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Methodological Issues

The Influence of Health on Unemployment in Germany: A Duration Model

by J. O. Arrow

The high proportion of unemployed workers with health problems has led to two theses explaining the link between health and unemployment. The causation thesis proposes that unemployment causes health problems. The second thesis is that individuals with bad health are more likely to be fired or voluntarily quit their jobs. Because the majority of these end up in unemployment or because bad health itself may be an obstacle to renewed employment, the proportion of persons with health problems among the unemployed is likely to be higher than among the general population. This phenomenon has been sometimes referred to in the literature as the healthy worker effect. Both hypotheses, especially the causation hypothesis, have generated a huge body of literature. For a review of this literature, see for example, Kurella (1992) and Schwefel (1987).

In principle, these hypotheses can be tested. But serious data problems arise in connection with such studies. For instance there is often the lack of an appropriate control group or the study population is simply not representative of the target population. The GSOEP removes some of these methodological constraints and thus allows for a test of the above hypotheses.

Andreß (1993) discusses some of these issues while examining the link between long-term unemployment and sick-leaves using longitudinal data. Using a logistic regression model, he finds no evidence that unemployment leads to increased sick-leaves. The disadvantage of using sick-leaves as an indicator of health to test the causation hypothesis lies in the fact that the unemployed do not generally ask for a sick-leave. Hence it is possible that deterioration in health status during an employment spell may not be detectable on the basis of sick-leaves alone. Secondly, Andreß uses sick-leaves in an undifferentiated way without taking into account the respective severity and diagnosis of a given illness.

Ekeles and Seifert (1992) have examined the link between various health indicators and unemployment in order to test the causation and selection hypotheses; the authors used data from the first six waves of the German Socio-Economic Panel (GSOEP). Three samples are considered. The first consists of unemployed individuals at the time of a given survey who had reported being employed in the preceding survey. The second sample consists of employed individuals who were unemployed in the previous year. The control group for the second sample contains those employed or unemployed during both years. A third sample consists of those with an unemployment spell of at least 12 months. According to Ekeles and Seifert, to test the causation hypothesis one needs to measure the health status of an individual at two points in time, for example, once during an employment spell and again during unemployment. A deterioration in health status compared to its previous value can then be interpreted as evidence in support of the causation hypothesis. Conversely, they argue that improvement or a constant level of the health status can be seen as supporting the selection thesis. On the basis of some descriptive statistics the authors conclude that there is no evidence for the causation hypothesis. They argue instead for the selection hypothesis.

Their conclusions are suspect since their sampling design for testing the selection hypothesis is inappropriate. The relevant question to ask is whether bad health raises the risk of unemployment or lowers the chances of re-employment. This requires a different sampling design than those proposed by the authors. For unemployment this would require a cohort study of employed individuals, where health status constitutes a risk factor while the duration of employment becomes the dependent variable of interest. If, on the other hand, one is only interested in testing whether bad health is an obstacle to re-employment, then an appropriate sample could be one consisting of unemployed persons looking for a job. The duration of unemployment would become the dependent variable and health status the risk factor. In terms of statistical modelling the two cases are equivalent. In both situations the resulting data can then be modelled in the context of survival analysis and no control group is needed.

Furthermore, in situations where there are confounding factors whose influence has to be accounted for statistically, a regression model that permits a proper statistical assessment of the relative strength of evidence for a given hypothesis is necessary. If the selection hypothesis is true, then bad health would tend to raise the probability of unemployment or reduce the probability of re-employment. The descriptive statistics in Ekeles and Seifert (1992) do not provide a rigourous statistical test of their hypotheses.

In this paper consideration is restricted to the selection hypothesis, focusing on the following question: Under what conditions does bad health constitute a risk to employment? My hypothesis is that bad health only becomes a risk factor when it occurs in conjunction with other attributes such as gender and nationality. A different sampling design from that used by Ekeles and Seifert is adopted and the data are analysed in the framework of survival analysis.

Data

Generally there are several ways in which bad health can be measured. These include psychological as well as physical dimensions. For an operational definition of health the European Health Committee (1987) suggests among many others the use of the following indicators found in the GSOEP data: (1) sick-leave certificates issued by physicians; (2) personal statements on general health status as experienced subjectively, or chronic impairments; (3) personal statements on complaints and recent diseases; (4) questions as to whether an impairment to health has been officially acknowledged as diminishing the chances of earning an income or being employed and (5) questions about diseases and handicaps impending re-employment.

No attempt will be made here to reduce health status to a single indicator. Not all the indicators of bad health each represent an unemployment risk. This depends on other factors such as the social environment at the work place or legal provisions which, for example, protect an individual with impairment from dismissal. Large companies may be more tolerant toward workers with health problems than small ones, whose very existence could be jeopardized by reduced productivity attributable to, say, frequent and long sick-leaves within the work force.

There is a positive correlation between bad working conditions and bad health among unemployed persons. For example, Brinkmann (1984) reports that unemployed German men with health problems in their last job endured working conditions that were 'above average bad'. Büchtemann (1982) reports a positive correlation among health, chronic illness, psychosomatic complaints and bad working conditions at the last job for a group of unemployed workers. In the majority of cases he finds that bad health was the reason for terminating the last job. This is controlled for by including an appropriate indicator for working conditions which might adversely affect health.

In addition to the health-related variables mentioned above, one needs to control other factors known to be related to the risk of unemployment, including sociodemographic variables (gender, nationality, marital status). If certain risk factors are not randomly distributed, for example, with respect to gender or nationality, it may be necessary to use gender and nationality for stratification. A worker's labour history is an important factor for predicting further unemployment. The employment calendar in the GSOEP can be used to compute this variable. For the sample studied here this variable is based on an indicator about the occurrence of unemployment between 1974 and the first survey date in 1984. Account also has to be taken of age. I use three age groups: 18 to 29, 30 to 50 and 51 or older, based on the ages in 1984. The expectation with respect to age is that young and older individuals have higher risks of unemployment; in this case it be would appropriate to use age-group as a categorical variable instead of introducing it in a statistical analysis as interval-scaled. The GSOEP variable classifies workers as unskilled, semi-skilled, skilled and foremen. I collapse the last two categories into a single one. The resultant variable has only three values: unskilled, semi-skilled and skilled workers. The inclusion of this variable is important because unskilled and semi-skilled persons on the labour market are more likely to lose their jobs faster than skilled workers. It is also the unskilled who are more likely to be assigned jobs that are potentially hazardous to their health. Because the risk of unemployment could depend on the employment sector, I use the GSOEP variable, which states whether the job is in the public sector or not, as a proxy for security of a given job. Jobs in the public sector are more secure than those in the private sector.

The data were taken from the first six waves of the Western Sample of the GSOEP and include workers, aged 18-64 years, who were employed full — or part-time — during the first interview in 1984. Because some information relating to important aspects considered here was obtained retrospectively, it was necessary to impose a further requirement, namely, that persons were included in the study groups, only if they were not lost to follow-up in the second year of the survey.

The final sample consisted of 2398 workers with an approximate mean age of 39 years (median age was 40 years). Twohundredthirty one unemployment spells were captured on the data. Of these 9.6% were still unemployed in the last wave of the data and are left censored. The majority of the workers were male (73.9 %). German workers comprised 47.7 %, followed by Turks (14.9 %), and Yugoslavians (11.3 %). Other nationalities made up the remaining 26.1 %. They were from the following EC countries: Greece (8.8 %), Italy (10.3 %) and Spain (7.0 %). Unskilled workers constituted 19.6 % of workers in the sample; 43.3 % were semi-skilled; the remaining 37.1 % were either skilled workers or higher up in some supervisory capacity, for example, as foremen. Almost one-fifth (19.1 %) of the

workers in the sample had at least one unemployment episode during the period 1974-1983. Only a small proportion of the sample — 11.2 % — came from the public sector.

The dependent variable is a worker's employment duration in the job he and she held at the time of the first interview. Some of these employment episodes may be terminated by a transition into unemployment; others are terminated by a change of job or smaple attrition; others might still be working at the date of the last interview. Any termination, that is not known to have ended in unemployment will be called a censored spell[1].

Multivariate Results

This section presents the results of a multivariate regression analysis. The Cox partial-likelihoods regression method is used. The results are with respect to variables included in the regression analysis through a stepwise selection process. Intermediate results have been omitted and the discussion refers only to a parsimonious set of variables. Computations were done in SAS using a PHREG estimation by partial-likelihood.

Table 1 shows the results for a model in which gender and nationality have been included as dichotomous variables. The first column contains the names of the variables. Columns 2 and 3 report the estimated regression coefficients and standard errors, respectively. Column 4 contains the (conditional) relative risk, whose 95%-confidence interval

[1] A special version of the data suitable for labour market transitions was made available by courtesy of Götz Rohwer.

Table 1

Maximum-Likelihood Parameter Estimates in Cox Proportional Hazards Model of Employment Duration for Workers Employed at the Time of the First Wave of GSOEP
All Workers (N = 2398)

Variable name	Parameter estimate	Standard error	Conditional Risk Ratio and 95 % Confidence Limits		
NATIONALITY	0.385	0.146	1.470	1.104	1.957
GENDER	0.331	0.157	1.392	1.023	1.894
AGE (18-29)	0.904	0.188	2.470	1.707	3.572
AGE (51-64)	0.100	0.164	1.105	0.801	1.524
UNEMPL	1.215	0.159	3.372	2.468	4.608
SECTOR	−0.922	0.367	0.398	0.194	0.816
FIRM SIZE	−0.405	0.069	0.667	0.583	0.764
CHRONIC	0.128	0.148	1.137	0.852	1.518
SICK-LEAVE	−0.056	0.316	0.946	0.509	1.757

Variable Definition	values	**Reference category**
NATIONALITY	0/1	Germans (0)
GENDER	0/1	male (0)
AGE (18-29)	0/1	30-50 (0)
AGE (51-64)	0/1	30-50 (0)
UNEMPL past unemployment	0/1	no previous unemployment (0)
SECTOR employment sector	0/1	non-public sector
FIRM SIZE	metric	—
CHRONIC	0/1	no chronic illness (0)
SICK-LEAVE sick-leave >42 days	0/1	none/sick-leave ≤ 42 days (0)

is given by columns 5 and 6. Confidence intervals which include 1 are statistically not significant at the 5 %-test level.

Table 1 shows that the risk of unemployment is higher for females; with a relative risk of 1.47, the risk of a female losing a job is almost one-and-half times higher than for a male worker. Similarly, foreign workers have a higher risk of unemployment than German workers.

Two health-related variables — CHRON and LSICK — have no significant effect on the hazard of unemployment. A possible explanation for this result is that gender or nationality are possibly confounders for the effect of health.

It has been argued in the literature that risk factors underlying labour market processes may be gender-specific (see, for example, Schneider 1987). On the basis of

Table 2

Maximum-Likelihood Parameter Estimates in Cox Proportional Hazards Model of Employment Duration for Workers Employed at the Time of the First Wave of GSOEP

Variable name	Parameter estimate	Standard error	Conditional Risk Ratio and 95 % Confidence Limits		
Male Germans (N = 835)					
AGE (18-29)	0.364	0.323	1.439	0.764	2.710
AGE (51-64)	−0.080	0.273	0.923	0.541	1.574
UNEMPL	1.642	0.262	5.168	3.092	8.638
SECTOR	−1.307	0.728	0.271	0.065	1.128
FIRM SIZE	−0.434	0.117	0.648	0.515	0.815
CHRONIC	−0.273	0.259	0.761	0.458	1.265
SICK-LEAVE	−0.154	0.723	0.857	0.208	3.536
Male Foreigners (N = 838)					
AGE (18-29)	1.165	0.318	3.207	1.719	5.984
AGE (51-64)	0.496	0.268	1.643	0.972	2.776
UNEMPL	1.275	0.270	3.578	2.108	6.073
SECTOR	−0.801	0.726	0.449	0.108	1.860
FIRM SIZE	−0.248	0.111	0.780	0.628	0.970
CHRONIC	0.471	0.236	1.601	1.008	2.543
SICK-LEAVE	−0.843	0.530	0.430	0.152	1.216
Female Germans (N = 244)					
AGE (18-29)	2.345	0.784	10.429	2.434	48.499
AGE (51-64)	0.859	0.782	2.360	0.510	10.920
UNEMPL	1.090	0.522	2.975	1.069	8.280
SECTOR	−0.552	0.762	0.576	0.129	2.562
FIRM SIZE	−0.588	0.211	0.555	0.367	0.839
CHRONIC	1.043	0.445	2.838	1.187	6.786
SICK-LEAVE	not evaluated for lack of events				
Female Foreigners (N = 341)					
AGE (18-29)	0.747	0.497	2.111	0.797	5.591
AGE (51-64)	−0.525	0.451	0.592	0.244	1.434
UNEMPL	0.481	0.468	1.618	0.647	4.049
SECTOR	−0.370	0.750	0.691	0.159	3.002
FIRM SIZE	−0.481	0.206	0.618	0.413	0.925
CHRONIC	−0.273	0.259	0.761	0.458	1.265
SICK-LEAVE	1.424	0.505	4.153	1.544	11.170

Note: See Table 1 for variable definations and reference categories.

the above results, this may also apply to nationality, impling that one ought to perform separate analyses for gender and nationality.

The results of four separate analyses (male Germans, male foreigners, female Germans and female foreigners) are shown in Table 2. As in the case of the combined and unstratified analysis above, the effects of past unemployment, size of firm and employment sector are invariant with respect to gender and nationality. Especially worth noting is the higher risk of renewed incidence of unemployment for those with a previous spell of unemployment, a result which seems to strongly support the hypothesis of lagged state dependence[2].

The effect of age seems to differ by gender and nationality. Whereas the risk of unemployment among young foreign male workers relative to those of prime age (30 to 50 years) is more than three times higher, no significant differences in the corresponding age groups are observed among German male workers. The result for foreign workers is in line with the high rate of unemployment found among this group of the labour force. Age is also a risk factor among female workers. The result for foreign women is not significant at the 5 %-level but the sign of the regression coefficient as well as the highly right-skewed nature of the confidence interval do not contradict the possibility of increased hazard within this age group as compared to the prime aged one. The result for German women is quite remarkable. The relative risk of younger women is more than 10 times that of female workers aged 30 to 50.

Finally, let us examine the statistical evidence in support of the negative hypothesis. Only two health-related variables remain in the final regression model: sick-leaves exceeding 42 days (LSICK) and reported chronic illness during the current employment period (CHRON). Neither of these variables is significant for German male workers. In fact the estimated parameters have negative signs. Hence there is no statistical evidence for this hypothesis among German male workers, when other relevant confounders are accounted for. For foreign male workers, however, there is evidence in support of the negative health selection. The coefficient for chronic illness is positive and the relative risk of 1.6 is significant at the 5 %-level. It is only with respect to this variable that Germans and foreign male workers differ significantly. One may therefore conclude that there is an interaction between health and nationality: bad health seems to be an unemployment hazard among foreign male workers.

For German female workers only the indicator for chronic illness was used because none of the women who had been granted sick-leave became unemployed. The coefficient of the indicator for chronic illness as shown in Table 2 is positive and statistically significant. With a relative risk of almost 3, a female German who becomes chronically sick has high odds of losing her job. In the case of foreign female workers, the indicator for a long sick-leave is significant. The relative risk of becoming unemployed after a long sick-leave is more than four times higher than without such a long absence from the place of work among foreign female workers.

Conclusion

The above results show that the hypothesis that bad health constitutes a risk to employment is generally not true. But for groups who are otherwise vulnerable in the labour market, such as foreigners and female workers, chronic illness or a long absence from work for health reasons is positively associated with the risk of unemployment. This suggests that bad health may be used by employers to fire those with weak social and political bargaining position in the society. Assuming this to be true, one could come to the conclusion that risks tend to accumulate and assume a self-perpetuating character with respect to the less advantaged groups in the labour market.

Individuals who were previously unemployed were found to have a higher risk of future unemployment, as were those classified unskilled or semi-skilled or who were assigned to jobs with bad working conditions. Since a disproportionate share of such people are women or foreigners, this raises important questions for social policy formulations as well as for those involved in scientific research. Unlike in the UK or the USA, the problems of ethnic groups have rarely been systematically studied in Germany. Given the large number of immigrants and the important role they play in the German economy, it would seem that further work is necessary to examine the processes by which social inequality is reproduced and perpetuated with respect to gender and ethnicity on the labour market.

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[2] See, for instance, Heckmann and Borjas (1980) as well the paper by Martin Mühleisen in this volume.

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