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by
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Abstract:

Empirical evidence from several countries reveals that self-rated health is a valid predictor of mortality. So far, there have been no studies conducted for Germany. Using data from the German Socio-Economic Panel Study (GSOEP) we confirm the relationship between self-rated health and mortality for Germany. In addition the GSOEP data enable an exploration of the trajectory hypothesis.

JEL Classification: I12, C23.

Keywords: Mortality, Self-Rated Health, Trajectory Hypothesis.

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1. Introduction

The World Health Organization (WHO) announced a while ago that its future assessments on country morbidity structures would increasingly be based on self-ratings of health. Compared to medical checkups carried out by physicians this method is not only extraordinarily inexpensive, but also quick and can be performed simultaneously for vast population areas. Therefore, this procedure might be a simple instrument to help in allocating resources, to justify interventions by health policy, and to predict retirement or utilization of medical care.

Following the first analysis of self-rated health and mortality by Mossey and Shapiro (1982), studies from several countries with most diverse cultural and institutional contexts have shown that self-rated health is an independent predictor of mortality (for a survey see Idler and Benyamini 1997). There are studies for the USA, Canada, Great Britain, Sweden, Finland, Netherlands, Poland, Hong Kong, Japan, Australia, Lithuania, France, and also China, but not for Germany.

Thus, the aim of our study is to investigate the effectiveness of self-ratings of health by individuals as predictors of mortality for Germany. However, our objective is not only to replicate the effect of self-rated health on mortality, which is also expected to be significant for Germany. We will also analyze the effects of individual changes in self-rated health on mortality. We will especially proof the so-called trajectory hypothesis which says "that the long-standing relationship between poor self-rated health and mortality, as well as other adverse health outcomes, simply reflects self-assessments of declining health trajectories rather than current health status" (Wolinsky and Tierney 1998, 338). However, an alternative hypothesis, namely "that poor self-rated health and declining health trajectory appear to have independent and complementary effects on health outcomes" (Wolinsky and Tierney 1998, 338) may also be true.

So far, only few studies that allow an investigation of this alternative hypothesis are known (Idler and Benyamini 1997, 29). Our data enable further indication of whether self-rating is in fact a description of the actual condition, and/or whether the development of those self-ratings is an independent explanation variable. Studies that implement utilization indicators to control for objective morbidity besides the subjective component are rare as well (see, Menec et al. 1999, P85). This simultaneous consideration is another examination of the question as to whether self-rating is an independent determinant of the explanation, and, if so, to what extent.

The international discussion is influenced by two parallel paths of investigation. On the one hand, more studies that explain why such a simple indicator depict such a broad spectrum of determinants (e.g. Idler and Benyamini 1997, 29) are required and need to be published. On the other hand, further areas of use for this indicator can be expected. If self-rated health is qualified to give valid and reliable information on morbidity structures of whole countries, it should be possible to describe and to compare populations that are differentiated by diverse characteristics. And if self-rated health and the trajectories are connected with mortality, it is fair to assume that there are also connections with other health outcomes. We assume, for good reason, that self-rated health is qualified to predict the use of health services.

2. Data, measures, and estimation methods

The data that we use here come from the German Socio-Economic Panel Study (GSOEP). The GSOEP is a representative longitudinal micro-data base covering a wide range of socio-economic information on households in Germany. The first wave of data was collected from about 6,000 families in former West Germany in 1984. Foreigners were oversampled. After the German re-unification in 1989 the GSOEP was extended by about 2,200 families from former East Germany. All samples are multi-stage random samples which are regionally clustered. The respondents (households) are selected by random-walk. Principally, an interviewer tries to obtain face-to-face interviews[1].

Our dependent variable describes whether a survey respondent died in a certain year or whether she is still alive. Information on death is collected by interviewers, and Klein (1996) shows that information on death in the GSOEP is representative as compared to official statistics. Since 1984 about 1,000 events of death are available for the researchers. However, for our analysis on the dynamics of self-rated health information for two consecutive years is required, which is available only for the 1994 to 1996 waves of the GSOEP[2]. Thus, we construct baseline survey data by pooling GSOEP respondents with interviews in 1994 and

[1] The GSOEP data used in this study are available as a "scientific use"-file (see Wagner, Burkhauser, and Behringer 1993). For further information please contact the German Institute for Economic Research (DIW), Berlin: http://www.diw.de/soep/.
[2] Before 1994, the question on self-rated health was not part of the questionnaire.

1995 and for respondents with interviews in 1995 and 1996. In other words, we have pooled two, two-wave-longitudinal subsamples from the GSOEP. For respondents with interviews in 1994 and 1995 (resp. in 1995 and 1996) we take the information whether they died or are still alive from wave 1996 (resp. 1997). The respondents have to be older than 50 years of age. Further, we exclude foreigners that live in Germany from the sample, because many of them return to their country of origin when they are aged. Therefore, information on death is not reliable for foreigners. All in all we start with a population of 3,096 persons aged 50 years or more. Altogether, 127 of these persons died (76 in 1996 and 51 in 1997).

The construction of our "baseline data" is in line with most studies analyzing the impact of self-rated health on mortality: they use base-line data that is surveyed in a certain year and supplemented by the information on whether a survey-respondent died or whether he is still alive in the following years. Helmer et al. (1999), e.g., used base-line data for a population aged 65 years and older collected between 1988 and 1990. Data on vital status during five years then were collected from families, physicians, and civil state records. By contrast, our data does not only provide information on subjective health for one base-line year but for two consecutive years. Thus, on the one hand we are able to link the information on death to the self-rated health information of the current year. On the other hand, we can study the impact of changes in self-rated health on mortality.

Self-rated health is measured by the international widely accepted scale "How would you evaluate your present health? Is it (1) very good, (2) good, (3) fair, (4) poor, or (5) bad?" To analyze the impact of self-rated health on the probability to die, we will start with a fully specified model, covering current health status as well as changing health trajectories. This full model enables us to test some hypotheses on whether self-reported health status alone, declining trajectories, or both can help to explain mortality. Let Y_t^* be the unobserved probability that a respondent will die in year t which might be influenced by socio-demographic variables X_t, (previously) self-reported health SR_{t-1} and changes in self-reported health between the current and the previous year $(SR_t - SR_{t-1})$:

(1) $$Y_t^* = a + bX_t + c(SR_t - SR_{t-1}) + dSR_{t-1} + \varepsilon$$

a, *b*, *c*, and *d* are parameters to be estimated, ε are unobservable effects. As stated above, Y^* cannot be observed directly. Instead we observe whether a respondent is dead at point of time

t (Y=1) or whether he is still alive (Y=0)[3]. Assuming that ε has a standard normal distribution, with mean zero all parameters can be estimated using a simple probit model (e.g. Greene 1997)[4].

In model (1), parameter d measures the impact of previously reported *health status* and c the impact of *changes* (trajectories) on mortality. If the estimated parameter c equals the estimated parameter d, it can easily be seen that only currently self-rated health can help to explain mortality; no additional information comes from previously self-rated health We cannot test this in a direct way, however, because of scaling problems which will we discuss below. However, after some reformulation it can be seen that model (1) can also be written as

(2) $$Y_t^* = a + bX_t + d^* SR_{t-1} + c^* SR_t + \varepsilon$$

where c^* measures the impact of currently self-reported health on mortality and d^* equals (d-c) from model (1). If the estimated parameter d^* is not significantly different from zero, only the currently self-reported health status explains the probability to die. In other words: changes in self-rated health would not have an impact on explaining mortality and current information on self-rated health would be a valid indicator alone. The model then can be written as

(3) $$Y_t^* = a + bX_t + c^* SR_t + \varepsilon$$

which is nothing else than the standard model (see Idler and Benyamini 1997). Thus, we are able to replicate international evidence for Germany.

On the other hand, if the estimated parameter c^* in model (2) is not different from zero, only changes in self-rated health (the trajectories) would explain mortality. Testing model (1) resp. model (2) against model (3) might be a way to test the trajectory-hypotheses.

For estimation purposes the scale (SR) with five items is broken down into three dummy variables (see Table 1) where the items "very good" and "good" serve as reference categories. This is in line with most of the international studies on this topic (see Idler and Benyamini 1997). We can estimate our model (1) in two different ways: on the one hand we can estimate it as formulated in model (2). Note that model (2) is nothing more than a reformulation of model (1). Thus, we include both currently self-reported health SR_t and previously self-

[3] Exactly, whether he died after the last but before the next questioning.
[4] We use a simple probit-model instead of a discrete hazardrate-model, because the period between surveying the data and observing whether the respondent died or whether she is still alive is not longer than one year for each person. In addition, we do not know exactly the time (e.g., the month) of death.

reported health SR_t . Please note that the parameter estimated for SR_t , d^*, should be interpreted as (*d*-*c*).

On the other hand, we can estimate model (1) in a direct way, where we include previously self-reported health SR_t as well as the difference between currently self-reported health and previously self-reported health $(SR_t - SR_t)$. However, it does not make sense to estimate model (1) by subtracting one scale from the other, because we face the problem of the bounded scale of self-rating health. Especially the fact, that the scale is bounded from above makes a direct estimation of the "trajectory-hypotheses" difficult: respondents rating their health as bad do not have the possibility to rate their health poorer in the following year. To deal with this problem, we create five dummy-variables to measure changes in self-rating health: self-rated health decreased by two or more points on the scale (1), self-rated health decreased by one point (2), and self-rated health increased (3). We control for the scaling problem by including a dummy variable which indicates a rating of "bad" in both years (4). No (other) changes in self-rated health (5) serve as the reference category.

To control for some well-known relationships between sociodemographic variables and mortality we also include the following variables (X_t) in all models: gender, age in years, a regional dummy for East Germany, the type of household, information on whether the partner died last year, a subjective measure for loneliness, per-capita disposable household income, education and occupational skills. We also include information on functional disability provided by the respondents as objective health information. In addition, we have information on utilization of the medical care system which also can serve as proxy variables for objective health. These proxies are: visits to a physician in the last quarter before the survey took place, the number of visits, and information on hospitalization in the previous year. Descriptive information on all variables used in the estimations are shown in Table 2.

It has to be noted that we make use of panel information from two consecutive years for self-rated health but not for other covariates. This would be of interest for variables like functional disability, physician visits and hospitalization. Unfortunately, valid panel information for these indicators is not available because survey questions have changed during the years under consideration. For most of the socio-demographic covariates it makes no sense to include information from the previous year because there is no (e.g., age and sex) or only small variation in these variables over time.

Table 1: Description of Variables used in the Probit Models

Variable Name	**Description**
	Dependent variable
Died	Respondent died in the previous year = 1, else = 0 (dependent variable)
	Sociodemographic variables
Sex	Gender: 0=male, 1=female
East	Regional dummy: 0=former west Germany, 1=former GDR
Age	Age in years
Couple	Type of Household: 1=married couple, else=0
Couple, children	Type of Household: 1=couple with children, else=0
More Generations	Type of Household: 1=more than two generations are living together, else=0
	Type of Household: 1=person living alone, else=0; Reference category
Partner died	Partner died last year = 1, else = 0
Lonesome	Person feels very lonesome = 1, else = 0
Income	Per-capita disposable household income in 1995 Deutsche Mark
High school	Education: High school degree = 1, else =0
No skills	Skills: No special occupation training = 1, else = 0
	Health variables
Disabled	Functional disabled = 1, else = 0
Physician	Person visited a physician in the last quarter = 1, else = 0
Physician Number	Number of visits to a physician in the last quarter
Hospital	Person was hospitalized in previous year = 1, else = 0
Hospital nights	Number of nights hospitalized in previous year
	Self-rated health, original scale from 1 (very good) to 5 (bad)
Currently fair	Currently: Fair = 1, else = 0
Currently poor	Currently: Poor = 1, else = 0
Currently bad	Currently: Bad = 1, else = 0
	Currently: Very good, good = 1, else = 0; Reference category
Previously fair	Previous year: Fair = 1, else = 0
Previously poor	Previous year: Poor = 1, else = 0
Previously bad	Previous year: Bad = 1, else = 0
	Previous year: Very good, good = 1, else = 0; Reference category
Decrease 2	Self-rated health decreased from previous year to current year by two or more points on the scale = 1, else = 0
Decrease 1	Self-rated health decreased from previous year to current year by one point on the scale = 1, else = 0
Increase	Self-rated health increased from previous year to current year on the scale
Both bad	Self-rated health was bad in the previous year as well as in the current year (a decrease of self-rated health is not possible by construction of the scale)
	No changes in self-rated health is observed (with exemption of Both bad)

Table 2: Means/proportions of variables used in the Probit analysis

Variable	Total	Men	Women
Died (in 1996 or 1997)	0.04	0.05	0.04
Sex	0.55	0.00	1.00
Age	65.63	64.32	66.69
Couple	0.54	0.65	0.46
Couple, children	0.18	0.22	0.15
More Generations	0.05	0.04	0.06
Partner died	0.01	0.01	0.01
Lonesome	0.09	0.07	0.11
Income	1589.0	1598.29	1581.52
East	0.36	0.36	0.36
High school	0.10	0.15	0.06
No Skills	0.25	0.09	0.38
Disabled	0.26	0.32	0.21
Physician	0.84	0.81	0.86
Physician Number	4.24	4.18	4.28
Hospital	1.84	1.84	1.84
Hospital Nights	3.73	4.01	3.51
Currently very good	0.02	0.02	0.02
Currently good	0.22	0.24	0.20
Currently fair	0.46	0.46	0.45
Currently poor	0.24	0.21	0.25
Currently bad	0.07	0.07	0.08
Previously very good	0.02	0.03	0.02
Previously good	0.25	0.27	0.23
Previously fair	0.44	0.45	0.43
Previously poor	0.23	0.20	0.25
Previously bad	0.06	0.05	0.07
Decrease 2	0.03	0.03	0.03
Decrease 1	0.22	0.23	0.22
Increase	0.21	0.20	0.21
Both bad	0.03	0.03	0.04
Observations	3,096	1,384	1,712

Source: GSOEP, 1994 – 1997.

3. Results

Before we will have a closer look on self-rating health variables, the impact of socio-demographic variables and "objective" health measures on mortality should be briefly discussed. In our first estimation all variables are included except for self-rated health variables (see Table 3, first column). The estimated relationships between socio-demographic variables like age, sex, and household composition and the probability to die have the expected signs, and these results do not change when self-rated health variables are included later. Education and occupational skills are not significant. However, most of these effects may be captured by our income variable which is significantly negative. The higher the disposable per-capita income of the household, the lower is the probability to die. The occurrence that residents from the former German Democratic Republic have a higher probability to die, which even increased after re-unification, is a well-known fact (see Eberstadt 1994). The death of a partner in the previous year does not have an impact on mortality. Also, respondents reporting that they feel lonesome do not have an increased probability to die.

Table 3: Probit estimates on mortality

	Model without information on self-rated health		Model (2)[a]		Model (3)[a]	
Variable	Parameter	Std. Error	Parameter	Std. Err.	Parameter	Std. Error
Intercept	-5.2042***	0.5821	-5.0858***	0.5997	-5.0376***	0.5945
Sex	-0.3076***	0.1125	-0.3719***	0.1156	-0.3625***	0.1147
Age	0.0532***	0.0056	0.0482***	0.0056	0.0486***	0.0057
Couple	-0.1932	0.1302	-0.2484*	0.1335	-0.2524	0.1326
Couple, children	0.0084	0.1759	-0.0697	0.1806	-0.0662	0.1793
More Generations	0.1204	0.1848	0.0243	0.1925	0.0316	0.1914
Partner died	-0.3431	0.5870	-0.4610	0.6280	-0.4074	0.6161
Lonesome	0.2305	0.1404	0.0974	0.1484	0.0966	0.1471
Income	-0.0002**	0.0001	-0.0001**	0.00009	-0.0002**	0.0001
East	0.3292***	0.1027	0.3206***	0.1052	0.3172***	0.1047
High school	0.2001	0.1701	0.2472	0.1728	0.2279	0.1724
No skills	0.1501	0.1150	0.1428	0.1176	0.1354	0.1170
Disabled	0.4803***	0.1025	0.3325***	0.1091	0.3458***	0.1073
Physician	-0.2631*	0.1441	-0.3630**	0.1535	-0.3395**	0.1517
Physician number	0.0209***	0.0062	0.0141***	0.0064	0.0136**	0.006
Hospital	0.1563	0.1456	0.2294	0.1512	0.2335	0.1499
Hospital nights	0.0116***	0.0027	0.0099***	0.0027	0.0101***	0.0028
Previously fair	-	-	0.2116	0.1570	-	-
Previously poor	-	-	0.0870	0.1838	-	-
Previously bad	-	-	0.3728*	0.2175	-	-
Currently fair	-	-	0.0988	0.1716	0.1482	0.1647
Currently poor	-	-	0.4140**	0.1882	0.4705***	0.1732
Currently bad	-	-	0.7188***	0.2252	0.8503***	0.1985
Log-Likelihood	-412.52		-396.91		-399.40	
χ^2- LR-Test	31.22(6)***					
			4.98(3)			

Source: GSOEP, 1994 – 1997.

[a] The models are explained in section 2.

* Statistically significant at the 10% level, ** at the 5% level, *** at the 1% level.

Nearly all "objective" health variables are significant determinants for the probability of death. There were more deaths of respondents who reported disability than of those who did not. Our other "objective" health variables measure utilization of the health care system. Persons who visited a physician in the last quarter before the survey have a lower probability to die. The visit to a physician in the last quarter before the survey took place can perhaps be interpreted as an indicator for regular visits, e.g. as the utilization of preventive care. Regular visits to a physician then lower the risk of mortality, especially for women (see Table 5). In fact, women visit a physician more regularly than men, and they have a higher utilization rate of preventive care. In contrast to regularity, the frequency of physician contacts is primarily an indicator of morbidity. Therefore, the more frequent the visits to a physician, the higher is the probability to die, which also means a higher morbidity. Being in a hospital during the last year does not have a significant influence on mortality, but the number of nights in a hospital leads to a significant increase in the likelihood to die. The higher the number of nights a person spent in a hospital, the higher is the probability to die and the higher is the probability of impending doom.

We start with analyzing the effect of self-rating health provided by the respondents as formulated by model (2): We include self-reported health from both the current as well as from the previous year. The LR-test statistic shows that this model should be preferred to the model without this information. In other words: self-reported health variables significantly increase the prediction of mortality. It can be shown further, however, that previously reported health is clearly dominated by currently reported health. Note that the parameters estimated for the impact of previously self-reported health have to be interpreted as d^*, that is the difference (*d*-*c*). Thus, it might be possible to explain the impact of self-reported health on mortality by the currently reported health status alone. To test this hypothesis further, we estimate a model including the currently self-reported health status only (see model (3) in Table 3). A LR-test shows that model (2) contains no additional information for explaining mortality. The chi-square value is 4.98(3), and the critical value on the 10 percent level is 6.25. As a result, the thesis that declining health trajectories have an additional impact on mortality, has to be rejected.

The results from model (3) confirm international evidence (see Idler and Benyamini 1997). The probability to die within the year after surveying is significantly higher for those respondents who reported their health as poor or bad. The category "fair" in not significant.

Reference category are respondents with self-ratings as good or very good. Moreover, self-rated health seems to be an unique indicator for explaining the probability of death, because we included "objective" information on health and there are only few changes in sign and significance of objective health variables, as well as of socio-demographic variables, regardless of whether self-rated health indicators are included in the regressions or not.

Table 4: Probit estimation on mortality: Changes in self-rated health

	Model (1)[a]		Model (3)[a]	
Variable	Parameter	Std. Err.	Parameter	Std. Error
Intercept	-5.2972***	0.6018	-5.0376***	0.5945
Sex	-0.3783***	0.1163	-0.3625***	0.1147
Age	0.04841***	0.0056	0.0486***	0.0057
Couple	-0.2508*	0.1341	-0.2524	0.1326
Couple, children	-0.0605	0.1813	-0.0662	0.1793
More Generations	0.03803	0.1942	0.0316	0.1914
Partner died	-0.4686	0.6380	-0.4074	0.6161
Lonesome	0.12103	0.1485	0.0966	0.1471
Income	-0.0001**	0.00001	-0.0002**	0.0001
East	0.33600***	0.1055	0.3172***	0.1047
High school	0.26933	0.1729	0.2279	0.1724
No skills	0.14274	0.1179	0.1354	0.1170
Disabled	0.33251***	0.1094	0.3458***	0.1073
Physician	-0.3619**	0.1519	-0.3395**	0.1517
Physician number	0.01418**	0.0065	0.0136**	0.006
Hospital	0.23489	0.1513	0.2335	0.1499
Hospital nights	0.00976***	0.0027	0.0101***	0.0028
Previously fair	0.46519***	0.1609	-	-
Previously poor	0.59398***	0.1886	-	-
Previously bad	0.91247***	0.3100	-	-
Decrease 2	0.58741**	0.2586	-	-
Decrease 1	0.41354***	0.1277	-	-
Increase	-0.0725	0.1599	-	-
Both bad	0.40102	0.3005	-	-
Currently fair	-	-	0.1482	0.1647
Currently poor	-	-	0.4705***	0.1732
Currently bad	-	-	0.8503***	0.1985
Log-Likelihood	-395.69		-399.40	
χ^2- LR-Test	7.42(4)			

Source: GSOEP, 1994 – 1997.

[a] The models are explained in section 2.

* Statistically significant at the 10% level, ** at the 5% level, *** at the 1% level.

Next we deal with changes in self-reported health between two successive years as formulated by model (1). Note that this model is theoretically equivalent to model (2). In the estimates shown by Table 4 changes in self-reported health are explicitly included as explanatory variables for mortality. It can be seen that some of the change variables are significantly different from zero. Given self-reported health information from the previous year a decrease in self-reported health by one or two points on the scale increase the probability to die. Also significant is the variable that controls for the fact that the rating scale is bounded. However, again the question is whether this model gives a better explanation in the sense that changes in self-reported health explain the probability to die additionally to the model described in model (3). To figure this out, we test model (1) against model (3) by using a LR-Test. The chi-square value is 7.42(4), and the critical value on the 10 percent level is 7.78. Therefore, again we have to reject the thesis that changes in self-rated health give additional explanation.

Our results correspond to those of Wolinsky and Tierney (1998), who also rejected the trajectory hypothesis using data for the United States. The relationship between poor self-rated health and mortality is not a simple reflection of declining health trajectory. "Rather, the effects of poor self-rated health and declining health trajectory appear to be independent and complementary" (Wolinsky and Tierney 1998, p. 383). In further research it should be examined whether trajectories might have a special predictive quality for hospitalization, nursing home placement or retirement.

Finally, we will present different estimations for men and women (Table 5). As it was shown before, it is sufficient to include the currently self-reported health status. First we find a remarkable similarity to a recent study from France (Helmer et al. 1999): self-rated health seems to be a better predictor of mortality for men than for women. For women only the category "bad" is a significant predictor for mortality. Another interesting difference between women and men are the effects of the "objective" health variables. The only variable which is significant for women is the negative impact of visit to a physician on mortality. As stated above, the visit to a physician may be interpreted as an indicator for regular visits, e.g. as the utilization of preventive care. It might be interesting to note that the variable visit to a physician is not significant for men, but all other utilization variables are significant.

Table 5: Probit estimations on mortality for men and women

	Men		Women	
Variable	Parameter	Std.Err.	Parameter	Std.Err.
Intercept	-5.8836***	0.8880	-5.4873***	0.7987
Age	0.0472***	0.0084	0.0547***	0.0082
Couple	-0.4957**	0.2149	-0.1296	0.1809
Couple, children	-0.5965**	0.3016	0.3122	0.2313
More Generations	-0.1741	0.3728	0.0620	0.2282
Lonesome	0.1400	0.2421	0.0450	0.1948
Income	-0.0001	0.0001	-0.0003**	0.0001
East	0.3556**	0.1625	0.2980**	0.1436
High school	0.2343	0.2219	0.2382	0.3173
No skills	0.5140**	0.2042	-0.0282	0.1433
Disabled	0.2665*	0.1535	0.4734***	0.1575
Physician	-0.2968	0.2207	-0.4062*	0.2183
Physician number	0.0216***	0.0083	0.0078	0.0113
Hospital	0.4655**	0.2318	0.0695	0.2078
Hospital nights	0.0152***	0.0039	0.0062	0.0047
Currently fair	0.2862	0.2430	-0.0010	0.2350
Currently poor	0.5763**	0.2573	0.3245	0.2449
Currently bad	1.0047***	0.2969	0.6406**	0.2800
Log-Likelihood	-185.32		-203.76	

Source: GSOEP, 1994 – 1997.

* Statistically significant at the 10% level, ** at the 5% level, *** at the 1% level.

4. Conclusions

Using data from the German Socio-Economic Panel study we confirm the international evidence that self-rated health is a valid predictor of mortality for Germany, too. In addition, our data enable us to prove the so-called trajectory hypothesis. We found that the relationship between self-rated health and mortality is not a simple reflection of declining health trajectories.

It should be examined in further research whether self-rated health can be used more generally in health economics. Finnish investigations do not only show the well-known connection between self-rated health and mortality for the working-age population, but they also demonstrate that self-rated health is qualified to predict the use of physicians' services (see Miilunpalo et al. 1997). Dwyers and Mitchell (1999) have shown that self-rated health is also an indicator for predicting retirement. These studies show the increasing importance of this indicator in health economics.

References

Dwyer, D. S. and O. S. Mitchell (1999), Health problems as determinants of retirement: are self-rated measures endogenous?, Journal of Health Economics, 18(2),173-193.

Eberstadt, N. (1994): Demographic shocks after communism: Eastern Germany, 1989-1993, Population and Development Review, (20)1, 137-152.

Greene, W. H. (1997): Econometric Analysis, Third Edition, London.

Helmer, C., P. Barberger-Gateau, L. Letenneur, and J-F. Dartigues (1999): Subjective Health and Mortality in France – Elderly Women and Men, Journal of Gerontology: Social Sciences, (54B)2, 84-92.

Idler, E. L. and Y. Benyamini (1997), Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies, Journal of Health and Social Behavior, (38), 21-37.

Julhä, M, J. M. Guralnik, L. Ferrucci , J. Jokela and E. Heikkinen (1998), Is Self-Rated Health Comparable Across Cultures and Genders?, Journal of Gerontology: Social Sciences, (53B)3, 144-152.

Klein, Th. (1996): Mortalität in Deutschland – Aktuelle Entwicklungen und soziale Unterschiede. In: W. Zapf, J. Schupp and R. Habich (eds.): Lebenslagen im Wandel: Sozialberichterstattung im Längsschnitt, Frankfurt and New York, 366-377.

Menec, V. H., J. G. Chipperfield and R. P. Perry (1999), Self-Perceptions of Health: A Prospective Analysis of Mortality, Control, and Health, Journal of Gerontology: Psychological Sciences, (54B)2, P85-P93.

Miilunpalo, S., I. Vuori; P. Oja, M. Pasanen and H. Urponen (1997), Self-rated health status as a health measure: the predictive value of self-reported health status on the use of physician services and on mortality in the working-age population, Journal of Clinical Epidemiology, 50(5), 517-528.

Mossey, J. M. and E. Shapiro (1982), Self-Rated Health: A Predictor of Mortality Among the Elderly", American Journal of Public Health, 72(8), 800-808.

F. D. Wolinsky and W. M. Tierney (1998), Self-Rated Health and Adverse Health Outcomes: An Exploration and Refinement of the Trajectory Hypothesis, Journal of Gerontology: Social Sciences, (53B), 336-340.

Wagner, G. G., R. V. Burkhauser and F. Behringer (1993): The English Language Public Use File of the German Socio-Economic Panel, Journal of Human Resources, (28), 429-433.