The own children method for event history analysis

A study of the transition to motherhood for women migrated from Veneto in the 1950s*

SILVIA MEGGIOLARO

1. Introduction. Migrations are an important factor in the population history of the North-East Italian region of Veneto. Massive migratory movements drove thousand of people from Veneto towards foreign countries even since the last twenty years of the nineteenth century (Lazzarini 1981). Afterwards, migrations became most of all interregional migrations (Sori 1979): the ratio between international and internal flows decreased, indeed, considerably after the First World War (Miani 1970). Interregional migrations had an important role in the second half of the twentieth century, too: in the 1950s Veneto became the area characterized by the greatest interregional flow towards North-western Italy. Beginning from the 1990s, Veneto is marked by immigration flow of foreigners coming from developing or Eastern European countries. The latter phenomenon is strongly growing, whereas interregional migration is almost concluded. Recent immigration flow of foreigners is often considered; conversely, there are only few studies about migrations from Veneto in the period between 1950 and 1970 (Vian 1974; Rossi, Meggiolaro 2006). In a recent paper (Rossi, Meggiolaro 2006), these migrations were analyzed with data of the 1981 and 1991 population censuses samples. That study focused on people born in Veneto and living in the two North-West Italian regions of Piemonte and Lombardia (where emigrants from Veneto prevalently moved in the 1950s) at the dates of the censuses. Some characteristics of these migrants (i.e., the disadvantaged social condition) were found to be typical of the selection which occurs when people move for economic reasons (migration flows of this period were, indeed, those of poor population attracted by the richer areas of the 'industrial triangle', Sori 1979; Rossi, Meggiolaro 2006; Minoia 2007). Other features (as the high female participation in the labor market) were so similar to those of the destination population, that a sort of assimilation to the host society may be observed. In fact, some of these aspects might be due to the need of adapting family life style to the economic system of the destination community. For example, fertility level might be limited both by the high female participation in the labor market and by the lack of a strong family network to nurse children, which was instead typical of many areas in Veneto.

* Acknowledgements. I would like to thank Fiorenzo Rossi and Alessandro Rosina for helpful advice during the analyses and for valuable comments on the various drafts of this paper. I would also like to thank Gianpiero Dalla Zuanna for helpful comments on earlier version of this paper.

SIDeS, «Popolazione e Storia»,
1/2008, pp. 99-112

The present paper aims at shedding light on the assimilation process of these migrants from Veneto into the society of the receiving regions (Piemonte and Lombardia), considering a particular aspect of demographic behaviour, the entry into motherhood. In this way, the relationship between fertility and migration is analyzed. In fact, the birth of the first child is studied with data from the 1981 population census, considering only a specific group of women: emigrants from Veneto in Piemonte and Lombardia, aged 30-34 at the date of the census. This choice is due to the particular structure of available data. The measure of migration is indeed obtained by the discrepancy between the place of birth (Veneto) and the place of residence (Piemonte and Lombardia) as reported in the census. This definition of migration may strongly affect the interpretation of the results, as, in this way, we do not have information on whether births come before or after migration for a woman. In fact, the choice of the women of that particular age class allows us to obtain clearly interpretable results. Considering that the greater migration flow from Veneto was in the 1950s (see section 2), (at least most of) this specific group of women may be expected to have emigrated in that period, that is when they were not in reproductive age. Women aged 30-34 at the date of the 1981 population census belong approximately, indeed, to the birth cohort of 1946-1951 and they were 0-4 in the 1951 and 10-14 in the 1961. They probably came to the new location with their parents, so that they are the second-generation migrants. As regards the (relatively few) women who emigrated in the first years of the 1960s, they may be expected to have no children before the migration: they were, indeed, 15-19 in 1966 and the mean age at the first child in Italy for those cohorts was 24.9 (Istat 1997). As a consequence, without loss of generality, we assume that the birth of the first child for women moved from Veneto and aged 30-34 at the 1981 census came after migration.

The birth of the first child is examined with event history analysis; this allows us to control the joint effect of more than one predictors, describing completely and properly the entry into motherhood for the population of interest.

Using event history analysis techniques starting from census data is possible thanks to a quite innovative approach. It is associated to the proper use of census (or, in general, current status) data, which provides information about status, to know events. This approach matches own children method with event history analysis. Thus, it makes the most of census data and this allows us to have further and richer information than that usually available with census data source.

The paper is organized as follows. Section 2 gives a brief description of the inter-regional migration from Veneto. Section 3 discusses the relationships between fertility and geographical mobility, in the light of hypotheses and empirical results in the literature. Sections 4 describes some characteristics of the female population of interest, comparing them with those of other women in the same age (those living in the destination regions, and those living in Veneto). Methodological issues are considered in section 5: first, it describes the approach of using current status data to study events through the own-children method (section 5.1 and 5.2), then event history models to study the birth of the first child are examined (section 5.3).

Results are presented in section 6. Lastly, section 7 contains some concluding remarks.

2. The exodus from Veneto to the North-West of Italy. After the Second World War, Veneto was marked out by a strong migration towards the 'industrial triangle', especially Piemonte and Lombardia, and it became a sort of «labour force tank of the industrial north-western areas» due to its economic conditions (Sori 1979). Like other north-eastern regions, in that period Veneto was, indeed, characterized by the prevailing importance of agricultural activities and by the only recent development of industrial activities; whereas, in north-western regions structural foundations for the productive take-off and for the subsequent economic growth phase had already started up and had become established.

A measure of the phenomenon may be obtained examining registered and cancelled people in Veneto, from and towards other regions and from and towards foreign countries, according to population register, for some periods: a negative balance of migration of about 280,000 people is observed between 1955 and 1971 (most of all in the period till 1961). Another important data source to measure migration is the population census[1]. Comparing information about the place of birth and of residence at the time of the census, many people born in Veneto and living in another Italian region at the dates of the censuses may be identified: they moved in the past and they did not return to the origin region. At the date of the 1951 population census, about 635,000 people born in Veneto were living in other Italian regions. This confirms the presence of firm migration flows. In the following decade, they were about 310,000 more. They slightly increased in 1971, and from 1981 they decreased. Both data sources (population register and census) show that the massive interregional migration from Veneto was in the 1950s.

Data of the 1951 population census showed that among people born in Veneto and living in 1951 in other Italian regions, nearly 60% was in Piemonte and Lombardia, whereas the proportions in other regions were negligible (apart from neighbouring ones, for geographical reasons, and Lazio). In 1961, in Piemonte and Lombardia further immigrants from Veneto were about 268,000 (+74%): in these two regions there were altogether 630,000 immigrants from Veneto. In the period between 1961 and 1971 the most of immigrants from Veneto moved into Piemonte and Lombardia, too. In subsequent censuses the phenomenon decreased considerably, but people from Veneto living in these two regions stayed at near two-thirds of immigrants from Veneto in other Italian regions.

3. Fertility and migration. The analysis of the connection between fertility and migration has a long history in demography. Literature has focused on testing three basic hypotheses.

The 'adaptation' hypothesis (Goldstein, Goldstein 1981; Stephen, Bean 1992) predicts a gradual assimilation of migrants to fertility norms and behaviour of the destination community. This hypothesis may be particularly important in the present study as adaptation may be presumed to be more likely for women of the

second generations since they arrived in the regions of destination during their childhood and socially formative years (Schoorls 1990; Young 1993).

The 'disruption' hypothesis considers only a temporary effect of migration, which depresses fertility in the first period after the move, because of spousal separation or the settling-in process (Carlson 1985). In fact, this may be more strong for the first generation of migrants.

Lastly, the literature refers to a 'selection' hypothesis (Hervitz 1985; Kahn 1994), according to which migrants are selected through socio-economic characteristics, which in turn also influence fertility behaviour: controlling for these characteristics should mean that there are no differences in fertility between migrants and non-migrants.

The international literature has mainly tested these three hypotheses with respect to the urbanisation process, in both developing and industrialised countries, focusing on urban and rural differentials. In addition, some studies have focused on multicultural countries, such as the United States and Australia, with reference to international migration flows (Ford 1990; Stephen, Bean 1992; Carlson 1985; Abbasi-Shavazi, McDonald 2000). In fact, only few studies focused on the second generations (Abbasi-Shavazi, McDonald 2000).

The few researches considering Italy referred to urbanization process. Two studies used data of the 1981 population census with reference to a large city in Lombardia, Milan (Clerici 1988, 1989). These analyses grouped women who were living in Milan at the date of the census according to the region of birth and of residence in 1976. Immigrants women (who were born outside the region) were distinguished between 'old immigrants' (who had already lived in Lombardia in 1976) and 'recently immigrants' (who had not already lived in that region in 1976). In particular, women of 'old immigration' were found to be assimilating fertility levels of 'natives' (women born in Lombardia); conversely, 'recently immigrant' women were found to have lower fertility levels and higher mean ages at birth than 'natives', showing a lower level of assimilation than 'old immigrants'. Others researches considered data on all people who have ever been residents in Turin (a large city in Piemonte) during the 1971-2001 period (Michielin 2003, 2004). These studies proved that fertility of immigrants was different to those of non-migrants: at least for first parities, the former had a higher probability of having an additional child. Then their behaviour seems to converge to that of the host population, supporting the adaptation hypothesis. Lastly, an analysis with more recent data (Gabrielli, Paterno, White 2007) found considerable evidence for selection hypothesis, considering recent interregional migrants.

4. Comparison among populations: some features. Since 1981, Istat (Italian National Institute of Statistics) created files with samples of census and placed them at users' disposal. This modality of information diffusion turned out to be important for the aim of this paper. It allows us to identify women born in Veneto who were living in Piemonte and Lombardia at the time of the census (from now on, they are referred as 'immigrant'), and to analyse their fertility with own-children

method. In fact, own-children method can be applied only to the 1981 population census, since a (2%) sample of households was provided; whereas available sample of the 1991 census is an individuals sample and own-children method cannot be applied (see note 3).

In this study, immigrant women aged 30-34 (at the date of the 1981 census) are considered. They are compared with other two groups of women of the same age class. The first group is composed by women who were living in Veneto at the date of the census and who were born there (henceforth, they are called 'natives' of Veneto). The second group refers to women who were living in Piemonte and Lombardia (in 1981) and who were born in those regions ('natives' of Piemonte and Lombardia). Women aged 30-34 at the date of the 1981 population census belong approximately to the birth cohorts of 1946-1951. They were characterized by high fertility and nuptiality levels (Caltabiano 2008). Moreover, they had one of the lowest ages at first birth (and at first marriage) of the century (Giovannelli, Santini 2005) and, as a consequence, most of them had already had their first child at the date of the 1981 census (official data showed that almost 80% of women born in 1947 have their first child when they were under 30, Castiglioni 1994).

Table 1 lists some demographic and socio-economic characteristics of the three groups of women, available from the 1981 population census: marital status, education, and employment status at the date of the census and 5 years before.

As regards marital status, most of women are married. Never married women are about 10%; proportions of separated or divorced women are about 2%, and the percentage of widows is even lower. Immigrants have higher percentages of married women; whereas, higher proportions of unmarried women are observed among natives, particularly of Piemonte and Lombardia.

Educational level is expressed into three categories: high (university degree or high school diploma), middle (junior high school diploma) and low. The highest educational level is found among natives of Piemonte and Lombardia. Whereas women moved from Veneto show lower levels, and similar results are noted for natives of Veneto.

As regards employment status, both that declared at the time of the census (October, 1981), and that 5 years before (October, 1976) are considered. Women moved from Veneto present very high female occupational rates; lower percentages of employed women are observed among natives of Veneto.

5. Methods

5.1. Survival analysis with current status data. One common variable of interest in many demographic researches is the age at which a certain event occurs, for example, age at first sexual intercourse, first marriage or first birth. There are many examples in other fields where age at which a 'milestone' occurs is studied. The methods of survival analysis can be used to study the relationship between explanatory variables and the length of time or duration between one event and a subsequent event.

Data on the age at which a milestone occurs are usually collected retrospectively,

but retrospective age data may contain serious reporting errors. Rather than base an analysis on unreliable data of reported age at the time of the event, it may be preferred to refer to reliable current status data, that is to the occurrence or non-occurrence of the event at the time of the survey or census. Current status data may indeed be considered more reliable than retrospective reports of age or duration[2]. If the milestone (in this study, the first birth) has been reached, we have incomplete information on when this occurred. Conversely, for respondents who have not achieved the milestone at the time of the survey or the census, we do not know when it will be reached (if ever). Current status data thus correspond to the extreme situation where all the survival time data are either right-censored or left-censored.

The extension of event history analysis models for use in conjunction with current status data in demography was initially proposed by Diamond, McDonald, Shah (1986); such a use, however, is common in several other fields (for examples in epidemiological studies, see Jewell, van der Laan 2002; Jewell, Shiboski 1990). Some studies consider, in particular, census data (see, for istance, Rosina 2005, 2006).

The present paper uses survival analysis model with census data. Data about events are obtained using own children method (see section 5.2): it allows us to derive information on the birth of the first child. This is quite an innovative approach which allows to make the most of census data. In fact, a similar approach has been suggested by Michielin (2003), even if she used a longitudinal database for her analyses.

5.2. The own children method. Women's entry into motherhood is obtained using the own children method (Cho, Retherford, Choe 1986). It is a reverse-survival technique for estimating age-specific birth rates for years previous to a census or household survey[3]. The own children method relies upon establishing an accurate link between children and their mothers[4]. The protocol of the method allocates children to their plausible mother based upon several 'rules' as described briefly below.

1. Clearly, children must be residing in the same household as their mother. This generally entails that the age at the first birth assigned to mothers is likely to be upward biased, in particular for women of the older cohorts.
2. Some age constraints must be verified: a potential mother has to be more than 15 years older, but no more than 45 years older, than the child. Having the first child outside these ranges is relatively rare.
3. The foundation of the allocation procedure rests upon the 'relationship to the household head' coding scheme that is included in most household surveys and in the census. This coding scheme provides information on how each person in the household is related to the household head, thus allowing us to make inferences about how non-heads, in a given household, may be related to one another.

In fact, mothers and children might be mismatched in some cases. This might happen, for example, when a woman has divorced and remarried and she is living

Tab. 1. *Characteristics of women aged 30-34 in the three compared populations*

Characteristics	Immigrants from Veneto	Natives of Piemonte and Lombardia	Natives of Veneto
Marital status			
Never married	7.6	11.7	9.8
Married	89.5	84.8	88.0
Legally separated or divorced	2.5	2.8	1.5
Widowed	0.4	0.7	0.7
Educational level			
High	13.7	25.2	16.2
Middle	32.3	35.6	26.2
Low	54.0	39.2	57.6
Employment status in 1976 and 1981			
Employed both in 1976 and 1981	48.5	50.5	36.0
Not employed in 1976, employed in 1981	10.8	8.2	9.4
Employed in 1976, not employed in 1981	4.8	7.8	7.5
Employed neither in 1976 nor in 1981	35.9	33.5	47.1
Total = 100	474	6,614	2,704

with the children of the 'new' husband. Other limitations rise when women do not live with their children: for instance, women might have had a child (outside marriage) who has been given up for adoption or who is living with relatives. However, these situations are not common among the populations of interest. The percentages of separated or divorced women are negligible (Tab. 1). In addition, in a context like the Italian one, fertility outside marriage is not common (Castiglioni 1994), especially in the period of interest.

In this paper women aged 30-34 are considered. As a consequence, their first child is probably not over 15 and children under 15 are highly unlikely to leave the parental family; in this way, potential bias due to children leaving home is removed.

5.3. Variables and methods. The percentages of women aged 30-34 (at the census) who have already had their first child are almost similar for natives of Veneto (78.4%) and Piemonte and Lombardia (77.5%); immigrants from Veneto have higher proportions (83.1%).

Obviously, percentages of women who had the first child vary considerably according to some socio-demographic characteristics. As a consequence, the effect observed for immigrants from Veneto may be spurious and should be controlled for by a multivariate analysis. In particular, our dependent variable is the time (measured in years) from a starting time to the birth of the first child. In the following we will consider the age of 15 as a starting time; a woman's age at the first birth and consequently the duration variable are obtained from the age of the child and of the woman at the census. Women who had not had a child were censored at the time of the census.

Besides the various population (immigrants from Veneto, natives of Veneto, and of Piemonte and Lombardia), several independent variables were used to assess the factors influencing the risk of a first birth. In particular, covariates included in the model are those presented in table 1: they described women's demographic and socio-economic characteristics and they allow us to take into account, at least partly, the potential effect of selection. In fact, no time varying variables are available and thus only associations between covariates and the entry into motherhood may be observed. Other variables which may be important, for example religious participation, or variables connected with women's social network, are not available with census data.

We considered continuous time event history analysis techniques. Piecewise constant exponential models[5] (Blossfeld, Rohwer 2002) were used to estimate the effects of the explanatory variables on the birth of the first child for women aged 30-34. The models are described as:

$$r_{jk}(t)=\exp\{\alpha_l^{(jk)} + \beta^{(jk)} X^{(jk)}\}, \quad (1)$$

t where $r_{jk}(t)$ is the hazard of the transition rate from origin state j to destination state k at time t (in this case, the entry into motherhood); $X^{(jk)}$ is a (row) vector of covariates and $\beta^{(jk)}$ is an associated vector of coefficients. $\alpha_l^{(jk)}$ is a constant coefficient associated with the lth time period ($l = 1, .., L$), where periods are based on (L-1) split points on the time axis. Thus, the model assumes that the hazard is constant not over the whole range of time, but within certain specified intervals of time. Conversely, the covariates are assumed to have the same effects in each period, so that the model is of proportional hazard type.

In our analyses, there were five time periods (corresponding to the age 15-17, 18-20, 21-23, 24-27 and 28 and more).

In fact, since it cannot be assumed that a potential covariate influence on the risk of the birth child is proportional over all periods of time, the model was then adapted for period-specific effects (Blossfeld, Rohwer 2002), i.e., the effects of the covariates were estimated separately for every defined time period.

First we model the entry into motherhood under the assumption of proportionality. Then we consider period-specific effects.

6. An analysis of the birth of the first child. Table 2 lists the parameter estimates of the proportional regression model, describing the risk of entry into motherhood for women aged 30-34 at the census of the three considered populations. Results show that the effect of the time from exposition to the risk (the age of 15) on the probability of having the first child increases till the fourth period, where there is the highest risk (that is when women are 24-27); after this period, the risk decreases.

As expected, coefficients related to demographic (marital status) and socio-economic (education and employment status) variables are largely significant: unmarried and employed women and women with high educational level have lower risk

Tab. 2. *Determinants of the risk of having the first child (women aged 30-34); piecewise constant exponential model*

	Effect	*Significance*
Period 1: 15-17	-7.29 (0.106)	***
Period 2: 18-20	-5.18 (0.075)	***
Period 3: 21-23	-3.93 (0.070)	***
Period 4: 24-27	-3.31 (0.069)	***
Period 5: 28 +	-3.48 (0.073)	***
Population (ref: Natives of Piemonte and Lombardia)		
Immigrants from Veneto	0.09 (0.052)	*
Natives of Veneto	-0.09 (0.026)	***
Education in 1981 (ref: low)		
High	-0.38 (0.032)	***
Middle	-0.11 (0.027)	***
Employment status in 1976 and 1981 (ref: employed neither in 1976 nor in 1981)		
Employed both in 1976 and 1981	-0.48 (0.026)	***
Not employed in 1976, employed in 1981	-0.14 (0.044)	***
Employed in 1976, not employed in 1981	-0.47 (0.044)	***
Marital status (ref: unmarried)		
Married	2.29 (0.065)	***

Notes: Standard errors are in parentheses. *p-value*: * $p < 0.10$; ** $p < 0.05$, *** $p < 0.01$.

of having the first child earlier. Immigrants from Veneto have a greater risk of having the first child earlier in comparison with natives of Piemonte and Lombardia (reference category), whereas the risk is lower for women natives of Veneto. In fact, immigrants from Veneto enter earlier into motherhood compared with the origin population, but their fertility timing is very similar to that of the destination population, as the effect is only significant at the 10% level. This is consistent with the hypothesis of adaptation and assimilation of behaviour.

Table 3 summarizes the results of the more in depth approach which considers period specific effects. In fact, to get sensible estimates we have to group the first two time periods in a single interval (referred to 15-20 years). We consider, in particular, the effect of migration: it is interesting to note that different risks among various groups of women are observed only in the first period (coefficients related to other periods are not significant, except for the third period for natives of Veneto). The risk of entering into motherhood between age 15 and 20 is lower for natives of Veneto than for natives of Piemonte and Lombardia[6] (reference category). Immigrants from Veneto have a positive, but not completely significant, coefficient. As a consequence, the differences in fertility timing of women aged 30-34 are due to the differences in the first years of reproductive age (between 15 and 20). In that period, immigrants from Veneto show a fertility behaviour which is more similar to that of women of destination community than of departure community.

Tab. 3. *Determinants of the risk of having the first child (women aged 30-34); piecewise constant exponential model with period specific effects*

	Period 1: 15-20	Period 2: 21-23	Period 3: 24-27	Period 4: 28 +
Base line hazard	-4.69***	-3.01***	-3.71***	-5.46***
	(0.145)	(0.114)	(0.117)	(0.234)
Population (ref: Natives of Piemonte and Lombardia)				
Immigrants from Veneto	0.20*	0.14	0.08	-0.27
	(0.121)	(0.092)	(0.081)	(0.194)
Natives of Veneto	-0.50***	0.03	-0.08**	-0.08
	(0.077)	(0.045)	(0.039)	(0.084)
Education in 1981 (ref: low)				
High	-0.52***	-0.78***	-0.32***	0.44***
	(0.095)	(0.066)	(0.047)	(0.093)
Middle	-0.09	-0.34***	-0.04	0.37***
	(0.069)	(0.048)	(0.040)	(0.089)
Employment status in 1976 and 1981 (ref: employed neither in 1976 nor in 1981)				
Employed both in 1976 and 1981	-0.16**	-0.62***	-0.61***	0.10
	(0.069)	(0.048)	(0.039)	(0.097)
Not employed in 1976, employed in 1981	0.11	-0.09	-0.25***	-0.17
	(0.109)	(0.074)	(0.068)	(0.171)
Employed in 1976, not employed in 1981	-0.32**	-0.87***	-0.56***	0.66***
	(0.129)	(0.093)	(0.063)	(0.125)
Marital status (ref: unmarried)				
Married	0.98***	1.49***	2.73***	3.49***
	(0.135)	(0.110)	(0.113)	(0.216)

Notes: standard errors are in parentheses. *p-value*: * $p < 0.10$; ** $p < 0.05$, *** $p < 0.01$.

7. Conclusions. This paper analysed the assimilation process of immigrants from Veneto in the 1950s into the receiving society of Piemonte and Lombardia. In particular, the relationship between fertility and territorial mobility was studied, considering the entry into motherhood for women aged 30-34 at the 1981 population census. This thanks to an innovative approach which lies in the matching between own children method and event history analysis. This matching allowed us to use data of the sample of the 1981 population census for survival analysis.

The use of own children method for event history models may be very advantageous to study fertility in many situations when current status data are either the only data available or are to be preferred to the retrospectively reported data. In fact, this approach should be used with some cautions, as there are also some shortcomings connected with the own children method itself. In particular, it should be taken into account that own children method yields fertility rates only for the 12-15 years preceding a census. Moreover, an 'own children' birth history differs from a complete birth history by excluding births of deceased children and of surviving

children who no longer live in the mother's household (due, for example, to separation or remarriage of the parents). In fact, since the numbers of these omitted births are often relatively small for the period of 15 or so years preceding the census, the 'own children' birth histories may include most of the complete birth histories.

In this study these limitations are reduced at a minimum since remarriage and extramarital fertility are not common in the Italian context, particularly in the period considered here. Moreover, in this paper mothers are 30-34, thus their children are probably not over 15 and they are highly unlikely to have left the parental home.

Some other shortcomings are specific of the data used in this paper. First, only women aged 30-34 are studied and this does not allow us to describe their complete fertility histories. In addition, the lack of more detailed information about social and demographic characteristics of women (available only with ad hoc studies) does not permit a more in depth study of the mechanisms governing their reproductive behaviour.

Despite these limitations, the paper sheds some light on the process of assimilation of women moved from Veneto into the society of the receiving regions. Results of piecewise exponential models were in line with the adaptation hypothesis. They showed that, controlling for demographic and socio-economic characteristics, immigrants from Veneto had an earlier entry into motherhood respect to the origin population, but also that their behaviour was very similar to that of the destination population.

In fact, the adaptation for immigrants from Veneto of reproductive models of Piemonte and Lombardia regarded the entry into motherhood. It is difficult to understand from available data in what way these aspects may characterize also final fertility. Future research may analyse in depth this aspect.

[1] For a review of the census source for migrations see Corgeau 1988; as regards Italy see Rossi, Clerici 1988.

[2] For a review of the advantages and disadvantages of current status vs. retrospective data see Diamond, McDonald 1992.

[3] Individual data from census must be arranged in households.

[4] Infant mortality and mortality of mothers are neglected in this analysis. This is not a great limitation since they may be supposed quite low in the period of interest. Moreover, similar levels of mortality may be expected for the considered populations.

[5] Models are estimated using TDA (Transition Data Analysis) software (available at http://www.stat.ruhr-uni-bochum.de/tda.html).

[6] This result is consistent with official data: age specific fertility rates for the ages 15-20 for the cohorts of 1946-1951 are lower in Veneto in comparison particularly with Piemonte (Caltabiano 2006).

References

M.J. Abbasi-Shavazi, P. McDonald 2000, *Fertility and multiculturalism: immigrant fertility in Australia, 1977-1991*, «International Migration Review», 34, 1, 215-242.

H.P. Blossfeld, G. Rohwer 2002, *Techniques of event history modelling. New approaches to causal analysis,* Lawrence Erlbaum Associates Publisher, London.

M. Caltabiano 2006, *Recenti sviluppi della fecondità per coorti in Italia*, Dipartimento di Scienze Statistiche, Università degli Studi di Padova, Working Paper, 2.

M. Caltabiano 2008, *Has the fertility decline come to an end in the different regions of Italy? New insights from a cohort approach*, «Population», 63, 1, 157-170.

E.D. Carlson 1985, *The impact of international migration upon the timing of marriage and childbearing*, «Demography», 22, 1, 61-72.

M. Castiglioni 1994, *Innovazione nella tradizione. Comportamento riproduttivo e unioni coniugali in Italia negli anni '70 e '80*, in L. Ciucci, F. Racioppi (eds.), *Studi di popolazione. Nuovi approcci per la descrizione e l'interpretazione*, Dipartimento di Scienze Demografiche, Università di Roma 'La Sapienza', Roma, 13-40.

L.J. Cho, R. Retherford, M. Choe 1986, *The Own-Children Method of Fertility Estimation*, University of Hawaii Press, Honolulu.

R. Clerici 1988, *Fecondità e migrazioni: un'analisi delle donne censite nel 1981 in provincia di Milano*, «Studi Emigrazione/Etudes Migrations», 90, 258-280.

R. Clerici 1989, *Fecondità, lavoro e migrazioni. Fecondità differenziale secondo esperienze di mobilità da dati di censimento*, «Studi Emigrazione/Etudes Migrations», 93, 35-51.

D. Courgeau 1988, *Méthodes de mesure de la mobilité spatiale*, INED, Paris.

I. Diamond, J.W. McDonald, I.H. Shah 1986, *Proportional hazard models for current status data: application to the study of differentials in age at weaning in Pakistan*, «Demography», 23, 4, 607-620.

I. Diamond, J.W. McDonald 1992, *Analysis of current status data*, in J. Trussel, R. Hankinson, J. Tilton (eds.), *Demographic Application of Event History Analysis*, Oxford University Press, Oxford, 231-252.

K. Ford 1990, *Duration of residence in the United States and the fertility of U.S. immigrants*, «International Migration Review», 24, 34-68.

G. Gabrielli, A. Paterno, M. White 2007, *The impact of origin region and internal migration on Italian fertility*, «Demographic Research», 17, 519-554.

C. Giovannelli, A. Santini 2005, *La primonuzialità delle coorti femminili in Italia e nelle sue regioni*, Florence University Press, Firenze.

S. Goldstein, A. Goldstein 1981, *The impact of migration on fertility: an Own Children analysis for Thailand*, «Population Studies», 35, 2, 265- 284.

H. Hervitz 1985, *Selectivity, Adaption, or Disruption? A comparison of alternative hypotheses on the effect of migration on fertility: the case of Brazil*, «International Migration Review», 19, 2, 293-317.

ISTAT 1997, *La fecondità nelle regioni italiane. Analisi per coorti. Anni 1952-1993*, Informazioni, n. 35, Roma.

J.R. Kahn 1994, *Immigrant and native fertility during the 1980s: adaptation and exceptions for the future*, «International Migration Review», 28, 3, 501-519.

N.P. Jewell, S.C. Shiboski 1990, *Statistical analysis of HIV infectivity based on partner studies*, «Biometrics», 46, 4, 1151-1163.

N.P. Jewell, M.J. Van Der Laan 2002, *Current status data: review, recent developments and open problems*, Division of Biostatistics, University of California, Working Paper, 113.

A. Lazzarini 1981, *Campagne venete ed emigrazione di massa, 1866-1900*, Istituto per le ricerche di storia sociale e di storia religiosa, Vicenza.

F. Miani 1970, *Aspetti quantitativi del movimento sociale della popolazione nelle Venezie,* Unione regionale delle Camere di Commercio.

F. Michielin 2003, *Fertility in an urban context: a complex phenomenon*, Ph.D. thesis in Statistics Applied to Economic and Social Sciences. Published as «Quaderni di Ricerca IRES», n. 102/2003.

F. Michielin 2004, *Lowest low fertility in an urban context: the role of migration in Turin, Italy*, «Population, space and place», 10, 331-347.

G. Minoia 2007, *Evoluzione della politica agraria e della organizzazione della società rurale*, Rapporto sullo sviluppo sostenibile, Fondazione Eni Enrico Mattei.

A. Rosina 2005, *Lo studio della nuzialità con dati di censimento: dalla SMAM all'Event History Analysis (e ritorno)*, «Popolazione e Storia», 67-78.

A. Rosina 2006, *A model with long-term survivors for the analysis of current-status nuptiality data*, «Population Studies», 60, 1, 73-81.
F. Rossi, R. Clerici 1988, *La mobilità territoriale rilevata dal censimento della popolazione: confronto con altre fonti*, «Studi Emigrazione/Etudes Migrations», 89, 98-126.
F. Rossi, S. Meggiolaro 2006, *Da Nord Est a Nord Ovest. Gli emigrati veneti in Italia nel XX secolo*, Materiali di Demografia Storica, Cleup, Padova.
J.J. Schoorl 1990, *Fertility Adaptation of Turkish and Moroccan women in the Netherlands*, «International Migration», 28, 4, 477-495.
E. Sori 1979, *L'emigrazione italiana dall'Unità alla seconda guerra mondiale*, Il Mulino, Bologna.
E.H. Stephen, F.D. Bean 1992, *Assimilation, disruption, and the fertility of Mexican Origin women in the United States*, «International Migration Review», 26, 1, 67-88.
F. Vian 1974, *Le cause strutturali dell'emigrazione nel Veneto*, Atti della Conferenza regionale dell'emigrazione, Verona 29-30 luglio 1974, Regione Veneto, Venezia.
C.M. Young 1993, *Are there any differences between New Zealand Immigrants and the Australia-born population?*, in G.A. Carmichael (ed.), *Trans-Tasman Migration: Trend, Causes and Consequences*, Australian Government Publishing Service, Canberra, 183-215.

Summary

The own children method for event history analysis: A study of the transition to motherhood for women migrated from Veneto in the 1950s

This paper aims at studying the assimilation process of migrants moved from the North-East Italian region of Veneto in the 1950s into the society of receiving regions. In particular, the relationship between fertility and migration is considered. A quite innovative approach lies on the matching between own children method and event history analysis; this allows us to consider current status data, such as those of the 1981 population census, to know demographic events. Piecewise constant exponential models are used to study the birth of the first child for women aged 30-34 (at the census) moved from Veneto towards the North-West Italian regions of Piemonte and Lombardia. Results show that these emigrant women experienced a gradual assimilation to fertility behaviour of the host society.

Riassunto

Il metodo dei figli propri per analisi di tipo event history*: uno studio della nascita del primo figlio per le donne emigrate dal Veneto negli anni Cinquanta*

In questo lavoro si studia il processo di assimilazione degli emigrati dal Veneto nelle regioni del Nord-ovest dell'Italia negli anni Cinquanta. In particolare, si considera la relazione fra fecondità e migrazione. Con un approccio innovativo, che si basa sull'uso del metodo dei figli propri e delle tecniche di *event history analysis*, si sfruttano dati di stato, come quelli del censimento della popolazione del 1981, per avere informazione sugli eventi. Con modelli esponenziali a tratti si studia la nascita del primo figlio per le donne che hanno fra i 30 e i 34 anni (al censimento) e che sono emigrate dal Veneto nelle due regioni del Nord-ovest, Piemonte e Lombardia. Dai risultati si vede che queste emigrate sperimentano una graduale assimilazione al comportamento riproduttivo della società in cui arrivano.