SONDERFORSCHUNGSBEREICH 504

Rationalitätskonzepte,
Entscheidungsverhalten und
ökonomische Modellierung

No. 03-35

The Pennsylvania Reemployment Bonus Experiments: How a survival model helps in the analysis of the data

Daniel Schunk*

November 2003

*Sonderforschungsbereich 504, email: dschunk@uni-mannheim.de

Universität Mannheim
L 13,15
68131 Mannheim

The Pennsylvania Reemployment Bonus Experiments: How a survival model helps in the analysis of the data

Daniel Schunk[*]

This version: February 2003

ABSTRACT. *Survival models for life-time data and other time-to-event data are widely used in many fields, including medicine, the environmental sciences, engineering etc. They have also found recognition in the analysis of economic duration data. This paper provides a reanalysis of the Pennsylvania Reemployment Bonus Experiments, which were conducted in 1988-89 to examine the effect of different types of reemployment bonus offers on the unemployment spell. A Cox-proportional-hazards survival-model is fitted to the data and the results are compared to the results of a linear regression approach and to the results of a quantile regression approach. The Cox-proportional-hazards model provides for a remarkable goodness of fit and yields less effective treatment responses, therefore lower expectations concerning the overall implications of the Pennsylvania experiment. An influence analysis is proposed for obtaining qualitative information on the influence of the covariates at different quantiles. The results of the quantile regression and of the influence analysis show that both the linear regression and the Cox-model still impose stringent restrictions on the way covariates influence the duration distribution, however, due to its flexibility, the Cox-proportional hazards model is more appropriate for analysing the data.*

Keywords: Reemployment Experiments, Survival Analysis, Quantile Regression

---

[*] Daniel Schunk is member of the Sonderforschungsbereich 504 and of the Mannheim Research Institute for the Economics of Aging (MEA), University of Mannheim, D-68131 Mannheim. e-mail: dschunk@uni-mannheim.de.
The author wants to to express appreciation to Roger Koenker, Professor of Economics at the University of Illinois at Urbana-Champaign, for stimulating his interest in this topic and for a detailed review of an earlier draft of this paper.

1. INTRODUCTION

The Unemployment Insurance (UI) Program provides short-term income support to involuntarily unemployed individuals while they seek work. Both from a social and an economic point of view, it is certainly an important policy goal to reduce the duration of unemployment spells. The Pennsylvania Reemployment Bonus Experiments tested the effect of different types of reemployment bonus offers on the unemployment spell. Six treatments that varied in the amount of bonuses that are offered and in the time period in which the bonus offer remains valid, were tested and compared to a control group.

The Pennsylvania Reemployment Bonus Experiment data have been analysed based on different statistical approaches: In the Final Report (Corson *et al.* (1992)), the treatment response analysis is done by calculating the mean unemployment time for each treatment group. Using a linear regression approach, Corson *et al.* (1992) control for the relevant individual characteristics of the claimants and for the experimental design, such as the timing of the sample selection. Meyer (1995, 1996) presents the same results. Additionally, he gives an excellent review of the experiments, some general conclusions about their efficacy and a critique of their policy relevance. Koenker&Bilias (2001) perform a reanalysis of the results of the Pennsylvania Experiment based on a quantile regression analysis. They examine different covariates, focusing on particular quantiles of the distribution and they show that this approach is successful in providing a detailed picture of the varied effects of the covariates on the unemployment time.

This paper intends to fit the experimental data to a Cox proportional hazards model and to provide a comparison between the Cox-model fit and both the quantile regression results as well as the linear regression results. An influence analysis is proposed for obtaining qualitative information on the influence of the covariates at different quantiles. An overall benefit-cost analysis of the effect of the different treatments is omitted here, since this is a straightforward procedure that doesn't produce new insights about the experiment.

2. THE PENNSYLVANIA REEMPLOYMENT BONUS EXPERIMENTS

The current framework of the U.S. unemployment insurance system provides short-term monetary assistance to the involuntarily unemployed. A frequent criticism of the system has been that the unemployment insurance benefit acts as a disincentive for job-seekers and prolongs the duration of unemployment insurance spells. During the 1980’s several controlled experiments tested alternative compensation schemes for UI. In theses experiments, UI claimants were offered a cash bonus if they found a job within some specified period of time and if the job was retained for some specified duration. The question was: would the promise of a monetary lump-sum benefit provide a significant inducement for more intensive job-seeking?

The first two experiments were conducted in Illinois in 1984 and 1985 and are described in detail by Woodbury and Spiegelman (1987). In the first experiment, a random sample of new claimants were told that they would receive a bonus of $500 if they found full-time employment within 11 weeks of filing their initial claim, and if they retained their new job for at least 4 months. In the second experiment, a random sample of new claimants were told that their prospective employer would be entitled to a bonus of $500 provided that the claimants were able to find a job and keep it under the same conditions as the previous experiment. The two treatments were tested against a control group of claimants who followed the usual rules of the Illinois UI system.

The Illinois experiments, and especially the bonus offer made directly to claimants provided a very encouraging initial indication of the incentive effects of such policies. They showed that bonus offers could result in a significant reduction in the duration of unemployment spells and consequently of the regular amounts paid by the state to UI beneficiaries. This finding let to further “bonus experiments” in the states of New Jersey, Pennsylvania and Washington with a variety of new treatment options. In this paper we will focus more narrowly on a reanalysis of data from only the Pennsylvania Reemployment Bonus Demonstration described in detail in Corson *et al*. (1992).

2.1. TREATMENT DESIGN

The Pennsylvania experiments were conducted by the U.S. Department of Labor between July 1988 and October 1989. During the enrolment period, claimants who became unemployed and registered for unemployment benefits in one of the selected local offices throughout the state were randomly assigned either to a control group or one of the six experimental treatment groups. In the control group the existing rules of the unemployment insurance system applied. Individuals in the treatment groups were offered a cash bonus if they became reemployed in a full-time job, working more than 32 hours per week, within a specified period we call the qualification period. In addition, to qualify for the bonus, claimants were required to work in the new job continuously for at least 16 weeks, or they were allowed to change jobs as long as the transition took place within a period of 5 days. The latter requirements were imposed to discourage cases of fraudulent hiring for purposes of obtaining the bonus, and to avoid the possibility of bonus payments to seasonal workers.

Two bonus levels were tested. The lower bonus was three times the weekly benefit amount, and the higher bonus was six times the weekly benefit. Bonuses were tied to the weekly benefit rather than offering a fixed amount as in the Illinois experiment, because it was felt that such a policy yielded more uniform incentives across individuals. It was also thought that such as system was politically more feasible than the fixed bonus scheme. The low bonus averaged $500 and the high bonus averaged $997. Two qualification periods were considered: a short period of 6 weeks and a longer one of 12 weeks. The long qualification period was close to that studied in Illinois and New Jersey. The choice of the shorter period was intended to test the sensitivity of the treatment effect to alternative specifications of the qualification periods.

The bonus levels and qualification periods of the six treatment groups are described in *TABLE 2.1*. All of the treatments, except the last one, involved a voluntary option of attending a workshop designed to aid job search. However, less than three percent of eligible participants attended the workshop so we follow the practice established by prior analysts of ignoring the workshop option. In effect this enables us to pool treatments 4 and 6. Four of the treatments were created by the combination of a bonus amount and a qualification period plus the offer of the workshop. The fifth treatment included an initially high, but declining bonus over the period of 12 weeks plus the optional workshop. The sixth treatment combined the high bonus with the long qualification period without the workshop.

2.2. SAMPLE DESIGN

The Pennsylvania experiments were designed to answer two questions. Could "policy relevant", i.e. politically feasible, treatments yield detectable cost savings to existing UI benefit programs? And how sensitive are program cost to various elements of the treatment design? For a more detailed description of the design goals one can consult Corson *et al.* (1992). Based on these objectives, as well as prior estimates of the magnitude of the response to the bonus offers, and a budget constraint for the experiment, a formal sample allocation model was developed that fulfilled the goals. The design provided 3,000 control and 10,120 treatment plan members; the allocation to the specific treatments is shown in *TABLE 2.2*.

The sample was drawn randomly from claimants at twelve Job Services (JS) offices located throughout the state of Pennsylvania. The limited selection of sites constituted a compromise between the need to obtain a fairly large sample that could accurately reflect the demographic and occupational characteristics of the state, and the need for an easy monitoring and low operational cost of the study. Effort was made to select twelve local offices, which were representative of the insured unemployed population of Pennsylvania. More specifically, the state was divided in eight UI/JS regions. One or more clusters of local offices were formed within each region according to average duration of UI caseloads. Finally, one office was selected randomly from each cluster to participate in the demonstration. The twelve Job-Service offices chosen were: Coatesville, Philadelphia-North, Philadelphia-Uptown, Reading, Lancaster, Lewistown, Butler, Connellsville, McKeesport, Erie, Pittston and Scranton. Corson *et al.* (1992) comment, "UI claimants were selected randomly from claimants at local offices throughout Pennsylvania. The most cost-effective way to meet this objective was first to select a random sample of local UI/JS offices, and then to select a random sample of UI claimants from each of the selected offices. This process was undertaken in a manner which ensured that each eligible claimant in the state had an equal probability of selection into the demonstration sample."

Several criteria were imposed on potential UI claimants to determine their eligibility in the experiment. To be selected and assigned to one of the six treatments or to the control group, an individual had to:

- file a non-transitional claim in one of the selected offices between July, 1988 and October, 1989,
- indicate on union or employer attachment,
- apply for benefit starting no more than 2 weeks before their selection day,
- be separated from their old job for reasons other than a labour dispute

These eligibility criteria were imposed to increase the homogeneity of the sample and thus ensure that possible differences in the response could be attributed primarily to variation in treatment. Claimants who filed for a transitional claim were excluded because of the likelihood of a previous job offer. For the same reason there was exclusion from the experiment of individuals who indicated that it was possible they could find a new job through a union channel rather than the market, or if they were waiting for some definite recall within 60 days from their former employer. This category of claimants was very unlikely to respond to a bonus offer by searching for a new job intensively. The bonus payments would simply constitute a "windfall" gain for them. The fourth eligibility criterion was established to attain the operational goal of the program to offer bonuses to claimants as soon as possible after they became eligible for UI. On the other hand, the Pennsylvania UI system permits backdating applications as long as claimants had been eligible for benefits during previous weeks. Requiring the unemployed not to have been separated from the most recent employer due to a labour dispute was dictated from the need to conduct a test for the effectiveness of job-search services; state and federal regulations prohibit the provision of such services to such claimants.

2.3. THE DATA

The final collected sample was the result of fifty-two weekly sub-samples selected in all twelve offices beginning on October 26, 1988. Prior to that date, fifteen weekly sub-samples were drawn from the Pittston site for a pilot test of all operations, which are also included in the final "collected-sample". Thus, the enrolment period for the experiment started July 1988 and ended October 1989. The design target was to identify and select 13,120 claimants with each site contributing roughly 1,100 individuals in total and a weekly target of 21 claimants per site. However, since some claimants who initially apply for benefits do not return to a local office to file further, a larger sample was selected to achieve the desired sample size for analysis. Thus a sample ranging from 22 to 40 claimants was selected at each office per week, depending on the historical experience. Overall, 15,005 individuals were initially selected to participate in the demonstration. A total of 14,086 individuals filed for a week of UI and were included in the study. *TABLE 2.2.* presents the distribution of the final sample by treatment group under the header "Collected n". Missing values for certain variables that are needed as covariates during our data analysis stage necessitated that we restrict our attention to a total of 13,913 subjects; the last column of *TABLE 2.2.* presents the allocation of our analysis sample over the control and the six experimental groups.

An examination of the distribution of claimants in each treatment group by quarter of entry into the experiment confirms two interventions that took place during the enrolment period. One change was dictated by the low participation rate in the job-search assistance services provided along with the group of treatments 1 to 5. As previously noted, the attendance in the workshop was less than 3%, which made the fourth and the sixth treatments indistinguishable. Therefore, as of July 1989-four month before the end of the experiment-individuals who would have been assigned to treatment 6 were assigned to other treatments. A second change was made because preliminary demonstration results showed that treatment 1 had a larger than expected effect. Initially, only a small proportion of the total sample was assigned to this treatment due to its perceived low policy significance. Beginning October 1989, experimenters increased its sample. This change is reflected in a relatively high percentage, 18.3%, of entries during the last quarter.

A detailed description of the characteristics of the claimants under study can be found in Corson *et al*. (1992). Age, race, gender, number of dependents, location in the state, existence of recall expectations, and type of occupation have been recorded. Standard χ^2- tests for nonrandomness of the allocations to the 7 treatments for each of the covariates fall well within conventional confidence limits, confirming the success of the randomnization procedure. Categorical variables related to these characteristics are used in our model - the coding was chosen as follows:

- *RECALL*: 1 if the claimant answered "yes" when asked if he/she had any expectation to be recalled to his/her prior job
- *BLACK*: 1 if the claimant is black, 0 otherwise
- *HISPANIC*: 1 if the claimant is hispanic and 0 otherwise
- *OTHRACE*: 1 if the claimant is neither black, nor hispanic nor white, 0 otherwise
- *FEMALE*: 1 for female claimant, 0 for male
- *LUSD*: 1 if the claimant filed in one of the three sites that were considered to be characterised by low unemployment rate and therefore shorter durations of unemployment, 0 otherwise.
- *MULD*: 1 if the claimant filed in one of the five sites that were considered to be characterised by moderate unemployment rate and long duration of unemployment, 0 otherwise.
- *HUSD*: 1 if the claimant filed in one of the three sites that were considered to be characterized by high unemployment rate and short duration of unemployment, 0 otherwise.
- *DURABLE*: 1 if the occupation of the claimant was in the sector of durable manufacturing, 0 otherwise
- *NONDURABLE*: 1 if the occupation of the claimant was in the sector of nondurable manufacturing, 0 otherwise
- *DEP*: indicates the number of dependents of the claimant. Coded 0, 1, or 2 if the number of dependents is 2 or greater
- *AGELT35*: 1 if the claimant's age was less than 35 years, 0 otherwise
- *AGEGT54*: if the claimant's age was more than 54 years, 0 otherwise
- *Q1,…Q5*: five indicator variables indicating the quarter of enrolment of each claimant
- *TG0,…,TG5*: indicator variables indicating the treatment group 0,…,5 (characterized by bonus amount and qualification period) in which each claimant was enrolled

Payment of Unemployment Insurance (UI) in Pennsylvania usually starts after one waiting week and the potential UI duration of the vast majority (99 percent) was 26 weeks. Looking at the exit rates in week 1 and in week 27, we realize that they have extreme peaks for these weeks. Due to the exponential form of the Cox-PH-Model, a high peak of the exit rates at week one is not supposed to affect the fit of the model in an absolutely unreasonable way, but the peak at week 27 constitutes a considerable irregularity. Therefore, this paper will present two analyses: One analysis based on the whole data-set (hereafter referred to as case (I)) and a second analysis based on a reduced data set: All individuals with unemployment durations higher than 26 weeks are excluded (hereafter referred to as case (II)).

Furthermore, we chose to pool the claimants assigned to treatments 4 and 6 into a single treatment, which is referred to as treatment 4. A rationale for this is given in the other papers on the Pennsylvania Bonus Experiments. Like our predecessors, we assume that the process of randomly attributing the subjects to the experimental groups was effective. It follows that the treatment effect is considered to be exclusively responsible for the differences in the length of the unemployment spells.

3. FITTING THE COX-MODEL

3.1. THE COX -MODEL

Translating the experimental situation into the language of our survival framework, the time from entering the study until an individual leaves the unemployment status is interpreted as the *survival time* for this individual. Consequently, the phenomenon that an individual becomes reemployed is an *event* in our model

Doksum and Gasko (1990) provide a very useful survey of survival analysis emphasizing the fundamental link with binary response models and the transformation model

$$h(T_i) = x_i'\beta + u_i \qquad (1)$$

Many important parametric and semiparametric models may be expressed in this form: some monotone transformation of an observed survival time, T_i, represented as a linear predictor plus iid error.

In the Cox proportional hazards model (hereafter: Cox-PH-model), which is undoubtedly the leading example, we have

$$\log h(t \mid x) = \log h_0(t) + x'\beta \qquad (2)$$

Due to the baseline-hazard $h_0(t)$ being an unspecified function, the Cox-PH-model is a semiparametric model. Even though the baseline hazard is not specified, the Cox-PH-model is considered to yield reasonably good estimates of regression coefficients, hazard ratios and adjusted survival curves; it is a relatively robust model, which is probably the key reason for its popularity. Since we cannot be totally sure about the correct parametric model, the Cox-PH-model is a sensible choice.

According to the Cox-model, the hazard for individual j is specified as

$$h_j(t,x) = h_0(t)\exp(X_j(t)\,\beta) \qquad (3)$$

Here, $h_0(t)$ is the aforementioned baseline hazard, an unspecified nonnegative function of time, $\beta = (\beta_1 ... \beta_p)$ is the vector of coefficients and $X_j = (X_{j,1},...,X_{j,p})$ is the vector of covariates of subject j.

The survival function based on the Cox-model then has the form:

$$S(t,X) = \left[S_0(t)\right]^{exp(X_j(t)\beta)}, \qquad (4)$$

where $S_0(t)$ is the baseline survival function.

We anticipate here that the covariates of the Cox-model presented in this paper are fixed - this will be motivated later. The proportional hazards assumption of the Cox-model means that the hazard ratio for a model with covariates that are independent of time is constant over time:

$$HR = \frac{\hat{h}(t, X^*)}{\hat{h}(t, X)} = \frac{\hat{h}_0(t, X^*)\exp(\mathrm{X}^*(t)\,\beta)}{\hat{h}_0(t, X)\exp(\mathrm{X}(t)\,\beta)} = \exp((\mathrm{X}^* \text{-} \mathrm{X})\,\beta) \qquad (5)$$

Here, X and X* denote two different specifications of the explanatory variables; we can think of two different individuals or two different groups.

In our model, the hazard h(t,X) can be interpreted as the instantaneous potential per time unit for an individual to get reemployed, given that the individual was unemployed up to time t. Due to the proportional hazards assumption, the hazard ratio for two different values of one covariate is the same regardless of time.

Nonproportionality appears in the form of time-varying coefficients. There are several methods to test the proportional hazards assumption for the different covariates, but even if there is strong evidence of nonproportionality, often the Cox-PH-model is still the best and most robust choice one can make (see Therneau and Grambsch (2000) for further details).

One common method to test nonproportionality is based on the Schoenfeld-residuals, as proposed in Schoenfeld (1980). Since we added a very small, normally distributed random noise to the event weeks, we do not have tied event times, and in this case the Schoenfeld residuals s_k correspond to the simple expression:

$$s_k = X_{(k)} - \bar{x}(\hat{\beta}, t_k), \qquad (6)$$

where $\bar{x}(\hat{\beta}, t_k)$ is the weighted mean of the covariates over those still unemployed at time t_k. $X_{(k)}$ is the covariate vector of the individual experiencing the k-th event, at the time of that event.

The test for nonproportionality we use here simply tests whether the least squares line fitted to the scaled Schoenfeld residuals of a certain covariate has slope 0, which would indicate proportional hazards for the particular covariate. For both versions of our model, (I) and (II), the nonproportionality-test is highly significant for the variable *RECALL* (Chi-Square=354 for (I) and Chi-Square=372 for (II)). For both versions, we find some other variables that are significant, but for all variables the significance is totally different in (I) and (II). E.g. the variable *AGELT35* is not significant for the short version (p=0.79), but it is highly significant for the long version (p=0.000017). Apparently, *RECALL* is the only covariate that significantly varies with time and in both versions. All other variables do vary slightly over the run, but the assumption of a fixed covariate is still reasonable and - as we will see later - still allows for a relatively good fit of our Cox-PH-model. The PH-assumption turns out to be reasonable for all our covariates except from *RECALL*, since we expect all other covariates to have a more or less constant influence on the hazard rate over the whole time of the experiment.

3.2. INFLUENCE ANALYSIS AND STRATIFICATION

Before we introduce stratification - one of the concepts that is applied to covariates, such as *RECALL*, that are obviously nonproportional - we will propose a method how we can get some information about the effect of a particular covariate on the survival distribution at different quantiles. Similar to the regular case of an ordinary least squares fit, residuals in a Cox-model can be used to assess the impact of each point on the fit of a model. Reid and Crépeau (1985) show a nice derivation of the dfbeta-residual-matrix. Those dfbeta-residuals are the approximate change in the coefficient vector if that observation were dropped. Due to the exponential form of our survival distribution, most observations are made in the lower tail of the distribution. Therefore, dfbeta-residuals that measure the *influence* of each point and that are very "sensitive" in the upper tail - far from the mean of the observations - yield significantly better results in showing the time dependency of *RECALL* than plotting Schoenfeld- or deviance-residuals. Using the influence works like a magnifying glass that is especially important in our survival curve. The dfbeta-residuals can be computed based on a slightly changed Newton-Raphson algorithm that estimates the influence of each point by dropping the points successively. *FIGURE 3.1.* and *FIGURE 3.2.* present a residual plot for the *RECALL*-covariate. This residual-plot is based on the short data set (II); this corresponds to choosing the quantile τ such that $\tau \le 0.8$. *FIGURE 3.1.* shows the dfbeta-residuals ordered by index of the observation. Note that those 1364 observations where the subjects have anticipated recall to their prior job, have deliberately been indexed with the highest numbers, e.g. their index is higher than 9421.

In the dfbeta-plot, an observation has a negative dfbeta-residual if its removal caused $\hat{\beta}$ (the corresponding coefficient for the fitted model) to increase. The interpretation is obvious: The residuals for the subjects that indicated recall (index > 9421) are below zero in the lower tail of the distribution, and above zero in the upper tail. A smoothing line through those residuals (with *RECALL*=1) had a positive slope, indicating that the residuals for those subjects tend to ask for a lower fitted value of $\hat{\beta}$ for the lower tail of the distribution, but for a higher fitted value of $\hat{\beta}$ for the upper tail of the distribution. This has an interesting interpretation: Anticipated recall to one's prior job has an estimated detrimental effect over the lower tail, i.e. subjects with recall expectation made less efforts to become reemployed in the first weeks of their unemployment. *FIGURE 3.2.* makes that clear. Here, we plotted the residuals over the event time. *FIGURE 3.1.* has shown that the line of residuals with the positive slope can be attributed to those subjects that anticipated recall, and the line with the negative slope is the line for those individuals that had not anticipated recall. We performed this graphical analysis by just fitting the model to the covariate *RECALL*. However, the result is nearly identical if we plot the residuals after having fitted the model including all significant covariates.

Note that this interpretation here is not limited to a certain group of people, such as white males, but we included the whole dataset (up to event week 26) in this plot. Certainly, this idea can also be limited to only a particular group, and - depending on the chosen subgroup - the effect can be seen to be even stronger or weaker. However, we have to keep in mind that the graphical argument given above is rather qualitative, no quantitative information about the strength of the effect is obtained and the confidence of this interpretation is not measured.

The dfbeta-residual plot also shows useful results for other covariates. But since the time-dependency of the *RECALL* variable was obviously the strongest of all covariates (as the test for nonproportionality has shown), the presentation of the residual-plot of the *RECALL* variable is the most interesting.

There are two ways of dealing with the *RECALL*-variable: We can introduce time-dependent covariates or we can stratify on the *RECALL*-covariate. In our case, it would make sense to fit the model to the new covariate *RECALL*Time*, instead of simply fitting it to the covariate *RECALL*. This way, the effect of the covariate *RECALL* would increase over time and a better fit could be expected according to what the graphical analysis above has shown. Due to the small proportion of the recall-subjects, the success of the introduction of this time-dependency was is rather modest - no better fit (as measured by the value of the partial-likelihood) can be achieved. Therefore, we decide to stratify on the *RECALL*-covariate.

According to the *general stratified Cox model*, the hazard for individual j is given as:

$$h_{g,j}(t,x) = h_{g,0}(t)\exp(\mathrm{X}_{\mathrm{j}}(t)\,\beta)\,. \qquad (7)$$

g = 1,2,…,k are the strata that are defined as the different categories of the stratification variable. Consequently, in our case k = 2, i.e. we have 2 strata, *RECALL=0* and *RECALL=1*.

Note that the stratified variable is not explicitly included in the model, this means that due to stratification, *RECALL* is not a covariate any more. The notation shows that the baseline hazard function $h_{g,0}(t)$ is different for each stratum. However, the coefficients $\beta_1,...,\beta_{\mathrm{p}}$ are the same for each stratum. As a consequence, the estimates of hazard ratios are also the same for each stratum.

But since the baseline hazard functions are different for each stratum, the fitted stratified Cox-PH-model will yield different estimated survival curves for each stratum. This is exactly what we want to achieve since the RECALL covariate has an influence on the survival curve that is strongly time-dependent.

3.3. FITTING THE COX-PH-MODEL WITH THE STEPWISE REGRESSION PROCEDURE

A major interest of this survival analysis is to identify from the many available covariates a small subset of prognostic factors that relate significantly to the length of the unemployment time of the subjects. Including a predictor that has no real relationship to survivorship should certainly be avoided, i.e. the type I - error has to be minimized. To achieve this, we proceed similar to the case of standard multiple regression analysis: According to a specified criterion for including a covariate, we add into or remove the covariates from the model, one at a time. Of course, the most significant covariate is automatically chosen first.

Le (1997) proposes the *stepwise regression procedure* for fitting a survival model. Our criterion is the value of the likelihood ratio chi-squared statistic, which is applied after each removal or addition of a new covariate:

$$\chi^2_{LR} = 2[\ln L(\hat{\beta}, X_1,..., X_n) - \ln L(\hat{\beta}, X_1,..., X_{i-1}, X_{i+1},..., X_n)] \qquad (8)$$

Note that the likelihood function $L(\cdot)$ used here is the *partial likelihood* function introduced by Cox, (1972).

For fitting our model, we choose a significance-level of 0.05 for the likelihood ratio chi-squared statistic and - due to its relevance for our interpretation - the variables indicating the treatment group, *TG1,…,TG5*, are a priori included as a covariate. (The variable *TG0* is not included since it causes convergence problems of the Newton-Raphson-algorithm - but the interpretation of the results is still straightforward.)

The long data set (I) then yields the following sequence of covariates added to the model (sorted by the order they have been added to the model):

AGEGT54 - *AGELT35* - *LUSD* - *FEMALE* - *NONDURABLE* - *BLACK* - *HISPANIC* - *DURABLE* - *Q4*

TABLE 3.1. shows estimates for the covariate-coefficients together with their significance after fitting the model to all covariates that have been found by the stepwise regression procedure:

For the short data set (II), the following sequence of covariates has been added to the model:

BLACK - *Q2* - *AGELT35* - *NONDURABLE* - *LUSD* - *HISPANIC* - *AGEGT54* - *DEP* - *OTHRACE* - *MULD*

The table below gives the coefficient estimates and their significance:

Obviously the likelihood ratio test is much better for the long data set (I). Furthermore, we see that we have 9 significant variables (we do not count the treatment indicator variables here) for (I) but 10 significant variables for (II) and that the signifcant covariates (and also their ordering) are not the same in both cases. There are 6 variables that are significant in both models: *AGEGT54*, *AGELT35*, *LUSD*, *NONDURABLE*, *BLACK* and *HISPANIC*. The effects are similar in both models; however, the absolute effect is stronger for *BLACK* and *HISPANIC* in version (II) but stronger for *AGELT35*, *LUSD* and *AGEGT54* in version (I).

3.4. COMPARISON WITH THE RESULTS OBTAINED BY THE QUANTILE REGRESSION AND THE LINEAR REGRESSION

Are these results approximately as anticipated in the quantile regression analysis? We have to keep in mind that the covariates in the Cox-PH-model act as a scale shift of the baseline hazard. A particular coefficient obtained by fitting our model characterizes the effect over the entire distribution without paying special attention to the effect at certain quantiles of the distribution.

Koenker&Xiao's (2001) results show that "not only the treatment effect of the bonus payment, but many other of the covariates appear to affect the conditional distribution of unemployment duration in ways that are poorly approximated either by pure location and/or scale shifts." The pure scale shift assumption of the survival model proposed here obviously paints a less complete picture of the varied effects of the covariates on the survival, but for assessing the overall effect of one covariate on the expected mean or median unemployment time, we have to rely on these "condensed" coefficients.

In both versions, *AGEGT54* has a negative effect on the hazard, meaning that the unemployment spell of individuals that are older than 54 years is generally longer. This can be expected from the quantile regression results. Surprisingly, the linear regression in the Final Report yields a positive effect of *AGEGT54* on the hazard - but the reported effect is less strong than that for the other age-groups (Ages 25-34 and Ages 35-54). The coefficient of *AGELT35* is positive in both the linear and the quantile regression, indicating that young people are reemployed more quickly. This corresponds to the results in all other analyses. As expected, *LUSD* has a negative effect on the unemployment duration, this corresponds to the findings of the quantile regression and the linear regression. *NONDURABLE* has a positive impact on the hazard, implying that the unemployment duration for subjects working in the sector of nondurable manufacturing is generally lower. In the linear regression case, *NONDURABLE* also had a negative influence on the employment duration; it has not been tested in the quantile regression.

BLACK has very strong positive effect on the hazard in the short version (II), and a considerably weaker positive effect in the long version (I). These results correspond to the linear and the quantile regression. Additionally, a graphical influence analysis as in section 3.2. shows that the positive effect of the covariate *BLACK* is most distinct in the lower tail of the distribution. This explains why the coefficient is much higher in the shorter version (II) of the model. The positive effect of *HISPANIC* corresponds to the findings in the linear and the quantile regression. In (II), *Q2* has a negative effect on the hazard, meaning that entering the study in the second quarter generally decreased the exit rate. The quantile regression shows an opposite result: Here, entering the study in *Q2* reduced the duration of unemployment, mostly in the centre of the distribution. For the covariates *Q1*, *Q3*, *Q4* and *Q5*, this effect was seen to be stronger - this explains why *Q2* has a negative effect on the hazard in our model.

All other coefficients correspond to the findings in quantile and linear regression. It is interesting to note that variables such as *DEP*, where the quantile regression shows nearly no effect in the upper tail, are not significant in the longer version, but they are significant in the shorter version.

Of course, the main idea of the whole experiment was to examine the impact of the different treatments on the unemployment spell. With regard to the treatment effects, both versions of the model generate qualitatively similar results. Treatment 4, offering the high bonus amount and the long duration of qualification period, was not only the most effective in reducing the unemployment spell, but also the most significant in both versions of the model. Treatment 2 has a less strong negative effect on unemployment time than treatment 4; unlike the results of the linear regression, treatment 1, 3 and 5 have a very weak effect on the unemployment reduction. Looking at the confidence intervals, we even see that they have no significant effect. Moreover, the confidence bands show that *all* our conclusions regarding the treatment effects stand on relatively shaky ground.

Based on the PH-assumption, we can conclude from the short model for example that a member of treatment group 4 has a 1.095 fold increase of its probability to leave unemployment in the next time-step in comparison to a member in the control group. Remember that the scale-shift assumption becomes very clear here: In the Cox-PH-Model Treatment 4 just causes a scale shift of the survival distribution, not reflecting the fact that was found in the QR-regression, that the effect of TG4 is very strong in the 2^{nd} and 3^{rd} quartile of the distribution, but very weak in the first and the last quartile.

From a policy standpoint, information on the mean or median unemployment time in response to different treatments is more interesting - e.g. for a benefit-cost analysis - than an analysis of the treatment effects on the hazard.

Since it obviously doesn't make sense in our case to create something like a "mean individual", the estimates for mean and median survival time are calculated for the following covariate values (Individuals with these characteristics were very frequent in the sample):

Long version (I):

AGEGT54=0, AGELT35=0, LUSD=0, FEMALE=0, NONDURABLE=0, BLACK=0, HISPANIC=0, DURABLE=0, Q4=0

Short Version (II):

BLACK=0,Q2=0,AGELT35=0,NONDURABLE=0,LUSD=0,HISPANIC=0,AGEGT54=0,DEP=0 OTHRACE=0, MULD=0

After having estimated the baseline hazard $h_0(t)$ for each of the two strata we can calculate the survival function as presented in equation (2). Then, for the median survival time T_{median}, we have: $S(T_{median}) = 0.5$.

The mean survival time T_{mean} is calculated as the area under the survival curve:

$$T_{mean} = E(T) = \int_0^\infty S(t)dt \qquad (9)$$

There is a discussion on whether the mean or the median survival time is more meaningful. Since we want to compare our results to the results of the linear regression, we should focus on the mean survival time instead of the median survival time. The following brief proposition explains why:

Proposition: *The mean survival as calculated in the Final Report is the same as the area under the Kaplan-Meier-survival-curve of the long data set (1).*

Proof. Note that our model is discrete in time (time unit = [weeks]). In the Final Report, the mean survival time MSF is then calculated as:

$MSF(T) = \sum_{t=1}^{T} \frac{P(t-1) - P(t)}{PT} \cdot t$, where P(t) is the number of people that are still unemployed at time t. PT is the total number of people that take part in the experiment. Obviously: P(0)=PT. T is the total number of weeks of the analysed experiment, in our case T=52.

According to the Kaplan-Meier-estimate, the surviving proportion of people at time t is $\frac{P(t)}{PT}$.

Then the mean survival time MSK is calculated as the area under the Kaplan-Meier-survival curve:

$$MSK(T) = \sum_{t=0}^{T} \frac{P(t)}{PT}.$$

Remember that we have no censored events. This implies that at we have no unemployed individual at the end of the experiment, after 52 weeks. The estimates for the mean survival time of the Final Report have been calculated based on the 13913 individuals that are registered as reemployed in week 52. No censoring implies that P(52)=P(T)=0.

Now, Complete Induction helps:

Induction Start: T=1

$$MSK(1) = \frac{1}{PT}(P(0) + P(1)) = \frac{1}{PT} PT = 1 = \frac{1}{PT}(P(0) - P(1)) = \frac{1}{PT} PT = MSF(1)$$

Induction Step: T → T+1

$$MSK(T+1) = MSK(T) + \frac{1}{PT} P(T)$$

$$MSF(T+1) = MSF(T) + \frac{1}{PT}(-P(T)) \cdot T + \frac{1}{PT}(P(T) - 0) \cdot (T+1) = MSF(T) + \frac{1}{PT} P(T)$$

Since *MSF(T)=MSK(T)* by hypothesis, we find the desired result: *MSF(T+1)=MSK(T+1)*

Obviously, this result holds in general for all uncensored and time-discrete survival distributions.

The following tables[1] present the results. Note that the two different strata have different survival curves, as expected.

Long version (I):

Short version (II):

If we look at the change of unemployment weeks in response to the different treatments, we find the results that we have expected from our analysis of the treatment covariates. The results for the mean unemployment duration are generally the same as those in Corson *et al.* (1992) and in Meyer (1995), although - logically - the induced reduction in unemployment spell is lower in the results of the short version (II). The weakness of the effect of treatment 3 in the long version is remarkable, especially in comparison with the linear and the quantile regression results. However, the standard errors are significantly lower than in the other studies based on linear regression (in these studies, we have standard errors from 0.26 to 0.34). This can be attributed to the survival regression that provides a better fit than a linear regression. Note also that the standard errors are the lowest in the short version of the model. In this version, we avoided the huge "irregularity" in week 27. A general comparison with the linear regression results shows that the survival analysis implies less strong treatment effects than the linear regression.

We conclude this analysis with a graph of the Kaplan-Meier estimate of the survival, along with pointwise 95% confidence intervals (figure 3.3). The shape of this curve shows that the idea of using the Cox-model to analyse the data instead of a standard linear regression model is quite reasonable, at least if we restrict ourselves to the observations with event-time smaller than 26 weeks. The small standard errors in the mean survival time analysis of version (II) seem to confirm that. For investigating covariate effects, and especially for comparing the short-term treatment effects, the restriction to a shorter data set might be reasonable and yields reliable estimates, since the Cox-PH-model provides a good fit in our case.

4. Conclusion

We have shown that the Pennsylvania Reemployment Bonus Experiment can be analysed with a survival analysis framework and a reasonable fit is obtained. The results are similar to the results obtained in the Final Report of this experiment. However, the standard errors for the mean unemployment time *TABLE 2.3.* and *TABLE 2.4.* are considerably lower than those obtained in the linear regression framework of the Final Report. This shows that our survival model is helpful for an analysis of different covariate effects in the Pennsylvania Bonus Experiment data - here the survival analysis seems to outperform the linear regression approach; but since random sampling of the experiment is generally considered to be accurate, this shouldn't have important implications for the overall results and the cost-benefit analysis of the Pennsylvania Experiment. The overall results of the survival analysis present a slightly less optimistic picture of the effectiveness of the different treatments than the linear regression.

The comparison with the quantile regression approach has shown that - despite its good fit - the Cox-PH-model with its underlying assumption that the fixed covariates act as a scale shift of the baseline hazard is still very restrictive. A detailed influence analysis shows that most covariates effectively not only cause a scale shift, but the Cox-PH-model proposed in this paper doesn't account for this. This became especially apparent when we compared the covariate-coefficients of version (I) and version (II) and we found that those covariates that have a strong effect in the lower quartiles of the distribution, but a low effect in the upper quartiles, also had a stronger effect in version (II) that is only based on the data up to week 26.

REFERENCES:

[1] Chap T. Le (1997). Applied Survival Analysis. Wiley-Interscience. New York.

[2] Chen, C.H. and P.C. Wang (1991). Diagnostic plots in Cox's regression model. *Biometrics*, **47**, 841-850

[3] Cox, D.R. (1972). Regression models and life tables (with discussion). *Journal of the Royal Statistical Society B*, **34**, 187-220

[4] Cox, D.R and D. O. Oakes (1984). Analysis of Survival Data. Chapman and Hall. London.

[5] Corson, W., Decker, P., Dunstan, S., and Keransky, S. (1992*)*. Pennsylvania Reemployment Bonus Demonstration: Final Report. Unemployment Insurance Occasional Paper, 92-1. US-Dept of Labor, Employment and Training Administration, Washington D.C.

[6] Doksum, K. and M. Gasko (1990). On a correspondance between models in binary regression and Survival Analysis*. Intl. Stat. Review*, **58**, 243-252

[7] Koenker, Roger and Yannis Bilias (2001). Quantile Regression for Duration Data: A Reappraisal of the Pennsylvania Reemployment Bonus Experiments. *Empirical Economics*. Forthcoming

[8] Koenker, Roger and Zhijie Xiao (2001). Inference on the Quantile Regression Process. *Preprint.* UIUC Department of Economics.

[9] Meyer, B. (1995). Lessons from the U.S. unemployment insurance experiments. *Journal of Economic Literature*, **33**, 91-131

[10] Meyer, B. (1996). What have we learned from the Illinois reemployment bonus experiment. *Journal of Labor Economics*, **14**, 26-51

[11] Reid, N. and H. Crépeau (1985). Influence functions for proportional hazards regression. *Biometrika*, **72**, 1-9

[12] Schoenfeld, D. (1980). Chi-squared goodness-of-fit tests for the proportional hazards regression model. *Biometrika*, **67**, 145-153

[13] Therneau, Terry M. and Patricia M. Grambsch (2000). Modeling Survival Data. Extending the Cox Model. Springer. New York.

[14] Woodbury, S.A. and Spiegelman, R.G. (1987). Bonuses to workers and employers to reduce unemployment: randomized trials in Illinois. *American Economic Review*. **77**, 513-530

FOOTNOTES:

1) The fact that the numbers for the median results always have the decimals .98,.99,.00,.01,.02 comes from the fact that some normally distributed noise in the range [-0.02,…,+0.02] has been added to the integer duration data (measured in weeks) in order to prevent ties.

TABLES AND FIGURES:

TABLE 2.1. TREATMENT GROUPS.

Group	Bonus Amount	Qualification Period	Workshop Offer
Controls	0	0	No
Treatment 1	Low	Short	Yes
Treatment 2	Low	Long	Yes
Treatment 3	High	Short	Yes
Treatment 4	High	Long	Yes
Treatment 5	Declining	Long	Yes
Treatment 6	High	Long	No

Note: The low bonus was 3 times UI weekly benefit amount, the high benefit was 6 times this amount. The declining bonus declined from 6 times the weekly benefit to zero, over a 12 week period. The short qualification period was 6 weeks, and the long period was 12 weeks.

TABLE 2.2. TARGET, COLLECTED AND ANALYSIS SAMPLE SIZES.

Group	Target m	Collected n	Analysis n
Controls	3,000	3,392	3,354
Treatment 1	1,030	1,395	1,385
Treatment 2	2,240	2,495	2,428
Treatment 3	1,740	1,910	1,885
Treatment 4	1,590	1,771	1,745
Treatment 5	1,740	1,860	1,831
Treatment 6	1,780	1,302	1,285
Total	13,120	14,086	13,913

FIGURE 3.1. INFLUENCE GRAPH I

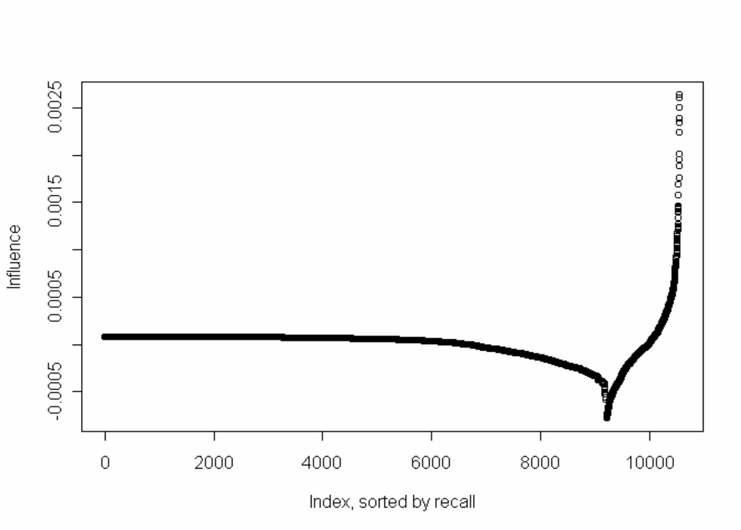


FIGURE 3.2. INFLUENCE GRAPH II

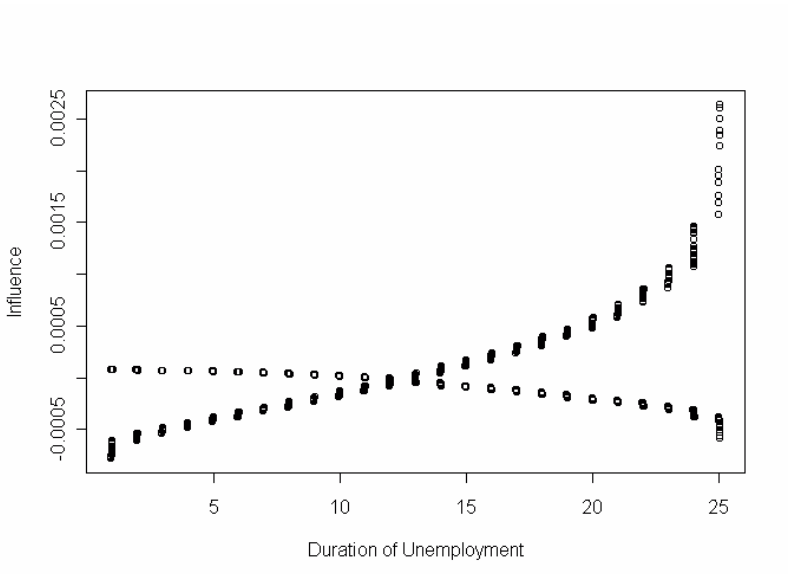


TABLE 3.1. RESULTS FOR THE LONG DATA SET (I)

n = 13913	$\hat{\beta}_i$	exp($\hat{\beta}_i$)	se($\hat{\beta}_i$)	z	p	lower .95	upper .95
TG1	0.0358	1.036	0.032	1.119	2.60E-01	0.973	1.103
TG2	0.05816	1.06	0.0267	2.18	2.90E-02	1.006	1.117
TG3	0.00292	1.003	0.0288	0.101	9.20E-01	0.948	1.061
TG4	0.09433	1.099	0.0251	3.756	1.70E-04	1.046	1.154
TG5	0.02301	1.023	0.0291	0.791	4.30E-01	0.967	1.083
AGEGT54	-0.31552	0.729	0.0304	-10.376	0.00E+00	0.687	0.774
AGELT35	0.1643	1.179	0.0185	8.891	0.00E+00	1.137	1.222
LUSD	0.13086	1.14	0.0195	6.726	1.70E-11	1.097	1.184
FEMALE	-0.10846	0.897	0.0176	-6.175	6.60E-10	0.867	0.929
NONDURABLE	0.13341	1.143	0.0276	4.837	1.30E-06	1.083	1.206
BLACK	0.12431	1.132	0.0267	4.648	3.40E-06	1.075	1.193
HISPANIC	0.16166	1.175	0.0456	3.541	4.00E-04	1.075	1.285
DURABLE	-0.05597	0.946	0.0246	-2.277	2.30E-02	0.901	0.992
Q4	0.0421	1.043	0.0202	2.088	3.70E-02	1.003	1.085
Likelihood ratio test			486 on 14 df, p=0				
Wald test			466 on 14 df, p=0				
Score (logrank) test			471 on 14 df, p=0				

TABLE3.2. RESULTS FOR THE SHORT DATA SET (II)

n = 10784	$\hat{\beta}_i$	exp($\hat{\beta}_i$)	se($\hat{\beta}_i$)	z	p	lower .95	upper .95
TG1	0.04507	1.046	0.0367	1.2298	2.20E-01	0.974	1.124
TG2	0.07509	1.078	0.0303	2.4772	1.30E-02	1.016	1.144
TG3	0.0625	1.064	0.0329	1.8975	5.80E-02	0.998	1.135
TG4	0.0905	1.095	0.0285	3.1795	1.50E-03	1.035	1.158
TG5	-0.00105	0.999	0.0332	-0.0315	9.70E-01	0.936	1.066
BLACK	0.35167	1.421	0.032	10.9902	0.00E+00	1.335	1.513
Q2	-0.16239	0.85	0.0241	-6.7382	1.60E-11	0.811	0.891
AGELT35	0.05845	1.06	0.0212	2.7611	5.80E-03	1.017	1.105
NONDURABLE	0.13045	1.139	0.0304	4.2912	1.80E-05	1.073	1.209
LUSD	0.06281	1.065	0.0258	2.4336	1.50E-02	1.012	1.12
HISPANIC	0.19449	1.215	0.0508	3.8269	1.30E-04	1.1	1.342
AGEGT54	-0.11053	0.895	0.0364	-3.038	2.40E-03	0.834	0.962
DEP	-0.03731	0.963	0.0128	-2.9096	3.60E-03	0.939	0.988
OTHRACE	0.27849	1.321	0.1289	2.1613	3.10E-02	1.026	1.701
MULD	-0.05149	0.95	0.0244	-2.1108	3.50E-02	0.905	0.996
Likelihood ratio test			249 on 15 df, p=0				
Wald test			257 on 15 df, p=0				
Score (logrank) test			257 on 15 df, p=0				

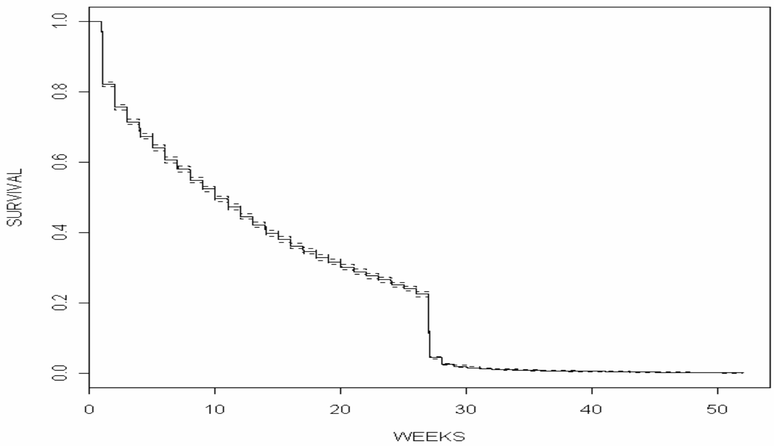
TABLE 3.3. SURVIVAL TIMES FOR DIFFERENT TREATMENTS - LONG VERSION (I)

Treatment Group	*RECALL*	mean	se(mean)	median	0.95 LCL	0.95 UCL
0	0	13.9	0.109	12.0	11	13.0
	1	14.5	0.224	13.01	13	14.0
1	0	13.6	0.105	11	10.0	12
	1	14.2	0.215	13	13.0	14
2	0	13.4	0.102	11.02	10.0	12.0
	1	14.1	0.209	13.0	12.0	14.0
3	0	13.9	0.108	12.0	10.0	13.01
	1	14.5	0.223	12.99	13.0	14.
4	0	13.0	0.0987	10	9	11
	1	13.8	0.2005	13	12	13
5	0	13.7	0.106	11	10	12.01
	1	14.3	0.218	13	13	14

TABLE 3.4. SURVIVAL TIMES FOR DIFFERENT TREATMENTS - SHORT VERSION (II)

Treatment Group	*RECALL*	mean	se(mean)	median	0.95 LCL	0.95 UCL
0	0	8.57	0.0846	6	5.98	6.98
	1	12.18	0.1698	12	12.00	12.02
1	0	8.24	0.0799	5.99	5.0	6.01
	1	11.93	0.1625	12.00	12.0	12.01
2	0	8.03	0.0768	5.01	5.0	6
	1	11.76	0.1578	12.00	12.0	12
3	0	8.12	0.078	5.98	5.0	6
	1	11.83	0.160	12.00	12.0	12
4	0	7.92	0.0752	5.01	5.0	6
	1	11.68	0.1555	12.00	11	12
5	0	8.57	0.0847	6	5.02	6.99
	1	12.18	0.1700	12	11.99	12.02

FIGURE 3.3. KAPLAN-MEIER SURVIVAL CURVE (WITH TWO-SIDED 0.95-CONFIDENCE INTERVAL)



Nr.	Author	Title
03-34	Volker Stocké Bettina Langfeldt	Umfrageeinstellung und Umfrageerfahrung. Die relative Bedeutung unterschiedlicher Aspekte der Interviewerfahrung für die generalisierte Umfrageeinstellung
03-33	Volker Stocké	Measuring Information Accessibility and Predicting Response-Effects: The Validity of Response-Certainties and Response-Latencies
03-32	Siegfried K. Berninghaus Christian Korth Stefan Napel	Reciprocity - an indirect evolutionary analysis
03-31	Peter Albrecht Cemil Kantar	Random Walk oder Mean Reversion? Eine statistische Analyse des Kurs/Gewinn-Verhältnisses für den deutschen Aktienmarkt
03-30	Jürgen Eichberger David Kelsey Burkhard Schipper	Ambiguity and Social Interaction
03-29	Ulrich Schmidt Alexander Zimper	Security And Potential Level Preferences With Thresholds
03-28	Alexander Zimper	Uniqueness Conditions for Point-Rationalizable Solutions of Games with Metrizable Strategy Sets
03-27	Jürgen Eichberger David Kelsey	Sequential Two-Player Games with Ambiguity
03-26	Alain Chateauneuf Jürgen Eichberger Simon Grant	A Simple Axiomatization and Constructive Representation Proof for Choquet Expected Utility
03-25	Volker Stocké	Informationsverfügbarkeit und Response-Effects: Die Prognose von Einflüssen unterschiedlich kategorisierter Antwortskalen durch Antwortsicherheiten und Antwortlatenzen
03-24	Volker Stocké	Entstehungsbedingungen von Antwortverzerrungen durch soziale Erwünschtheit. Ein Vergleich der Prognosen der Rational-Choice Theorie und des Modells der Frame-Selektion

Nr.	Author	Title
03-23	Daniel Schunk	Modeling the Use of Nonrenewable Resources Using a Genetic Algorithm
03-22	Brian Deal Daniel Schunk	Spatial Dynamic Modeling and Urban Land Use Transformation: An Ecological Simulation Approach to Assessing the Costs of Urban Sprawl
03-21	Thomas Gschwend Franz Urban Pappi	Stimmensplitting und Koalitionswahl
03-20	Thomas Langer Martin Weber	Does Binding or Feeback Influence Myopic Loss Aversion - An Experimental Analysis
03-19	Peter Albrecht Carsten Weber	Asset/Liability Management of German Life Insurance Companies: A Value-at-Risk Approach in the Presence of Interest Rate Guarantees
03-18	Markus Glaser	Online Broker Investors: Demographic Information, Investment Strategy, Portfolio Positions, and Trading Activity
03-17	Markus Glaser Martin Weber	September 11 and Stock Return Expectations of Individual Investors
03-16	Siegfried K. Berninghaus Bodo Vogt	Network Formation and Coordination Games
03-15	Johannes Keller Herbert Bless	When negative expectancies turn into negative performance: The role of ease of retrieval.
03-14	Markus Glaser Markus Nöth Martin Weber	Behavioral Finance
03-13	Hendrik Hakenes	Banks as Delegated Risk Managers
03-12	Elena Carletti	The Structure of Bank Relationships, Endogenous Monitoring and Loan Rates
03-11	Isabel Schnabel	The Great Banks‘ Depression - Deposit Withdrawals in the German Crisis of 1931

Nr.	Author	Title
03-10	Alain Chateauneuf Jürgen Eichberger Simon Grant	Choice under Uncertainty with the Best and Worst in Mind: Neo-additive Capacities.
03-09	Peter Albrecht Carsten Weber	Combined Accumulation- and Decumulation-Plans with Risk-Controlled Capital Protection
03-08	Hans-Martin von Gaudecker Carsten Weber	Surprises in a Growing Market Niche - An Evaluation of the German Private Annuities Market
03-07	Markus Glaser Martin Weber	Overconfidence and Trading Volume
03-06	Markus Glaser Thomas Langer Martin Weber	On the trend recognition and forecasting ability of professional traders
03-05	Geschäftsstelle	Jahresbericht 2002
03-04	Oliver Kirchkamp Rosemarie Nagel	No imitation - on local and group interaction, learning and reciprocity in prisoners break
03-03	Michele Bernasconi Oliver Kirchkamp Paolo Paruolo	Expectations and perceived causality in fiscal policy: an experimental analysis using real world data
03-02	Peter Albrecht	Risk Based Capital Allocation
03-01	Peter Albrecht	Risk Measures
02-51	Peter Albrecht Ivica Dus Raimond Maurer Ulla Ruckpaul	Cost Average-Effekt: Fakt oder Mythos?
02-50	Thomas Langer Niels Nauhauser	Zur Bedeutung von Cost-Average-Effekten bei Einzahlungsplänen und Portefeuilleumschichtungen
02-49	Alexander Klos Thomas Langer Martin Weber	Über kurz oder lang - Welche Rolle spielt der Anlagehorizont bei Investitionsentscheidungen?
02-48	Isabel Schnabel	The German Twin Crisis of 1931

Nr.	Author	Title
02-47	Axel Börsch-Supan Annamaria Lusardi	Saving Viewed from a Cross-National Perspective
02-46	Isabel Schnabel Hyun Song Shin	Foreshadowing LTCM: The Crisis of 1763
02-45	Ulrich Koch	Inkrementaler Wandel und adaptive Dynamik in Regelsystemen
02-44	Alexander Klos	Die Risikoprämie am deutschen Kapitalmarkt
02-43	Markus Glaser Martin Weber	Momentum and Turnover: Evidence from the German Stock Market
02-42	Mohammed Abdellaoui Frank Voßmann Martin Weber	An Experimental Analysis of Decision Weights in Cumulative Prospect Theory under Uncertainty
02-41	Carlo Kraemer Martin Weber	To buy or not to buy: Why do people buy too much information?
02-40	Nikolaus Beck	Kumulation und Verweildauerabhängigkeit von Regeländerungen
02-39	Eric Igou	The Role of Lay Theories of Affect Progressions in Affective Forecasting
02-38	Eric Igou Herbert Bless	My future emotions versus your future emotions: The self-other effect in affective forecasting
02-37	Stefan Schwarz Dagmar Stahlberg Sabine Sczesny	Denying the foreseeability of an event as a means of self-protection. The impact of self-threatening outcome information on the strength of the hindsight bias
02-36	Susanne Abele Herbert Bless Karl-Martin Ehrhart	Social Information Processing in Strategic Decision Making: Why Timing Matters
02-35	Joachim Winter	Bracketing effects in categorized survey questions and the measurement of economic quantities

Nr.	Author	Title
02-34	Joachim Winter	Design effects in survey-based measures of household consumption
02-33	Stefan Schwarz Dagmar Stahlberg	Motivational influences on the strength of the hindsight bias
02-32	Stefan Schwarz Dagmar Stahlberg	Strength of hindsight bias as a consequence of meta-cognitions
02-31	Roman Grunwald	Inter-Organisationales Lernen und die Integration spezialisierten Wissens in Kooperationen - Eine empirische Untersuchung anhand von kooperativen Entwicklungsprojekten
02-30	Martin Hellwig	The Relation Between Real Wage Rates and Employment: An Intertemporal General-Equilibrium Analysis
02-29	Moshe Ben-Akiva Daniel McFadden Kenneth Train Axel Börsch-Supan	Hybrid Choice Models: Progress and Challenges
02-28	Angelika Eymann Axel Börsch-Supan Rob Euwals	Risk Attitude, Impatience, and Asset Choice
02-27	Axel Börsch-Supan Alexander Ludwig Joachim Winter	Aging and International Capital Flows
02-26	Rüdiger F. Pohl Stefan Schwarz Sabine Sczesny Dagmar Stahlberg	Gustatory hindsight bias
02-25	Axel Börsch-Supan	What We Know and What We Do NOT Know About the Willingness to Provide Self-Financed Old-Age Insurance
02-24	Florian Heiss	Specification(s) of Nested Logit Models

Nr.	Author	Title
02-23	Axel Börsch-Supan	Kann die Finanz- und Sozialpolitik die Auswirkungen der Bevölkerungsalterung auf den Arbeitsmarkt lindern?
02-22	Tito Boeri Axel Börsch-Supan Guido Tabellini	Would you Like to Reform the Pension System? The Opinions of European Citizens
02-21	Axel Börsch-Supan Florian Heiss Miki Seko	Housing Demand in Germany and Japan - Paper in memoriam of Stephen Mayo
02-20	Siegfried K. Berninghaus Karl-Martin Ehrhart	The power of ESS: An experimental study
02-19	Douglas Gale Martin Hellwig	Competitive Insurance Markets with Asymmetric Information: A Cournot-Arrow-Debreu Approach*
02-18	Michele Bernasconi Oliver Kirchkamp	The Expectations view on fiscal policy - An experiment using real world data
02-17	Oliver Kirchkamp Rosemarie Nagel	Reinforcement, repeated games, and local interaction
02-16	Volker Stocké	Die Vorhersage von Fragenreihenfolgeeffekten durch Antwortlatenzen: Eine Validierungsstudie
02-15	Thomas Kittsteiner Jörg Nikutta Eyal Winter	Discounting in Sequential Auctions
02-14	Christian Ewerhart	Banks, Internal Models and the Problem of Adverse Selection
02-13	Christian Ewerhart Eyal Winter	Limited Backward Induction as an Expression of Bayesian Rationality
02-12	Christian Ewerhart	Enabling Goal-Directed Planning and Control: Experiences with the Implementation of Value Management in an Internationally Operating Stock Exchange

Nr.	Author	Title
02-11	Christian Ewerhart Karsten Fieseler	Procurement Auctions and Unit-Price Contracts
02-10	Susanne Abele	How to Influence Cooperation Subtly
02-01	Geschäftsstelle	Jahresbericht 2001
02-09	Volker Stocké	Soziale Erwünschtheit bei der Erfassung von Einstellungen gegenüber Ausländern. Theoretische Prognosen und deren empirische Überprüfung
02-08	Volker Stocké Bettina Langfeldt	Ex-post Implementation with Interdependent Valuations
02-07	Benny Moldovanu Christian Ewerhart	A Stylized Model of the German UMTS Auction
02-06	Benny Moldovanu Aner Sela	Contest Architecture
02-05	Benny Moldovanu Christian Ewerhart	The German UMTS Design: Insights From Multi-Object Auction Theory
02-04	Alex Possajennikov	Cooperative Prisoners and Aggressive Chickens: Evolution of Strategies and Preferences in 2x2 Games
02-03	Alex Possajennikov	Two-Speed Evolution of Strategies and Preferences in Symmetric Games
02-02	Markus Ruder Herbert Bless	Mood and the reliance on the ease of retrieval heuristic
01-52	Martin Hellwig Klaus M. Schmidt	Discrete-Time Approximations of the Holmström-Milgrom Brownian-Motion Model of Intertemporal Incentive Provision
01-51	Martin Hellwig	The Role of Boundary Solutions in Principal-Agent Problems with Effort Costs Depending on Mean Returns
01-50	Siegfried K. Berninghaus	Evolution of conventions - some theoretical and experimental aspects

Nr.	Author	Title
01-49	Dezsö Szalay	Procurement with an Endogenous Type Distribution
01-48	Martin Weber Heiko Zuchel	How Do Prior Outcomes Affect Risky Choice? Further Evidence on the House-Money Effect and Escalation of Commitment
01-47	Nikolaus Beck Alfred Kieser	The Complexity of Rule Systems, Experience, and Organizational Learning
01-46	Martin Schulz Nikolaus Beck	Organizational Rules and Rule Histories
01-45	Nikolaus Beck Peter Walgenbach	Formalization and ISO 9000 - Changes in the German Machine Building Industry
01-44	Anna Maffioletti Ulrich Schmidt	The Effect of Elicitation Methods on Ambiguity Aversion: An Experimental Investigation
01-43	Anna Maffioletti Michele Santoni	Do Trade Union Leaders Violate Subjective Expected Utility?Some Insights from Experimental Data
01-42	Axel Börsch-Supan	Incentive Effects of Social Security Under an Uncertain Disability Option
01-41	Carmela Di Mauro Anna Maffioletti	Reaction to Uncertainty and Market Mechanism:Experimental Evidence
01-40	Marcel Normann Thomas Langer	Altersvorsorge, Konsumwunsch und mangelnde Selbstdisziplin: Zur Relevanz deskriptiver Theorien für die Gestaltung von Altersvorsorgeprodukten
01-39	Heiko Zuchel	What Drives the Disposition Effect?
01-38	Karl-Martin Ehrhart	European Central Bank Operations: Experimental Investigation of the Fixed Rate Tender
01-37	Karl-Martin Ehrhart	European Central Bank Operations: Experimental Investigation of Variable Rate Tenders
01-36	Karl-Martin Ehrhart	A Well-known Rationing Game

Nr.	Author	Title
01-35	Peter Albrecht Raimond Maurer	Self-Annuitization, Ruin Risk in Retirement and Asset Allocation: The Annuity Benchmark
01-34	Daniel Houser Joachim Winter	Time preference and decision rules in a price search experiment
01-33	Christian Ewerhart	Iterated Weak Dominance in Strictly Competitive Games of Perfect Information
01-32	Christian Ewerhart	THE K-DIMENSIONAL FIXED POINT THEOREM OF PROVABILITY LOGIC
01-31	Christian Ewerhart	A Decision-Theoretic Characterization of Iterated Weak Dominance
01-30	Christian Ewerhart	Heterogeneous Awareness and the Possibility of Agreement
01-29	Christian Ewerhart	An Example for a Game Involving Unawareness: The Tragedy of Romeo and Juliet
01-28	Christian Ewerhart	Backward Induction and the Game-Theoretic Analysis of Chess
01-27	Eric Igou Herbert Bless	About the Importance of Arguments, or: Order Effects and Conversational Rules
01-26	Heiko Zuchel Martin Weber	The Disposition Effect and Momentum
01-25	Volker Stocké	An Empirical Test of the Contingency Model for the Explanation of Heuristic-Based Framing-Effects
01-24	Volker Stocké	The Influence of Frequency Scales on the Response Behavior. A Theoretical Model and its Empirical Examination
01-23	Volker Stocké	An Empirical Examination of Different Interpretations of the Prospect Theoryś Framing-Hypothesis
01-22	Volker Stocké	Socially Desirable Response Behavior as Rational Choice: The Case of Attitudes Towards Foreigners

Nr.	Author	Title
01-21	Phillipe Jehiel Benny Moldovanu	License Auctions and Market Structure
01-20	Phillipe Jehiel Benny Moldovanu	The European UMTS/IMT-2000 License Auctions
01-19	Arieh Gavious Benny Moldovanu Aner Sela	Bid Costs and Endogenous Bid Caps
01-18	Benny Moldovanu Karsten Fieseler Thomas Kittsteiner	Partnerships, Lemons and Efficient Trade
01-17	Raimond Maurer Martin Pitzer Steffen Sebastian	Construction of a Transaction Based Real Estate Index for the Paris Housing Market
01-16	Martin Hellwig	The Impact of the Number of Participants on the Provision of a Public Good
01-15	Thomas Kittsteiner	Partnerships and Double Auctions with Interdependent Valuations
01-14	Axel Börsch-Supan Agar Brugiavini	Savings: The Policy Debate in Europe
01-13	Thomas Langer	Fallstudie zum rationalen Entscheiden: Contingent Valuation und der Fall der Exxon Valdez
01-12	Peter Albrecht Raimond Maurer Ulla Ruckpaul	On the Risks of Stocks in the Long Run:A Probabilistic Approach Based on Measures of Shortfall Risk
01-11	Peter Albrecht Raimond Maurer	Zum systematischen Vergleich von Rentenversicherung und Fondsentnahmeplänen unter dem Aspekt des Kapitalverzehrrisikos - der Fall nach Steuern
01-10	Gyöngyi Bugàr Raimond Maurer	International Equity Portfolios and Currency Hedging: The Viewpoint of German and Hungarian Investors

Nr.	Author	Title
01-09	Erich Kirchler Boris Maciejovsky Martin Weber	Framing Effects on Asset Markets - An Experimental Analysis -
01-08	Axel Börsch-Supan Alexander Ludwig Joachim Winter	Aging, pension reform, and capital flows: A multi-country simulation model
01-07	Axel Börsch-Supan Annette Reil-Held Ralf Rodepeter Reinhold Schnabel Joachim Winter	The German Savings Puzzle
01-06	Markus Glaser	Behavioral Financial Engineering: eine Fallstudie zum Rationalen Entscheiden
01-05	Peter Albrecht Raimond Maurer	Zum systematischen Vergleich von Rentenversicherung und Fondsentnahmeplänen unter dem Aspekt des Kapitalverzehrrisikos
01-04	Thomas Hintz Dagmar Stahlberg Stefan Schwarz	Cognitive processes that work in hindsight: Meta-cognitions or probability-matching?
01-03	Dagmar Stahlberg Sabine Sczesny Friederike Braun	Name your favourite musician: Effects of masculine generics and of their alternatives in german
01-02	Sabine Sczesny Sandra Spreemann Dagmar Stahlberg	The influence of gender-stereotyped perfumes on the attribution of leadership competence
01-01	Geschäftsstelle	Jahresbericht 2000
00-51	Angelika Eymann	Portfolio Choice and Knowledge
00-50	Oliver Kirchkamp Rosemarie Nagel	Repeated Game Strategies in Local and Group Prisoner‘s Dilemma
00-49	Thomas Langer Martin Weber	The Impact of Feedback Frequency on Risk Taking: How general is the Phenomenon?

Nr.	Author	Title
00-48	Niklas Siebenmorgen Martin Weber	The Influence of Different Investment Horizons on Risk Behavior
00-47	Roman Inderst Christian Laux	Incentives in Internal Capital Markets
00-46	Niklas Siebenmorgen Martin Weber	A Behavioral Approach to the Asset Allocation Puzzle
00-45	Thomas Langer Rakesh Sarin Martin Weber	The Retrospective Evaluation of Payment Sequences: Duration Neglect and Peak-and-End-Effects
00-44	Axel Börsch-Supan	Soziale Sicherung: Herausforderungen an der Jahrhundertwende
00-43	Rolf Elgeti Raimond Maurer	Zur Quantifizierung der Risikoprämien deutscher Versicherungsaktien im Kontext eines Multifaktorenmodells
00-42	Martin Hellwig	Nonlinear Incentive Contracting in Walrasian Markets: A Cournot Approach
00-41	Tone Dieckmann	A Dynamic Model of a Local Public Goods Economy with Crowding
00-40	Claudia Keser Bodo Vogt	Why do experimental subjects choose an equilibrium which is neither risk nor payoff dominant
00-39	Christian Dustmann Oliver Kirchkamp	The Optimal Migration Duration and Activity Choice after Re-migration
00-38	Niklas Siebenmorgen Elke U. Weber Martin Weber	Communicating Asset Risk: How the format of historic volatility information affects risk perception and investment decisions
00-37	Siegfried K. Berninghaus	The impact of monopolistic wage setting on innovation and market structure
00-36	Siegfried K. Berninghaus Karl-Martin Ehrhart	Coordination and information: Recent experimental evidence

Nr.	Author	Title
00-35	Carlo Kraemer Markus Nöth Martin Weber	Information Aggregation with Costly Information and Random Ordering: Experimental Evidence
00-34	Markus Nöth Martin Weber	Information Aggregation with Random Ordering: Cascades and Overconfidence
00-33	Tone Dieckmann Ulrich Schwalbe	Dynamic Coalition Formation and the Core
00-32	Martin Hellwig	Corporate Governance and the Financing of Investment for Structural Change
00-31	Peter Albrecht Thorsten Göbel	Rentenversicherung versus Fondsentnahmepläne, oder: Wie groß ist die Gefahr, den Verzehr des eigenen Vermögens zu überleben?
00-30	Roman Inderst Holger M. Müller Karl Wärneryd	Influence Costs and Hierarchy
00-29	Dezsö Szalay	Optimal Delegation
00-28	Dezsö Szalay	Financial Contracting, R&D and Growth
00-27	Axel Börsch-Supan	Rentabilitätsvergleiche im Umlage- und Kapitaldeckungsverfahren: Konzepte, empirische Ergebnisse, sozialpolitische Konsequenzen
00-26	Axel Börsch-Supan Annette Reil-Held	How much is transfer and how much insurance in a pay-as-you-go system? The German Case.
00-25	Axel Börsch-Supan	Rentenreform und die Bereitschaft zur Eigenvorsorge: Umfrageergebnisse in Deutschland
00-24	Christian Ewerhart	Chess-like games are dominancesolvable in at most two steps
00-23	Christian Ewerhart	An Alternative Proof of Marshallś Rule
00-22	Christian Ewerhart	Market Risks, Internal Models, and Optimal Regulation: Does Backtesting Induce Banks to Report Their True Risks?

Nr.	Author	Title
00-21	Axel Börsch-Supan	A Blue Print for Germany's Pension Reform
00-20	Axel Börsch-Supan	Data and Research on Retirement in Germany
00-19	Henning Plessner Tilmann Betsch	Sequential effects in important sport-decisions: The case of penalties in soccer
00-18	Susanne Haberstroh Ulrich Kühnen Daphna Oyserman Norbert Schwarz	Is the interdependent self a better communicator than the independent self? Self-construal and the observation of conversational norms
00-17	Tilmann Betsch Susanne Haberstroh Connie Höhle	Explaining and Predicting Routinized Decision Making: A Review of Theories
00-16	Susanne Haberstroh Tilmann Betsch Henk Aarts	When guessing is better than thinking: Multiple bases for frequency judgments
00-15	Axel Börsch-Supan Angelika Eymann	Household Portfolios in Germany
00-14	Annette Reil-Held	Einkommen und Sterblichkeit in Deutschland: Leben Reiche länger?
00-13	Nikolaus Beck Martin Schulz	Comparing Rule Histories in the U.S. and in Germany: Searching for General Principles of Organizational Rules
00-12	Volker Stocké	Framing ist nicht gleich Framing. Eine Typologie unterschiedlicher Framing-Effekte und Theorien zu deren Erklärung
00-11	Oliver Kirchkamp Rosemarie Nagel	Local and Group Interaction in Prisoners' Dilemmas
00-10	Oliver Kirchkamp Benny Moldovanu	An experimental analysis of auctions with interdependent valuations
00-09	Oliver Kirchkamp	WWW Experiments for Economists, a Technical Introduction

Nr.	Author	Title
00-08	Alain Chateauneuf Alain Chateauneuf	Organizational Learning through Rule Adaptation: From the Behavioral Theory to Transactive Organizational Learning
00-07	Raimond Maurer Steffen Sebastian	Inflation Risk Analysis of European Real Estate Securities
00-06	Martin Hellwig	Costly State Verification: The Choice Between Ex Ante and Ex Post Verification Mechanisms
00-05	Peter Albrecht Raimond Maurer	100% Aktien zur Altersvorsorge - Über die Langfristrisiken einer Aktienanlage
00-04	Douglas Gale	Aging and the Pension Crisis: Flexibilization through Capital Markets
00-03	Axel Börsch-Supan	Data and Research on Saving in Germany
00-02	Raimond Maurer Alexander Mertz	Internationale Diversifikation von Aktien- und Anleiheportfolios aus der Perspektive deutscher Investoren
00-01	Office SFB504	Jahresbericht 1999
99-89	Holger M. Müller Roman Inderst	Project Bundling, Liquidity Spillovers, and Capital Market Discipline
99-88	Raimond Maurer Gyöngyi Bugàr	Efficient Risk Reducing Strategies by International Diversification: Evidence from a Central European Emerging Market
99-87	Berit Ernst Alfred Kieser	In Search of Explanations for the Consulting Explosion. A Critical Perspective on Managers' Decisions to Contract a Consultancy
99-86	Martin Hellwig Andreas Irmen	Wage Growth, Productivity Growth, and the Evolution of Employment
99-85	Siegfried K. Berninghaus Werner Gueth Claudia Keser	Decentralized or Collective Bargaining in a Strategy Experiment

Nr.	Author	Title
99-84	Jan Vleugels	Bidding Against an Unknown Number of Competitors With Affiliated Information
99-83	Stefan Schwarz Ulf-Dietrich Reips	Drop-out wegen JavaScript:
99-82	Holger M. Müller Karl Wärneryd	Inside vs Outside Ownership - A Political Theory of the Firm
99-81	Ralf Rodepeter Joachim Winter	Rules of thumb in life-cycle savings models
99-80	Michael Adam Raimond Maurer	Risk Value Analysis of Covered Short Call and Protective Put Portfolio Strategies
99-79	Peter Albrecht	Rendite oder Sicherheit in der Altersversorgung - unvereinbare Gegensätze?
99-78	Karsten Fieseler	The Efficient Bilateral Trade of an Indivisible Good: Successively Arriving Information
99-77	Karsten Fieseler	Optimal Leasing Durations: Options for Extension
99-76	Peter Albrecht Raimond Maurer	Zur Bedeutung einer Ausfallbedrohtheit von Versicherungskontrakten - ein Beitrag zur Behavioral Insurance
99-75	Benny Moldovanu Aner Sela	The Optimal Allocation of Prizes in Contests
99-74	Phillipe Jehiel Benny Moldovanu	Efficient Design with Interdependent Valuations
99-73	Phillipe Jehiel Benny Moldovanu	A Note on Revenue Maximization and Efficiency in Multi-Object Auctions
99-72	Eva Brit Kramer Martin Weber	Über kurz oder lang - Spielt der Anlagehorizont eine berechtigte Rolle bei der Beurteilung von Investments?
99-71	Karsten Fieseler Thomas Kittsteiner Benny Moldovanu	Partnerships, Lemons and Efficient Trade

Nr.	Author	Title
99-70	Dagmar Stahlberg Sabine Sczesny Stefan Schwarz	Exculpating Victims and the Reversal of Hindsight Bias
99-69	Karl-Martin Ehrhart Claudia Keser	Mobility and cooperation: on the run
99-68	Roman Inderst Holger M. Müller	Delegation of Control Rights, Ownership Concentration, and the Decline of External Finance
99-67	Eric Igou Herbert Bless Michaela Wänke	Ursachen der Verwässerung oder: Konversationslogische Aspekte des ”Dilution-Effektes”
99-66	Stefan Schwarz Dagmar Stahlberg	Auswirkungen des Hindsight Bias auf ökonomische Entscheidungen
99-65	Susanne Abele Karl-Martin Ehrhart	Why Timing Matters: Differential Effects of Uncertainty about the Outcome of Past versus Current Events
99-64	Thomas Langer Martin Weber	Prospect-Theory, Mental Accounting and Differences in Aggregated and Segregated Evaluation of Lottery Portfolios
99-63	Andreas Laschke Martin Weber	Der ”Overconfidence Bias” und seine Konsequenzen in Finanzmärkten
99-62	Nikolaus Beck Peter Walgenbach	From Statistical Quality Control, over Quality Systems to Total Quality Management - The Institutionalization of a New Management Approach
99-61	Paul Povel Michael Raith	Endogenous Debt Contracts With Undistorted Incentives
99-60	Nikolaus Beck Alfred Kieser	Unspectacular Organizational Change in Normal Times: Rule Change as a Routine Activity
99-59	Roman Inderst Holger M. Müller	Why Peaches Must Circulate Longer than Lemons

Nr.	Author	Title
99-58	Roman Inderst	Bargaining with Sequential Buyers under Incomplete Information
99-57	Roman Inderst	Bargaining with a Possibly Committed Seller
99-56	Roman Inderst	Efficiency Wages under Adverse Selection and the Role of Rigid Wages
99-55	Daniel Probst	Evolution, Automata and Repeated Games
99-54	Christian Laux Daniel Probst	The Ambiguous Effects of Rankings: Strategically Biased Forecasting by Advisers
99-53	Martin Hellwig Andreas Irmen	Endogenous Technical Change in a Competitive Economy
99-52	Roman Inderst Holger M. Müller	Competitive Search Markets with Adverse Selection
99-51	Abdolkarim Sadrieh Werner Gueth Peter Hammerstein Stevan Harnard Ulrich Hoffrage Bettina Kuon Betrand R. Munier Peter M. Todd Massimo Warglien Martin Weber	Is there evidence for an adaptive toolbox?
99-50	Ulrich Hoffrage Gerd Gigerenzer	How to Foster Diagnostic Insight in Experts
99-49	Martin Lages Ulrich Hoffrage Gerd Gigerenzer	Intransitivity of fast and frugal heuristics
99-48	Axel Börsch-Supan Joachim Winter	Pension reform, savings behavior and corporate governance
99-47	Craig R. Fox Martin Weber	Ambiguity Aversion, Comparative Ignorance, and the Role of Context

Nr.	Author	Title
99-46	Manfred Hassebrauck Cornelia Vogt Michael Diehl	Der Einfluß von Prototypen auf die Informationssuche bei Entscheidungen
99-45	Manfred Hassebrauck Cornelia Vogt Michael Diehl	Das ”prototype matching”-Modell des Entscheidungsverhaltens: Der Einfluß kognitiver Belastung, Zeitdruck und Stimmung
99-44	Axel Börsch-Supan Patrizia Tumbarello Robert Palacios	Pension systems in the Middle East and North Africa: A window of opportunity
99-43	Reinhold Schnabel	Vermögen und Ersparnis im Lebenszyklus in Westdeutschland
99-42	Reinhold Schnabel	The Declining Participation in the German PAYG-Pension System
99-41	Reinhold Schnabel	Social Security Reform and Intergenerational Redistribution in Germany
99-40	Reinhold Schnabel	The Golden Years of Social Security – Life-cycle Income, Pensions and Savings in Germany
99-39	Stefan Schwarz Sabine Sczesny Dagmar Stahlberg	Der Hindsight Bias bei gustatorischen Entscheidungen
99-38	Axel Börsch-Supan Annette Reil-Held	Family Resources in Retirement. Germany
99-37	Axel Börsch-Supan Rob Euwals Angelika Eymann	Portfolio Choice with Behavioral Decision Mechanisms
99-36	Axel Börsch-Supan	Template for International Savings Comparisons Project
99-35	Stefan Schwarz Dagmar Stahlberg	Hindsight Bias: The Role of Perfect Memory and Meta-Cognitions

Nr.	Author	Title
99-34	Dagmar Stahlberg Stefan Schwarz	Would I Have Known It All Along if I Would Hate to Know It? The Hindsight Bias in Situations of High and Low Self Esteem Relevance
99-33	Ulrich Hoffrage Ralph Hertwig Gerd Gigerenzer	Hindsight Bias: A By-product of Knowledge Updating
99-32	Ralph Hertwig Ulrich Hoffrage	Begrenzte Rationalität: Die Alternative zu Laplace'schen und schlechter Software
99-31	Raimond Maurer Ulrich Hoffrage	An Expected Utility Approach to Probabilistic Insurance: A Comment on Wakker, Thaler and Tversky (1997)
99-30	Henning Plessner Susanne Haberstroh Tilmann Betsch	The effects of affect-based attitudes on judgment and decision making
99-29	Tilmann Betsch Andreas Glöckner Susanne Haberstroh	A Micro-World Simulation to Study Routine Maintenance and Deviation in Repeated Decision Making
99-28	Jan Walliser Joachim Winter	Tax incentives, bequest motives and the demand for life insurance: evidence from Germany
99-27	Joachim Winter	Ökonometrische Analyse diskreter dynamischer Entscheidungsprozesse
99-26	Gerd Bohner Dagmar Stahlberg Dieter Frey	Einstellungen
99-25	Ulrich Hoffrage Martin Weber Ralph Hertwig Valerie Chase	How to keep children save in traffic: Find the daredevils while they are young.
99-24	Elke Kurz Gerd Gigerenzer Ulrich Hoffrage	Representations of uncertainty and change: Three case studies with experts

Nr.	Author	Title
99-23	Stefan Krauss Laura Martignon Ulrich Hoffrage	Simplifying Bayesian Inference: The General Case
99-22	Ulrich Hoffrage Ralph Hertwig	Hindsight Bias: A Price Worth Paying for Fast and Frugal Memory
99-21	Ulrich Hoffrage	Irren ist wahrscheinlich. Medizinische Experten und Laien bewerten Risiken oft falsch.
99-20	Claudia Keser Jean-Louis Rulliére Marie-Claire Villeval	Union Bargaining Strength as a Public Good: Experimental Evidence
99-19	Rüdiger F. Pohl Dagmar Stahlberg Dieter Frey	I'm not trying to impress you, but I surely knew it all along! Self-presentation and hindsight bias
99-18	Dagmar Stahlberg Lars-Eric Petersen Dirk Dauenheimer	Preferences for and Evaluation on Self-Relevant Information Depending on the Elaboration of the Self-Schemata Involved
99-17	Rob Euwals	Do mandatory pensions decrease household savings? Evidence for the Netherlands.
99-16	Roman Inderst	A Note on the Strategic Foundation of Competitive Equilibrium in Buyer Markets
99-15	Michael Adam Raimond Maurer	An Empirical Test of Risk-Adjusted Performance of Call Option Writing and Put Option Buying Hedge-Strategies
99-14	Annette Reil-Held Reinhold Schnabel	Vom Arbeitsmarkt in den Ruhestand: Die Einkommen deutscher Rentner und Rentnerinnen
99-13	Peter Walgenbach	Das Konzept der Vertrauensorganisation - Eine theoriegeleitete Betrachtung
99-12	Herbert Bless Michaela Wänke	Can the same information be typical and atypical? How perceived typicality moderates assimilation and contrast in evaluative judgements

Nr.	Author	Title
99-11	Eric Igou Herbert Bless Wolfram Schenck	Stärkere Framing Effekte durch mehr Nachdenken? Einflüsse der Bearbeitungszeit auf Lösungen des ”Asian-disease”-Problems
99-10	Dirk Dauenheimer Dagmar Stahlberg Sandra Spreemann Constantine Sedikides	Self-Enhancement, Self-Verification, or Self-Assessment? The Intricate Role of Trait Modifiability in the Self-Evaluation Process
99-09	Cornelia Hegele Peter Walgenbach	Was kann der Apfel von der Birne lernen, oder wozu brauchen Unternehmen Benchmarking?
99-08	Michaela Wänke	Assimilation and Contrast as a Function of the direction of Comparison
99-07	Michael Woywode	Ein lerntheoretisches Modell zur Erklärung der Unternehmensent-wicklung
99-06	Tilmann Betsch Susanne Haberstroh Andreas Glöckner Klaus Fiedler	The Pros and Cons of Expertise: Routine Strength and Adaptation in Recurrent Acquisition and Disposal Decisions
99-05	Ulrich Koch	Regeländerungsprozesse und organisatorisches Lernen: Zum Übergang individueller Erfahrungen in eine organisationale Wissensbasis
99-04	Alfred Kieser Ulrich Koch Michael Woywode	Wie man Bürokratien das Lernen beibringt
99-03	Joachim Winter	Strukturelle ökonometrische Verfahren zur Analyse von Renteneintrittsentscheidungen
99-02	Axel Börsch-Supan Annette Reil-Held Ralf Rodepeter Reinhold Schnabel Joachim Winter	Ersparnisbildung in Deutschland: Meßkonzepte und Ergebnisse auf Basis der EVS
99-01	Office SFB504	Jahresbericht 1998

Nr.	Author	Title
98-61	Siegfried K. Berninghaus Karl-Martin Ehrhart	Long-run Evolution of Local Interaction Structures in Games
98-60	Isabel Gödde Reinhold Schnabel	Does Family Background Matter? - Returns to Education and Family Characteristics in Germany
98-59	Holger M. Müller	Why Tender Offers Should be Financed with Debt
98-58	Ralf Rodepeter Joachim Winter	Savings decisions under life-time and earnings uncertainty:
98-57	Thomas Langer Martin Weber	Entscheidungsanalyse
98-56	Reinhold Schnabel	Rates of Return of the German Pay-As-You-Go Pension System
98-55	Raimond Maurer Steffen Sebastian	Immobilienfonds und Immobilienaktiengesellschaften als finanzwirtschaftliche Substitute für Immobiliendirektanlagen
98-54	Michaela Wänke Herbert Bless Eric Igou	Next to a star: Paling, shining or both? Turning inter-exemplar contrast into inter-exemplar assimilation
98-53	Gerd Gigerenzer Laura Martignon Ulrich Hoffrage Joerg Rieskamp Jean Czerlinski Dan G. Goldstein	One-reason decision making.
98-52	Gerd Gigerenzer Ralph Hertwig Ulrich Hoffrage Peter Sedlmeier	Cognitive illusions reconsidered
98-51	Gerd Gigerenzer Ulrich Hoffrage	Overcoming Difficulties in Bayesian Reasoning: A Reply to Lewis & Keren and Mellers & McGraw
98-50	Roman Inderst	Signaling in a Search Market

Nr.	Author	Title
98-49	Paul Povel Michael Raith	Liquidity Constraints, Production Costs and Output Decisions
98-48	Joachim Winter	Does Firms‘ Financial Status Affect Plant-Level Investment and Exit Decision
98-47	Michele Bernasconi Oliver Kirchkamp	Why monetary policy matters — An experimental study of saving, inflation and monetary policies in an overlapping generations model
98-46	Oliver Kirchkamp	Simultaneous Evolution of Learning Rules and Strategies
98-45	Martin Weber Jan Pieter Krahnen Frank Voßmann	Risikomessung im Kreditgeschäft: Eine empirische Analyse bankinterner Ratingverfahren
98-44	Axel Börsch-Supan	Anreizprobleme in der Renten- und Krankenversicherung
98-43	Martin Hellwig	On the Economics and Politics of Corporate Finance and Corporate Control
98-42	Axel Börsch-Supan	Demographie, Entwicklung und Stabilität der Sozialversicherung in Deutschland
98-41	Axel Börsch-Supan	Zur deutschen Diskussion eines Übergangs vom Umlage- zum Kapitaldeckungsverfahren in der Gesetzlichen Rentenversicherung
98-40	Axel Börsch-Supan	A Model under Siege: A Case Study of the Germany Retirement Insurance System
98-39	Martin Hellwig	Financial Intermediation with Risk Aversion
98-38	Martin Hellwig	Risk Aversion and Incentive Compatibility with Ex Post Information Asymmetry
98-37	Roman Inderst Christian Pfeil	Duopolistic Competition in Search Markets
98-36	Roman Inderst	Incentives Schemes as a Signaling Device

Nr.	Author	Title
98-35	Roman Inderst	Multi-Issue Bargaining with Endogenous Agenda
98-34	Roman Inderst	Competition Drives Up Prices
98-33	Roman Inderst	A Note on the Limited Value of Time for Screening
98-32	Roman Inderst	Screening With Endogenous Reservation Values
98-31	Paul Povel	optimal bankruptcy laws
98-30	Martin Hellwig	Systemische Risiken im Finanzsektor
98-29	Axel Börsch-Supan	Incentive Effects of Social Security on Labor Force Participation: Evidence in Germany and Across Europe
98-22	Phillipe Jehiel Benny Moldovanu	Efficient Design with Interdependent Valuations
98-21	Benny Moldovanu Aner Sela	Patent Licensing to Bertrand Competitors
98-20	Alfred Kieser	How Management Science, Consultancies and Business Companies (Do not) Learn from Each Other. Applying Concepts of Learning to Different Types of Organizations and to Interorganizational Learning
98-16	Tilmann Betsch Babette Brinkmann Klaus Fiedler Katja Breining	When prior knowledge overrules new evidence: Adaptive use of decision strategies and role behavioral routines
98-15	Klaus Fiedler	Illusory Correlations: Explicating and Stimulating Their Apparent and Less Apparent Origins
98-14	Klaus Fiedler Babette Brinkmann Tilmann Betsch Beate Wild	A Sampling Approach to Biases in Conditional Probability Judgments: Beyond Baserate-Neglect and Statistical Format

Nr.	Author	Title
98-13	Tilmann Betsch Stefan Krauss	Eine Kritik an der klassischen Framing - Studie, eine konzeptuelle Replikation und eine Bewertung der Prospect Theory.
98-12	Siegfried K. Berninghaus Karl-Martin Ehrhart Claudia Keser	Conventions and Local Interaction Structures: Experimental Evidence
98-11	Michael Kilka Martin Weber	What Determines the Shape of the Probability Weighting Function under Uncertainty?
98-10	Tilmann Betsch Frank Siebler Peter Marz Stefan Hormuth Dorothee Dickenberger	The moderating role of category salience and category focus in judgments of set size and frequency of occurence.
98-08	Peter Albrecht	Alterssicherung und Vorsorgebedarf im Spannungsfeld von Versicherungs- und Investmentprodukten
98-07	Axel Börsch-Supan Annette Reil-Held Reinhold Schnabel	Pension Provision in Germany
98-06	Martin Hellwig Klaus M. Schmidt	Discrete-Time Approximations of the Holmström-Milgrom Brownian-Motion, Model of Intertemporal Incentive Provision
98-05	Tilmann Betsch G. - M. Biel C. Eddelbuettel A. Mock	Natural sampling and base-rate neglect
98-04	Martin Hellwig	Allowing for Risk Choices in Diamond’s ”Financial Intermediation as Delegated Monitoring”
98-03	Martin Weber Lukas Mangelsdorff	Hindsight-Bias im Prinzipal-Agent-Kontext: Die Aktennotiz als Antwort?
98-02	Alfred Kieser Nikolaus Beck Risto Tainio	Limited Rationality, Formal Organizational Rules, and Organizational Learning (OL)

Nr.	Author	Title
98-01	Office SFB504	Sonderforschungsbereich 504 Jahresbericht 1998
97-44	Raimond Maurer Michael Adam	Analytische Evaluation des Risiko-Chance-Profils kombinierter Aktien- und Optionsstrategien
97-43	Holger M. Müller	The Mirrlees-Problem Revisited
97-42	Annette Reil-Held	Bequests and Aggregate Wealth Accumulation in Germany
97-41	Axel Börsch-Supan	Übergangsmodelle vom Umlage - zum Kapitaldeckungsverfahren in der deutschen Rentenversicherung
97-40	Siegfried K. Berninghaus Karl-Martin Ehrhart Claudia Keser	The invisible hand: Experiments on strategy selection in population games
97-39	Axel Börsch-Supan Annette Reil-Held	Retirement Income: Level, Risk, and Substitution Among Income Components
97-38	Holger M. Müller	The First-Best Sharing Rule in the Continuous-Time Principal-Agent Problem with Exponential Utility
97-37	Holger M. Müller	Randomization in Dynamic Principal-Agent Problems
97-36	Gyöngyi Bugàr Raimond Maurer	International Portfolio Diversification for European countries: The viewpoint of Hungarian and German investors
97-35	Martin Hellwig	Banks, Markets, and the Allocation of Risks in an Economy
97-34	Nikolaus Beck Alfred Kieser	Standard Operating Procedures and Organizational Learning
97-33	Thomas Langer Peter Waller	Implementing Behavioral Concepts into Banking Theory: The Impact of Loss Aversion on Collateralization

Nr.	Author	Title
97-32	Guenther Franke Martin Weber	Risk-Value Efficient Portfolios and Asset Pricing
97-31	Axel Börsch-Supan	Das deutsche Rentenversicherungssystem: Probleme und Perspektiven
97-30	Claudia Keser Marc Willinger	Principals
97-29	Siegfried K. Berninghaus Karl-Martin Ehrhart Claudia Keser	Coordination Games: Recent Experimental Results
97-28	Peter Albrecht	A Stochastic Approach for the Quantification of Default Risk of OTC-Financial Derivatives
97-27	Dagmar Stahlberg A. Maass	Hindsight bias: Impaired memory or biased reconstruction?
97-26	Manfred Hassebrauck Cornelia Vogt Michael Diehl	Das ”prototype matching”-Modell des Entscheidungsverhaltens: Darstellung des Modells und erste Ergebnisse
97-24	Claudia Keser	SUPER: Strategies used in public goods experimentation rounds
97-23	Axel Börsch-Supan	Germany: A social security system on the verge of collaps
97-22	Axel Börsch-Supan	Privatisierungsmöglichkeiten der Sozialversicherung in Europa
97-21	Axel Börsch-Supan	Capital productivity and the nature of competition
97-20	Axel Börsch-Supan Reinhold Schnabel	Social security and retirement in germany
97-19	Raimond Maurer	Ertrag und Shortfall Risiko von Wertsicherungsstrategien mit Optionen unter alternativen Zielrenditen: Empirische Evidenzen für den deutschen Aktienmarkt

Nr.	Author	Title
97-18	Peter Albrecht	Risk based capital allocation and risk adjusted performance management in property/liability-insurance: A risk theoretical framework
97-17	Peter Albrecht Raimond Maurer Matthias Möller	Shortfall-Risiko/Excess-Chance-Entscheidungskalküle: Grundlagen und Beziehungen zum Bernoulli-Prinzip
97-16	Claudia Keser Karl-Martin Ehrhart Siegfried K. Berninghaus	Coordination and local interaction: Experimental evidence
97-15	Herbert Bless Tilmann Betsch Axel Franzen	Framing the framing effect: The impact of context cues on solutions to the ”asian disease” problem
97-14	Michael Kilka Martin Weber	Home Bias in International Stock Return Expectation
97-13	Jan Vleugels	Bidding against an unknown number of competitiors sharing affiliated information
97-12	Dov Monderer Aner Sela	Fictitious play and- no-cycling conditions
97-11	S. Hon-Suir Dov Monderer Aner Sela	A learning approach to auctions
97-10	Karl H. Schlag Aner Sela	You play (an auction) only once
97-09	Aner Sela	One against all in the fictitious play process
97-08	Benny Moldovanu	William Vickrey und die Auktionstheorie - Anmerkungen zum Nobelpreis 1996
97-07	M. Tietzel Benny Moldovanu	Goethe
97-06	Phillipe Jehiel Benny Moldovanu	Auctions with Downstream Interaction among Buyers

Nr.	Author	Title
97-05	Phillipe Jehiel Benny Moldovanu	Resale Markets and the Assignment of Property Rights
97-04	Phillipe Jehiel Benny Moldovanu E. Stacchetti	Multidimensional Mechanism Design for Auctions with Externalities
97-03	Karsten Fieseler	Bidding for unit-price contracts - How craftsmen should bid
97-02	Martin Hellwig	Unternehmensfinanzierung, Unternehmenskontrolle und Ressourcenallokation: Was leistet das Finanzsystem?
97-01	Ralf Rodepeter	Identifikation von Sparprofilen im Lebenszyklus
	Daniel Schunk	The Pennsylvania Reemployment Bonus Experiments: How a survival model helps in the analysis of the data