Migration, Family, and Career: A Life Course Approach

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Abstract

This study uses data from a French survey to demonstrate with well-chosen examples how migration is best understood within a life course framework. It leads to the conclusion that spatial mobility must no longer be considered independent of other relational systems, such as family and career. Future research directions are discussed to cover the complexity of the physical, but also the social space within which we live.

I. Introduction

An individual's residence history is a part of his whole life history and, therefore, is linked to other key sequences such as his educational history, family life-cycle, career-cycle, etc. For example, particular forms of mobility may be associated with important stages in the life cycle such as leaving home for an education or to get married; finding or changing employment; rearing a family; and retirement. Conversely, some residence changes, such as those induced by

rural–urban migration, may lead to important alterations in the pattern of family formation or occupational career.

There has been little research, however, on the extent to which migration is linked to family life cycle and career (Sandefur & Scott, 1981). This is mainly due to the fact that most migration studies have relied on cross-sectional data and techniques of analysis. For that reason we show first how cross-sectional analysis can produce very misleading results.

Unlike longitudinal data, cross-sectional data do not permit the distinction between pre- and postmigration events or characteristics, and do not permit the examination of the associated timing of migrations, family events, and career changes. However, longitudinal data require some special methods of analysis suitably adapted for handling the complex interactions among these processes.

In this chapter we explore the influence of family and career events on spatial mobility and the reciprocal influence of spatial mobility on the family and career life cycle. These relationships are illustrated with results from a French survey covering a sample of 4602 individuals living in France in 1981, and who were born between 1911 and 1936. The survey collected retrospective information on the entire family, career, and migratory history of the individuals.

Spatial mobility is a complex phenomenon. Migration may be defined at a number of spatial levels of analysis. Thus, while this analysis focuses on migration to and from metropolitan areas, it is possible to employ a greater diversity of migration definitions (e.g., change in dwelling, change in province, and moves from the agricultural sector). Results obtained with these definitions would permit us to broaden the scope of this paper. For example, the use of different definitions might be useful for relating migration to the urbanization process.

II. Background

The concept of territorial mobility spans the continuous motion of human beings. Many different forms of movements are implied in this concept, including short-distance commuting or recreational mobility as well as long-distance international migration. However, each discipline has viewed migration from its own particular perspective, integrating some forms of mobility, leaving aside others. Existing data sources, mainly censuses or population registers, introduce precise criteria for the definition of migration which have crucial repercussions on the findings of mobility studies by limiting the available definitions of territorial mobility.

The concept of "usual residence" is mainly used to define migration in censuses or in population registers. Such a residence is the place where an individual usually lives. Once we adopt this definition, it restricts analysis to the resident population because it excludes those individuals without a precise residence, such as nomads and vagrants. A migration is additionally defined as a change in usual residence from one place to another. Often this place is a parish or a commune so that moves within these administrative units, even if they involve a change of residence, will not be considered to be migrations.

Furthermore, as it is too expensive to ask, in a census, for the entire past migration history, only questions about the last place of residence and the time of last change, or questions about place of residence at a past previous date may be asked. Such questions, which only consider the last move in the first case, or recent moves in the second case, provide little information on the migration process. As we see later, such information may lead to serious problems of interpretation.

With longitudinal data, since we are not restricted by census definitions, we can introduce the concept of a "dwelling." A dwelling is a "statistical abstraction denoting housing accommodations appropriate for occupation by one household" (Van de Walle, 1982). A migration can then be defined as a change of dwelling. Such changes are more numerous than changes of usual residence, because they include temporary or seasonal moves, etc. Thus, we can consider all changes of dwelling-houses, not just dwelling-places, which permits us to later define other kinds of movement (such as rural–urban) from this set. However, in order to restrict the number of recorded migrations, we do not consider in this chapter those dwellings in which individuals spend less than 6 months. For some purposes, it may be necessary to introduce a longer time space.

The principle family events are more easy to identify: the formation of the family through marriage, its extension through childbirth, its dissolution through departure of children from their parents' home, or the death of a spouse. In a great number of countries, some of these family events are still recorded in birth, marriage, and death registers. Similarly, some censuses ask questions about date of marriage and/or date of birth of the different children. However, other less important events are not generally recorded in a census or in registers. For example, the departure of children from their parents' home may only be registered in countries with population registers. Only a few countries, mainly in Northern Europe, have such population registers. They do not exist in France or in the United States, for example. Finally, some family events may never be recorded in registers or censuses. For example, the start of cohabitation, which has become an important family event in recent generations, is not recorded. Retrospective or prospective surveys are, therefore, very useful in order to get the whole set of family events and to analyze them in interaction with migration.

For the last type of event we are considering here, career events, some new definitional problems appear. One interesting approach is to consider only employment and unemployment periods, until retirement, and try to relate migration to employment status. However, unemployment has been found to have

little effect on migration (Courgeau, 1985a). The economic sector in which an individual works would be more interesting to consider. For example, the migratory behavior of men working in the agricultural sector may be very different from that of an individual working in industry or in commerce. It is therefore useful to introduce different occupational categories to ascertain the relationship between an individual's migratory behavior and his career mobility. For France, we use the following social status categories: farmers, farm laborers, factory workers, assistants, executives in industry and commerce, and managerial staff and assistant managers. Categories that have too few members to be considered separately (attendants, military personnel, artists, clerical personnel, housekeeping staff, servants, and the nonworking population) are grouped together.

Other distinctions between different employment statuses are also useful to consider; that is, whether one is employed in or out of the public sector, and whether one is self-employed. The migratory behavior within these categories may be very different.

Again, census data are very poor on the career history of an individual. Only information on current profession and place of work is available, as well as the educational status of the individual. Thus, to be able to relate migration to career, survey data are needed.

III. Major Drawbacks in Previous Research

Previous analyses of the connection between life course variables and migration were hampered by different drawbacks which we now discuss.

First, in contrast to the more general definition of territorial mobility, given at the beginning of the preceding section, previous research has employed various definitions of migration which are restricted by the sources of data available (e.g., population register, different census questions) and over which the researcher has practically no influence. The decision that one move constitutes a migration while another does not, reflects "the concern of bureaucrats to attach people to domiciles where they can be registered, enumerated, taxed, drafted and watched" (Tilly, 1978). Even when researchers have used survey data that would permit broader definitions of migration, they have employed commonly used, more restrictive definitions of migration.

Another drawback of previous research lies in the use of a mainly cross-sectional approach to assess the interactions between migration, family, and career. Such an approach does not permit identification of the timing of various events occurring in the individual life cycle. Rather, it identifies family and career stages in the life cycle at a particular point in time.

Additionally, cross-sectional data contain no information on either the number of migrations or the duration of each residence period. As a result of these

limitations, the use of cross-sectional data to study the relationship between migrations, family, and career can lead to imprecise, and even erroneous results.

To illustrate this, consider how we might examine the relationship between marriage and migration using cross-sectional data. For marriage, we know the marital status at the time of the census or the survey, but we have no information on the date of marriage. For migration we may have the place of residence at the time of the previous census compared with the current one, in French census.

To study the effect of migration on marriage, we could compare the proportion of those remaining single at the time of the census with their migration status to and from metropolitan areas. However, such a comparison is not very informative. As we do not know the date of marriage, we do not know if the registered migration occurred before or after a marriage. If marriage occurred after the migration, it is of little interest: Marital behavior was not affected by the registered migration. If migration occurs before marriage, the comparison may be more relevant. Unfortunately, as we are unable to distinguish between the two previous cases, the global result is of little interest.

To study the effect of marriage on migration, we can examine the migration rates to the metropolitan or nonmetropolitan areas by marital status. This comparison seems to yield more interesting results than the previous one. For example, Deville (1979) showed clearly that married individuals ages 20–44 have higher mobility. However, this comparison may be very misleading. If marriage occurs during the intercensal period, the registered migration may be associated with marriage. If marriage occurs before the previous census, the registered migration is really a migration of married individuals. We are thus unable to distinguish migration through marriage from later migrations of married persons. This is especially problematic since married persons may have lower age-specific migration rates than those who are single, so that the direction of causality can not be determined.

Let us now introduce the family size at the time of the census. Again we know the number of children at the time of census, and from the age of each child we can obtain some information on fertility (Long, 1972). In this case we can compare the fertility of migrant and nonmigrant women according to their origin and their children's ages, but again this information is not very informative. We are unable to determine whether childbirth leads to migration or whether a move is undertaken in anticipation of a birth.

Finally, let us introduce different characteristics to explain migration or family behavior. These different characteristics are usually entered as independent variables in a regression model (Puig, 1981). The dependent variable could be, for example, the migratory status or the number of children born. As the covariates are measured at the time of the census or the survey, some new problems are added to the previous ones. Some of these covariates may have been modified by the previous migration or a birth. For example, then, suppose that a registered

migration results in a career change. If we introduce the new profession to explain the previous migration, this may lead to inconsistent results. We can conclude that measuring the covariates at the end of the interval can be misleading, especially if these covariates are likely to change during the interval as a consequence of mobility or fertility (Sandefur & Tuma, 1987).

Longitudinal data are required to overcome these problems. Retrospective or prospective surveys are used to record the continuous-time life history of individuals. They enable us to collect information on events in the family, and on the occupational and migratory history of individuals, both of which avoid many of the pitfalls of cross-sectional data.

IV. Towards a More Synthetic Approach

To analyze the connections between life course variables and migration, we consider their expression in time and space through events. These events may be defined as a change of status in one or more relational systems. For example, a migration may simultaneously be linked to an increase in family size or to a change in work-place. On the other hand, we may observe that a migration induces some new changes in family or career status. "By measuring probabilities of change and investigating the kinds of changes which occur when a new situation arises, we are able to know more about interactions among relational systems" (Courgeau, 1985a).

To be able to lay out a model that mirrors the interactions between these events, we have to make some assumptions about the underlying process. We assume here that this process is correctly specified as transitions between a countable number of discrete observable states. For example, for a woman at time t, her state could be identified as the number of children to whom she has given birth and the number of moves she has previously made, or these states could be identified on the basis of the place, rural or urban, where she is living. In the latter case a change may be a rural–urban migration or an urban–rural one. A second assumption is that these changes occur at a precise point in time. In reality such changes occur within a period of time sufficiently short so that events may be considered simultaneous; however, it is important to be able to register the exact timing of each studied event relative to the others. We discuss later the validity of these assumptions, but let us suppose for the moment that they are correct.

In shifting the problem to this new ground, some of the previous difficulties are removed and some new ones emerge. We now have to use a longitudinal approach to analyze the duration between two or more different events occurring to the same individual. Using a retrospective survey schedule permits us to collect longitudinal information on events in the family, occupational, educational and migratory history of interviewees. However, as conventional methods of analyzing migration differentials are no longer useful, we have to employ more specific methods for analyzing event histories (Tuma & Hannan, 1984).

Second, this approach will no longer introduce migration as the dependent variable, and some other characteristics as the independent ones. As we have said, it is necessary to analyze migration as a related phenomenon but not as a dependent one. Therefore, we present here an analysis of the interaction between migration, family and career events. We could add some events occurring in other relational systems, such as the educational or political systems, but that is beyond the scope of this paper.

Third, using survey data, we are more free to use new definitions of migration, which differ from what census or register data necessitate. At the beginning of the study, we must define precisely the spatial states to be considered, and then identify as migrations transitions between these states.

V. Data

The data are drawn from the INED (Institut National d'Etudes Démographiques, France) survey on the *Family, Career, and Migration Histories,* which recorded retrospective life histories of a random sample of individuals between the ages of 45 and 69 inclusive, all of whom were living in France in 1981. These data were collected by INSEE (Institut National de la Statistique et des Etudes Economiques) interviewers, from a nationwide sample of 16,410 households in two different surveys.

One survey (the results of which we do not employ here) was intended to ascertain the effects of work on the family life of working women. It was directed toward young women with children under the age of 16. The second survey, which we do use here, dealt with the family, work, and migration histories of older individuals. From this survey we obtained 4602 completed questionnaires (2050 for males, 2552 for females) giving a completion rate of approximately 89%.[1]

These life histories included information on the educational, occupational, familial, and residential experiences of these individuals from their birth to the time of interview. Information was also obtained on parents' origin and on current spouse. All life events resulting in a change of state (for example, a new dwelling or a change in marital status) of more than 6 months were registered by month and year of occurrence.

Because the life histories of individuals are complex, this survey generated an enormous amount of information.

[1]This rate was estimated only for the two surveys taken together.

In reports of events in which the respondent failed to provide the month of the event, the missing data was coded in a range of months from 21 to 32, to permit the allocation of missing dates. The assignment of months to those with missing data was done as follows: In general, the months of the two surrounding events being registered, we took the middle month in the interval between them. If they were not registered, a random month was attributed. For the different events reported, the allocated dates represent 0.9% for marriages, 0.8% for children's births, 5.7% for divorce or widowhood, 6.6% for dwelling changes, and 7.3% for career changes (Riandey, 1985). Neither the date of the event nor the age of the interviewed individual has an influence on these percentages.

To assess the reliability and the validity of retrospective data, the same questionnaire was used in Belgium. Because this country has a population register, it was possible to check the data collected against the authority of the register. The first results show that even though errors in the dating were frequent and more prevalent for men than for women (Duchène, 1985), the logical sequence was usually correct. This finding led us to test the effects of erroneous dating of migration data from this survey (Courgeau, 1985c). The regularity of the main results confirm that recall of the logical sequence of events was good. Thus, memory seems to be reliable when the analysis requires it. However, more tests will be necessary to confirm these first results, as they were obtained with a very small sample (50 interviewed households).

Another test of accuracy is possible for periods of military service. These periods seemed to be underreported by the interviewed men: Only 50% of them reported such periods. However, consultation of military documents showed that for budgetary reasons an important part of the annual contingent was not recruited. For example, only 74% of the cohorts born between 1911 and 1914 were recruited. The survey gives us a rate of 72% with a confidence interval of 5% (Riandey, 1985) for the same cohort. Thus, the data are reliable with respect to periods of military service.

VI. Methods of Analysis

In recent years, the techniques of survival analysis have been extended to analyze failures of a more complex type than individual deaths for which they were first used (Kalbfleisch & Prentice, 1980). These techniques were previously widely used in medical work, particularly in clinical trials. It was assumed that the response for each individual can be viewed as an event at a specific point in time. In these studies, failure can occur at most once in any individual life. However, some individuals may never experience the event in the time period observed. For example, in a retrospective survey some individuals are interviewed before they experience the event. It is possible, and in fact important, to include these individuals. Even though they did not experience the event, they were exposed to the risk of experiencing the event, and the fact that they did not experience it is significant. Such incomplete observation is called censored data.

Failure data may be more general. The failure of an individual may be one of several distinct types. For example, an individual changing his occupational status may change to any one of several different occupational states. This possibility leads to competing risks models. Second, an individual can undergo more than one failure time with respect to different life events. For example, when studying the interaction between leaving agriculture and marrying, we have to adopt a bivariate model which can also be extended to multivariate failure time data.

Furthermore, we can distinguish three approaches to the statistical analysis of interactions between family, career, and migration events. The first is a nonparametric one which generalizes the usual demographic survival methods for longitudinal data to incorporate complex interactions. The second approach is a parametric one where the underlying form of the failure time distribution may be specified parametrically and models relating the parameters of this distribution to some observed variables may be fitted by maximum likelihood methods. Such an approach generalizes previous geographic and economic regression models by introducing a time dimension. A third approach, called semiparametric, attempts to synthesize the parametric and nonparametric approaches.

As general methods for the analysis of event history data are presented elsewhere in this volume (Palloni & Sørensen), we focus here on more specific models needed to analyze the connection between life course variables and migration.

A. NONPARAMETRIC BIVARIATE ANALYSIS

Nonparametric bivariate or multivariate models are particularly appropriate to study the connections between life course events and migration. Usually, we are interested in assessing how one event influences the occurrence of the others, rather than in computing coefficients of correlation or similar measures of association (Aalen, Borgan, Keiding, & Thormann, 1980). These models formalize different stochastic processes developing over time. Some of these processes may influence the local development of other processes, leading to different concepts of dependence or independence.

We have stochastic independence between two processes when the occurrence of one type of event is wholly unrelated to the occurrence of the other and vice versa. We say that there is local dependence (Schweder, 1970) when a stochastic process may influence the local development of another process, while the converse may not be true. If this is ever the case, then we are able to say that there is

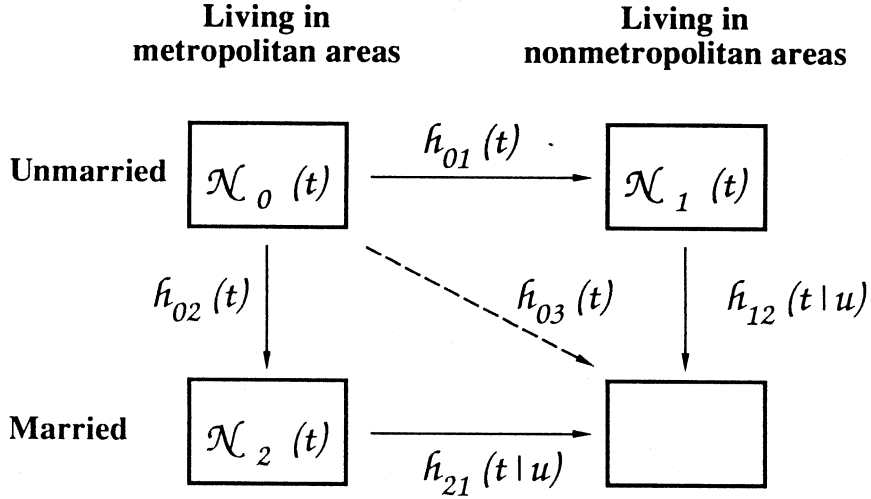

Fig. 1. State space diagram for the bivariate case.

a one-sided influence by the first process on the second one. Finally, we have stochastic dependence if the two processes are mutually dependent.

Let us formalize the bivariate case. We consider here two events which may occur in any order. For example, working in terms of the state-space diagram in Fig. 1, consider the relationship between getting married and migrating from metropolitan areas.

In this case we have two failure times represented by the random variables T_1 and T_2, and four possible states (unmarried, living in a metropolitan area; married, living in a metropolitan area; unmarried, living in a nonmetropolitan area; married, living in a nonmetropolitan area). In this example we assume that everybody starts in the state of being unmarried and living in the metropolitan area, and is exposed over time to the risks of marriage and migration to a nonmetropolitan area.

The hazard function, defined in the univariate case as the instantaneous rate of failure conditional upon survival to time t, can be generalized into four hazard functions:

$$h_{01}(t) = \lim_{\Delta t \to 0} \frac{P(T_1 < t + \Delta t | T_1 \geq t, T_2 \geq t)}{\Delta t} \tag{1}$$

with a similar one for $h_{02}(t)$ and:

$$h_{12}(t|u) = \lim_{\Delta t \to 0} \frac{P(T_2 < t + \Delta t | T_1 = u, T_2 \geq t)}{\Delta t} \text{ with } t \geq u \tag{2}$$

with a similar one for $h_{21}(t|u)$. If we do not take into account the time u of the previous event, then these two series of hazard functions become $h_{12}(t)$ and $h_{21}(t)$.

It is also necessary to introduce the possibility of simultaneous occurrence of the two types of failure $h_{03}(t)$. We have first to define what simultaneity is. As we have previously said, we get only the month of occurrence of each event in our survey, so that there may be a small number of simultaneous occurrences which are for all practical purposes simultaneous. It is possible to try to eliminate these simultaneities by reducing the length of this interval (e.g., to days, hours, etc.). However, while such a possibility exists for a statistician, it is of little significance for the sociologist. When establishing the timing of events, we have to recognize that these events are the expression of decisions of individuals with regard to a number of factors associated with their life circumstances. Thus, temporal ordering may not necessarily reflect the decision-making process. For example, an individual who first migrates and then marries may have actually decided to migrate as a consequence of a previously made decision to marry. While our survey provides no direct information on the decision process, it is reasonable to assume that this problem is most severe when events are nearly simultaneous.

For that reason, we introduced the notion of "fuzzy" time (Courgeau & Lelièvre, 1988) by employing a specific time length to define simultaneous events. It may also be interesting to see how results are changed when taking different time lengths (1 month, 6 months, 1 year, etc.). All these possibilities permit us to address the difficult problem of linking decisions with events; however, information on decision-making processes from other methods and disciplines, such as anthropology and psychology, seems absolutely necessary. For our French survey we used a time period of a year, defined as a calendar year. This procedure is easy to use, as it introduces the estimation of a continuous distribution with piecewise-constant hazard rates for each calendar year (Cox & Oakes, 1984).

How do we handle simultaneity when two events occur during the same time interval? In some cases, one should consider the two processes as the outcomes of a single decision-making process. For example, there may be no need to consider the decision to leave the metropolitan area and the decision to marry as separate interacting processes. As a decision outcome, they could be viewed singly. To incorporate this, we can introduce a fifth series of hazard functions $h_{03}(t)$. However, when the simultaneous cases are few, the consideration of these rates will not be very informative.

Other possibilities exist. For example, consider the marital behavior of individuals on the verge of leaving metropolitan areas. We can state the assumption that their behavior will be similar to the behavior of those who have already left metropolitan areas. In this case, we introduce these simultaneities in the esti-

mates of the hazard function $h_{21}(t)$ rather than in a fifth series of hazard functions and compare it to $h_{01}(t)$.

Let us now consider the ways to estimate these hazard functions.

Let $N_i(t)$ i = 0, 1, 2, . . . be the population in state i at the beginning of year t, and let $n_{ij}(t)$ j = 1, 2, . . . be the number of events of type j occurring in the population of state i, during the year t. To simplify the presentation we assume here that the behavior of the observed individuals will depend only on their age and not on the time at which the previous event occurred. However, this assumption can be relaxed by grouping on the conditioning time of the previous event, u. The approximate estimates of the hazard rate are as follows:

$$h_{oj}(t) = n_{oj}(t)/[N_0(t) - 1/2 \sum_i n_{oi}(t)] \quad (3)$$

$$h_{ij}(t) = n_{ij}(t)/[N_i(t) - 1/2(n_{ij}(t) - n_{oi}(t))] \quad (4)$$

We can also include censored individuals which are then assumed to be exposed to risk for approximatively 0.4 year.

We can cumulate these rates from the beginning of the observation. These cumulative rates will give smoother curves than the annual ones. Later, we will use mainly cumulative hazard functions. We can then test the equalities:

$$h_{01}(t) = h_{21}(t)\ h_{02}(t) = h_{12}(t)$$

If both equalities hold true we can conclude that there is stochastic independence between the two processes. If only one holds true, we can conclude that there is local dependence. If none of these holds true we have a stochastic dependence between the two processes. The following test statistic, for example, can be used for the first hypothesis:

$$U(t) = (h_{01}(t) - h_{21}(t))/\left(\frac{h_{01}(t)}{N_0(t) - 1/2 \sum_i n_{0i}(t)} + \frac{h_{21}(t)}{N_2(t) - 1/2(n_{21}(t) - n_{02}(t))}\right)^{1/2} \quad (5)$$

and the cumulative:

$$U = \frac{1}{\sqrt{n}} \sum_{t=t_0}^{t=t_0+n} U(t) \quad (6)$$

which is asymptotically normal $N(0,1)$, when the equality holds. The multivariate case may be formalized in a similar way (Courgeau & Lelièvre, 1988).

B. SEMIPARAMETRIC METHODS OF ANALYSIS

Fully parametric models are developed elsewhere in this book (Palloni & Sørensen). As these parametric regression models involve very strong distributional assumptions, it may be useful to consider only partially parametric models

involving an unspecified factor in the form of the previous instantaneous transition rates.

In the previous example, we can introduce a model using proportional hazards for the two rates we want to compare, h_{01} and h_{21}. Let Z be a row vector of explanatory variables:

$$Z = (Z_1, \ldots, Z_r, \ldots, Z_s)$$

with r basic time independent variables and (s-r) variables depending on the second state reached at time u. These last variables are thence time dependent.

Under the hypothesis that the individual behavior will depend only on age and not on the time the previous event occurred, we can write the following rates:

$$h_{01}(t; Z, \beta_1) = h_0(t) \exp(Z\beta_1) \quad (7)$$

$$h_{21}(t; u, Z, \beta'_2) = h_2(t) \exp(Z\beta'_2) \quad (8)$$

where β_1 and β'_2 are two column vectors of estimated regression parameters, $h_0(t)$ and $h_2(t)$ are two unspecified base-line hazard functions. Under the hypothesis that these two hazard functions are proportional, we can write the two previous rates under a more concise formulation (Crowley & Hu, 1977):

$$h(t; u, Z, \beta_1, \beta_2) = h(t) \exp[Z\beta_1 + H(t - u)(\beta_0 + Z\beta_2)] \quad (9)$$

where $H(t - u)$ is the Heaviside function. The parameters β_0, β_1, β_2, as well as their covariance matrix, can be estimated by partial likelihood methods (Cox, 1972; Kalbfleisch & Prentice, 1980).

Some constraints on the parameter values may be desirable or necessary. A first constraint can be used to force the (s-r) last parameters in the vector β_1 to be zero. As the variables corresponding to these parameters depend on the state reached at time u, they do not need to operate before this time. For example, when studying the risk of migration from metropolitan areas, conditioned on marriage, we may be interested in the effects of spouse characteristics. These variables will play a role only where an individual has entered the marital state.

Some of the first r parameters in vector β_2 may also be constrained to zero. In this case, the corresponding variables are considered as acting independently of the state of the individual. For example, some variables related to migration may be assumed to operate independently of marital status. Thus, the model is flexible enough to cover different kinds of interaction among demographic phenomena.

VII. Analysis Results

The previous chapter gave us the opportunity to review a variety of methods applicable to the use of longitudinal data to study the interaction of migration, family, and career events. We have also suggested a variety of moves to be

considered if we want to study the complex interactions between different kinds of migrations and the family or career life cycle.

We shall not try here to carry out a comprehensive study of all these aspects, as this goes beyond the scope of this chapter; we will, however, try to highlight some interesting aspects of the migration process. At the same time, we will demonstrate with a few examples why the life-course approach makes greater sense than prior, especially cross-sectional, approaches.

Let us first focus on the problem of urbanization, which takes place through rural–urban migration. In France this process has led to the contrast between the more modern and urbanized regions, namely areas of Paris, Lyon, and Marseilles, and the rest of the country (Tugault, 1975). We define here the area of origin as the province[2] where the individual lives at age 14. Only the first migration into or out of a metropolitan area, followed by a stay of 3 years or more, is taken into account for this analysis. We wish to answer the following questions: (a) Does migration to or from major metropolitan areas affect the migrant's family constitution process? (b) Does the constitution of a family affect migration to or from major metropolitan areas?

To answer these questions we can use the nonparametric and the semiparametric approaches presented above. Table I contains the definitions of the different variables that are used in this analysis.

Some of these variables are coded differently depending on the sex of the respondent and on the family event studied. This choice was made on the basis of previous research (Desplanques, 1985; Roussel, 1975) or preliminary research by ourselves. Such a coding was used to reduce the number of parameters to be estimated.

A. MARRIAGE AND MIGRATION TO OR FROM METROPOLITAN AREAS

We now examine the association between marriage and migration between metropolitan and nonmetropolitan areas employing the bivariate nonparametric model presented above. This analysis is also used to illustrate how an event history approach avoids some of the drawbacks of cross-sectional analysis.

Women's Marriage According to Their Migratory Status. Figure 2 gives the cumulative hazard rates of nuptiality for women from metropolitan or nonmetropolitan areas, whether or not they experienced a move. We have not given the rates for simultaneous events, as they constitute only 3.8% of the observed marriages.

[2]The following provinces are considered here as metropolitan: Seine, the ring of provinces forming the previous Seine-et-Oise, Rhône, Bouches-du-Rhône, Alpes-Maritimes, Var.

TABLE I

Measures of Variables to Study Urbanisation and Family Constitution

Variables		Indicator for the study of			
		nuptuality			
		males	females		female fertility
Education	—without diploma	0	0		0
	—Certificate at the end of the elementary cycle	1	0		1
	—School Certificate	2	1		3
	—general Certificate of Education or more	2	2		2
Elder		1	1		1
Not Elder		0	0		0
Number of sibs		their number	their number		their number
Parents' residence during childhood	—major metropolitan areas	1	1		1
	—other places	0	0		0
Nationality	—foreigner or naturalized	1	1		1
	—born French	0	0		0
Father farmer		1	1		1
Father not farmer		0	0		0
				wives	husbands
First professional occupation	—never worked	0	0	0	0
	—farmer or farm labourer	0	1	1	0
	—unskilled workers	1	2	2	1
	—skilled workers, executives in industry & commerce, managerial staff	2	3	3	2
	—assistant managers, other staff employees	2	3	4	3
Tenant or lodged by employer		1	1		1
Homeowner or lodged by parents		0	0		0

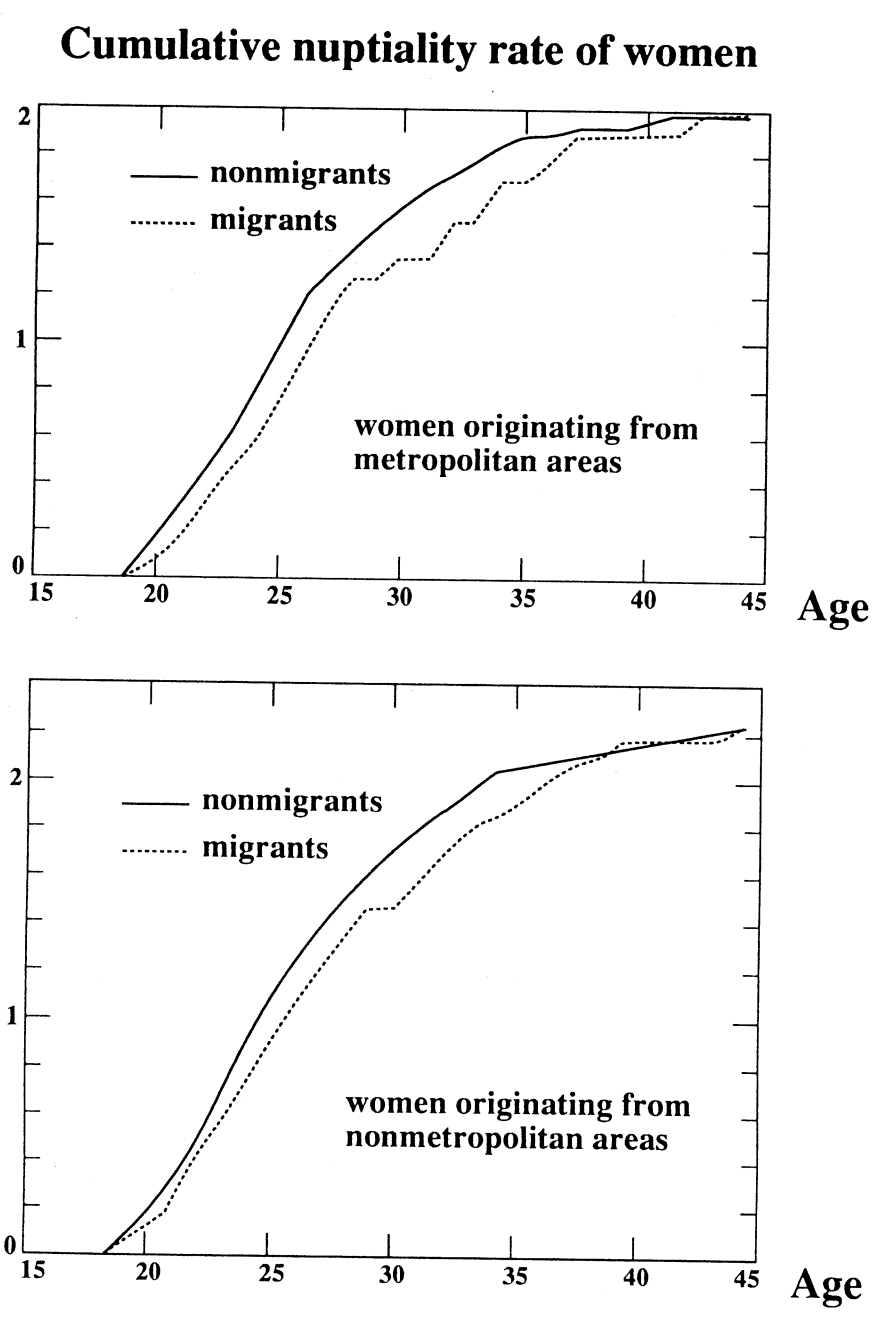

Fig. 2. Cumulative nuptiality rates for nonmigrant and migrant women originating from nonmetropolitan or metropolitan areas (nonparametric maximum likelihood: models (3) and (4). From Courgeau (1987).

For women from either place of origin, a short delay in marriage due to migration appears between 20–30 years-of-age, but this is recovered after age 40. Regardless of whether they migrate, the proportion remaining single at age 40 is 8% for women from nonmetropolitan areas and 12% for others. These results indicate a local independence of marriage on migration to or from metropolitan areas. The slight drop in nuptiality attributable to migration is only temporary and appears to be recovered later.

These results confirm some previous cross-sectional results obtained from census data. We knew already that women who at the time of the census live in metropolitan areas marry later and remain more frequently single than women living in nonmetropolitan areas (Roussel, 1975). For the generations born between 1919 and 1923, the proportion remaining single is 11% in the metropolitan area of Paris and only 8% in nonmetropolitan areas. However, only longitudinal surveys can give information on their marital behavior after migration.

Men's Marriage According to Their Migratory Status. Figure 3 depicts the cumulative nuptiality rates for men. Again, we have not provided the rates for simultaneous events as they represent only 2.1% of men's marriages.

The results appear to be quite different from those obtained for women. For men who originate in metropolitan areas, migrants have a higher nuptiality rate than nonmigrants for ages greater than 25. For men who originate in nonmetropolitan areas, migrants have higher rates of nuptiality after age 30.

For men originating in nonmetropolitan areas, this behavior may be a result of the behavior of agricultural workers who undertake labor mobility. In another paper (Courgeau & Lelièvre, 1986) we have presented evidence for this behavior. Men remaining in the agricultural sector have a very low nuptiality rate compared with those leaving. We know already from census data that a high proportion of men living in rural areas remain single. For the generations born between 1919 and 1923, the proportion remaining single in rural areas is 16%. Unlike this analysis, the census does not show the huge increase in nuptiality for those who migrate from rural areas.

This differential behavior by sex may be explained by different constraints. First, we know that the probability for a woman from a nonagricultural household to marry a farmer is very low (Roussel, 1975). Thus, a farmer will have to find his wife in the agricultural sector. But in this sector, the ratio of the number of men aged 25–29 to the number of women aged 20–24 is very high (135 men per 100 females in 1962). These conditions also explain the low nuptiality of men remaining in the agricultural sector and the higher nuptiality for the corresponding women. The men who leave this sector recover the nuptiality level of those living outside of rural areas. Again, only longitudinal surveys can give us this information.

It is necessary to introduce more precise information on occupation to verify if

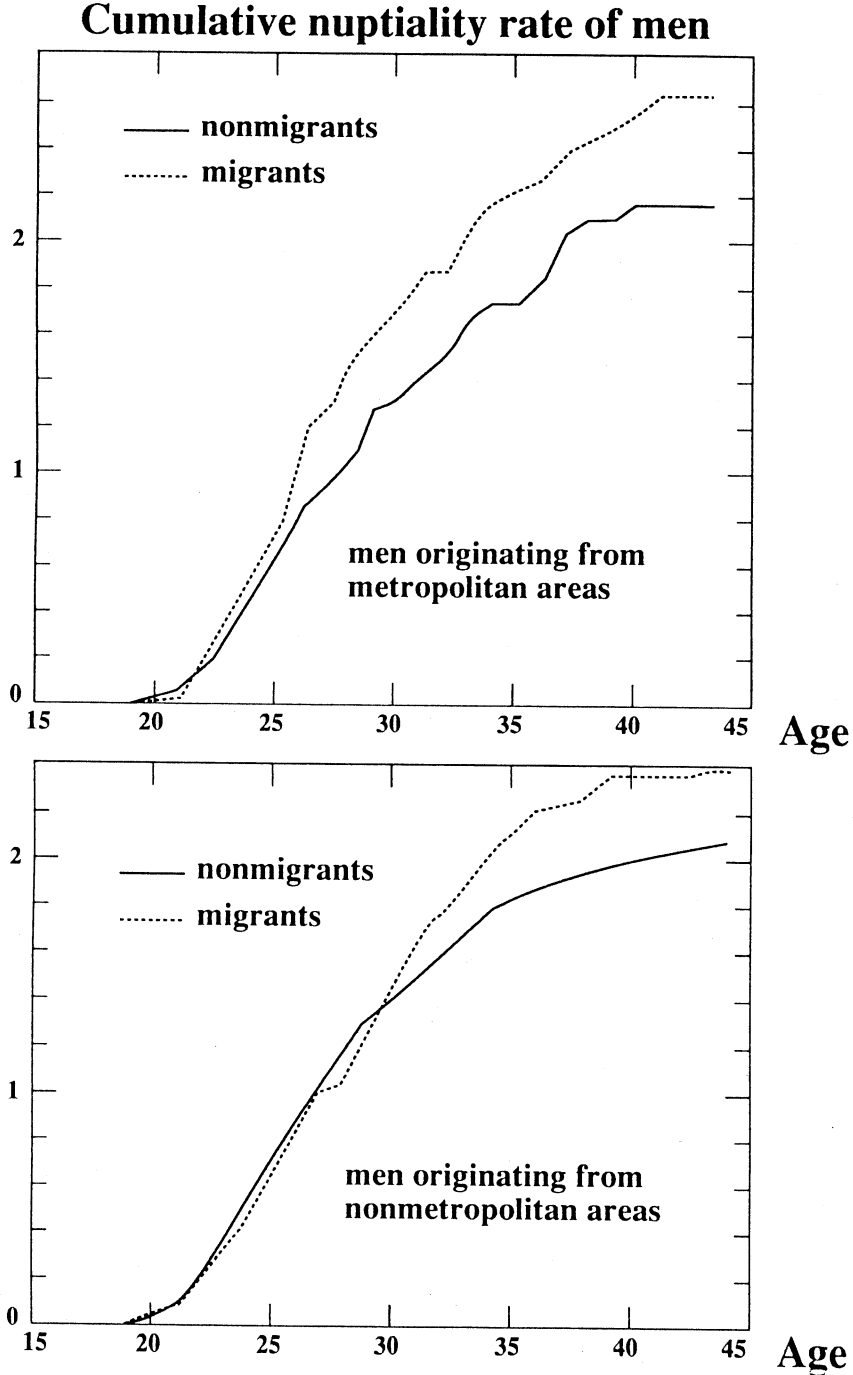

Fig. 3. Cumulative nuptiality rates for nonmigrant and migrant men originating from nonmetropolitan or metropolitan areas (nonparametric maximum likelihood: models (3) and (4)). From Courgeau (1987).

this explanation holds true for migration to metropolitan areas. This is done later with the semiparametric model.

For men who migrate from metropolitan areas, we know that their migration is not directed to rural areas but mainly to small or medium-sized towns (Courgeau, 1979). We can observe, from census data, that the proportion who never married is the lowest in small or medium-sized towns. For the generations born between 1919 and 1923, the proportion of men remaining single is around 7% in these areas. Therefore, the observed increase in nuptiality for migrants from metropolitan areas may be a result of adaptation to the marital patterns in these areas.

Migration to Metropolitan Areas According to Marital Status. Let us now examine how marriage modifies migration. Figure 4 gives the cumulative hazard migration rates according to marital status of men and women from nonmetropolitan areas. Simultaneities are again excluded.

The behavior for men and women is similar. Once married, mobility to metropolitan areas is halved for women and reduced by 1.5 for men. Marital status appears to have a strong effect on the migration process. Single individuals in particular are drawn to urban areas.

Because the occurrence of marriage for women was almost unrelated to their migration to metropolitan areas we can say that the relationship between migration and nuptiality is one-sided. We are close to establishing a causal relationship, even if this may not be possible in a strict philosophical sense (Aalen et al., 1980). For men, however, we have stochastic dependence between the two processes: Marriage has an influence on their migration to metropolitan areas, while migration to metropolitan areas has an influence on marriage.

Although it was possible to link the longitudinal effects of migration on nuptiality with findings from census data, this cannot be done with the longitudinal effect of nuptiality on migration. For example, the higher mobility for married individuals, which is observed in census data (see above), is no longer apparent when we observe the related timing of each event. In fact, the longitudinal results clearly indicate that married persons have a lower age-specific migration rate than those who are single. In this case longitudinal analysis provides interesting results which were impossible to obtain from a cross-sectional approach.

Up to this point we have excluded simultaneous events. For migrations, however, the incidence of simultaneous events is not negligible. For men, they occur in 11% of their migrations and for women in 23%. If we assume that migration rates of individuals on the verge of marrying are similar to migration rates of those already married, we can include the simultaneous events in the migrations of married people. Figure 4 gives also these rates. We observe that simultaneous cases occur mainly for young people under 26. The allocation of these simultaneities results in similar migration rates for married and unmarried individuals

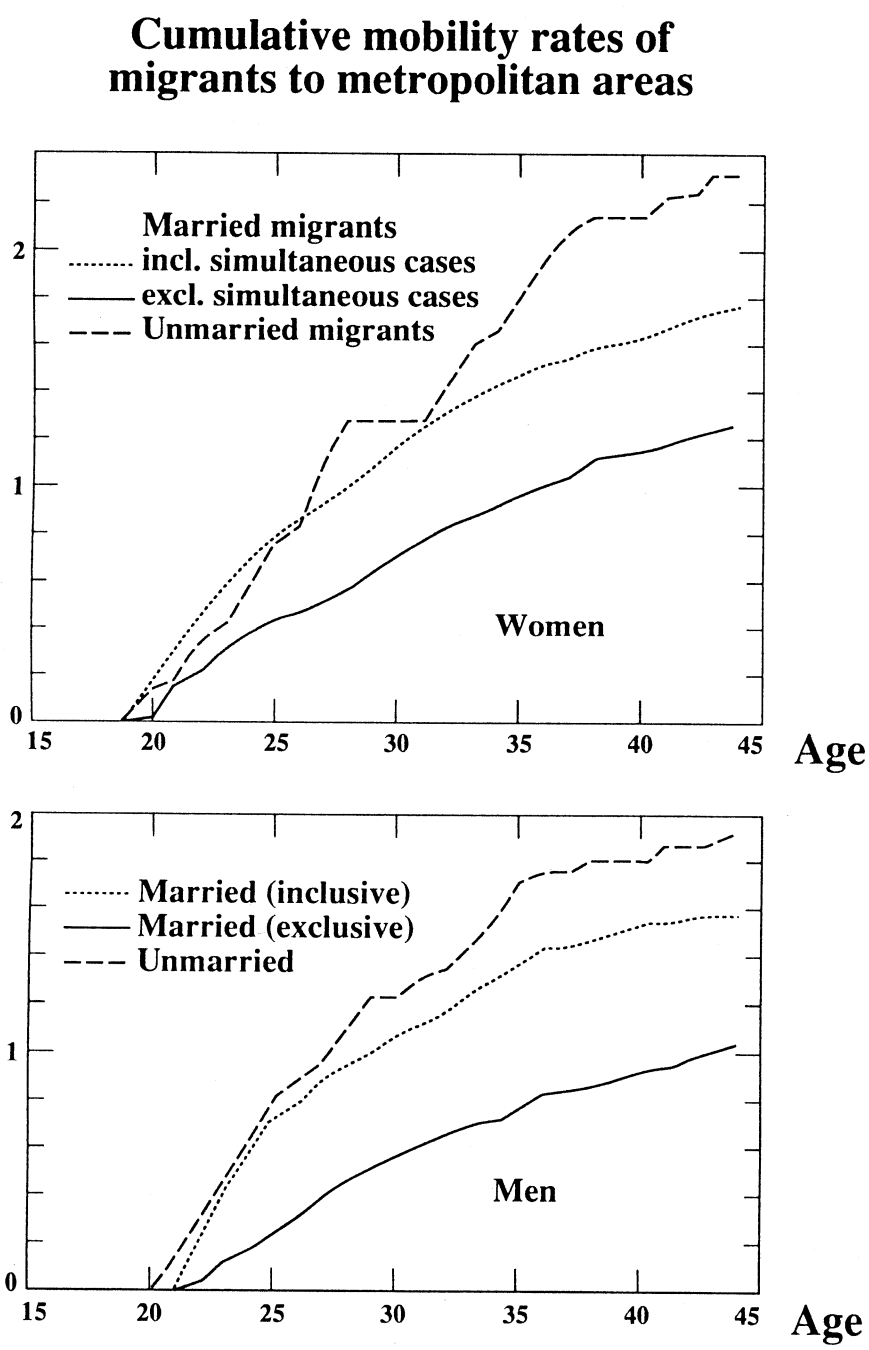

Fig. 4. Cumulative mobility to metropolitan areas of unmarried and married men and women (excluding or including simultaneous cases) (nonparametric maximum likelihood: models (3) and (4)). From Courgeau (1987).

at young ages. At later ages the number of simultaneous cases becomes smaller, leading to a reduction of mobility rates once married. The rates at older ages are nearly the same as those observed when simultaneities are excluded.

We do not consider the results corresponding to the migrations from metropolitan areas, as the number of observed events is too small to provide significant results.

B. INTRODUCTION OF FAMILY AND CAREER VARIABLES

Let us now examine the effects of a number of different individual characteristics on these rates. We use here a semiparametric model as presented earlier.

We introduce several variables describing family origins, education, and professional occupation. Some of these variables are not time-dependent, such as number of siblings, parents' residence during childhood, education, and first professional occupation; however, their effects may vary depending upon the marital or migratory states of the individual. For these variables we estimate the previous parameters β_1, before marriage or migration, and β_2, after the occurrence of one of these events. Some of the other variables in the analysis are time-dependent. Migratory status is treated as time-dependent when the transition rate for marriage is analyzed. Other time-dependent variables, such as professional occupation and tenancy, come into play after a migration has taken place. Thus, since we need not consider the effect of these variables prior to a migration, we set their parameter β_1 to zero. We then estimate the parameters in β_2 for these variables. In a similar fashion, when migration transitions are analyzed, marriage is treated as a time-dependent covariate, while other time-dependent covariates come into play after a marriage has taken place. Notice that unlike analysis with census data, which measured covariates at the end of the observed time interval, covariates are measured before the event of interest.

Marriage of Men and Women from Nonmetropolitan Areas Revisited. Table II analyzes the hazard nuptiality rates for men and women originating in nonmetropolitan areas. We distinguish here between two cohorts, those born between 1911 and 1925, and those born between 1926 and 1931.

Rather than giving a detailed description of this table and those following (Courgeau, 1987), we highlight some of the more striking results. In particular, we verify the previous hypothesis which was made to explain the increase in men's nuptiality after their departure from the nonmetropolitan sector.

Prior to departure from nonmetropolitan areas, the main educational and occupation effects differ depending on sex. For men, the more educated and the higher the status of their professional occupation, the more likely they will be to find a wife. For women, the more educated and the higher the status of their professional occupation, the less likely they will be to find a husband. These

TABLE II

Marriage of Men and Women Coming from Nonmetropolitan Areas Perturbed by Departure to Major Metropolitan Areas (Partial Likelihood: Model (9))

	Cohort born in 1911–1925						Cohort born in 1926–1935					
	Variables fitted separately			Variables fitted simultaneously			Variables fitted separately			Variables fitted simultaneously		
	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2
Variables	MEN											
Departure to major metro areas		0.115			0.271			0.133			0.079	
Education	0.112**	0.252	−0.160	0.085**		−0.163	0.126**	−0.167	0.283*	0.049		0.461**
Elder	0.107*	0.247*	−0.318*	0.076		−0.364*	−0.129*	0.172	−0.098	−0.167**		−0.001
Number of sibs	−0.010	−0.027	0.048				0.003	0.200	−0.021			
Childhood in urban areas	0.137	0.030	0.362				0.083	0.166	−0.237			
Foreigner or naturalized	−0.163*	0.086	0.346				0.075	0.139	−0.072			
Father farmer	0.240**	−0.072	0.214	0.227**		0.517*	0.293*	0.388**	−0.435**	0.157*		−0.250
First professional occupation	0.091**	0.315*	−0.210*	0.022		−0.217	0.232**	0.307*	−0.257**	0.170**		−0.322**
Tenant at departure		0.699	−0.673**					0.059	0.088			
Professional occupation at departure		0.168	−0.048					0.205	−0.065			
Maximum log likelihood	−5152.30 (father farmer)			−5148.65			−4115.44 (first prof. occupation)			−4109.09		
Variables	WOMEN											
Departure to major metro areas		−0.083			−0.158			0.051			0.478**	
Education	−0.339**	−0.038	−0.071	−0.306**		−0.173	−0.231**	0.023	0.119	−0.218**		0.270
Elder	0.043	−0.263*	0.263**	0.094*		0.777**	−0.021	0.205	−0.512**	0.043		−0.500*
Number of sibs	0.017*	0.097	−0.051				0.005	−0.221	0.071*			
Childhood in urban areas	−0.031	−0.017	−0.582				−0.063	0.035	0.199			
Foreigner or naturalized	−0.031	−0.720**	0.548**				−0.066	0.033	0.182			
Father farmer	−0.118**	0.051	−0.186	−0.017		−0.310	0.069	0.196	−0.230	0.155**		−0.188
First professional occupation	−0.107**	−0.136	0.034	−0.059**		0.105	−0.071**	0.267	−0.133	−0.050*		−0.147
Tenant at departure		−0.162	0.096					0.664	−0.639			
Professional occupation at departure		0.006	−0.078					−0.045	0.082			
Maximum log likelihood	−7616.56 (education)			−7608.56			−4564.76 (education)			−4559.72		

*Significant at 10 per cent level.
**Signficant at 5 per cent level.
Sources: Courgeau, 1987.

β_1 Main effect
β_0 Perturbation
β_2 Interaction

contrasting effects remain even when the variables are fitted simultaneously. Controlling for education, the effects of professional occupation remain, and vice versa. This result confirms the results obtained from cross-sectional census data (Calot & Deville, 1971).

After departure to metropolitan areas, the results for men change somewhat. As already noted, the rate at which men marry depends on first professional occupation. Agricultural workers marry less frequently and later than unskilled workers, who in turn marry less frequently than men employed in higher-level occupations. After their migration, this effect no longer holds. While the nuptiality rates of men in the two last categories (unskilled workers and men employed in higher-level occupation) remain nearly at the same level, the nuptiality rate of men who were previously farmers is multiplied by approximatively by 1.35 for the two observed cohorts (exp(0.315) for the cohort born in 1911–1925, exp(0.307) for the cohort born in 1926–1935). Thus, the previous hypothesis that the increase in nuptiality for men migrating to metropolitan areas was mainly due to the behavior of farmers is perfectly verified.

Marriage of Men and Women from Metropolitan Areas Revisited. Table III analyzes the hazard nuptiality rates for men and women from metropolitan areas. Given the size of this population we cannot distinguish here between different cohort groups.

First, let us examine marital behavior before departure from metropolitan areas. Even if the results are not entirely significant, due to the small number of cases, the effects of the main variables have opposite signs depending on gender. However, marital behavior for each sex is quite similar to the behavior for individuals originating in nonmetropolitan areas.

Having migrated to nonmetropolitan areas, women's behavior remains unchanged. For men, some changes occur that explain the increase in their nuptiality after migration. First we observed that, unlike migratory behavior from nonmetropolitan areas, these changes in nuptiality are not related to occupation. The effect of the first professional occupation before departure is similar to the effect of professional occupation just after departure. The change in nuptiality after migration is mainly a function of whether the father was a farmer, and whether the man was of foreign origin. First, the men whose fathers were farmers show a significant increase in their nuptiality after moving to nonmetropolitan areas. This migration is not related to an agricultural activity, but to a return to a place where many links may have been maintained, and where circumstances are more conducive to finding a wife quickly.

A second category of individuals, foreigners, also shows a significant increase in nuptiality rate after moving to nonmetropolitan areas. We know that foreigners are attracted to metropolitan areas where they can find unskilled work more easily, work not attractive to French workers. As housing is very expensive in

TABLE III

Marriage of Men and Women Coming from Major Metropolitan Areas Perturbed by Departure to Nonmetropolitan Areas, Migration to Nonmetropolitan Areas Perturbed by Marriage (Partial Likelihood: Model (9))

	MEN						WOMEN					
	Variables fitted separately			Variables fitted simultaneously			Variables fitted separately			Variables fitted simultaneously		
Variables	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2
	Marriage perturbed by departure to nonmentropolitan areas											
Departure to nonmetro areas		0.400**			−0.131			0.085			0.179	
Education	0.023	0.345*	0.039	−0.040		0.036	−0.340**	0.140	0.064	−0.342**		−0.055
Elder	0.068	0.403**	−0.013	0.054		0.090	−0.007	0.033	0.111	0.074		0.235
Number of sibs	−0.032	0.394**	0.000	—		—	0.024	0.175	−0.035	—		—
Childhood in urban areas	0.009	0.387**	0.030	—		—	0.071	0.192	−0.227	—		—
Foreigner or naturalized	−0.528**	0.401**	−0.138	—		—	0.257	0.076	0.155	—		—
Father farmer	0.180	−0.157	0.666*	0.068		1.031**	0.134	0.219	−0.155	0.257*		−0.312
First professional occupation	0.122*	0.481**	−0.068	0.126		−0.343*	−0.090**	0.029	0.022	−0.043		0.107
Tenant at departure		0.443**	−0.050			—		−0.218	0.512*	—		—
Professional occupation at departure		0.187	0.202*			—		0.142	−0.034	—		—
Maximum log likelihood	−1629.41 (foreigner or naturalized)			−1627.84			−2179.50 (education)			−2177.31		

*Significant at 10 per cent level.
**Significant at 5 per cent level.
Sources: Courgeau, 1987.

β_1 Main effect
β_0 Perturbation
β_2 Interaction

these areas they often live in rented rooms shared with several other male foreigners. In these areas, marriage is delayed until they have accumulated enough money to settle in an apartment. Another solution would be to find work in nonmetropolitan areas where they can find cheaper housing and marry more easily. Such behavior explains the observed increase in nuptiality after migration.

It can now be seen that the life course approach has not only permitted us to distinguish categories of the population which exhibit different marital behaviors, but also enabled us to better understand how migration affects marital behavior.

Migration to Metropolitan Areas According to Marital Status Revisited. Let us now examine how marriage and a number of other variables influence the departure to metropolitan areas. Table IV analyzes the hazard migration rates for men and women from nonmetropolitan areas.

We can see first, from the perturbation factor, the important inhibiting effect which marriage has on the rate of migration. As observed in the analysis, this effect is stronger for women than for men. Prior to marriage we detect two main determinants for leaving nonmetropolitan areas: family and profession. These may be interacting determinants. The family determinants are influenced by the parents as well as by siblings. Having a father who is a farmer constitutes a significant motive to leave nonmetropolitan areas. For the observed cohorts, such a father will remain at the head of his farm usually until his death, with his children working as farm laborers. Such a situation may lead some offspring to try and find employment in metropolitan areas. It appears that this solution is often chosen.

For women, the number of siblings may be another incentive to move to metropolitan areas. For men, such an incentive does not play a role before marriage, but only after it. Even for those men born from 1911–1925, the larger their family the more likely it is that they will remain in nonmetropolitan areas before marriage. This contrasting behavior may partially explain the sex ratio previously observed in rural areas (135 males per 100 females in 1962) and the corresponding problem, for men remaining in the farm sector, of finding a wife.

Finally, men and women who have spent some time during their childhood in metropolitan areas are more likely to return later to metropolitan areas. It is easier to return to a familiar place than to undertake a migration to an unknown area.

What about the effects of education and profession? For both men and women the higher their level of education, the greater the attraction of metropolitan areas. The extreme concentration of universities, banks, central administration, and industries in these areas would explain this. For men only, the higher their professional level, the more likely they are to migrate to metropolitan areas. For

TABLE IV

Migration to Major Metropolitan Areas Perturbed by Marriage (Partial Likelihood: Model (9))

	Cohort born in 1911–1925						Cohort born in 1926–1935					
	Variables fitted separately			Variables fitted simultaneously			Variables fitted separately			Variables fitted simultaneously		
	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2
Variables	MEN											
Marriage		−0.449**			−1.977**			−0.732**			−2.030**	
Education	0.708**	−0.529**	0.029	0.500**		0.027	0.369**	−0.891**	0.103	0.274**		0.034
Elder	0.347**	−0.289	−0.429*	—		—	−0.070	−0.729**	−0.017	—		—
Number of sibs	−0.067**	−0.696**	0.078*	−0.025		0.073	0.001	−1.125**	0.106**	0.027		0.108**
Childhood in urban areas	−(1)	−(1)	−(1)	—		—	1.769**	−0.599**	−1.297**	1.983**		−1.796**
Foreigner or naturalized	−0.133	−0.638**	1.486**	0.089		1.507**	1.079**	−0.907**	0.497*	1.321**		−0.015
Father farmer	0.573**	−1.292**	0.938**	0.001		0.955**	0.326*	−0.888**	0.164	0.151		0.767**
First professional occupation	0.592**	−0.769**	0.222	0.370**		0.002	0.332**	−0.730**	−0.096	0.200		−0.128
Spouse's diploma		−0.612**	0.750**			0.275*		−0.909**	0.572**			0.440**
Spouse born in foreign country		−0.564**	1.031**			0.341		−0.941**	1.166**			0.777**
Spouse born in urban areas		−0.580**	1.443**			1.217		−0.884**	1.959**			1.866**
Spouse in urban areas before marriage		−(1)	−(1)					−0.870**	1.714**			—
Spouse's professional occupation		−0.739**	0.213**					−0.799**	0.045			—
Professional occupation after marriage		−1.016**	0.490**					−0.567**	−0.167			—
Tenant after marriage		−0.747**	0.438**					−0.709**	−0.034			—
Maximum log likelihood	−1137.54 (first profes. occupation)			−1106.37			−975.94 (foreigner or naturalized)			−931.84		

TABLE IV

(Continued)

Variables	Cohort born in 1911–1925						Cohort born in 1926–1935					
	Variables fitted separately			Variables fitted simultaneously			Variables fitted separately			Variables fitted simultaneously		
	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2	β_1	β_0	β_2
	WOMEN											
Marriage		−1.000**			−1.717**			−0.999**			−2.520**	
Education	0.200**	−1.058**	0.404**	0.255**		0.111	0.126	−1.057**	0.271	0.175		−0.153
Elder	−0.190	−1.035**	0.085	—		—	−0.248	−1.104**	0.291	—		—
Number of sibs	0.065**	−0.864**	−0.046	0.075**		−0.016	0.065**	−0.871**	−0.036	0.064**		−0.003
Childhood in urban areas	1.158**	−1.009**	0.085	1.168**		−0.370	0.661**	−1.003**	0.149	0.682**		0.257
Foreigner or naturalized	0.685**	−1.344**	0.305	0.624**		0.002	0.265	−1.256**	1.359**	0.234		0.872**
Father farmer	0.505**	−1.423**	0.622**	0.468**		0.332	0.140	−1.415**	0.561**	0.208		0.239
First professional occupation	−0.012	−1.446**	0.287**	−0.100		0.151	−0.061	−1.512**	0.308**	−0.114		0.217*
Spouse's diploma		−1.384**	0.464**			0.183*		−1.576**	0.564**			0.506**
Spouse born in foreign country		−1.095**	0.838**			0.679**		−1.264**	1.413**			1.115**
Spouse born in urban areas		−1.146**	1.759**			1.550**		−1.124**	1.444**			1.474**
Spouse in urban areas before marriage		−1.195**	1.894**			—		−1.184**	1.989**			—
Spouse's professional occupation		−1.034**	0.034			—		−1.105**	0.099			—
Professional occupation after marriage		−1.234**	0.166**			—		−1.191**	0.126			—
Tenant after marriage		−1.532**	0.764**					−1.173**	0.253			
Maximum log likelihood	−1712.18 (education)			−1646.99			−1075.47 (foreigner or naturalized)			−1051.24		

*Significant at 10 per cent level.
**Signficant at 5 per cent level.
(1) Nonconvergence of the model. Model (9)

β_1 Main effect
β_0 Perturbation
β_2 Interaction

Sources: Courgeau, 1987.

women, professional level does not play a large role before marriage, but only after it. These results show that men are attracted to metropolitan areas mainly to take advantage of their education or their professional resources. Women migrate to metropolitan areas with a view to changing their way of life rather than to taking advantage of professional resources.

After marriage, some of these family and professional determinants are strengthened while others are reduced. Also, some new incentives come into play. However, none of these determinants can explain the significant drop in a migration to metropolitan areas after marriage.

Let us first examine family determinants. Once married, the reasons for leaving nonmetropolitan areas become more of an incentive when the father is a farmer. A breaking away from agriculture is confirmed by marriage. For men, the number of siblings becomes an incentive to move to metropolitan areas. Finally, if the spouse lived in a metropolitan area before marriage, this will increase the probability that the married couple will move.

Turning to the professional and educational determinants, the effect of education is slightly increased after marriage and, additionally, the spouse's education has an effect in the same direction. The spouse's first professional occupation also has a positive effect on the couple's migration to metropolitan areas. As individuals tend to marry into the same social class, a couple's migration behavior appears to exhibit patterns similar to their behavior before marriage. Lastly, for men as for women, the spouse's professional characteristics fall into the same pattern as those of the interviewee's, thus strengthening the effect of professional characteristics when they are the same for each of the partners.

It appears that professional and educational variables operate in a similar pattern before and after marriage. However, the most significant aspect of these results is the strong negative effect that marriage has on migration to metropolitan areas. Regardless of profession, if individuals in a nonmetropolitan area get married, their mobility rate is substantially reduced.

This example also shows how the semiparametric model allows us to introduce numerous variables and complex interactions between different aspects of the life cycle. These findings remain significant even when the different variables are introduced simultaneously.

C. FERTILITY AND MIGRATION TO OR FROM METROPOLITAN AREAS

Again, we do not follow the complete analysis of interactions between fertility and migration, but present here some examples that demonstrate the potential of the life-course approach.

Turning to the family life cycle, we now consider the relationship between successive births and migrations to or from major metropolitan areas. Here, we

examine only the female population, leaving aside the males, whose behavior is very similar, but less clearly related to age.

Figures 5 and 6 give the birth order-specific fertility rates (second and third order) of women originating in nonmetropolitan and metropolitan areas.

The contrast between these two series of graphs is striking. Looking at the second birth, women coming from nonmetropolitan areas show a very significant decrease in fertility when they migrate to metropolitan areas. After migration their fertility is similar to fertility rates in metropolitan areas. One explanation of such a reduction in fertility may be found in the very high price of housing in metropolitan areas. Also, many women living in metropolitan areas need to work and may commute long distances. This leaves them little time to attend to a large family.

Cumulative order-specific fertility rates: nonmetropolitan

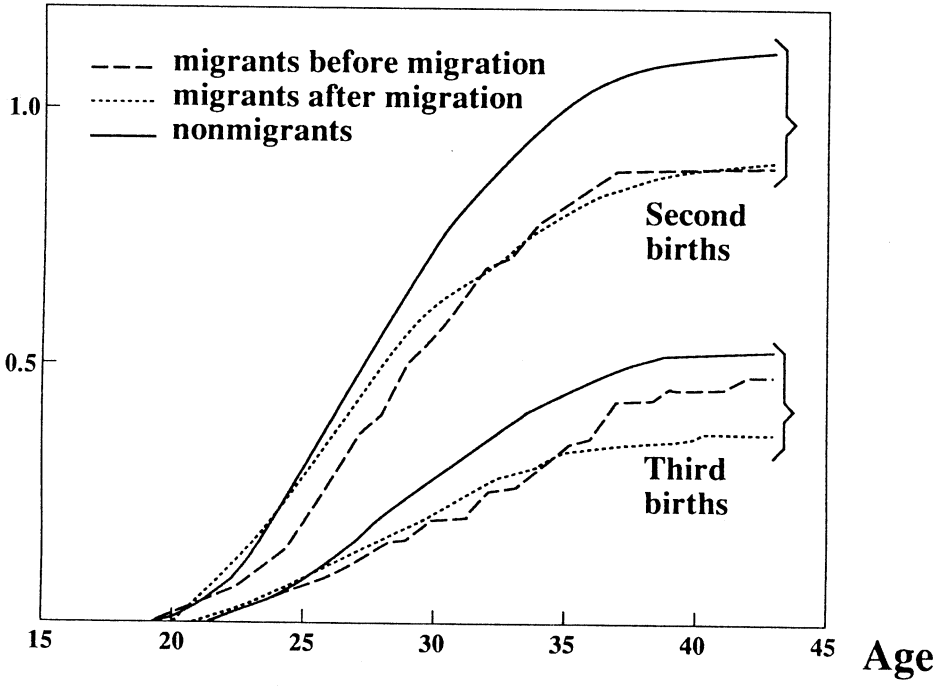

Fig. 5. Cumulative order-specific fertility rates for nonmigrant, migrant before migration and migrant after migration, women originating from nonmetropolitan areas (nonparametric maximum likelihood: models (3) and (4)). From Courgeau (1987).

Cumulative order-specific fertility rates: metropolitan

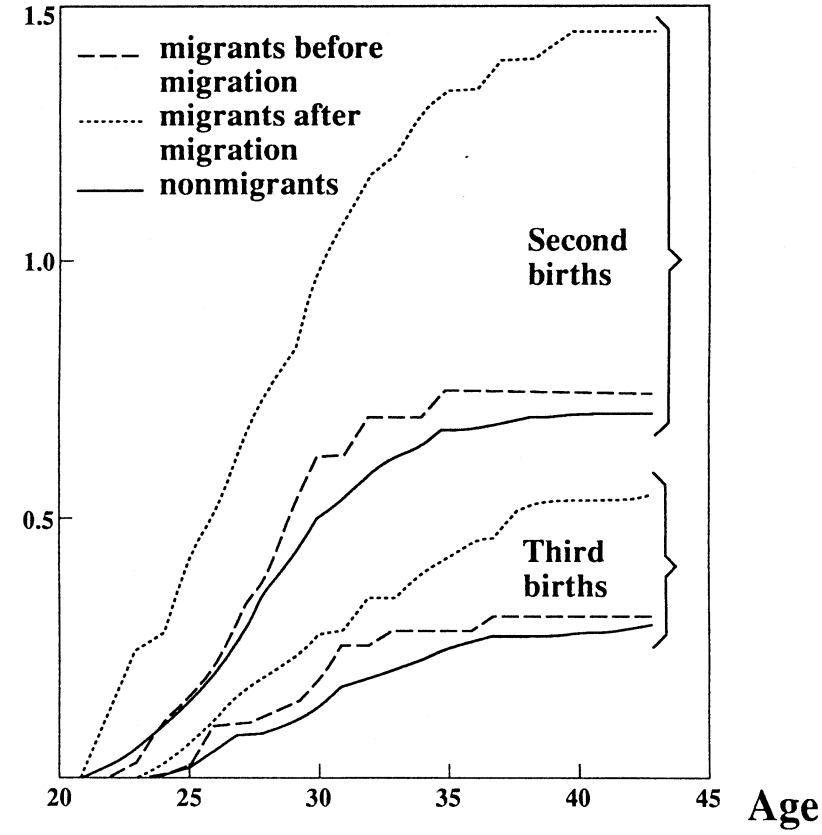

Fig. 6. Cumulative order-specific fertility rates for nonmigrant, migrant before migration and migrant after migration, women originating from metropolitan areas (nonparametric maximum likelihood: models (3) and (4)). From Courgeau (1987).

On the one hand, even for the first birth,[3] the women migrating to nonmetropolitan areas experience a significant increase in their fertility rate once they leave metropolitan areas. On the other hand, for the third birth their fertility is on the same level with nonmetropolitan fertility, and for the first and the

[3]To make this figure clearer we have not put here the first order fertility rates. They lead to a cumulative fertility to 44-years-old of 1.43 for nonmigrants and 2.04 for migrants.

second birth it is on a higher level. In this case, the previous explanation may be used in the reverse way.

It should be noted that migrants may not constitute a random sample of the population at their place of origin. The selectivity hypothesis suggests that migrants have distinct unobserved preferences for family size "such that it is fertility propensities which determine the choice of destination areas, rather than the choice of the area which determines fertility behavior" (Hervitz, 1985).

To verify if this hypothesis holds, we have also given in Figs. 5 and 6 the cumulative order-specific fertility rates of these future migrants. For example, to verify the selectivity hypothesis, it is necessary to observe the behavior of women before and after migration, and compare their behavior to nonmigrants. We can see that the fertility behavior of those who will later migrate to major metropolitan areas (414 women) differs from those who do not migrate. Their birth timing is generally very close to that of those who migrate.

However, for those who will later migrate to nonmetropolitan areas (144 women), such a selection hypothesis is not verified. Their birth timing is very close to that of the nonmigrant, without any apparent selection. An adaptation hypothesis holds true for these last migrants. Before migration, they have a fertility rate similar to that of women who remain in metropolitan areas. After migration they have higher fertility. The way of living in nonmetropolitan areas permits this increase in fertility.

These results show some new possibilities of the life-course approach. As we follow the lives of the individuals, we are able to detect evidence of some behavioral aspects undetectable by other approaches.

VIII. Discussion Leading to Future Research Direction

In the previous section we have given some examples of the complex interrelations between spatial mobility and the family and career life cycle. Such analyses lead us to the important conclusion that migration must no longer be considered as being independent of the other relational systems. It is not a phenomenon which can be investigated and understood by itself as a dependent variable, but must be viewed as an integral part of a more general process leading to sociocultural change. Bivariate or multivariate methods of analysis are in this case a very useful and powerful tool. Such an analysis, however, is only in its infancy, and even if the first results are very encouraging, we have to discuss in what direction we should be moving.

We examined in this chapter moves to and from metropolitan areas. In other papers we have examined the relationship between other types of moves and the family and career life cycle: change of dwelling (Courgeau, 1985a), change of province (Courgeau, 1985b) and moves from the agricultural sector (Courgeau & Lelièvre, 1986). We have been able to detect that some types of moves are related more closely to the family life cycle and others to the career cycle. For example, when comparing changes in dwelling and changes in province, we found that the first kind of move is closely related to the family life cycle, whereas the second one is only slightly influenced by it and mainly explained by economic characteristics. On the other hand, migration to modern urbanized areas appeared to be related both to the individual's position in his family life cycle and to the stage reached in his career development.

These first results show the complexity of the physical, but also the social space within which we live. We are just beginning to realize how little we observe the continuous motion of human beings. To explore it, we can consider the great variety of moves that are spatial realizations of our culture. The French survey will permit us to go further in that direction and to analyze the relationship between some of these moves and family and career. For example, an analysis on international migration could be undertaken along the same lines as the study reviewed here. It is important to identify the process of adaptation of nationalities other than the French as well as the rapidity and evolution of such a process. However, the small number of foreigners in our survey will unfortunately not allow a very detailed analysis. Furthermore, retrospective data is not representative of the population of international migrants because of return migration. Clearly, we need another more detailed survey if we want to carry out such an analysis. We can also, as we have registered the different places of work, analyze commuting in relation to migration, family and career. The scope of possibilities is wide.

Using the registration of all changes in dwelling in our survey, many other kinds of moves may be studied. A collaboration with geographers will be useful if we want to define more precise areas between which to consider moves. However, other forms of territorial mobility are not, or only partially, covered by our survey: recreational travel, business and shopping trips, seasonal labor migration, religious pilgrimages, etc.

Another problem lies in timing considerations. First, we have been able to explore models where only one duration of stay is to be considered, be it duration of stay in a dwelling or province, or the duration until marriage (Courgeau, 1985a, 1985b). To undertake a true interaction analysis, however, we must consider at least two durations: duration until a family event and duration until a migratory one. Such a bivariate analysis leads us to the important concept of "local dependence" (Schweder, 1970), which allows us to show how one stochastic process may influence the local development of another process at some time t, while the reverse may not be true. It permits us to go beyond the concept of stochastic dependence when introducing an irreversible time component to the analysis.

It is interesting to generalize this bivariate analysis to a multivariate one.

However, we would no longer be able to estimate all the rates arising from such a scheme because our sample size is not large enough. Hence, we would first have to introduce some restricting assumption so as to estimate less numerous rates (Courgeau, 1985a). We could then develop a more comprehensive approach that would allow us to test some of the previous hypotheses and, if they are not verified, to construct a more suitable model. Such a model will take into account the main forms of duration dependence which reflect the multiple clocks that time us (Featherman & Petersen, 1986). We also need to consider more carefully the problem of simultaneous events. It may always be possible to eliminate these simultaneities by taking more and more exact dates: year, month, week, day, hour, etc. (Tuma & Hannan, 1984). But then we must ask what is the meaning of a migration occurring one day before, on the same day or one day after the date of marriage? Such dates may give us a schedule of events which are merely the outcome of previous individual decisions. What we are mainly interested in is the timing of the decision process; however, our survey data give no information on this process. In this chapter, we introduce the notion of "fuzzy" time, which permitted us to take into account the uncertainty of these situations. By choosing a specific time length to be the "fuzzy" time span, we are able to consider separately the behavior of individuals experiencing simultaneous events. It would be interesting to introduce different "fuzzy" time lengths to study more precisely these simultaneous events. We will also have to draw on the work of psychologists to better understand the decision process.

The last problem concerns the presence of unobserved characteristics. Using our detailed survey data, we have tried to cover the whole range of family, economic, educational, and political variables, and we have been able to show how these characteristics are related to migration, family, and career life cycle. However, it is often necessary to use rougher proxy variables. For example, age has often been used as a proxy variable for various unmeasured phenomena of interest (Featherman & Petersen, 1986). When introducing 30 other variables, corresponding to the major stages in the family and career life cycle, this dependence on age disappears entirely for the last observed cohorts, and is reduced for the earlier cohorts (Courgeau, 1985a). The remaining age-effect may be related to unobserved variables. This also occurs when analyzing the relationship between the birth of the third child and migration to major metropolitan areas. We have shown that, even if different characteristics do have important effects on the probability of having a third child, they do not reduce and may even increase the perturbation effect of migration. Again, some unobserved variables may explain this remaining effect.

We assumed in our analysis that individuals with the same characteristics will follow the same probability distribution of failure. This hypothesis may be relaxed. However, attempts to correct from different probability distributions lead to results which depend heavily on the hypotheses made about the distribution of heterogeneity, and on the parametric form chosen to model the hazard rates (Heckman & Singer, 1984; Trussel & Richards, 1985).

The fragility of the various procedures proposed for modeling unobserved heterogeneity (Hobcraft & Murphy, 1986) leads us to another strategy. Anthropologists working on nonrepresentative samples of individuals obtain from their observation a far more exhaustive picture of the studied community, linking together a great variety of cultural aspects in a way that cannot be made in statistical analyses. We think that a confrontation between the anthropological and statistical approaches may lead to important improvements in the study of mankind.

To conclude, it appears that all social sciences are now using similar sets of longitudinal data: event histories. Each discipline analyzes its data according to its own perspective; these different points of view are, however, related and a confrontation between them is now possible (Courgeau & Lelièvre, 1987). We hope that such a confrontation will be the next step.

IX. Summary

The migratory behavior of individuals develops over a lifetime in different ways according to their educational history, family life cycle, and career cycle. Migrations may occur many times during one's life and may be directed to some particular areas, bypassing opportunities nearby. However, these patterns and areas of destination differ among individuals and have changed over time.

Previous research on the relationship between migration, family and career has been hampered by (a) a dearth of suitable data, (b) the use of cross-sectional data and analysis to study a longitudinal process, and (c) the lack of a convenient statistical model to analyze interaction between different life history events.

The research reported here represents a step in overcoming these problems. The study uses retrospective life history data from the INED survey on the Family, Career, and Migration Histories of French men and women born between 1911–1935. The techniques of survival analysis have been extended in order to study bivariate or multivariate failure data with nonparametric or semiparametric methods of analysis. However, a great diversity of migration definitions (change of dwelling or province, moves from the agricultural sector) used in other studies would permit us to broaden the scope of this paper.

The results of this research show the complex interrelations between spatial mobility, family, and career life cycle. They lead us to the important conclusion that migration must no longer be studied independently from the other relational systems. Furthermore, the results are informative as to the ways in which these different aspects of the life cycle are interrelated. Finally, future research possibilities, extending the methodology given in this paper were discussed.

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