazioni* [104], 1997.

[107] ISTAT. Internal migration and regional population dynamics in Italy. Essays, n.3, 1998.

[108] ISTAT. *Rapporto annuale 1999.* Istat, Roma, 2000.

[109] IUSSP. *International Population conference*, volume 1-2. Liege, 1973.

[110] J.D. Kalbfleisch and R.L. Prentice. *A statistical analysis of failure time data.* Wiley, New York, 1980.

[111] Matthijs Kalmijn. Spouse selection among children of European immigrants: a comparison of marriage cohorts in the 1960 census. *International Migration Review*, xxvii(1):5178, 1993.

[112] Matthijs Kalmijn. Assortative mating by cultural and economic occupational status. *American Journal of Sociology*, (100):422–452, 1994.

[113] Matthijs Kalmijn. Intermarriage and homogamy: causes, patterns, trends. *Annual Review of Sociology*, 24:395–421, 1998.

[114] Matthijs Kalmijn and Paul M. de Graaf. Remarriage and cohabitation after divorce in the Netherlands. paper presented at the conference 'Population Studies in Britain and the Netherlands' Utrecht, August 2000.

[115] E.L. Kaplan and P. Meier. Nonparametric estimation from incomplete observations. *Journal of American Statistical Association*, (53):457, 1958.

[116] R.E. Kass and A.E. Raftery. Bayes factors. *journal of American Statistical Association*, (90):773–795, 1995.

[117] M.C. Keeley. The economics of family formation. *Economic Inquiry*, XV:238–250, April 1977.

[118] Nico Keilman. Demographic and discrete-choice two-sex marriage models. paper presented at the workshop on Non-Linear Demography, Rostock, Germany, May 1998, April 1998.

[119] K.C. Land and A. Rogers (eds.). *Multidimensional Mathematical Demography.* Academic Press, USA, 1982.

[120] Henri Leridon. *Pourquoi le démographe s'intéresse-t-il à la nuptialité?*, pages 7–18. Volume n.7 of *Congrès et Colloques* [101], 1991.

[121] Henri Leridon and Laurent Toulemon. *Analyse des interférences*, chapter 7, pages 91–104. In *Collection Économie et Statistiques Avancées* [122], 1997.

[122] Henri Leridon and Laurent Toulemon. *Démographie.* Collection Économie et Statistiques Avancées. Economica, Paris, 1997.

[123] Henry Leridon and Catherine Villeneuve-Gokalp (eds.). *Constances and inconstances de la famille.* Travaux et Documents, Cahier n.134. Puf-INED, Paris, 1994.

[124] Ron Lesthaeghe and Johan Surkyn. Cultural dynamics and economic theories of fertility change. *Population and Development Review*, 14(1):1–46, March 1988.

[125] Susan K. Lewis and Valerie K. Oppenheimer. Educational assortative mating across marriage markets: non-Hispanic whites in the United States. *Demography*, 37(1):29–40, February 2000.

[126] Daniel T. Lichter. Delayed marriage, marital homogamy, and the mate selection process among white women. *Social Science Quarterly*, 71(4):802–811, December 1990.

[127] Daniel T. Lichter, Robert N. Anderson, and Mark D. Hayward. Marriage markets and marital choice. *Journal of Family Issues*, 16(4):412–431, July 1995.

[128] Daniel T. Lichter, Diane K. McLaughlin, George Kephart, and David J. Landry. Race and the retreat from marriage: a shortage of marriageable men? *American Sociological Review*, (57):781–799, December 1992.

[129] Dick London. *Survival models and their estimation.* ACTEX Pubilactions, Winsted, Connecticut, third edition edition, 1997.

[130] Robert D. Mare. Five decades of educational assortative mating. *American Sociological Review*, 56:15–32, February 1991.

[131] Ettore Marubini and Maria Grazia Valsecchi. *Analysing survival data from clinical trials and observational studies.* Statistics in practice. John Wiley and Sons, Chichester, England, 1995.

[132] Karl Ulrich Mayer and Nancy Brandon Tuma (eds.). *Event history analysis in life course research.* The University of Wisconsin Press, Wisconsin, 1990.

[133] Peter McDonald. L'équilibre numérique entre hommes et femmes et le marché matrimonial. *Population*, pages 1579–1590, 1995.

[134] D.D. McFarland. Models of marrigae formation and fertility. *Social Forces*, (54):66–83, 1975.

[135] Giuseppe A. Micheli. *Città, circolazione, permanenza: ancora sulle implicazioni teoriche e operative del concetto di mobilità*, chapter I, pages 17–37. In *Incontro di studio, Pisa, 13-14 ottobre 1988, Dipartimento di Statistica e Matematica Applicata all'Economia, Università* [27], 1990.

[136] Giuseppe A. Micheli. *Più transizioni in una*, chapter 3, pages 73–89. In [137], 1995.

[137] Giuseppe A. Micheli (ed.). *La società del figlio assente.* Franco Angeli, 1995.

[138] Alain Monnier. The demographic sistuation in Europe and the developed countries overseas: an annual report. *Population: An English Selection*, 10(2):447–473, 1998.

[139] H.V. Muhsam. The marriage squeeze. *Demography*, 11(2):291–299, May 1974.

[140] Krishnan Namboodiri and C.M. Suchindran. *Life table techniques and their applications.* Studies in Population. Academic Press, Orlando, 1987.

[141] Valerie Kincade Oppenheimer. A theory of marriage timing. *American Journal of Sociology*, 94(3):563–591, November 1988.

[142] Emma Otta, Renato da Silva Querioz, Lucila de Sousa Campos, Monika Weronika Dowbor da Silva, and Mariana Telles Silveira. Age differences between spouses in a Brazilian marriage sample. *Evolution and Human Behavior*, (20):99–103, 1999.

[143] Rossella Palomba (ed.). *Vita di coppia e figli.* La Nuova Italia, Firenze, 1987.

[144] Talcott Parsons. *The social structure of the family*, pages 173–201. In [4], 1949.

[145] Antonella Pinnelli and Alessandra De Rose. *Italy*, chapter 8, pages 175–190. In [69], 1995.

[146] John Pollard. Modelling human populations for projections purposes- some of the problems and challenges. *Australian Journal of Statistics*, (2):63–76, 1975.

[147] Zhenchao Qian and Samuel Preston. Changes in American marriage, 1972 to 1987: availability and forces of attraction by age and education. *American Sociological Review*, 58:482–495, August 1993.

[148] Kelly R. Ralley. A sthortage of marriageable men? a note on the role of cohabitation in Black-White differences in marriage rates. *American Sociological Review*, 61:973–983, December 1996.

[149] Alessandra Righi. *La nuzialità*, chapter III, pages 53–64. In [7], 1997.

[150] Götz Rohwer and Ulrich Pötter. Tda user's manual. Technical Report Version 1, Ruhr-Universitä Bochum, Bochum, Germany, 1998.

[151] G. Rosoli (ed.). *Cent'anni di emigrazione italiana (1876-1976)*, chapter I, pages 9–63. In [152], 1978.

[152] G. Rosoli (ed.). *Un secolo di emigrazione italiana 1876-1976.* Centro Studi Emigrazione, Roma, 1978.

[153] Louis Roussel. *Types of marriage and frequency of divorce*, chapter 2, pages 19–36. In *IUSSP* [89], reprinted in 1996 edition, 1989.

[154] Louis Roussel. La famille en Europe Occidentale: divergences et convergences. *Population*, (1):??, 1992.

[155] Linda Laura Sabbadini. *Famiglia unipersonale, unione libera o matrimonio.* In [143], 1987.

[156] Linda Laura Sabbadini. *Le convivenze"more uxorio"*, chapter VI, pages 86–94. In [7], 1997.

[157] Linda Laura Sabbadini. Modelli di formazione e organizzazione della famiglia. paper presented to the "Convegno Le famiglie interrogano le politiche sociali", organized by Dipartimento per gli Affari Sociali, Presidenza del Consiglio dei Ministri, Bologna, Italy, March 1999.

[158] Antonio Santini, Sabrina Prati, Alessandra Righi, A. Brancatello, Romina Fraboni, Alessandra Masi, R. Rodolfi, and Marina Venturi. La primo nuzialità nelle regioni italiane: tavole per coorte e per contemporanei. Paper presented to the 'Giornate di Studio della Popolazione', Firenze, Gennaio 1999.

[159] Jean-Paul Sardon. La primo-nuptialité féminine en Europe: éléments pour une typologie. *Population*, (4):855–892, 1992.

[160] Hans M.A. Schadee and Luisa Saviori. Il matrimonio e le frequentazioni delle classi superiori. *Polis*, VII(1):45–68, Aprile 1993.

[161] Hans M.A. Schadee and Antonio Schizzerotto. Processi di mobilità maschili e femminili nell'Italia contemporanea. *Polis*, IV(1):97–139, Aprile 1990.

[162] Robert Schoen. The armonic mean as the basis of a realistic two-sex marriage model. *Demography*, 18(2):201–216, May 1981.

[163] Robert Schoen. *Generalizing the Life Table Model to incorporate interactions between the sexes*, chapter 7, pages 385–443. In [119], 1982.

[164] Robert Schoen. Measuring the tightness of a marriage squeeze. *Demography*, 20(1):61–78, February 1983.

[165] Robert Schoen. *The Marriage Squeeze*, chapter 8, pages 167–185. In *The Plenum Series on Demographic Methods and Population Analysis* [166], 1988.

[166] Robert Schoen. *Modeling Multigroup Populations.* The Plenum Series on Demographic Methods and Population Analysis. Plenum Press, New York, 1988.

[167] Theodore P. Schultz (ed.). *Economics of the family: marriage, children and human capital; a conference report of the National Bureau of Economic Research.* University of Chicago Press, Chicago, 1974.

[168] SIS. *Atti della XXXIX riunione scientifica*, volume I. SIS, Sorrento, 14-17 Aprile, 1998.

[169] Wilma Smeenk. *Opportunity and marriage: the impact of individual resources and marriage market structure on first marriage timing and partner choice in The Netherlands*. PhD Thesis. Thela Thesis, 1998.

[170] Jeroen Smits, Wout Ultee, and Jan Lammers. Educational homogamyin 65 countries: an explanation of differences in openess using country-level explanatory variables. *American Sociological Review*, (63):264–285, 1998.

[171] Jeroen Smits, Wout Ultee, and Jan Lammers. More or less educational homogamy? a test of differetn versions of modernization theory using cross-temporal evidence for 60 countries. *American Sociological Review*, pages 781–788, October 2000.

[172] E. Sori. *L'emigrazione italiana dall'Unità alla seconda guerra mondiale*, chapter II-III, pages 19–118. In [173], 1979.

[173] E. Sori. *L'emigrazione italiana dall'Unità alla seconda guerra mondiale*. Il Mulino, Bologna, 1979.

[174] Scott J. South and Kim M. Lloyd. Marriage markets and nonmarital fertility in the United States. *Demography*, 29(2):247–264, May 1992.

[175] Scott J. South and Kim M. Lloyd. Marriage oportunities and family formation: further implications of imbalanced sex ratios. *Journal of marriage and the family*, (54):440–451, 1992.

[176] Scott J. South and Kim M. Lloyd. Spousal alternatives and marital dissolution. *American Sociological Review*, 60:21–35, February 1995.

[177] Haya Stier and Yossi Shavit. Age at marriage, sex ratios, and ethnic heterogamy. *European Sociological Review*, 10(1):79–87, May 1994.

[178] Marvin B. Sussman (ed.). *Sourcebook in marriage and the family*. Houghton Mifflin, Boston, second edition, 1963.

[179] Nancy Brandon Tuma and Michael T. Hannan. *Social Dynamics: models and methods*. Quantitative studies in social relations. Academic Press, Orlando, 1984.

[180] Peter Uhlenberg and Teresa M. Cooney. Male and female physicians: family and career comparisons. *Social Science and Medicine*, (30):373–78, 1990.

[181] U.N. Patterns of first marriage: Timing and prevalence. Department of international economic and social affairs, United Nations, New York, 1990.

[182] Wilfred Uunk. *Who marries whom? the role of social origin, education and high culture in mate selection of industrial societies during the twentieth century*. PhD thesis, Katholieke Universiteit Nijmegen, february 1996.

[183] Jacques Vallin and A. Nizard. La mortalité per état matrimonial. mariage sélection ou mariage protection. *Population*, (32, Numéro spécial), 1977.

[184] Dirk J. Van De Kaa. *Europe' Second Demographic Transiton*, volume 42 of *Population Bulletin*. Population Reference Bureau, Washington, 1987.

[185] Frans van Poppel, Aart C. Liefbroer, and Wendy J. Post. Vers un plus grande homogamie d'âge entre conjoints: différences entre les classes sociales et différences régionales aux Pays-Bas, 1812-1912. *Annales de Démographie Historique*, Le mariage, règles et pratiques:73–110, 1998.

[186] Hernan Vera, Donna H. Berardo, and Felix M. Berardo. Age heterogamy in marriage. *Journal of marriage and the family*, pages 553–566, August 1985.

[187] Catherine Villeneuve-Gokalp. *Du mariages aux unions sans papiers: histoire récente des transformations conjugales*, page ? In *Travaux et Documents, Cahier n.134* [123], 1994.

[188] Diana Vincenzi Amato. *Il diritto di famiglia*, chapter II, pages 37–52. In [7], 1997.

[189] Linda J. Waite. Does marriage matter? *Demography*, 32(4):483–507, November 1995.

[190] Guillame J. Wunsch and Marc G. Termote. *Introduction to Demographic Analysis. Principles and Methods.* Plenum Press, New York, London, 1978.

[191] Kazuo Yamaguchi. *Event History Analysis*, volume 28 of *Applied Social Research Methods Series.* Sage, New York, 1991.

[192] Zeng Yi, James W. Vaupel, and Anatoli I. Yashin. Marriage and fertility in China: a Lexis-Surface analysis. *International Insitute for Applied Systems Analysis*, Working Paper(WP-85-70), October 1985.