

Chapter 3

The Use of Event-History-Analysis in Career Research

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Introduction

This chapter will present a short introduction to event-history analysis of career mobility. Event-history analysis has become an important tool in recent years in contemporary studies of careers by sociologists. While the data requirements of the method limit its direct historical applicability, familiarity with the method can provide useful insights for the historian of careers. The rest of this chapter will provide an overview of research questions, theoretical answers, and empirical results of studies in which this method is used.

In defining more precisely what event-history analysis entails, it is useful to begin with two alternative methods for analyzing career mobility. The first is rooted in the tradition of research on status attainment. It describes how individual characteristics, such as class of origin and educational attainment, influence status of the present occupation, taking the status of the first occupation into account. The most well known example of this model is from Blau and Duncan (1978 [1967], p. 170) describing the process of status attainment in the United States in 1962. They show a direct (standardized regression) effect of .28 from occupational status of the first job to occupational status of the present job - taking father's education, father's occupational status, and respondent's educational status into account. A strong direct effect of status of the first job on present status indicates little career mobility, or in any case mobility of such a kind that those who had relatively high status first jobs are still ahead of others in their present job (see for other examples Featherman and Hauser, 1978; Glebbeek, 1993; De Graaf and Luijkx, 1995; Pollaerts, De Graaf and Luijkx, 1997; and for a ingenious historical application Prandy and Bottero, 2000).

The second method is built on the tradition of intergenerational mobility research. It cross-classifies occupational class at a certain moment in the career with occupational class some years later. Kaelble (1985) uses this method to compare career mobility in American and European cities between 1820 and 1930. The proportion of men changing classes in a period of ten years did not differ between the two continents, neither was it related to the pace of industrialization. However, a closer inspection of the proportions of men upwardly and downwardly mobile suggested that the chances of social ascent for workers were higher in

American cities than in European ones (other examples can be found in Boonstra, 1993; Chudacoff, 1972; Dessens, Jansen and Ultee, 1990; Featherman and Hauser, 1978; Hartog, Mekkelholt and Van Ophem, 1988; Mayer, Featherman, Selbee and Colbjornsen, 1989; Pinol, 1993).

Both alternative methods have their drawbacks. The first method requires only minimal information on the occupational career. What happens in between the first and the present occupation is left unstudied. The exact timing of career moves remains undocumented. As a consequence it is difficult to determine the influence of changes in individual characteristics, such as marriage or further education, or structural features of society, such as economic growth, on the process by which a person obtains a certain position in society (Sørensen, 1975). It would, for example, be easy to include 'being married' in the status-attainment model of Blau and Duncan, described above, and find out whether married men have on average a higher present occupational status than unmarried men. However, it is impossible to decide whether any difference is caused by a lower marriage rate of low status men, or by a positive influence of marriage on the occupational career.

With the second method based on intergenerational mobility analysis more steps in the occupational career can be made visible, but only very few independent variables can be included in the model. If one wants to study differences in career mobility between men and women and between lower educated, middle educated, and higher education individuals, six (2 x 3) separate cross-tabulations of occupation at two points in time have to be made. Most datasets are too small to allow this many or even further subdivisions.

The use of event-history-models overcomes both drawbacks. Not only is the exact timing of career moves studied, but numerous independent variables at the individual or macro level can be added to the models as well. This makes these models a powerful instrument to analyze not only occupational careers, but also geographical mobility, family careers, and other processes that are characterized by the occurrence of 'events' instead of gradual change.

Of course, event-history models are not without disadvantages themselves. To be able to use these models, extensive data on the past occupational career are needed. Ideally, information on all occupations between entrance to the labor market and the present is used, —a disadvantage it shares with another, recently developed method of career analyses, optimal matching (e.g. Abbot and Hrycak, 1990). A second drawback of event history models is that they focus more on the timing of career moves, and less on characteristics of these moves (how much status is won and what is the exact status after the move).

The main advantage of event-history models is that they are better equipped for causal analyses than the other methods of career analyses. Blossfeld and Rohwer (1995) list a number of reasons why this is the case. The most important are the following. (1) Event-history models enable a clearer view of the direction of causality, because it can at least be ascertained that the cause happened in time before the consequence. For example, friends can only help each other to find a new job after they know each other. (2) With event-history models, it is easier to distinguish the various strengths of reciprocal effects. For example, exact knowledge of timing of the events is necessary to at least approach the right effect

of working part-time on the opportunity to get a child and the effect of having a child on labor force participation. (3) Only with longitudinal data can effects of the previous history be modeled. For example, whether the duration of the third period of unemployment affects the opportunity to find a new job in the same way as that of the first period. (4) Age and cohort effects cannot be separated without longitudinal data. (5) Longitudinal analyses allow the estimation of the effects of multiple clocks, e.g. age, duration of present job, 'age' of the company, and historical time (for instance time since the transition in Eastern Europe). (6) And finally, as a consequence of the previous point, it is easier to model processes at different levels (individuals, companies, countries) with event-history models.

A Short Introduction to Event-History Analyses of Career Mobility

Data

One of the drawbacks of event-history analysis of career mobility, as noted above, is that this type of analysis demands extensive knowledge of the occupational career of an individual. Not only information on all jobs, but also on the timing of the transition from one job to the other is necessary (compare Alter and Gutmann, 1999). This data demand has long hampered career analyses; however recently several suitable datasets for event history analysis have become available. These datasets come from three different types of sources.

A first type of data is gathered using a retrospective design. A sample of the population, or samples of some birth cohorts are interviewed about their past occupational career. Examples of such datasets are the German Life-history Studies 1981-83 (Blossfeld, 1986; Blossfeld and Mayer, 1988; Carroll and Mayer, 1986), later extended with similar studies in the former German Democratic Republic (e.g. Huinink and Solga, 1994), the Swiss Life-history Study, 1989 (Charles and Buchmann, 1994), the Dutch Family Survey 1992-1993 (Bernasco, 1994; De Graaf and Luijkx, 1995; Korupp, 2000; Moerbeek, 2001), and the Dutch Telepanel Survey (Moerbeek, 2001). Retrospective data have the advantage that they enable analyses over a relatively long period of time. In the Berlin Aging Study (Baltes and Mayer, 1999) even persons born in the last decade of the 19th century are interviewed. The older the respondents, though, the larger the risk that there are selection biases making the group of survivors unrepresentative of their original birth or labor market cohort.

In a second type of data, a panel is interviewed regularly about their occupational career, and sometimes about what happened with their career in the time since the last interview. Examples of this type of data are the Panel Study of Income Dynamics (DiPrete and Nonnemaker, 1997) and the OSA-supply panel (De Graaf and Luijkx, 1997). Ideally the waves should be not too far apart, since otherwise short job-spells remain unnoticed. Panel data do not stretch back as far in time as retrospective data, but they allow researchers to analyze the most recent past. A well-known problem of long-lasting panel studies is selective dropout.

The third type of data consists of the personnel records of large companies or government departments. These data usually give a complete overview of all changes in job-functions that employees inhabited in the firm. From the personnel records it may also be clear where employees came from before they entered the firm and how they were educated. However, careers inevitably end when someone leaves the firm. Such career histories have for example been analyzed for the California State Civil Service (Barnett, Baron and Stuart, 2000), a large West German mechanical engineering company in the period 1976-84 (Brüderl, Preisendörfer and Ziegler, 1993; Diekmann and Preisendörfer, 1988), an energy- and telecommunication company in the Netherlands 1995-98 (Groeneveld and Van Kooten, 2001), Dutch navy officers between 1890 and 1990 (Oosterhuis, 1992), Lloyds Bank between 1890 and 1936 (Savage, 1993; Stovel, Savage and Bearman, 1996), the Post Office and the Great Western Railways (Miles and Savage, this volume), the Union Bank of Australia between 1850 and 1970 (Seltzer and Simons, 2001), Pullman repair shops from 1920 to 1950 (Hirsch and Reiff, this volume), and the Canadian Pacific Railway in the period 1903-29 (MacKinnon, this volume).

Methods

Event-history analysis is a statistical method to study the occurrence and timing of events (see for introductions Allison, 1984, 1995; Blossfeld and Rohwer, 1995). These events are qualitative changes (from one discrete state to the other) of which the exact timing can be measured. Besides, it is also necessary to be able to measure the beginning of the so-called risk time. For example, the risk time of becoming unemployed starts when someone leaves school. The risk time of getting fired starts as soon as a person enters a job.

There are both methods to describe the happening and timing of events and methods to model differences between groups of people. The most important descriptive methods are survival curves and hazard curves. A survival curve draws the cumulative percentage of the population that has not yet experienced the event against time. It can be used to make statements about the time until for instance 25 percent of the population moved from their first job into another job. The hazard curve shows the probability that an event happens at time t under the condition that a person did not experience the event before t . Persons who experience the event before t leave the risk population and are not added to the denominator of the probability. If we again look at career mobility from the first job into another job, the hazard rate in the first year of the occupational career is simply the number of individuals moving to another job divided by the total number in the dataset. However, in the second year the hazard rate is the number of individuals moving to another job divided by the number of individuals who did not move to another job in the first year.

The technical problem that had to be tackled before these descriptive methods could be developed was that of right censoring. Right censoring means that part of the population has not experienced the event at the time the study ends. For example (1) a labor market entrance cohort is studied for ten year after the start of

its occupational career, but after ten years some individuals still haven't moved to a another job, or (2) due to attrition some persons have only been observed for a smaller number of years and did not move to a better job in these years. For all of these people it is impossible to tell how long it takes until they experience upward mobility. The first type of right censoring simply restricts the period over which the researcher can draw conclusions to ten years. The second type of censoring is solved, by assuming that the probability of dropouts to experience the event is the same as the probability of those who are observed for a longer period. In a multivariate model it is assumed that they will 'behave' as others with the same characteristics. The problem with this solution is that it leads to biased results if the reason for attrition has something to do with the likelihood of experiencing the event. In mobility research it can be the case that people migrate to obtain a better job in another city. If this means that they are no longer part of the study, the hazard rate of upward mobility is underestimated.

Besides descriptive methods, several types of models have been developed to analyze individual differences in the likelihood to experience certain events. In most of these models the natural logarithm of the hazard rate is the dependent variable. In some models this is the natural logarithm of the time until an event takes place. For career mobility that means that the dependent variable usually is the probability to move from one job to another at a certain moment in time under the condition that a person did not make this move before. Positive coefficients of independent variables therefore indicate a higher likelihood to experience career mobility (i.e. a shorter time until people move from one job to another) and negative coefficients indicate a lower likelihood (i.e. a longer time). Since the hazard rate is defined for a certain moment in time, this enables the introduction of time-specific independent variables. For example, for each moment in time it is known whether a person is married or not. Event-history models will show whether the hazard rate of career mobility is low in years that a person was not married and higher in the years after marriage (other event history models allow to analyze whether the likelihood to marry differs between men in jobs with low status and men in jobs with higher status).

The three main types of event-history models are semi-parametric models (Cox's proportional hazard model), discrete-time or piece-wise constant models, and parametric models. In semi-parametric models only the effects of independent variables on the (log)-hazard rate of the event are modeled, but the change of the hazard over the risk time is left unspecified. Early applications of event-history analyses to career mobility tended to use Cox-proportional hazard models (e.g. Allmendinger, 1989; Wagner, 1992; but see also Kramer and Lambert, 2001; Seltzer and Simons, 2001). As is described below, however, many researchers try to say something about the likelihood to experience upward or downward mobility early and late in the occupational career, or soon after one has entered a job versus after some years. This type of question cannot be answered using the Cox-models.

Discrete-time models differ from the other two types of models in the sense that they model only whether an event happens in a certain interval of time (e.g. a year or a month) and not exactly when within this interval. This type of data is analyzed by creating a so-called person-period file in which all periods in which a person is

'at risk' to experience the event are put in the data file as separate cases. It is then estimated whether an event happens within an interval or not, using (usually) logistic regression (e.g. Bender and Seifert, 1996; Bernasco, 1994; Blossfeld, 1986; De Graaf, 1989). This type of model is often used, even when more precise knowledge on the timing of the event is actually available. The main advantage of this model is its flexibility. It allows flexibility in the estimation of time-dependencies (the multiple clocks discussed above) plus the effects of predictors at the individual or macro-level. Models may differ with respect to whether the event is repeatable (not only the first upward moves, but all upward moves). In that case usually a predictor 'number of move' and interactions with other predictors are included in the model (e.g. Barnett, Baron and Stuart, 2000). Another complication is that the event may take different shapes; so-called competing risks (not only upward, but also lateral and downward moves). In that case ordered or multinomial logistic regression is used (e.g. Hachen, 1992).

In parametric models both parameters for the shape of the hazard curve (how does the hazard change with the risk time) and parameters for effects of predictors on the hazard are estimated. A condition for the use of these models is an assumption about the shape of the hazard curve. For example, it could be assumed that the log (hazard) changes linearly with time, or that the log (hazard) changes linearly with the log (time). These models are seldom used in career mobility analysis. However, when they are used, it is assumed that the hazard first increases and then decreases with the risk time (inverted U-shape) (e.g. log-logistic rate model: Brüderl, Preisendörfer and Ziegler, 1993; DiPrete, De Graaf, Luijkx and Tählin, 1997).

Finally, Petersen (1988) proposed the so-called continuous state space failure time model. In this model it is both considered what determines the amount of time that elapses between changes in a dependent continuous variable (e.g. occupational status) and, given that a change has occurred, what determines the new value of the dependent variable. Estimates are obtained by estimating the hazard rate - using one of the models described above -, while ignoring the size of the changes, and estimating the new status, after the change has taken place (see for examples Korupp, 2000; Petersen, 1988).

Questions, Theory and Results

This section will survey some of the leading issues and findings that have stemmed from the application of event history analysis to the study of careers. It will begin with analyses that focus on features of the individual. It will then turn to analyses that make allowance for the influence of others in society at various levels of aggregation as well as social and economic circumstances more broadly.

Effects of Individual Characteristics

All models of career mobility more or less start with the assumption that individual characteristics indicating high productivity positively influence job mobility to

better jobs (De Graaf and Luijkx, 1997; but compare Miles and Savage, this volume, who stress the idea that careers may be used by certain classes to reproduce themselves and exclude others). The idea is that people invest in their own productivity and are rewarded with a better job (human capital theory), or that employers rank applicants on the basis of 'indicators' of productivity and give the job to the first applicant in line (signaling theory, vacancy chain models). As a result not only direct indicators of productivity such as a high level of education (Allmendinger, 1989), but also indirect indicators, such as being male (Kramer and Lambert, 2001), not having young children (for women, Huinink, 1989), and belonging to the autochthonous population (Bender and Seifert, 1996), are assumed to increase the chance of upward mobility. Kramer and Lambert (2001) explicitly state that it is not parenting responsibilities that cause the disadvantage of women, but that women experience less upward mobility even when they do not have (young) children. It is the possibility of future motherhood that makes them less suitable for promotion in the eyes of employers.

Research shows that individuals who enter the labor market with a higher level of education and those who engage in further education during the occupational career are indeed more likely to be upwardly mobile and less likely to be downwardly mobile (Allmendinger, 1989; Becker, 1991; Blossfeld, 1986; De Graaf and Luijkx, 1997). And although seniority was the most important predictor of promotion of Dutch navy officers, their performance on the job was the second most important one (Oosterhuis, 1992). However, contrary to these findings, in the nineteenth century Netherlands literate men were not more likely to be upwardly mobile than illiterate men, although (or perhaps even because) the first group entered the labor market at a higher level of status (Boonstra, 1993).

Results with respect to 'signals' of productivity are mixed. It is often found that women are less likely to be upwardly mobile than men (e.g. De Graaf and Luijkx, 1997; Kramer and Lambert, 2001). Interrupting the occupational career at the birth of a child has negative consequences for the further career (Huinink, 1989). But Kramer and Lambert (2001) show that in the USA having children under the age of six is not a significant predictor of promotion for women. Also against the 'signaling'-hypothesis is the finding that, taking education into account, mobility of immigrants from different countries did not differ from mobility of the autochthonous West-German (Bender and Seifert, 1996) and Dutch population (De Graaf and Luijkx, 1997). However, if not individual resources, but the opportunity structure is taken into account, effects of gender and nationality become visible. Brüderl, Preisendörfer and Ziegler (1993) find that women and non-German workers are located at lower levels of the hierarchy, which offer better opportunities for upward mobility. Compared with men and Germans at the same hierarchical level, women and non-Germans are disadvantaged.

Whereas low productivity of the individual thus harms future career chances, very high productivity may act in the same way. There are conflicting hypotheses on the effects of over-education (having a higher education than required in the present job) on mobility (Groeneveld and Van Kooten, 2001). On the one hand, overeducated employees may distinguish themselves with higher productivity and as a result experience upward mobility. On the other hand employers may think

that there is something ‘wrong’ with overeducated employees and, as a consequence, they will not experience as much upward mobility as undereducated or rightly educated employees. Results with respect to the consequences of overeducation are as mixed as the hypotheses. Groeneveld and Van Kooten (2001), for instance, show that being overeducated increases the likelihood of upward mobility into a higher position (see also Becker and Zimmermann, 1995), but decreases the likelihood of a gain in income.

Employees can invest in their own career by increasing their own productivity, but also by moving to areas where upward mobility chances are better. Van Ham (2002) expects migration to be instrumental in career advancements because it enables workers to take advantage of job opportunities elsewhere and provides the opportunity of competing for more jobs. Wagner (1992) derives from human capital theory, job search theory, and social capital theory that migration will not have a direct positive influence on upward mobility, because after a move, new social capital and information about the local labor market need to be developed. He expects migration to be detrimental for the occupational careers of wives, because the move is more often determined by the career opportunities of their husbands than their own. It can, however, be expected that the direction of migration (whether from rural to urban areas or in the opposite direction) matters.

Results with respect to the influence of migration on upward mobility and status attainment appear to depend on (1) whether mobility coinciding with migration is studied or mobility after migration, and on (2) the direction of migration. The immediate gain in status grows with the distance of migration (within one country) (Van Ham, 2002). However, after migration, migrants are not especially likely to experience upward or downward mobility. A closer look at the direction of migration reveals that men - and not women - profit from migration from rural areas to cities, and from cities to rural areas (compared to men who do not migrate or migrate from city to city or from rural area to rural area) (Wagner, 1992).

Two indicators of productivity are expected to have an inverse relationship with the chance of upward mobility: labor force experience and present occupational status. The hypothesis of decreasing upward mobility chances with increasing labor force experience can be derived from several theories. According to human capital theory, older employees are less likely to invest in their own human capital because of the lower returns they expect to get in return (because of the smaller number of years they can profit from their higher productivity). As a result they will experience upward mobility less often than younger employees (Allmendinger, 1989). According to job-shopping and job-matching models, upward mobility decreases with time in the labor market (and with time on the job) because jobs are ‘experience goods’. This means that employees usually do not know whether they fit with a certain job until they have worked in this job for a certain period of time. Early in the occupational career, therefore, people tend to move between jobs until they eventually find themselves in a job that fits to their abilities and aspirations (Bellmann and Bender, 1997). Labor force experience is also positively related to the duration of the present job. This duration may decrease the chance of mobility for a number of reasons (Diekmann and Preisendörfer, 1988). First, there may exist

implicit or explicit rules such as 'first in, last out'. Second, company specific human capital grows over time. At the same time knowledge of other jobs, especially in other companies, declines. Finally, the negative effect of the duration of the present job on job mobility may be an artifact of unobserved heterogeneity. People who stay in a job for a long time may have distinctive characteristics. These may be people who are for some reason bound to this company or who simply don't like moving.

Although negative effects of labor-force experience on upward mobility are found in most studies (e.g. Allmendinger, 1989; Blossfeld, 1986). Oosterhuis (1992) shows that in the very regulated labor market of Dutch navy officers, the likelihood of upward mobility moves actually increased with seniority.

Employees in higher status jobs, - in principle also indicating high productivity, - are less likely to be upwardly mobile because of a ceiling effect (Allmendinger, 1989). According to the vacancy competition theory upward mobility results from an interaction between the emergence of vacancies and individual differences in the ability to take advantage of these opportunities. Opportunities for better jobs decline as the level of attainment already achieved increases. As a consequence, the likelihood to move upward will also decline with time in the labor force (Blossfeld, 1986; Sørensen, 1975). Research shows that the status of the present job indeed has a negative effect on the transition rate to higher status jobs (e.g. Allmendinger, 1989; Blossfeld, 1986).

Influence of Significant Others

Whereas the influence of the family of origin, and especially the occupation of the father, is central in status attainment research, it plays only a minor role in research on career mobility. In general, the effect of the parents is expected to decline during the career of the child (De Graaf and Luijckx, 1995; Korupp, 2000). When they grow older, children become more independent of their parents, they achieve more resources of their own, and the likelihood that their parents are still alive, - and thus can directly influence their children's career, - decreases. Korupp (2000) formulates some more specific hypotheses on the effects of parents, and especially the mother, on their children's occupational career. She expects that the influence of a parent on the career of the child will decrease more slowly over time if parent and child are of the same sex. Also, if the child chooses as a first job exactly the same occupation as one of the parents, the likelihood to make a job transition will be negatively affected.

Empirical research on the effects of the parents on mobility chances of the children is rare. De Graaf and Luijckx (1995) show that the (positive) effect of father's occupational status on occupational status of the son declines with the age of the latter. Korupp (2000) studies the differential effects of father's and mother's resources on upward and downward mobility of the daughter and finds that mother's occupational status resources prevent the daughter from being downwardly mobile, whereas the father's occupational resources help the daughter to be upwardly mobile.

Having a spouse who is well equipped for paid work may have two consequences for one's own occupational career (Bernasco, 1994). According to the neoclassical theory of labor supply such a spouse interferes with an individual's success at work. If the spouse already earns a high income, it is less attractive for an individual to invest in his or her own occupational career and more attractive to invest in other activities that increase the family's utility (such as taking care of the children). Alternatively, however, resources of the partner may facilitate an individual's success at work, for example, because the partner can give advice or share information about job opportunities. A positive association between occupational successes of both partners is also expected as a consequence of assortative mating and shared restrictions (e.g. of the local labor market). A multivariate approach and longitudinal data are, therefore, necessary to draw conclusions about causal effects. The effects of partners on each other's careers may very well be gender specific in the sense that men profit from having a partner at home (i.e. not on the labor market), whereas women's careers are hampered by having a partner, especially if they have children (Tölke, 1996).

In a dynamic analysis of women's employment entry, support was found for the hypothesis that effects of husband's earnings on success at work are negative, as predicted by neo-classical economics, but that, controlling for husband's earnings, the effect of husband's education is again positive (Bernasco, 1994). Husband and wife's resources did not affect the likelihood of job mobility of the partner, but positively influenced the partner's occupational prestige after mobility had taken place.

Of course, before the development of social security systems, widowhood (but also desertion, sickness or chronic unemployment of the husbands) forced women to pursue an occupational 'career' of their own. Kay (this volume) argues that these 'marginal persons' were especially likely to start small businesses.

Moerbeek (2001) extends theory on the effect of social capital on status attainment in two directions. She applies it explicitly not only to career advancements but also to prevention of deterioration in labour market position and she considers both the consequences of having friends and of having foes. She expects that people who have friends with a relatively high occupational prestige, are more likely to find a new job and less likely to become unemployed than people who do not have such friends, whereas people who have foes with a relatively high prestige are less likely to find a new job and more likely to become unemployed. In her own research she finds that having a good relationship with the work leader increases the chance to find a new job when one has a job and decreases the risk of becoming unemployed. However, having a bad relationship with the work leader and a bad atmosphere at work also increase the chance to find a new job when one has a job. Finally, as expected, a bad atmosphere at work increases the risk of becoming unemployed.

Effects of Macro Characteristics

Most research on careers focuses on the influence of one or more macro characteristic (compare Rosenfeld, 1992). Effects can be directly on career

opportunities (this sub-section) or on the impact of individual characteristics that in turn influence career opportunities (next sub-section). Direct effects can occur because circumstances *differ* between labor markets or parts of the labor market, or because of *changes* in the labor market.

Effects of differences between types of labor markets and parts of the labor market

According to industrialization-theory there is both more upward and more downward mobility in industrialized societies than in agrarian societies. The science and technology of the industrial society is less static; it generates continual, rapid, widespread changes in production methods and products, it therefore requires continual training and retraining of the work force, geographical mobility and upward and downward mobility (Kerr, Dunlop, Harbison and Myers, 1960).

Support for the industrialization theory is indirect, comparing societies that differ with respect to levels of industrialization and modernization or comparing one industrializing society over time instead of comparing agrarian with industrial societies. Studies comparing periods show either increasing mobility (e.g. Blossfeld, 1986; Kramer and Lambert, 2001) or no change (e.g. De Graaf and Luijkx, 1995). Allmendinger (1989) compared several cohorts in Norway, the United States, and West Germany and found that the number of people employed in agriculture positively affected upward mobility. At first sight, this contradicts the industrialization theory. However, the country with the highest employment in agriculture (Norway) was the country that showed the most rapid industrialization. Instead of the level of industrialization, the pace of industrialization may have caused the high likelihood of upward mobility (see below).

Within industrial societies, sectors are expected to differ. Large-scale engineering and bureaucratic service sectors should show more within-firm upward mobility and less movement of workers to other firms. The competitive sector should show more lateral mobility across firms. Professional, small competitive and capitalist sectors should show more upward movement across firms (Carroll and Mayer, 1986). These differences can be theoretically derived from segmentation theory. Firms in different 'segments' of the labor market use different personnel strategies. Whereas in large firms, qualified personnel are attached to the firm by internal labor markets, small competitive firms use higher wages, and large competitive firms use a strategy of replacement instead of attachment (Hachen, 1992). Therefore, more mobility moves between organizations are expected in external labor markets than in internal labor markets. Mobility in 'occupational labor markets' is in between that of external and internal labor markets (Bellmann and Bender, 1997). Seltzer and Simons (2001) analyze the process of leaving the internal labor market of the Union Bank of Australia for reasons of resignation, forced resignation, dismissal, and retirement. As expected, hazards of resignation and dismissal decreased strongly with tenure. However, personnel with higher wages were also less likely to leave the bank, suggesting that a mixed strategy of career prospects within an internal labor market and financial incentives operated to reduce turnover.

Closely connected to the hypotheses about differences in mobility between segments in the labor market, are hypotheses on mobility from one segment to

another. Mobility more often takes place within labor market segments, and less often between them. Four labor market segments can be distinguished: (1) secondary labor markets (low job qualifications standards) in small firms (2) secondary labor markets in large firms (3) craft-specific labor markets (high job qualifications standards in small firms) (4) firm-specific labor markets (high job qualifications standards in large firms) (Blossfeld and Mayer, 1988).

Blossfeld and Mayer conclude from their own research that these four labor market segments are indeed sufficient to describe the patterning of labor market chances (compare also Carroll and Mayer, 1986). Hachen's (1992) research shows the importance of wage policies. Mobility patterns differ in the predicted way between industries that try to bind personnel to the company via internal labor markets and via higher wages.

With respect to social classes Carroll and Mayer (1986) expect that positions infused with more authority should be more stable than those infused with less authority. This implies the following descending order of stability among classes: owners, professionals, managers, white-collar employees and blue-collar employees. Other job characteristics that may affect career opportunities have to do with the type of contract. Workers with a temporary contract will be more often externally mobile, but less often internally and upwardly mobile. Part-time workers are expected to be less often upwardly mobile (De Graaf and Luijckx, 1997). Finally, characteristics of the other performers of the same occupation may affect an individual's career opportunities. Barnett, Baron and Stuart (2000) expect that individuals in occupations with a high proportion of women or people of color will experience lower rates of mobility and salary advancement within their organization. Inter-organizational moves (often less advantageous than moves within a given organization) are expected to be more frequent among employees in female- or minority-dominated jobs.

Barnett et al.'s (2000) study of the California state government supports these hypotheses. Civil servants in female- or minority-dominated occupations were less likely to change jobs within an agency and more likely to move across agencies. However characteristics of the gender and race mix were more important than gender and race itself in influencing mobility rates.

Allmendinger (1989) formulates several hypotheses on differences in career mobility between countries. First, career mobility should be affected by the income distribution. If there is little inequality, there cannot be much mobility. Second, career mobility will be affected by the standardization of the training system. The effect of a standardized training system is a smooth transition between the educational and occupational sector that does not require repeated job shifts to achieve a good 'match'. Third, career mobility will be affected by the stratification of the training system. In stratified educational systems, there is a tight coupling between the educational system and a differentiated occupational structure. Hence, stratified educational systems also should reduce the frequency of job shifts.

There are only a few studies that compare occupational careers in different countries. Allmendinger (1989) compares three countries (Norway, West-Germany, and the U.S.) and within the U.S., the black and the white population. Perhaps her most interesting finding is that, – contrary to her expectations, – job

transitions are more frequent in countries with standardized educational systems than in countries with less standardized systems.

Hypotheses on the effects of economic growth can be derived both from theory on differences between countries and from theory on changing labor markets. According to search theory in labor markets with favorable employment conditions search costs are lower than in labor markets with unfavorable employment conditions, therefore more mobility between organizations takes place (Bellmann and Bender, 1997). But one could also assume that during favorable employment conditions the number of open positions expands, leading to more mobility (Allmendinger, 1989; Seltzer and Simons, 2001).

Favorable employment conditions are usually measured by GNP, growth of GNP, or unemployment rate. Irrespective of the exact measure, it is found that upward mobility is more likely when conditions are good (Allmendinger, 1989; Blossfeld, 1986). However, several authors also find more downward mobility when labor market conditions are favorable (Blossfeld, 1986; De Graaf, 1989). A post-hoc explanation of this unexpected finding is that workers tend to take risks when labor market conditions are good. These risks may contain a temporary move to an occupation with lower status.

Structural contexts can both cause differences between labor market cohorts, because people start their careers in different circumstances, and between periods, the career prospects of all people in the labor market at a given time are improved or worsened (Blossfeld, 1986). Cohort differences in particular are sometimes counter-intuitive. Both the upgrading of the occupational distribution and good labor market conditions (low unemployment) cause people to enter the labor market in higher status jobs. As a consequence the rate of upward mobility in the subsequent career decreases (lower probability of finding a better job), and the rate of downward moves decreases (the new entrance positions are currently needed - not outdated occupations). These hypotheses are supported in Blossfeld's own research on West Germany.

The idea that historical circumstances especially influence occupational careers of different cohorts— instead of affecting the whole labor force during a certain period - also dominates research on the effects of wars, and the Great Depression (Elder, 1974, 1987; Maas and Settersten, 1999; Mayer, 1988). For the time being it is still unresolved whether the occupational careers of younger or older cohorts are damaged the most. The question is also still open on how long after these big historical events effects can be discerned in the occupational careers of those involved.

Effects of changes in the labor market Changes in the occupational distribution are expected to affect career mobility just as they affect intergenerational mobility. A first important change that took place during the second half of the 20th century was the decline of employment in the primary sector (agriculture) and the expansion of employment in the tertiary sector (service industry). Since occupations in the service sector usually have a higher status than occupations in the primary sector, there should be more upward mobility in countries that experience faster changes in the sectoral distribution of occupations

(Allmendinger, 1989). It is, however, debated whether modernization leads to a general upgrading of the occupational structure. A polarization of job requirements could take place instead. In this latter case, fast structural changes may increase both upward and downward moves (Blossfeld, 1986). There is hardly any research testing the influence of industrialization on mobility patterns. Allmendinger (1989) found more upward mobility in Norway, where both the number of men in agriculture and the rate of industrialization were high (see above). Maas and Van Leeuwen (this volume) show that industrialization was accompanied by an increase in lateral mobility (mainly from farm laborer to unskilled worker) and not so much by changes in upward or downward mobility.

DiPrete and Nonnemaker (1997) further elaborate on this topic. Their hypotheses are on mobility as such, and not so much on upward or downward mobility. They distinguish (1) mobility between industries and between occupations (2) mobility within an industry, but between employers (3) mobility within a company, and (4) employment exit. They expect that mobility is affected by shifts in both the industrial and the occupational structure. In general, if the origin industry or the origin occupations contracts, there will be more mobility between industries and between occupations respectively. And the opposite is true if the origin industry or occupation expands. However, in some countries workers in contracting sectors have rights that protect them from having to leave (DiPrete, De Graaf, Luijkx and Tählin, 1997; De Graaf and Luijkx, 1997).

In principle between-employer-within-industry job mobility is stimulated both by job creation within the industry (which pulls individuals into new jobs) and by job elimination within the industry (which stimulates separation from the employer). Given the difficulty that displaced workers have in finding new jobs in contracting industries, however, the net effect of expansion on within-industry job mobility is expected to be positive and the net effect of contraction on within-industry job mobility to be negative. Within-employer job mobility is also stimulated both by occupational or industrial expansion (which creates new opportunities in many establishments), and by occupational or industrial contraction (which stimulates reorganizations that in turn stimulate within-employer job mobility). According to DiPrete et al. (1997) the balance between these effects is an issue to be decided by empirical investigation. Finally, employment exit is expected to be a positive function of contraction (and a negative function of expansion) in the origin industry or the origin occupation.

In their own research they find support for most of their hypotheses. Indeed within-industry job mobility was stimulated by industrial and occupational expansion. However, this was only true for men, not for women. Within-employer job mobility appeared to be greater in contracting industries than in expanding ones for both men and women (DiPrete and Nonnemaker, 1997). De Graaf and Luijkx (1997) extend this line of research to mobility into higher functions and find that this type of mobility is also more likely in expanding sectors.

Windzio (2001) uses similar hypotheses to explain the exceptional high mobility in East Germany between 1990 and 1992 (the so-called 'Zeitfenster'). If there are more new companies and more companies are closing down (push- and pull-factors) there is more mobility in the labor market. More specifically, if there

are more new companies, there is more upward mobility, and if more companies are closing down, there is more downward mobility because positions disappear or employees are afraid that they will disappear. Windzio's research shows that if these company-changes are taken into account, the effect of the 'Zeitfenster' almost disappears.

The process of structural change is even expected to work within the context of one company. This is explained by the vacancy-competition theory (Sørensen, 1977). According to the theory, the proportion of jobs that is better than the one currently occupied by a person represents possible opportunities for gains in attainment for this person. However, as long as others occupy these jobs, no upward mobility is possible. This changes with the creation of a vacancy due to retirement (or the creation of a new job). When this vacancy is filled by a person lower in the company, this person experiences upward mobility and the vacancy moves down (to the former position of this person). This vacancy chain ends if a person from outside the company fills the vacancy (or if the job is eliminated). Vacancy-competition theory differs from human capital theory with respect to the assumption that people can be upwardly mobile without increasing their productivity. Employees who have just entered the labor force will have the lowest attainment relative to their resources. However, if vacancies appear at higher levels, these persons will move upward. The longer the time persons have spent in the labor force, the more likely it is that they have the best job they can hope to obtain (on basis of their productivity). Under these assumptions the career progress will grow rapidly during the beginning of the career and slower later until attainment reaches a stable level.

Interactions of Micro and Macro-Effects

Several authors assume the existence of interactions between macro-characteristics and the strength of the effects of individual resources. Carroll and Mayer (1986) expect that the effects of individual level independent variables, such as sex and education, vary by industrial sector, reflecting the presence or absence of discriminatory practices and qualification-based career ladders. In internal labor market, with highly standardized promotion rules, and in occupational labor markets, where promotion is strongly based on qualifications, prejudice should play a smaller role and resources (education and experience) a larger role.

Their hypotheses are generally supported by their own analyses of careers of West-German men. Kramer and Lambert (2001) also find an interaction between sector and gender. Being in the manufacturing sector decreased the risk of promotion more for women than for men, suggesting more prejudice in external labor markets.

DiPrete and Nonnemaker (1997) expect people with few labor market resources (women and non-whites) to be more affected by labor market turbulence (i.e. the inherent rate of mobility that characterizes a particular occupation or industry - besides growth or decline of that occupation or industry) than people with many labor market resources. In industries with high turbulence women and non-whites thus experience more mobility (presumably especially downward and lateral

mobility) than men and whites. At the country level, a worker's labor market resources are expected to be more strongly connected to mobility (again presumably especially downward and lateral mobility) in countries with weaker employment protection and weaker labor market boundaries (DiPrete, De Graaf, Luijkx and Tählin, 1997). At the company level an organizational contraction is expected to affect promotion chances of groups with few resources (women and minorities for example) more than those of groups with many resources (Brüderl, Preisendörfer and Ziegler, 1993). At the job level the negative effects of being in a female-dominated occupation on mobility or salary advancement are expected to be smaller for men than for women (Barnett, Baron and Stuart, 2000).

There are empirical studies of these interaction effects. DiPrete and Nonnemaker (1997) indeed find that men with long employer tenure are protected from (downward) mobility in the more turbulent industrial sectors, whereas women with comparable tenure are not. The same was true for whites compared to non-whites. Individual resources also had larger effects in the country with the least protected labor market (i.e. the U.S.) (DiPrete, De Graaf, Luijkx and Tählin, 1997). Unexpectedly, however, the disadvantages of German female workers diminished when opportunities on the labor market were worse (Brüderl, Preisendörfer and Ziegler, 1993). The effects on the difference between German and non-German workers, however, were in the predicted direction.

According to the modernization hypothesis decreasing sex-based discrimination will be most readily seen in promotion patterns of later cohorts (Kramer and Lambert, 2001) and subsequent cohorts experience a decreasing influence of social origin on career opportunities, resulting in a diminishing influence of both the father's and mother's job status (Korupp, 2000). Alternatively, Korupp formulates the transition hypothesis that claims that compared to the influence of the father, the influence of the mother's occupational status on her daughter's occupation has increased throughout time.

Empirical results with respect to these theoretical arguments regarding ascription and achievement are very mixed. Kramer and Lambert (2001) do not find any significant interactions between sex and historical time. Allmendinger (1989) studied several individual characteristics and concludes that their effects on mobility hardly change over time. However, Oosterhuis (1992) showed that during the 20th century performance has become a more important determinant of promotion for Dutch navy officers.

Not only the effects of individual resources, but also those of structural characteristics may vary with macro-characteristics. For example from segmentation theory it can be derived that the effect of economic growth on mobility is stronger on external than on internal labor markets (Bellmann and Bender, 1997). DiPrete, De Graaf, Luijkx and Tählin (1997) formulate a range of hypotheses on country differences. They argue that the effects of structural contraction on job mobility to new occupations and industries is inversely related to (a) social welfare programs that make non-employment an attractive option, (b) the strength of job security, which forces greater reliance on hiring reductions and early retirement as a way for organizations to shrink, and (c) the strength of labor market boundaries. Active labor market policies designed to facilitate job mobility

may actually strengthen the effects of structural contraction on job mobility (d). And the effect of structural expansion on job mobility within the occupation or industry should be directly related to the strength of labor market boundaries, which inhibit mobility to other occupations or industries (e).

Most of their hypotheses are supported by their own research. However, there are some unexpected findings. For example the effects of net change on exit, on within occupation and on within industry mobility are as expected according to hypothesis (e) smallest in the U.S., larger in Sweden, largest in Germany; but their findings for the Netherlands constitute an exception to hypothesis (e). Large effects were expected in this country because of strong labor market boundaries, but small effects were found. The authors explain this unexpected finding by the extensive welfare-sustaining employment-exit programs in the Netherlands that are not restricted to contracting industries. Still waiting for an explanation is the finding of Allmendinger (1989) that economic conditions are of more relevance in the European than in the American populations.

Conclusion

Event-history analysis will probably never become as common in historical research on career mobility as it is in research on contemporary career mobility. Whereas social scientists can gather their own data, historians are dependent on evidence from the past. The main sources for occupational information of men living during the 19th century, such as censuses and vital registration data do not contain information on the timing of career moves. But there are some sources, such as company records or tax registers, that do.

Nevertheless, even with less complete data, restricted forms of event-history analysis can be performed with historical materials. For example, if only two measurements of occupational status are available, event-history models can be used to investigate the effects of individual and structural characteristics on the rate of mobility between these two points in time (e.g. one year or five years apart). The models are restricted in the sense that information on earlier career moves cannot be included in the model as a predictor of what happens later. A second restriction is that it will sometimes be difficult to be certain about causality, because the exact timing of the career move is unknown. This problem becomes larger when the two measurements are further apart. A further complication may occur if the duration between the two (or more) measurements differs between individuals. This duration can be included as a predictor of the likelihood of mobility in the model; however, over long periods more mobility moves may remain undetected than for short periods.

Even when other methods are used, theory, hypotheses, and results of event history research on twentieth century career mobility may be of use for historical research on career mobility. To what extent was the hypothesis that high productivity positively influences mobility to better jobs valid in earlier centuries? What indicators of productivity can be used in the period before education was general? Did these indicators affect mobility in the predicted way? How important

were ascribed characteristics compared to achieved characteristics – and did the importance of the latter increase over time?

According to modernization theory significant others, such as the parents, the partner, friends and foes, should have affected an individual's career more in the past than they do now. Research suggests that at least during the 20th century the association between father's and son's occupation has decreased. However, it is largely unknown whether fathers in the past helped their sons by giving them a better start (i.e. first job) or whether they also played an important role in facilitating upward career moves (see for an exception Prandy and Bottero, 2000).

Many of the hypotheses discussed above, especially on the effects of macro characteristics and on interactions of structural and individual characteristics, are about change. Sometimes these are long-term (unidirectional) changes – such as industrialization and modernization – and sometimes these are short-term changes – such as the growth and contraction of certain sectors, the rise in number or size of companies, variations in the extent of migration. Many of these hypotheses can be better tested with (historical) data that stretch over longer periods. In a sense event-history models of modern career data are also restricted by their inability to reach back further in time.

Thus this chapter suggests that the methods, hypotheses, and results of research applying event-history models to modern career data can be a challenge for historians and social scientists working with historical data. Using their strong point, i.e. data on periods that cannot be reached with survey data, the systematic analyses of historical careers can provide new and better answers to old questions.

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