

## The Course of Subjective Well-Being over the Life Cycle

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### Abstract

This paper deals with the relationship between subjective well-being and ageing in the German Socio-Economic Panel (SOEP). The baseline results confirm the U-shaped relationship between life satisfaction and age, which has been found in many case studies by economists and others. Furthermore, the functional flexibility allows us to detect a second turning point later in life. Finally, some methodological issues are discussed and robustness checks are performed to further understand the observed relationship. The paper tries to emphasize the usefulness of the longitudinal set-up of the SOEP to examine life cycle patterns.

*JEL Classification: C23, I31, J10*

### 1. Introduction

People are heterogeneous across many dimensions, of which their age seems an obvious though important example. One has different physical and mental needs, capacities and expectations at different stages in life. *Age* is therefore a sociodemographic characteristic which deserves some attention in the empirical social science. Deaton/Paxson (1994, 1997, 1998) find that inequality in health and consumption rises with age. Sommer (2005), investigates shifts in patterns of the savings' portfolio structure over the life cycle.

This paper deals with the structure of life satisfaction over the life cycle, and suggests that the long time dimension of the German Socio-Economic Panel (SOEP) might help to thoroughly understand this issue.

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The remainder of the paper is organized as follows. Section 2 frames the research in the current economic literature. Section 3 offers some first basic empirical results, and section 4 discusses some methodological issues. Section 5 concludes.

## 2. Background

The closest model in economic theory linked to the empirical study is probably the well-known ‘life cycle utility’ model. At the beginning of the life cycle, an individual plans its consumption pattern subject to an intertemporal budget constraint. Solving this dynamic optimization problem leads to the following equality:

$$(1) \quad u'(C_0) = u'(C_1) \frac{1+r}{1+\rho} = u'(C_2) \left(\frac{1+r}{1+\rho}\right)^2 = \dots = u'(C_T) \left(\frac{1+r}{1+\rho}\right)^T$$

where

- $t = 0 \dots T$  is a subscript denoting the stage in the cycle.
- $r > 0$  is an interest rate (the savings rate, in this set-up, equals the borrowing rate).
- $\rho > 0$  is a discount rate: people would like to consume now rather than in the future.
- $C$  denotes consumption.
- $u$  denotes instantaneous utility, which is concave and increasing in  $C$ .

This highly stylized model, however, does not offer us much of a clue about the pattern of subjective well-being over the life cycle. Weaknesses of the framework to predict happiness over the life cycle could be categorized into two groups.

First, the predicted pattern is very sensitive to the assumptions imposed, and it is hard to judge a priori which assumptions are most appropriate. When the interest rate and discount rate are assumed to be equal, utility would be flat over the life cycle. However, the model can predict upward sloping as well as downward sloping utility over the life cycle if the discount rate is lower resp. higher than the interest rate. Moreover, if one would introduce other assumptions such as liquidity constraints or uncertainty in future income, virtually any shape can be simulated.

Second, subjective well-being research has shown that consumption is not the only determinant of one’s life satisfaction and that life events such as unemployment, marriage ... may play a major role apart from their pecuniary implications. Moreover, the life cycle theory depending on discounted utility does not incorporate utility of anticipation (Frederick et al., 2002): future well-being might well influence one’s *current* life satisfaction.

In summary, it seems that empirical research is crucial to understand patterns of life cycle happiness, and that it might be a step towards further refining economic theory.

### 3. Some Empirical Results

The empirical literature has repeatedly found a U-shaped relationship between subjective well-being and age in a (single) cross-sectional analysis, bottoming up between the late 30s and the early 50s. Interestingly, this pattern has been found for developed countries (e.g. by Blanchflower/Oswald, 2004; Clark/Oswald, 1996; Di Tella et al., 2001, 2003; Oswald, 1994; Oswald/Powdthavee, 2006, 2007a,b; Theodossiou, 1998; Winkelmann/Winkelmann, 1998), as well as for transition and developing countries (Fafchamps/Shilpi, 2008; Powdthavee, 2003, 2005; Sanfey/Teksoz, 2007; Senik, 2004).

Table 1 shows results for Germany using data from the German Socio-Economic Panel (SOEP). The following equation has been estimated using pooled OLS:

$$(2) \quad SWB_i = \alpha + (AGE_i)\beta_1 + (AGE_i)^2\beta_2 + (AGE_i)^3\beta_3 + X_i\Gamma + \epsilon_i .$$

- *SWB* denotes subjective well-being.
- *AGE* denotes one's age.
- *X* is an  $1 * M$  vector of sociodemographic characteristics including time dummies.
- $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are parameters to be estimated and  $\Gamma$  an  $M * 1$ -vector of parameters to be estimated associated with the sociodemographic characteristics and time dummies. Including time dummies is essential due to the panel ageing over time (Frijters et al., 2004).
- $\alpha$  is a constant,  $\epsilon$  an error term and  $i$  is an individual subscript.

The specification differs from most other cross-sectional and pooled cross-sectional studies in this respect that a cubed term of age is included, allowing for more functional flexibility.

The pooled OLS regressions are shown for both West and East Germany separately. Survey rounds from 1985 to 2007 are used for West Germany, and from 1991 to 2007 for East Germany. Results for both West and East Germany confirm the well-established U-shape of subjective well-being over the life cycle. Moreover, the cubed term allows us to identify a second turning point later in life. Subjective well-being seems to be lowest around 40 and highest around 75 in West Germany. In East Germany, the first turning point occurs at the age of 44 while the second turning point occurs only at the age of 85.

Table 1

**The course of subjective well-being over the life cycle:  
pooled OLS results**

	No Birth Decade Dummies		Birth Decade Dummies	
	West Germany	East Germany	West Germany	East Germany
Age	-0.173524 (16.55)***	-0.158239 (7.22)***	-0.145110 (13.13)***	-0.146963 (5.81)***
Age squared	0.003306 (15.04)***	0.002722 (5.96)***	0.002830 (12.13)***	0.003110 (5.70)***
Age cubed	-0.000019 (13.10)***	-0.000014 (4.61)***	-0.000017 (10.89)***	-0.000019 (5.11)***
Local minimum	40.38	44.03	40.54	34.28
Local maximum	75.00	85.07	69.78	76.00
Constant	8.660817 (56.29)***	7.317497 (23.55)***	8.349325 (28.79)***	6.457922 (10.59)***
Observations	164342	42569	164242	42569
R-squared	0.06	0.09	0.06	0.10

*Notes:* Covariates include the log of real household income and the log of real assets' revenues, marital status dummies, dummies for whether the marital status has changed during the last 3 months, a dummy for disability status, an unemployment dummy, the number of months being unemployed during the last 12 months and time dummies. Specifications reported in the last 2 columns also include birth decade dummies with the cohort born before 1920 as base category. Absolute value of  $t$  statistics are in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

#### 4. Some Methodological Issues

One might be concerned that the U-shape of subjective well-being over the life cycle is driven by a calendar or birth cohort effect: some people are born in better/different times than others. Simultaneously identifying the effect of ageing, time effects and birth cohorts is difficult due to multicollinearity issues. Indeed:

$$(3) \quad AGE = Y_{int} - Y_B$$

where  $Y_{int}$  denotes the year of interview and  $Y_B$  the year of birth. Columns 3 and 4 of table 1 show results obtained using the methodology outlined in Blanchflower/Oswald (2008). In an attempt to overcome the multicollinearity problem and still to capture some calendar effects, regressions shown in columns 1 and 2 of table 5 are re-estimated but now including birth decade dummies as additional covariates. The multiple survey rounds provided in the GSOEP ensure that the same age is observed for different birth cohorts.

Allowing a less accurate measurement of birth cohorts (in decades instead of years) helps to overcome the multicollinearity problem. Working papers such as Clark (2007), and Clark/Oswald (2007) are proposing a fixed effects methodology to deal with calendar effects applied to the British Household Panel. The methodology has been applied to the SOEP in Van Landeghem (2008) but will not be discussed here. The same U-shaped relationship of subjective well-being seems to reappear, backward bending at later age. For West Germany, the first turning point is almost unchanged, while the second turning point appears somewhat earlier in life, at the age of 70 instead of 75. For East Germany, turning points both seem to fall considerably earlier in life after controlling for birth decade dummies. Life cycle happiness now bottoms at the age of 34 while it reaches a peak at about 76 years of age.

## 5. Conclusion

This paper discussed the course of subjective well-being over the life cycle using data from the German Socio-Economic Panel (SOEP). For baseline regressions, the U-shaped relationship between happiness and age, found in many other case studies, was confirmed. Results also revealed, however, that there is a second turning point in life, a phenomenon which has received far less attention in the literature. The panel property of the SOEP allows us to investigate whether the U-shape can be explained by a calendar effect rather than an age effect. The robustness check still reveals a U-shape of subjective well-being over the life cycle, although the turning points fall somewhat earlier in life, especially in East Germany. Further investigations might be useful to thoroughly understand life cycle happiness, and the SOEP and its longitudinal set-up seems promising to understand patterns over the life cycle in general.

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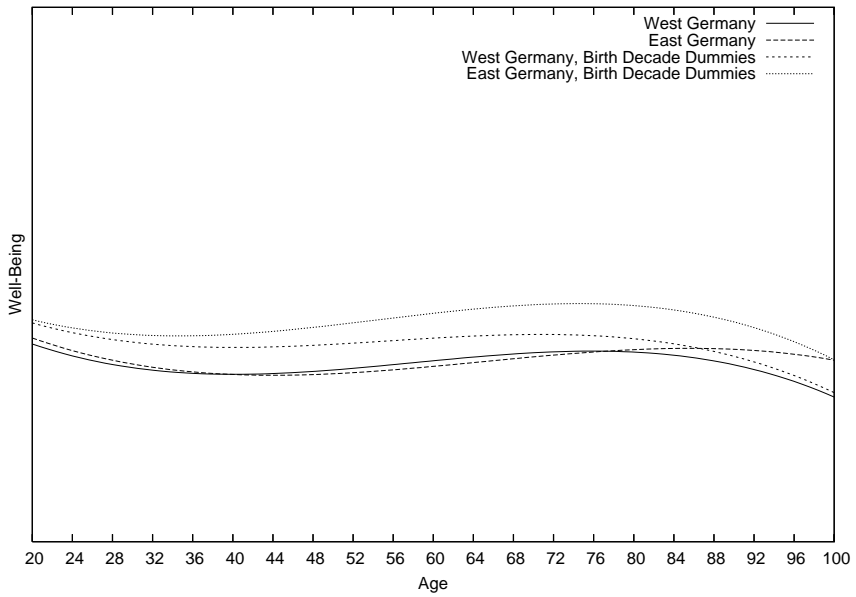


Figure 1: The course of subjective well-being over the life cycle:  
graphical representation