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**Article**

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## **Retrospective Error in SOEP Calendar Data: The Case of Unemployment**

By Hendrik Jürges\*

### **Abstract**

This paper compares current and one-year retrospective data on unemployment in the German SOEP. Thirteen percent of all unemployment spells remain unreported one year later, and another 7 percent are misreported. Individuals with weak labour force attachment, e.g., women with children or individuals close to retirement, have the largest propensity to underreport unemployment retrospectively. The data are consistent with evidence on retrospective bias found by cognitive psychologists and survey methodologists.

*JEL Classification: C81*

### **1. Introduction**

The aim of this paper is to study retrospective bias regarding unemployment in the German Socio-Economic Panel (SOEP). As described below in more detail, the SOEP uses monthly calendars to elicit retrospective data on labour force participation. These data are often used to generate spell data for event history or duration analyses. While many microeconomic studies of labour market behaviour in Germany rely on this data (e.g., Hunt 1995, Hujer/Schneider 1989), the quality of this retrospective data and its implications for the analyses is yet unclear. For example, retrospective data that is collected repeatedly in the form of calendars often contains spurious transitions between calendars collected in subsequent years (Kraus/Steiner 1998, Wolff/Augustin 2003).

Considering the fact that many applications in labour economics rely on non-linear methods, measurement error of the dependent variable (e.g., the length of an unemployment spell) can potentially bias the results. Although there may be no alternative to retrospective information, it is still useful to

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know which factors influence retrospective error and how bias due to retrospective error can be minimised. In the following I will study retrospective bias by comparing reports on being unemployed at the time of the interview with the retrospective calendar data on being unemployed at the same time – reported one year later. The basic hypothesis is that unemployment spells will be more often remembered if unemployment is a salient event, i.e., an event with large economic or social costs or benefits and continuing consequences (Akerlof / Yellen 1985). According to cognitive psychology, salience is one of the main determinants of the accuracy of recall, not only in surveys (Eisenhower et al. 1991). More salient events are remembered more easily than less salient events, with the exception of traumatic or threatening events.

The paper is organised as follows: Section 2 describes the data and how current and retrospective data are compared. Section 3 studies the determinants of retrospective bias in a regression analysis. Section 4 concludes.

## 2. Data

The SOEP data used in this study cover the period from 1985 to 2003 (see SOEP Group 2001 for a description of the SOEP). The sample is restricted to respondents aged 20 to 59. Workers in Germany who are 60 or older are usually not unemployed. At age 60, unemployed men become eligible for early retirement and unemployed women become eligible for regular old-age retirement. The total number of observations is approximately 180,000, based on some 28,000 individuals.

A simple yes/no-question asks for current unemployment: “Are you officially registered as unemployed at the Employment Office (Arbeitsamt)?”. Strictly speaking, the question measures unemployment at one single point in time: the interview day. Note that registration at the Employment Office is a necessary condition for the receipt of unemployment benefits.

Retrospective data on unemployment is recorded in an employment calendar: “And now think back on all of <preceding year>. We have drawn up a type of calendar below. Listed on the left are various employment characteristics that may have applied to you last year. Please go through the various months and check all the months in which you were employed, unemployed, etc. Please note that one must be checked for each month. *Even if you were unemployed for less than one month, please check off that month.*” [italics not in original]. The employment characteristics listed in the calendar are shown in Table 1. Note that unemployment is explicitly referred to as “registered unemployment”, the same concept that is used in the question on current unemployment.

Table 1

**Labour force states coded in the SOEP calendars**

Employed	Unemployed	Out of labour force
<ul style="list-style-type: none"> <li>• full-time employed (including state employment programs)</li> <li>• part-time employed</li> <li>• in occupational training / apprenticeship, retraining, further professional education</li> <li>• in compulsory military / community service</li> </ul>	<ul style="list-style-type: none"> <li>• registered unemployed</li> </ul>	<ul style="list-style-type: none"> <li>• in retirement or early retirement</li> <li>• on maternity leave</li> <li>• in school or university</li> <li>• homemaker</li> <li>• other (specify)</li> </ul>

The SOEP calendar data is used in most labour market analyses to construct labour market spells. In principle, retrospective error should be small. First, the recall period is rather short (on average one year) and the question format (calendar) is an established way to improve memory (Eisenhower et al. 1991). Second, being registered as unemployed is a legal status, not a subjective state, the perception of which can change over time. In principle, there should not be much scope for retrospective bias due to re-interpretation of the past (e.g., “I was not *really* looking for work”) because respondents are asked for factual information.

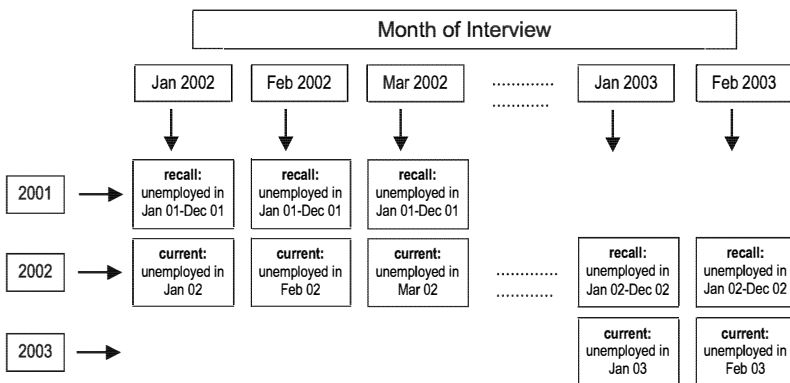


Figure 1: The structure of unemployment data in the SOEP

The basic comparison in this paper is between the current data and the calendar data collected one year after. Figure 1 describes the structure of the data. For example, consider a respondent who is interviewed in February 2002 and in January 2003. In February 2002, two types of information on unemployment are collected: (1) retrospective data on unemployment in all of 2001

and (2) current data on unemployment in February 2002 (strictly speaking, on the day of the interview in 2002). In January 2003, the same type of information is collected, but one year later: (1) retrospective data on unemployment in all of 2002 and (2) current data on unemployment in January 2003. The information overlap used to compare current and retrospective data is thus current unemployment reported in February 2002 and recalled unemployment in February 2002 (reported in January 2003). Throughout this paper, I will assume that current data reflects an individual's true labour market status (although there may be misreporting of current unemployment, e.g., due to the fear of stigmatisation).

The comparison of current and retrospective information on unemployment yields two types of misclassification: *false negatives* and *false positives*. False positives are very rare (about 0.5 percent of all currently non-unemployed report unemployment retrospectively). In the following, we will thus concentrate on false negatives. These occur when respondents fail to report unemployment spells retrospectively. This is logically possible only if someone was unemployed, so that we confine the analysis to those 10,930 respondents (with complete data on all covariates listed in Table 3) who report being currently unemployed. Table 2 describes the prevalence of false negatives in the data for different groups of respondents: West Germans, West German guest workers (the so-called sample B, in the remainder called guest workers), and East Germans. Note that West Germans and East Germans are classified by current residence.

Table 2

**Prevalence of false negatives, by sub-sample and type of error  
(column percentages in parentheses)**

Error Type	West Germans	Guest Workers (Sample B)	East Germans	Total
No error	3,149 (77.9)	1,757 (78.1)	3,820 (82.4)	8,726 (79.8)
Hard error	627 (15.5)	375 (16.7)	429 (9.3)	1,431 (13.1)
Soft error: 1 month difference	156 (3.9)	58 (2.6)	206 (4.4)	420 (3.8)
Soft error: >1 month difference	110 (2.7)	60 (2.7)	183 (4.0)	353 (3.2)
Total	4,042	2,250	4,638	10,930

Source: SOEP 1985–2003.

Overall, 20 percent of all respondents who say they are registered unemployed fail to report unemployment in that month when interviewed one year

later. One can further identify different degrees of failure. First, there are 13.1 percent *hard errors*, where respondents do not report a single month of unemployment in the calendar. Second, we can identify *soft errors*, where respondents do report spells of unemployment in the preceding year, but not in the month in which last year's interview took place. In 3.8 percent of the cases, the difference between retrospective and current unemployment is only one month. In another 3.2 percent, the deviation is more than one month.

Table 2 also shows that there are large differences in reporting behaviour between respondent groups. Of the East German respondents, 9.3 percent make hard errors, compared to 15.5 percent of West Germans and 16.7 percent of guest workers. With respect to soft errors, the order is reversed. These are most common among East Germans and least common among guest workers. In the following section, I focus on hard errors and study who forgets to report unemployment altogether and why.

### 3. Who reports unemployment retrospectively?

Table 3 shows the results of probit estimates for the probability to report registered unemployed retrospectively for the three subsamples. The coefficients are marginal effects; for dummy variables they reflect the effect of a discrete change from 0 to 1. Note that soft errors are included in the regressions as correctly recalled unemployment. Leaving out such cases does not change the main results presented below. In order to account for potential attrition bias, all estimates use longitudinal weights.

As mentioned before, East Germans' retrospective reports are more accurate than those of West Germans and guest workers. The results reported in Table 3 suggest that this difference is partly due to differences in reporting behaviour of women with children. The first column shows that West German females, in particular those with children, are less likely to report unemployment retrospectively than West German men. The main sex effect of 2.2 percentage points is rather small and insignificant, but the interaction effect of sex and presence of children is very large (nearly 12 percentage points) and highly significant. Similar results are found for women in the guest worker sample. A closer look at the employment calendars shows that two-thirds of all West German and guest worker women with children – who fail to report unemployment – report having been housewives. Such patterns cannot be found among East German women, for whom both the main effect of sex and the interaction of sex and the presence of children are insignificant. This suggests that unemployment is as salient for East German women as for East German men, an observation that can be explained by the significance of female employment in the former GDR.

Table 3

**Probit estimates of correctly recalling unemployment (marginal effects)**

Covariates	West Germans		Guest Workers		East Germans	
	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Female	-0.0224	0.0155	-0.0336	0.0257	0.0146	0.0107
Children < 16 yrs	0.0036	0.0200	0.0368	0.0253	0.0049	0.0134
Female * Kids	-0.1175**	0.0319	-0.0891*	0.0423	-0.0117	0.0167
Age 20–24	-0.0290	0.0180	0.0184	0.0208	-0.0034	0.0148
Age 45–54	-0.0049	0.0160	-0.0138	0.0226	0.0166	0.0102
Age 55–59	-0.0505*	0.0234	-0.0030	0.0297	-0.0622**	0.0190
Years of education	-0.0082**	0.0026	-0.0029	0.0049	-0.0049*	0.0022
Log per capita hh income	0.0083	0.0147	0.0114	0.0162	0.0031	0.0115
Unemployed at recall	0.1701**	0.0116	0.2077**	0.0174	0.0753**	0.0084
Regional unempl. rate	0.0046*	0.0021	0.0016	0.0030	0.0009	0.0015
Interviewer present	0.0405**	0.0116	0.0314	0.0243	-0.0038	0.0081
Recall period (years)	-0.0786*	0.0337	-0.0064	0.0437	-0.0428	0.0344
Take up empl. next year	-0.0637**	0.0189	-0.0543+	0.0279	-0.0661**	0.0150
Take up empl. > 1 year	-0.1191**	0.0252	-0.1291**	0.0444	-0.2331**	0.0362
Take up empl. never	-0.1464**	0.0289	-0.1561**	0.0375	-0.2730**	0.0351
Calendar Year	0.0038**	0.0010	0.0094**	0.0023	0.0020	0.0016
Completed Interviews	0.0035*	0.0015	0.0057*	0.0029	0.0066**	0.0017
<i>N</i>	4,042		2,250		4,638	
Model <i>Chi</i> -Squared	462.7**		333.7**		459.7**	
Model degrees of freedom	17		17		17	
Pseudo- <i>R</i> -Squared	.166		.201		.178	

Note: standard errors corrected for repeated observations; +  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ .

Source: SOEP 1985–2003.

Turning to the effect of age on the reporting unemployment retrospectively, one finds that the oldest group (55–59) is most likely to underreport. However, this finding is hardly due to deteriorating memory. In fact, the oldest group is close to retirement, and more than 50 percent of all false negatives in that age group defined themselves as pensioners rather than as unemployed.

Years of education have a negative effect on recall, suggesting that the experience of unemployment is less salient for well-educated respondents. It is *a priori* unclear which sign the coefficient should have. On the one hand, better-educated respondents may be more frustrated when unemployed because they have made greater investments in human capital that are not currently

yielding returns. On the other hand, they may be less frustrated because they tend to have better re-employment opportunities. Log per capita household income has no significant effect on recall.

One of the most important determinants of recall is unemployment at the time of recall. Respondents who are (still?) unemployed at the time of recall have a much higher propensity to report spells of unemployment in the preceding year. The estimated marginal effects are 17 percentage points among West Germans, 21 percentage points among guest workers, and 8 percentage points among East Germans. Many of those who are unemployed in the preceding and in the current year may not have worked at all in between. The regional unemployment rate (at the time of unemployment) generally increases the probability of recall. However, the effect is significant only among West Germans, i.e., there is weak evidence for a systematic effect of reference group unemployment (see Clark 2003).

Individual recall periods in our sample range from 3 to 20 months, with a mode of 12 months, i.e., most respondents' interviews are exactly one year apart. Given the presumed salience of unemployment, a year seems to be a relatively short recall period. Memory problems are not likely. Still, there is a significant negative effect on recall among West Germans of 8 percentage points per year and insignificant effects among guest workers and East Germans of 0.6 and 4.3 percentage points, respectively. Extrapolation of these effects to four- or five-year recall periods (although actually not permissible given the range used to estimate the effect) suggest that memory problems may become significant after several years.

The next set of variables provides a direct measure of the respondents' labour force attachment. Non-employed respondents are regularly asked whether they "*intend to engage in paid employment (again) in the future?*" and if yes, "*when, approximately, would you like to start paid employment?*" Possible answers to the latter question are "as soon as possible", "next year", "in the next two to five years", and "in more than five years". I combined the answers to both questions in one variable with four categories: respondent wants to take up employment (1) immediately, (2) within the next year, (3) in more than a year, or (4) not at all.

As shown in Table 3, this variable has a large effect on recall. Respondents who claim they want to start employment within the next year have a recall probability that is about 6 percentage points lower than those who seek work immediately (the reference category). If employment is sought in more than a year, retrospective errors increase by about 12 percentage points in the West (Germans and guest workers) and by 23 percentage points among East Germans. Finally, those who do not intend to get back into paid employment at all are between 15 and 27 percentage points less likely to report unemployment in the preceding year.



Another important finding is that underreporting decreases both in the course of time and in the course of the survey. The large SOEP refreshment sample that was started in 2000 and the continuous inflow of new (mainly young) respondents from existing households provides enough independent variation of calendar year and individual survey year to identify both effects separately. The positive coefficients of “calendar year” implies that, between 1985 and 2003, the proportion of unreported unemployment spells has decreased in all three subsamples (although in East Germany, the effect is not significant). The completed number of interviews also has a significant positive effect on recall. This is good news for the survey methodologist, because it suggests that data quality increases in the course of a panel survey, for instance because respondents become familiar with the survey instrument and become more likely to give accurate answers. An alternative interpretation is that the sample becomes more selective because unmotivated and hence unreliable respondents tend to drop out of the panel earlier. However, in additional analyses not shown in this paper, future panel attrition does not help to predict retrospective bias in the SOEP calendar.

The results presented in this section are well in accordance with the literature on the psychology of recall. Still, the results must be interpreted with some caution because one important variable is missing from the analysis. The data does not allow us to ascertain the true length of the unemployment spell that respondents are asked to recall. Longer spells are remembered more precisely than shorter spells for two reasons. First, they are more painful to the respondent. Second, the longer the spell, the smaller the probability that respondents report the wrong month. Unfortunately, the available information on spell length is in some sense endogenous because it can only be derived from the employment calendars. One possibility to deal with this shortcoming would be an instrumental variable-type approach in which one uses some estimate of spell length as an explanatory variable. In the absence of useful “instruments”, stochastic matching might be a viable alternative. Such extensions are beyond the scope of the current paper.

#### 4. Summary and Conclusion

In this paper, I compare current and one-year retrospective data on unemployment derived from 19 years of the German Socio-Economic Panel. Assuming that reports of current unemployment reflect the true labour market status, the data suggests that monthly retrospective data in the SOEP employment calendars suffers from systematic underreporting. About 20 percent of all reports of being unemployed have no match in the calendar completed in the following year. Of all respondents who said they were registered unemployed when interviewed, 13 percent fail to mention any (registered) unemployment when asked one year later.

A detailed analysis of these “false negatives” suggests that respondents with weak labour force attachment are most likely to underreport unemployment, in particular West German women with children (who have a strong tendency to remember periods of unemployment as periods of being a homemaker) and those close to retirement. Direct measures of labour force attachment also have strong effects on the accuracy of retrospective information. Unemployed respondents who say they want to re-enter employment as soon as possible are much more likely to recall unemployment than others.

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