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The Anatomy of Subjective Well-being

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THE ANATOMY OF SUBJECTIVE WELL - BEING

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THE ANATOMY OF SUBJECTIVE WELL - BEING

Abstract

Subjective Well-Being has increasingly been studied by several economists. This paper fits in that literature but takes into account that there are different aspects of life such as health, financial situation, and job. We call them domains. In this paper, we consider Subjective Well-Being as a composite of various domain satisfactions (DS). We postulate a two –layer model where individual Subjective Well-Being is explained by individual subjective domain satisfactions with respect to job, finance, health, leisure, housing, and environment. We distinguish between long -term and short - term effects. Next, we explain domain satisfactions and Subjective Well-Being by objectively measurable variables such as income. We estimate a model for the GS and DS equations with individual random effects and fix time effects.

JEL CODE: C23, C25**,** I31,

Key words : Subjective Well-Being, satisfaction measurement, qualitative regressors, health satisfaction, job satisfaction.

1. Introduction

A recent issue of the Journal of Economic Behavior & Organization (**45**,2001) was entirely devoted to the theme of 'Subjective Well – Being and Economic Analysis'. In our opinion it was a rather audacious but badly needed project to get attention for a lot of research that is going on SWB, mostly in other disciplines like psychology and sociology but also starting now in economics proper. The project is audacious because there is a virtual ban on measuring utility in mainstream economics since Robbins (1932) and Hicks (1934) declared any empirical measurement anathema. Although various prominent economists like Frisch (1932) and Tinbergen (1991) always refused to take such a stand, Easterlin (2001) and Holländer (2001) make a strong case that this anathema has actually caused a stagnation in the development of economic analysis (see also Van Praag (1968) for similar statements). The project is badly needed, because utility or SWB is the central pin in most economic theories, and nowadays it is still operationally an empty concept, because it is not filled on the basis of empirical direct measurement.

Individual choice behavior is frequently described and explained by a utility optimization model. Hence, any source that yields information about the nature of the optimization criterion used in various economic problems is relevant for economic science and should be exploited. We agree with Frey and Stutzer (2000) who claim that "To discover the sources of well–being is a major concern in the social sciences".

Until quite recently, the study of subjective well-being has been left almost exclusively to psychologists and sociologists (see e.g., Veenhoven, 1997). Nevertheless, in the last years several economists have started to study subjective well - being as a serious subject (see, for example, Blanchflower and Oswald, 2000; Clark

and Oswald, 1994; DiTella et al., 2001; Falk and Knell, 2000; Frey and Stutzer, 1999, 2000; McBride (2001); Oswald, 1997; Pradhan and Ravallion, 2000; Van Praag and Frijters, 1999; Winkelmann and Winkelmann, 1998; Wottiez and Theeuwes, 1998). Earlier studies include Easterlin (1974), Van Praag (1971), and Van Praag and Kapteyn (1973).

This paper may be seen in that line of research. The novelty of this paper is that we make a first attempt to develop a joint model, which gives room for SWB, 'satisfaction with life as a whole' *and* domain satisfactions. For in practice we distinguish various types of satisfaction, like health satisfaction, financial satisfaction, and job satisfaction. They refer to different domains of life and hence are termed *domain* satisfactions. At a more general level, there is satisfaction 'with life as a whole' or subjective well - being as an aggregate concept, which we can unfold into its components, i.e. the domain satisfactions.

Most of the studies in the literature on Subjective Well-Being use a similar method. Individuals are asked how satisfied they are with a specific domain or with 'life as a whole' and they are invited to cast their response in terms of a small number of verbal response categories such as 'bad', 'sufficient', and 'good'. Alternatively, the categories are numbered from 0 to 5, 7 or 10, where 'most dissatisfied ' corresponds to level 0 and 'most satisfied' with the highest level. Then, it lies at hand to explain the response behavior by Ordered Probit or Logit Analysis. The latent satisfaction variable y is explained by the equation $y = x'b + e$ where x stands for a vector of objective variables such as age, income, gender, and education. When two respondents give the same answer, they are assumed to enjoy similar satisfaction levels. In other words, ordinal comparability of the answers is assumed.

[1] We use the terms Subjective Well-Being, satisfaction with life, and (subjective) well-being as

Consequently, we may assess the effect of various explanatory variables in terms of contributing positively or negatively to Subjective Well-Being. We may also consider the substitution ratio between explanatory variables. For instance, Frey and Stutzer (2000) look at the impact of democratic institutions on Subjective Well-Being. Clark and Oswald (1994) look at the impact of unemployment on well-being. Cutler and Richardson (1997) and Groot (2000) look for the effect of various illnesses on health satisfaction. The evidence from the economic and psychological literature indicates a fairly stable relationship between satisfaction and objectively measurable variables (see e.g. Diener and Lucas 1999). This is seen as indirect evidence of the interpersonal comparability of the responses. This paper aims at a somewhat more sophisticated model in which we will assume that satisfaction with life is an aggregate of various domain satisfactions.

More precisely, we assume that there is a set X of objectively measurable explanatory variables X_1 ,…., X_k . Different subsets of X explain the various domain satisfactions, which we denote by $DS_1, \ldots, DS_J$. It is probable that there will be variables that only affect certain domains but not all of them. Then General Satisfaction (GS) with life is explained by $DS_1, \ldots, DS_J$. We sketch the structure in fig.1., where three variables X have been taken as an example to illustrate our model.

[Figure 1 about here]

We might surmise that the structure in fig.1. is too simple. For instance , it is quite probable that job satisfaction may depend a.o. on health satisfaction. In that case, one endogenous DS would influence another endogenous DS. In this context, we look

interchangeable.

only at the intermediate block as a *reduced* model where all such cross – relations have been eliminated. This paper is structured as follows. Section 2 presents the questions used for the analysis, the main underlying assumptions, and the model. Section 3 describes the data, extracted from the German Socio-Economic Panel (GSOEP). Section 4 shows and discusses the estimation results for the general satisfaction equation and Section 5 does so for the domain satisfaction equations. Section 6 concludes.

2 The Model

2.1 Subjective questions

Psychologists have used subjective questions regarding individuals' satisfaction with life for over three decades. Cantril (1965) developed a question module for life satisfaction, which has been asked in various forms since 1965 to over a million of respondents in thousands of questionnaires all over the world (see Veenhoven, 1997). Similar question modules are the Likert (1932)-scale and the Visual Analog Scale (VAS). See also Bradburn (1969). Some of these questions are included in the German Socio – Economic Panel (GSOEP) data set used in this study. The central question we use is the following:

"Please answer by using the following scale in which 0 means totally unhappy, and 10 means totally happy:
How happy are you at present with your life as a whole? "

The answer to this question is termed the General Satisfaction (GS) of the respondent. Next to it, respondents are also asked for their satisfaction with respect to various domains (DS) such as their financial and job situation.

2.2 The main assumptions

In order to use these questions to elicit individual preferences, we have to make two main assumptions.

First, we assume that responses of different persons are interpersonally comparable at an ordinal level. In other words, we postulate that individuals, answering similarly to such satisfaction questions, are enjoying a similar level of satisfaction. Actually, this is the hidden assumption on which individuals communicate with each other in any language. We do not assume any kind of cardinality assumption, which would imply that a step from 6 to 7 would be equal to the well –being or utility difference from 7 to 8 (see Suppes and Winet, 1954). Two recent psychological findings encourage the view that the levels of satisfaction found are also interpersonally comparable within a given language community. The first is that individuals are able to recognize and predict the satisfaction level of others. In interviews in which respondents are shown pictures or videos of other individuals, respondents were quite accurate in identifying whether the individual shown to them was happy, sad, jealous, etc (see e.g., Diener and Lucas, 1999). This also holds when individuals are asked to predict the evaluations of individuals from other cultural communities. Hence, although it is very probable that what makes individuals happy or sad differs greatly amongst different cultures, it does seem as if there is a common human 'language' of satisfaction and that satisfaction is roughly observable. The second finding is that individuals in a language community have a common understanding of how to translate internal feelings into a number scale. Virtually no respondent expects a very sad individual who is contemplating suicide to evaluate life satisfaction by anything higher than a 5 on a (0, 10)-scale. Also, respondents translate

verbal labels, such as 'very good' and 'very bad', into roughly the same numerical values (see Van Praag, 1991, 1994).

Second, we assume that there is a correspondence between what we measure, i.e. GS, and the metaphysical concept we are actually interested in. Obviously, satisfaction and well-being is not a physical phenomenon that can be easily and objectively measured. Nevertheless, it is well known that there is a strong positive correlation between emotional expressions like smiling, frowning, brain activity, and the answers to the satisfaction questions (see, Shizgal,1999; Fernández – Dols and Ruiz- Belda, 1995; Sandvik et al., 1993). Satisfaction levels are also predictive in the sense that individuals will not choose to continue activities which yield low satisfaction levels (see Kahneman et al., 1993; Clark, 1998; Frijters, 2000).

2.3 The model

Next, we present our model. We postulate that general satisfaction is a composite of the various domain satisfactions, say

$$GS = GS(DS_1,...,DS_J) \tag{1}$$

where *GS* stands for general satisfaction and $DS_1,...,DS_J$ for the specific domain satisfactions. In our data set, six domain satisfactions, referring to job, financial situation, housing, health, leisure, and environment satisfaction are distinguished. For individuals who do not have a job, information on job satisfaction is evidently absent. Following Fig.1 we can link GS to observable variables *x* by postulating a model

$$DS_j = DS_j(x) \qquad \text{j=1,2,…,J} \tag{2}$$

A change in *x* will change the *DS* and accordingly *GS*. Most probably the x- variables in (2) will not be exhaustive. We think of personality traits that are time invariant. We assume an unobservable, *z*, which co- determines *GS* and the *DS* (Argyle, 1999) jointly with the observed *x*.

Thus, general satisfaction is correctly described by

$$GS = GS(DS_1, ..., DS_J; z) \tag{3}$$

and

$$DS_j = DS_j(x_j, z) \qquad j=1,2,\ldots,J \tag{4}$$

where xj- stands for the sub –selection of x- variables for the domain j. If z is omitted in (3) it will become part of the error term. However z is also correlated with the explanatory variables DS. In other words, there is the threat of an endogeneity bias. If we do not correct for that, the estimates of (3) will be biased . The way in which we tackle this problem will be described later on.

There are some aspects of the estimation problem that have to be considered more in detail. First, the satisfactions are ordinal discrete variables. Such variables are also called sometimes qualitative variables or polytomous variables in psychometrics (Muthén, 1984). Estimation of a single equation, where the qualitative variable is the one to be explained, is possible by means of traditional methods of ordered probit or logit (see Clark and Oswald, 1994; Blanchflower and Oswald, 2000). Thus, we estimate the General Satisfaction equation by means of Ordered Probit. This is the usual way in the subjective satisfaction literature. The choice for normally distributed errors leads to an ordered probit model, which is by now standard in this literature (e.g. Blanchard and Oswald, 2000) because it is more flexible than the ordered logit

model. In our model, however, not only the dependent variable in equation (3) is qualitative, but the same holds for some of the explanatory variables. The most usual approach is by means of introducing dummy variables. A categorical variable with k categories is described by (k –1) dummy variables which are introduced as regressors. This is a non- attractive approach. In our case, where we have six domains, with ten values each, it would introduce 54 not easily interpretable regression coëfficiënts.

Since the DS are ordinal variables, any operationalization, that is translation into numbers, will do, provided that the order of the 'values'' is preserved. For instance, assume that we have two 'translations'

$$DS_j \text{ (j=1,…,6)} \quad \text{and} \quad \overline{DS}_j = \jmath_j(DS_j) \qquad \text{(j=1,…,6)}$$

where the $\jmath_j(\cdot)$ are monotonically increasing functions. Let us assume that GS is explained by a latent variable model

$$y = g_1 DS_1 + \ldots + g_6 DS_6$$

then the alternative model

$$y = g_1 \jmath_1^{-1}(\overline{DS}_1) + g_6 \jmath_6^{-1}(\overline{DS}_6)$$

will do just as well, although the functional specification is quite different in terms of the second translation. It can also be shown that the trade –offs between the basic x – variables remain the same, irrespective of whether they are calculated from the first model or from the second model after an inverse translation to DS_i and DS_j . We

notice that the translation function $j(\cdot)$ is and should be the same for all individuals, if we assume that the original answers have equal meaning for varying respondents. Hence, the specific choice of assigning numerical values to DS is a matter of expediency. If we want to use DS as explanatory variables in a regression or a Probit model, we would prefer explanatory variables which can vary over the whole real axis. We use the device proposed by Terza (1987). In the satisfaction questions described in Section 2.1. the categories are numbered 0 to 10. We assign a DS – value to each category by setting $\ddot{DS}_i = E(DS \mid m_{i-1} < DS \leq m_i)$ *(i=1,…,11)*, where the values m_i are the normal quantile values of the sample fractions of the 11 response categories.

Equation (3) is estimated by means of ordered Probit, where we employ the values just defined for the explanatory variables DS.

The equation system (4) is now operationalized as

$$\ddot{DS}_j = DS_j(x_j, z) \tag{4a}$$

and these six equations are estimated by GLS (see Stewart, 1983) for a similar approach). The unobserved variable Z is part of the disturbance term.

Second, we do not observe the variable Z ,which may be a co –determinant of both GS and the DS. We use the panel structure and include individual random effects for both the GS and the DS - equations. The error terms of the J different DS, i.e. e_{jnt}, are decomposed into two independent terms

$$e_{jnt} = v_{jn} + h_{jnt} \tag{5}$$

where v_{jn} stands for the individual random effect, i.e. the unobservable individual characteristics, and h_{jnt} is the pure error term. In a panel regression context this error structure is standard. As usual, we assume $E(e) = E(v) = E(h) = 0$. The variance of $\sigma^2(\nu)$ and $\sigma^2(\varepsilon)$ are estimated for each domain. The model assumes that $E(h, x) = 0$.

If there is a common factor *z*, we may assume that it is correlated with the individual random effects in the DS equations. It is a common component of all the domain individual effects. Hence, we estimate the covariance matrix of the random individual effects and look for the six principal components. The first component carried about 50 % of the total variance. We defined this common component as the unobserved personality trait *Z*. This Z - construct can be used in the GS – estimation. The variable *Z* is included as an additional explanatory variable in equation (3).

The regression coefficient of Z is a weighted covariance between the domain error terms and the GS- error. The whole procedure is a kind of Heckman (1976) correction. This additional explanatory variable corrects the possible bias due to the likely correlation between the DS and the error term of the GS-equation. It follows that the endogeneity bias when estimating GS is eliminated, because *Z* (due to the GLS orthogonality assumptions) is no longer included in the GS error term. Consequently, in the covariance matrix of the seven error terms we have now $s_{GS,j} = 0$ for j = 1,…,6. We may now view the seven equations (3) and (4a) as a recursive system. The six domain equations may have a non- diagonal covariance matrix, in which case they may be estimated by Seemingly Unrelated Regression (SUR). As the sample sizes employed are large, we use simple OLS, as it is well – known that the estimates will remain consistent. We use the calculated residuals of the domain equations to construct a z – value for each respondent and then we estimate

the GS –equation by Ordered Probit, where we include z as an additional explanatory variable, similar to a Heckman - term. By inclusion of this term, and hence the enforcement of block – diagonality, the GS- equation is consistently estimated.

The error term of the GS equation is described by equation (5). The error term follows a normal distribution and $\sigma^2(\eta)$ is normalized to 1 as usual in Ordered Probit. The Ordered Probit with individual random effects is estimated by means of the package LIMDEP 7.0. In estimating the DS and GS equation for the panel data, we also include a time effect as a year dummy.

In the model, we decompose the effect of some of the explanatory variables x_{nkt} in equation (4) and DS_{jnt} in equation (3) by using the identities

$$x_{nkt} = \bar{x}_{kn} + (x_{nkt} - \bar{x}_{kn})$$
$$DS_{jnt} = \overline{DS}_{jn} + (DS_{jnt} - \overline{DS}_{jn}) \qquad (6)$$

for instance, $b\ x + g\ \bar{x}$ may be rewritten as $b(x - \bar{x}) + (g + b)\bar{x}$, where $\bar{x}$ stands for the average over time. Notice that per individual and hence for the whole sample the two terms are uncorrelated. The terms in $\bar{x}$ and $\overline{DS}$ show the differences *between* individuals, while the deviations from the mean per individual identify the *within*-effect. Or in other words, the coefficients of $\bar{x}$ and $\overline{DS}$ represent *level* effects, while the coefficients of the differences represent *shock* effects. For example, the level effect of income covers the permanent income concept (Friedman, 1957), while the shock effect describes the effect of a transitory income change. Obviously, this decomposition only makes sense for those variables where we assume a differentiation between individuals and a considerable year to year deviation from the

individual means[2]. The variables for which we distinguish a level effect, are, depending on the specific equation: net household income, net working income (defined as the income from labor by the respondent), savings, children, working hours, leisure time, and the number of adults in the household. Including level effects gives some simple dynamics to the model, because the average value (over six years) changes gradually when years pass by.

3. Data description

We use the German Socio-Economic Panel (GSOEP)[3], which is a longitudinal household panel that started in the Federal Republic of Germany (West-Germany) in 1984. After the reunion (former) East-German households were included in the GSOEP from 1990 onwards. We use the period from 1992 to 1997. The GSOEP includes more than 14,000 individuals in the West sample and 6,000 in the East sample. As the citizens from East and West are different on many aspects, we take them as two different subpopulations (subsamples). The same holds for working and non-working respondents. The non-working sample includes inactive individuals as well as unemployed. About 30% of West non-workers are 65 years old or older, and 65% are females. For the East non-workers, these percentages are 26% and 62% respectively. Respondents are all

[2] See also Mundlak (1978), who argues in favor of the same specification but interprets the level effects as picking up the correlation between observed fixed individual characteristics and individual fixed-effects with $E(h_{jn}, \bar{x}_{jn}) = 0$. In the paper, we will interpret the mean and label it as level effects.

[3] The GSOEP is described in Wagner et al. (1993). The GSOEP is sponsored by the Deutsche Forschungsgemeinschaft and organized by the German Institute for Economic Research (Berlin), and the Center for Demography and Economics of Aging (Syracuse University). We are grateful to these institutes and its project director Prof. Dr. G. Wagner for making this data set available.

adults (16 years or older) in the household. When people move from East to West we consider them as different persons. For instance, if a household lives in the East in 1992 and moves to the West in 1994, we observe two households for incomplete periods. The same holds for the difference between workers and non-workers. Whether a move from one region to another would reduce or increase Subjective Well-Being is unclear. Given the scope of this paper we do not consider moving as endogenous. The same holds for the switch from worker to non-worker or *vice versa*. The transition frequencies are not large, thus, the impact of our simplifying assumptions also cannot be large (see also Hunt, 1999, 2000). The attrition rate of the panel as well as the causes of this attrition are discussed in Pannenberg (1997). Table 1 presents some summary statistics. Satisfactions are scaled on a 0-10 scale as in the original questions.

[Table 1 about here]

We notice that the average GS for West Workers is 7.21 and for East Workers 6.46, a difference of about 0.75. West Non-Workers score 6.95 on average and East Non-Workers 6.15. The pattern is overall fairly consistent. Workers score higher than non-workers except for housing and leisure satisfaction, and environment for Easterners. A second interesting point is that Westerners score higher than Easterners on almost every domain except for non-workers' environment satisfaction. From this summary table we cannot infer which factors determine satisfaction. For that, we look at the econometric analysis below.

4. Estimation of Domain Satisfaction equations

Here, we present the estimation of the six different DS equations. We choose our specifications with a view on the literature and the availability of variables in the data set. We evaluate our specification on the basis of intuitively and theoretically plausible values and statistical significance of the estimates[4]. We discuss the specifications for each domain along with the estimation results.

Job Satisfaction

The job satisfaction equation has also been estimated, for example, by Clark (1997), Clark and Oswald (1994), and Groot and Maassen van den Brink (1999) using the British Household Panel Survey (BHPS), though neither allows for individual effects in an ordered-probit setting.

[Table 2 about here]

Job satisfaction is assumed to depend on age. Since a monotonic relationship looks improbable, we introduce a quadratic relationship in ln(age). We find strong age effects, where satisfaction follows a U-curve. The minimum is reached at the age of 53 for the West and 48 for the East. It implies that job satisfaction is falling with age up to 53 or 48, after which it rises again. Males are less satisfied than females with their job.

The role of income with respect to job satisfaction is ambiguous. We have to distinguish between the income earned in the job by the respondent, i.e., working income, and the household income. The household income is at least as

large as the respondent's working income. In many households there will be more than one income earner, while a considerable number of households have income from other sources as well. Working income is certainly a dimension of the job. It expresses to a large extent how the worker is evaluated by the employer and is clearly a main determinant of job satisfaction. Moreover, given the amount of working hours and the job requirements, the larger the working income the higher job satisfaction. On the other hand, household income, here included as the ratio of household income over the respondent's working income, also influences job satisfaction. A larger household income gives each working member of the household more margin to be selective on his/her type of employment at the moment of application. It is also easier to leave an unsatisfactory job, if there is additional income in the household. Table 2 shows that the coefficient of ln(working income) is 0.05 in the West and 0.153 in the East. Hence changes in working income have a very strong effect on job satisfaction in the East, while the effect is much more moderate in the West. For mean ln(work income), the coëfficiënts are 0.005 and 0.033 respectively. The household income/working income level coefficient is 0.238 (i.e. 0.171 + 0.067), while the shock-effect is 0.067 for Western workers. Similar figures hold for the East. It is interesting to notice that working income seems to be a much more important aspect of job satisfaction in the East than in the West. The level effects of working income are 0.055 and 0.186 in the West and East respectively. Working hours have a negative non-significant influence on Western job satisfaction but are positively evaluated by Easterners.

[4] All the equations include dummy variables for missing values (see Maddala, 1977, p.202). Those, mostly insignificant, coefficients are not shown in the Tables.

Financial satisfaction.

Financial satisfaction has also been studied by a.o. Easterlin (1974) and by Van Praag (1971). Age effects are strongly prominent and even more so for non-workers. West-workers reach minimum satisfaction at the age of 45 and East workers at 54. The quadratic effect may have to do with differences in wage/age profiles and career patterns. It may also be caused by 'rising expectations'. For non-workers the age pattern is much more pronounced with a minimum at 38 for Westerners and 39 for Easterners.

[Table 3 about here]

We include here only household income and not the respondent's working income. The fect of household income enters as a level and as a shock variable. Moreover, the income effect itself is also affected by the number of children. The household income level effect is (0.120 + 0.262)=0.382 for West workers and 0.413 for West non-workers. For Eastern workers it is 0.362 and for Eastern non-workers 0.467. The interception term with children has a slight additional positive effect for Westerners. The education effect is positive in the West but zero or negative in the East. This probably reflects the strongly different labor markets and labor cultures between the two former German states. As could be expected, both the number of adults and that of children to be maintained have a negative effect on financial satisfaction, except for number of children that is non-significant for East Workers. The level effect of adults is about -0.152 (=-0.087-0.065) for West-workers and -0.140 for West non-workers. For Easterners the effect is less pronounced. The effects of children on financial satisfaction is

rather pronounced and negative. 'Living together' has a positive effect, and male respondents are less content than female respondents. Having savings has a positive effect on financial satisfaction, as expected.

Housing Satisfaction

Housing satisfaction has been studied by, among others, Varady and Carozza (2000). The age effects are similar in the West and the East, always with a minimum about 29. The mean of the household income and the 'rent', defined as all the monthly housing costs, have a strong positive effect on housing satisfaction. A higher rent and a higher income probably implies a nicer and better-situated house. The number of children and adults has the expected negative effects, implying that housing satisfaction falls with an increasing number of lodgers. The education effect is negative in both East and West, although not significantly so for the West. We conclude that higher educated people are more critical on their housing conditions. Finally, the dummy 'reforms', which is one if the house has been renovated in the last year, has a positive sign as may be expected.

[Table 4 about here]

Health Satisfaction

Self-rated health satisfaction is nowadays studied by many health economists, as the evaluation of health gains is an important tool to evaluate and compare medical treatments. We refer to Dolan (2000) for a recent survey. We assume that health depends on ln(age), income, and gender. Not surprisingly health

satisfaction falls monotonously with ln(age). Health satisfaction increases with income. The shock effect is not significant for any of the sub-samples. The level effect is significant only for Westerners. Hence, incidental income changes will have a less impact on health than permanent changes. Individuals with higher education are significantly more satisfied with their health. Working males are more satisfied with their health than females, while for non –working individuals the difference is non- significant.

[Table 5 about here]

Leisure Satisfaction

We distinguish in the GSOEP – data set between three kinds of time use, i.e. working time, household work, and leisure including sleep. Not unexpectedly the number of working hours has a strong negative effect on leisure satisfaction, while the number of hours spent on leisure has a small positive effect.

[Table 6 about here]

The age effect is again U-shaped with a minimum at about 35 for workers and 31 for non-workers. Household income is not a strong factor for leisure satisfaction, but the level effects are always positive. More education leads to less satisfaction with leisure. It seems that there is a tendency for people to enjoy their leisure time most when alone. Both, the presence of adults and that of children have a negative effect on leisure satisfaction, and living together has also a negative although only significant for Eastern non-workers. Males enjoy their leisure more

than females; these differences are slightly larger for workers. We resist the temptation to indulge in socio-psychological interpretations of these findings.

Environment Satisfaction

Finally, we look at the environment satisfaction, i.e., satisfaction with the surroundings where the individual lives. Again, the age effect follows a U–shape. Workers and West non–workers with more income are more satisfied with their environment; the effect is non-significant for non-workers. More education has a negative effect, but this is only significant for Easterners.

[Table 7 about here]

5. Estimation of the General Satisfaction Equation

We present the estimates for the explanation of general satisfaction (GS) in Table 8. We do this by applying Ordered Probit with individual random effects on the general satisfaction question. Again, we allow for shock- and level effects.

The explanatory variables DS are defined as in Section 2. General satisfaction is then modeled as:

$$GS_{nt} = g_o' \ddot{DS}_{nt} + d_o' \bar{\ddot{DS}} + + b\ Z_n + e_{ont} + v_{on} \qquad (8)$$

where $g_o' = (g_{1o},...,g_{6o})$ is the vector of shock-effects and where $d_o' = (d_{1o},...,d_{6o})$ is the vector of coefficients corresponding to the means of the domain satisfactions. The vector $(g_o + d_o)'$ is the vector of the level effects.

The correlation between the domain errors and the general satisfaction error is captured through the *Z*. In this way, we eliminate the endogeneity bias. Moreover, we annull the covariance between the *GS* - error and the domain errors, so that we may deal with the recursive system under the assumption that the error covariance matrix is block - diagonal (see e.g. Greene 2000, p.675).

The results in Table 8 give a picture of the complex phenomenon behind human well-being. First we see that general well-being is indeed an amalgam of various domain satisfactions. All effects are strongly significant. The level effects of the DS are tabulated in Table 9:

We see that the level effects for the four sub-samples are showing nearly the same ranking and are mostly of the same order of magnitude. The three main determinants are finance, health, and job satisfaction. Leisure comes fourth in importance for individuals' well-being in all sub-samples except West non-workers. Housing and environment seem to be much less important. It may be that there are other well-being determinants, e.g. marriage satisfaction and health of own children, but information on these aspects is not available in the GSOEP data set.

Next we look at the shock effects of the domain satisfactions, as given by the second block in Table 8. It appears that the shock effect of health is larger than that of finance, except for East workers. In any case, it is still true that financial satisfaction, job, and health satisfaction are the most important DS for individual's general satisfaction.

The time dummies incorporate several effects, including inflation, changes in external circumstances on individual satisfaction, and any trend effects in satisfaction. If we only allow for this last interpretation, after an initial decline, Germans experienced an increase in well-being.

[Table 8 about here]

[Table 9 about here]

In three of the four GS - equations Z has a significant positive coefficient. We notice that apart from the explanatory variables there is a quite remarkable unobservable individual effect, which accounts for about 30% of the total variance. We see that the environmental domain has a negative coefficient, which is counterintuitive. When we estimate the same equation when excluding the Z –variable (see Appendix B) we see that all domain effects are much more positive but preserve the same order and approximately the same trade off ratios. Hence we may interpret again Z as the common component in the domain satisfactions. If it is added as an explanatory variable the domain effects will be reduced, because the common component effect is estimated in its own right. For the environment effect the inclusion of Z implies even a correction to below zero.

6. Conclusions

In this paper we have made an attempt to measure the individual's domain and overall satisfactions and the way in which they are connected. We have postulated a simultaneous equation model, where general satisfaction is explained by the values of the satisfactions with respect to six distinct domains of life. We showed that it is possible to estimate a model for subjective satisfactions (i.e. individual well-being) in

the spirit of traditional econometric modeling, even though the qualitative variables are not measurable in the usual sense.

The main conclusions of this paper are:

1. Given the fact that we get stable significant and intuitively interpretable results, the conclusion seems justified that the assumption of interpersonal (ordinal) comparability of satisfactions cannot be rejected.
2. It is possible to explain domain satisfactions to a large extent by objective measurable variables. Domain satisfactions are strongly interrelated because of common explanatory variables.
3. General satisfaction may be seen as an aggregate of the six domain satisfactions.

Obviously, this study is a first step, which has to be replicated on other data. Moreover, it is easy to think of a number of refinements. Nevertheless, we believe that there is ample evidence that the answers to subjective questions can be used as proxies for measuring individual satisfaction. Using these proxies, general and domain satisfactions are to a large extent explainable. The consequence is that self-reported satisfaction is a useful new instrument for the evaluation and design of socio-economic policy. Moreover, the results help us to understand the composite construction of individual well-being.

Using the information provided by this model it is possible to assess trade-off ratios between, e.g. leisure, environment or health, and income like Di Tella, MacCullogh and Oswald have shown[5]. This is left for future research. It will be clear

[5] For first attempts with the more complex model presented in this paper see Ferrer-i-Carbonell and Van Praag, 2000, and Van Praag and Baarsma, 2000

that this model is a major potential playground for future research both for economists, psychologists, and political scientists.

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Appendix A: Variables description

In this Appendix we describe the variables used for the regressions that may need clarification.

Household income: Net monthly household income in German Marks (equal to all the respondents of the same household)

Years of education: For the west, this variable is computed according to the GSOEP documentation. For the East, we have applied similar conversion rules.

Children + 1: The number of children (+ 1) younger than 16 in the household.

Adults: The number of adults that live in the household.

Living together: Dummy variable where 1 stands for being married or having a partner living in the household.

2nd Earner in house: Dummy variable that takes value 1 if there is more than one earner in the household.

Working income: Is the sum of gross wages, gross self-employment income, and gross income from second job.

Working hours: Weekly average.

Extra money: Is the sum of the extra working income such as 13th or 14th month, Christmas bonus, holiday benefit, or profit-sharing.

Extra Hours: Extra working hours, i.e. overworked hours.

Savings: Amount of money left over each month for major purchases, emergencies, or savings.

Rent: Indicates housing costs and includes: rent per month, interest and amortization per month, other costs per month, housing costs per month, maintenance costs previous year (*1/12), and heat and hot water costs previous year (*1/12).

Reforms: Dummy variable that takes value 1 if the respondents or their landlord have made any modernization at their house the last year.

Leisure time: Hours spend on hobbies and other free time in a typical week (weekday and Sundays).

Appendix B: General Satisfaction without *Z*

Ordered Probit with Individual Random Effect and Time Effects

	West Workers		East Workers		West Non-Workers		East Non-Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	4.147	*86.391*	4.662	*52.971*	3.869	*88.220*	3.926	*60.380*
Dummy for 1992	0.257	*11.115*	-0.078	*-2.158*	0.245	*8.832*	-0.164	*-3.699*
Dummy for 1993	0.192	*8.558*	-0.062	*-1.685*	0.201	*7.455*	-0.153	*-3.670*
Dummy for 1994	0.124	*5.414*	0.049	*1.346*	0.027	*0.979*	-0.189	*-4.339*
Dummy for 1995	0.140	*6.182*	0.125	*3.353*	0.077	*2.900*	-0.057	*-1.282*
Dummy for 1996	0.122	*5.185*	0.101	*2.650*	0.071	*2.616*	0.004	*0.087*
Job Satisfaction	0.254	*27.500*	0.278	*20.752*	XXX	XXX	XXX	XXX
Finan. Satisfaction	0.233	*25.996*	0.287	*19.408*	0.198	*20.229*	0.222	*14.239*
House Satisfaction	0.135	*14.035*	0.144	*9.335*	0.132	*10.014*	0.157	*8.392*
Health Satisfaction	0.313	*30.394*	0.201	*10.964*	0.402	*34.425*	0.312	*15.787*
Leis. Satisfaction	0.114	*11.555*	0.071	*4.531*	0.122	*9.971*	0.121	*7.084*
Envir. Satisfaction	0.081	*8.346*	0.087	*5.400*	0.092	*8.188*	0.055	*3.207*
Mean (Job S.)	0.087	*5.288*	0.053	*2.096*	XXX	XXX	XXX	XXX
Mean (Financial S.)	0.396	*21.975*	0.494	*16.749*	0.534	*29.119*	0.529	*18.400*
Mean (House S.)	0.002	*0.135*	-0.057	*-2.194*	0.027	*1.312*	-0.053	*-1.793*
Mean (Health S.)	0.178	*10.852*	0.160	*5.495*	0.208	*12.665*	0.096	*3.423*
Mean (Leisure S.)	0.099	*6.029*	0.107	*4.029*	0.019	*0.965*	0.194	*6.670*
Mean (Environ. S.)	-0.044	*-2.651*	0.038	*1.390*	-0.076	*-4.045*	0.008	*0.283*
Std Deviation v_i	0.593	*66.815*	0.587	*38.561*	0.673	*58.153*	0.646	*34.802*
Variance due to v_i as % of the total variance	0.260		0.256		0.312		0.294	
Number Observations	29636		11941		20427		8335	
Log Likelihood	-43444		-18314		-33131		-14367	
LogLik/Observation	-1.466		-1.534		-1.622		-1.724	
Num. Of Individuals	7995		3157		6353		2651	

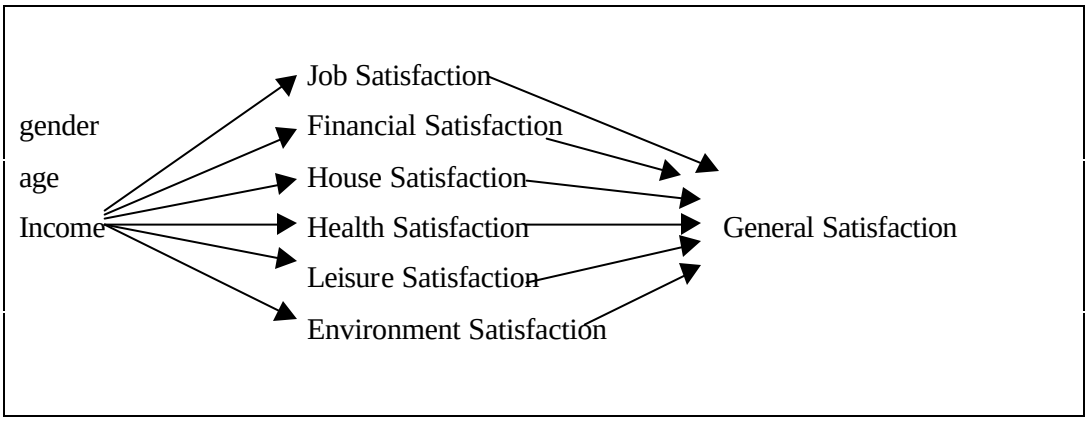

Figure 1: the two layer model

Table 1: Average and (standard deviations) of satisfaction levels and income in the GSOEP, 1992-1997

	West Workers	East Workers	West Non-Workers	East Non-Workers
General Satisfaction	7.21 (*1.632*)	6.46 (*1.615*)	6.95 (*1.947*)	6.12 (*1.970*)
Job Satisfaction	7.15 (*1.972*)	6.83 (*2.074*)		
Financial Satisfaction	7.09 (*1.887*)	6.28 (*1.890*)	6.99 (*2.120*)	6.12 (*2.136*)
Housing Satisfaction	7.42 (*2.145*)	6.66 (*2.297*)	7.57 (*2.186*)	6.96 (*2.319*)
Health Satisfaction	7.06 (*2.073*)	6.90 (*1.941*)	6.27 (*2.484*)	5.94 (*2.364*)
Leisure Satisfaction	6.40 (*2.318*)	5.89 (*2.392*)	7.48 (2*.235*)	7.18 (*2.245*)
Environment Satisfaction	6.26 (*2.008*)	4.99 (*2.073*)	3.68 (*2.065*)	5.13 (*2.174*)
Net Household Income (monthly in DM)	4034 (*2150*)	3393 (*1516*)	3115 (*2014*)	2438 (*1318*)
Number of Observations	29099	11668	19965	8021

Table 2: Job Satisfaction

GLS with Individual Random Effect and Time Effects

	West Workers		East Workers	
	Estimate	Estimate/ Std. Dev.	Estimate.	Estimate/ Std. Dev
Constant	3.155	*3.262*	5.276	*3.238*
Dummy for 1992	0.101	*6.466*	0.043	*1.516*
Dummy for 1993	0.028	*1.752*	0.101	*3.599*
Dummy for 1994	0.009	*0.584*	0.039	*1.431*
Dummy for 1995	0.014	*0.880*	0.024	*0.902*
Dummy for 1996	-0.008	*-0.493*	0.010	*0.385*
Ln(age)	-2.766	*-5.023*	-4.640	*-4.951*
Ln(age) ^ 2	0.348	*4.497*	0.600	*4.512*
*Min Age**	52.911		47.666	
Male	-0.041	*-2.097*	-0.038	*-1.353*
Ln(household income/ Working income)	0.067	*3.737*	0.068	*2.017*
Ln(yrs. education)	-0.044	*-0.939*	-0.042	*-0.509*
Ln(adults)	-0.056	*-2.790*	0.018	*0.449*
Ln(children+1)	0.009	*0.472*	-0.001	*-0.020*
Ln(working income)	0.050	*3.876*	0.153	*6.274*
Ln(working hours)	-0.010	*-0.562*	0.038	*1.077*
Ln(extra money)	0.007	*2.678*	-0.009	*-1.825*
Ln(extra hours)	0.002	*0.416*	0.009	*1.380*
Mean (ln(household inc/ Working income)	0.171	*5.368*	0.179	*3.207*
Mean (ln(w.inc)	0.005	*0.785*	0.033	*2.993*
Mean (ln(ch+1))	0.020	*0.598*	-0.080	*-1.277*
Mean (ln(adults))	0.031	*1.049*	0.013	*0.249*
Std Deviation v_i	0.669		0.625	
Variance due to v_i as % of the total variance	0.471		0.408	
Number Observations	30084		12122	
R-squared: within	0.007		0.006	
R-squared: between	0.024		0.059	
R-squared: overall	0.019		0.034	
Num. Of Individuals	8023		3180	

* This is the age at which the minimum of the quadratic form in ln(age) is reached.

Table 3: Financial Satisfaction

GLS with Individual Random Effect and Time Effects

	West Workers		East Workers		West Non-Workers		East Non-Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	1.815	*2.081*	1.404	*1.03*	8.473	*11.348*	10.549	*8.917*
Dummy for 1992	0.214	*13.308*	-0.076	*-2.904*	0.078	*3.800*	-0.232	*-6.485*
Dummy for 1993	0.105	*6.352*	0.007	*0.248*	0.117	*5.493*	-0.140	*-4.171*
Dummy for 1994	0.054	*3.266*	-0.288	*-11.195*	0.181	*8.583*	-0.021	*-0.641*
Dummy for 1995	0.035	*2.146*	-0.030	*-1.189*	0.117	*5.715*	-0.012	*-0.369*
Dummy for 1996	0.015	*0.846*	-0.025	*-0.932*	0.021	*0.923*	-0.081	*-2.302*
Ln(age)	-2.830	*-5.71*	-2.677	*-3.455*	-6.833	*-16.667*	-7.255	*-11.337*
Ln(age) ^ 2	0.373	*5.343*	0.336	*3.061*	0.941	*16.730*	0.992	*11.342*
*Min. Age**	44.596		53.876		37.791		38.684	
Ln(household income)	0.120	*5.496*	0.231	*6.109*	0.122	*4.397*	0.205	*4.077*
Ln(yrs. Education)	0.116	*2.797*	-0.032	*-0.485*	0.141	*2.559*	-0.273	*-3.520*
Ln(adults)	-0.087	*-4.124*	-0.139	*-3.617*	-0.013	*-0.435*	-0.068	*-1.139*
Ln(children+1)	-0.359	*-1.731*	0.018	*0.052*	-0.341	*-1.409*	-0.289	*-0.607*
ln(f.inc.)*ln(ch.+1)	0.038	*1.551*	-0.021	*-0.493*	0.034	*1.143*	0.025	*0.426*
Gender	-0.023	*-1.394*	-0.037	*-1.698*	-0.152	*-7.159*	-0.086	*-3.015*
Ln(Savings)	0.015	*6.28*	0.017	*4.246*	0.018	*5.318*	0.024	*4.283*
Living together?	0.094	*4.777*	0.172	*4.267*	0.140	*7.192*	0.054	*1.528*
2nd Earner in house	-0.015	*-0.854*	-0.073	*-2.292*				
Mean (ln(f.inc)	0.262	*8.2*	0.225	*4.289*	0.291	*7.402*	0.157	*2.372*
Mean (ln(savings)	0.043	*9.899*	0.031	*4.614*	0.050	*8.858*	0.045	*5.137*
Mean (ln(ch+1))	-0.080	*-2.498*	-0.154	*-2.803*	-0.207	*-4.822*	-0.253	*-3.301*
Mean (ln(adults))	-0.065	*-2.283*	0.042	*0.893*	-0.127	*-3.212*	-0.023	*-0.324*
Std Deviation v_i	0.564		0.463		0.620		0.495	
Variance due to v_i	0.745		0.287		0.386		0.279	
as % of the total variance								
Number Observations	30622		12357		20867		8536	
R-squared: within	0.014		0.035		0.011		0.037	
R-squared: between	0.116		0.132		0.181		0.201	
R-squared: overall	0.074		0.080		0.146		0.142	
Num. Of Individuals	8148		3236		6419		2699	

* This is the age at which the minimum of the quadratic form in ln(age) is reached.

Table 4: **Housing Satisfaction**

GLS with Individual Random Effect and Time Effects

	West Workers		East Workers		West non-Workers		East Non-Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	3.306	*3.832*	5.703	*3.978*	2.564	*3.707*	3.756	*3.386*
Dummy for 1992	0.077	*5.304*	0.081	*3.221*	0.210	*12.378*	0.237	*7.009*
Dummy for 1993	0.049	*3.304*	0.010	*0.421*	0.171	*9.812*	0.142	*4.664*
Dummy for 1994	0.030	*2.008*	0.001	*0.037*	0.146	*8.424*	0.151	*5.078*
Dummy for 1995	0.038	*2.652*	-0.005	*-0.207*	0.087	*5.198*	0.046	*1.600*
Dummy for 1996	0.015	*1.071*	0.009	*0.390*	0.027	*1.586*	0.039	*1.330*
Ln(age)	-4.068	*-8.211*	-4.23844	*-5.123*	-3.718	*-9.703*	-3.520	*-5.798*
Ln(age) ^ 2	0.605	*8.650*	0.623	*5.276*	0.555	*10.495*	0.515	*6.132*
*Min.Age**	28.891		30.077		28.539		30.390	
Ln(household income)	0.041	*2.236*	-0.041	*-1.256*	0.031	*1.427*	-0.089	*-2.070*
Ln(yrs. Education)	-0.060	*-1.383*	*-0.510*	*-6.627*	-0.032	*-0.590*	-0.409	*-4.898*
Ln(adults)	-0.133	*-7.150*	-0.085	*-2.445*	-0.071	*-2.878*	-0.048	*-0.928*
Ln(children+1)	-0.038	*-0.195*	*-0.192*	*-0.570*	-0.201	*-0.966*	-0.565	*-1.260*
ln(f.inc.)*ln(ch.+1)	-0.004	*-0.181*	0.023	*0.556*	0.021	*0.824*	0.067	*1.199*
Gender	-0.045	*-2.648*	-0.032	*-1.247*	-0.075	*-3.517*	-0.037	*-1.194*
Ln(rent)	0.195	*23.026*	0.268	*22.282*	0.082	*8.343*	0.214	*13.637*
Reforms?	0.047	*6.643*	0.052	*5.442*	0.027	*2.606*	0.053	*4.195*
Mean (ln(f.inc)	0.258	*8.804*	0.144	*2.875*	0.376	*11.567*	0.300	*5.146*
Mean (ln(ch+1))	-0.040	*-1.298*	-0.0611	*-1.075*	-0.196	*-5.070*	-0.187	*-2.557*
Mean (ln(adults))	-0.073	*-2.684*	-0.0313	*-0.659*	-0.204	*-5.711*	-0.062	*-0.911*
Std Deviation v_i	0.643		0.622		0.691		0.626	
Variance due to v_i	0.489		0.469		0.545		0.450	
as % of the total variance								
Number Observations	30554		12309		20810		8477	
R-squared: within	0.021		0.048		0.011		0.020	
R-squared: between	0.086		0.108		0.122		0.120	
R-squared: overall	0.063		0.087		0.116		0.090	
Num. Of Individuals	8143		3232		6393		2681	

* This is the age at which the minimum of the quadratic form in ln(age) is reached.

Table 5: **Health Satisfaction**

GLS with Individual Random Effect and Time Effects

	West Workers		East Workers		West Non-Workers		East Non-Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	-1.121	*-1.333*	-0.935	*-0.712*	5.254	*7.357*	2.731	*2.315*
Dummy for 1992	0.016	*1.148*	0.132	*6.366*	0.001	*0.037*	0.021	*0.746*
Dummy for 1993	-0.008	*-0.577*	0.109	*5.213*	0.021	*1.211*	0.053	*2.021*
Dummy for 1994	-0.002	*-0.139*	0.042	*2.050*	-0.003	*-0.179*	0.023	*0.914*
Dummy for 1995	-0.002	*-0.130*	0.039	*1.955*	0.000	*0.000*	-0.005	*-0.193*
Dummy for 1996	-0.035	*-2.374*	0.029	*1.329*	-0.001	*-0.031*	0.050	*1.803*
Ln(age)	0.852	*1.778*	0.627	*0.834*	-2.536	*-6.446*	-1.125	*-1.741*
Ln(age) ^ 2	-0.238	*-3.531*	-0.207	*-1.940*	0.210	*3.891*	0.023	*0.260*
*Max.Age**	5.976		4.560		424.307		4.E+10	
Ln(household income)	0.004	*0.232*	0.032	*1.175*	-0.009	*-0.456*	0.015	*0.399*
Ln(yrs. Education)	0.131	*3.068*	0.193	*2.697*	0.233	*4.215*	0.273	*3.359*
Ln(children+1)	0.012	*0.063*	-0.147	*-0.494*	-0.222	*-1.067*	0.814	*1.999*
ln(f.inc.)*ln(ch.+1)	0.000	*0.005*	0.017	*0.469*	0.027	*1.060*	-0.095	*-1.862*
Gender	0.082	*4.928*	0.104	*4.301*	-0.001	*-0.025*	0.027	*0.878*
Living together?	-0.011	*-0.843*	0.017	*0.634*	0.044	*2.492*	-0.003	*-0.099*
Ln(Savings)	0.006	*2.748*	-0.002	*-0.480*	0.008	*3.014*	0.003	*0.582*
Mean (ln(f.inc)	0.097	*3.236*	0.071	*1.432*	0.069	*1.944*	0.020	*0.325*
Mean (ln(ch+1))	0.019	*0.773*	-0.096	*-2.209*	-0.012	*-0.395*	-0.149	*-2.690*
Mean (ln(savings)	0.018	*4.355*	0.014	*2.108*	0.020	*3.749*	0.017	*2.096*
Std Deviation v_i	0.643		0.595		0.702		0.658	
Variance due to v_i as % of the total variance	0.515		0.513		0.549		0.532	
Number Observations	30669		12359		20883		8532	
R-squared: within	0.008		0.023		0.006		0.009	
R-squared: between	0.126		0.124		0.274		0.262	
R-squared: overall	0.083		0.090		0.191		0.174	
Num. Of Individuals	8153		3238		6424		2705	

* This is the age at which the minimum of the quadratic form in ln(age) is reached.

Table 6. Leisure Satisfaction

GLS with Individual Random Effect and Time Effects

	West Workers		East Workers		West Workers		East Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	9.890	*11.412*	10.607	*7.824*	8.978	*13.231*	8.170	*7.024*
Dummy for 1992	0.049	*3.380*	-0.077	*-3.359*	0.110	*6.286*	0.116	*3.661*
Dummy for 1993	0.061	*4.220*	-0.042	*-1.903*	0.041	*2.333*	0.010	*0.335*
Dummy for 1994	0.092	*6.043*	-0.023	*-1.009*	0.080	*4.395*	0.010	*0.342*
Dummy for 1995	0.001	*0.047*	-0.111	*-5.124*	0.078	*4.603*	0.142	*4.962*
Dummy for 1996	0.080	*5.446*	0.034	*1.459*	0.036	*2.081*	-0.025	*-0.866*
Ln(age)	-5.023	*-10.204*	-4.680	*-6.020*	-5.357	*-14.310*	-4.953	*-7.837*
Ln(age) ^ 2	0.696	*10.045*	0.661	*6.001*	0.777	*15.138*	0.720	*8.339*
*Min.Age**	36.855		34.456		31.466		31.155	
Ln(household income)	0.001	*0.074*	-0.008	*-0.292*	0.012	*0.597*	0.072	*1.815*
Ln(yrs. Education)	-0.092	*-2.196*	-0.274	*-4.051*	-0.134	*-2.663*	-0.227	*-2.912*
Ln(adults)	-0.034	*-2.421*	-0.038	*-1.609*	-0.086	*-4.984*	-0.168	*-4.695*
Gender	0.153	*8.807*	0.148	*6.368*	0.102	*5.128*	0.060	*2.067*
Living together?	-0.011	*-0.805*	-0.129	*-4.559*	-0.020	*-1.136*	0.037	*1.052*
Ln(working hours)	-0.261	*-19.096*	-0.429	*-15.970*				
Ln(leisure time)	0.017	*10.333*	0.018	*6.414*	0.014	*8.504*	0.013	*4.629*
Mean (ln(f.inc)	0.063	*2.481*	0.060	*1.462*	0.050	*1.809*	0.028	*0.570*
Mean (ln(les.time))	0.020	*5.810*	0.024	*4.473*	0.025	*8.504*	0.008	*1.574*
Mean (ln(ch+1))	-0.138	*-6.704*	-0.059	*-1.833*	-0.182	*-7.060*	-0.122	*-2.753*
Std Deviation v_i	0.624		0.528		0.610		0.556	
Variance due to v_i as % of the total variance	0.471		0.400		0.460		0.377	
Number Observations	30569		12323		20804		8528	
R-squared: within	0.016		0.021		0.011		0.016	
R-squared: between	0.072		0.141		0.156		0.108	
R-squared: overall	0.055		0.100		0.140		0.090	
Num. Of Individuals	8151		3230		6415		2703	

* This is the age at which the minimum of the quadratic form in ln(age) is reached.

Table 7: **Environment Satisfaction**

GLS with Individual Random Effect and Time Effects

	West Workers		East Workers		West Non-Workers		East Non-Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	0.003	*0.003*	-2.721	*-2.018*	3.717	*5.185*	2.605	*2.201*
Dummy for 1992	0.224	*15.019*	-0.426	*-18.440*	0.227	*12.017*	-0.297	*-9.374*
Dummy for 1993	0.115	*7.749*	-0.151	*-6.740*	0.124	*6.608*	-0.113	*-3.805*
Dummy for 1994	0.450	*28.754*	0.102	*4.365*	0.458	*23.616*	0.253	*8.437*
Dummy for 1995	0.069	*4.854*	-0.103	*-4.736*	0.061	*3.435*	-0.086	*-2.981*
Dummy for 1996	0.070	*4.715*	-0.089	*-3.877*	0.036	*1.940*	-0.105	*-3.567*
Ln(age)	-1.033	*-2.096*	0.971	*1.265*	-2.717	*-6.925*	-1.664	*-2.595*
Ln(age) ^ 2	0.157	*2.258*	-0.126	*-1.168*	0.401	*7.508*	0.256	*2.940*
*Min.Age**	27.094		46.370		29.544		25.662	
Ln(household income)	0.051	*3.211*	0.062	*2.342*	0.016	*0.758*	0.002	*0.049*
Ln(yrs. Education)	-0.060	*-1.397*	-0.350	*-4.895*	-0.042	*-0.762*	-0.254	*-3.167*
Gender	0.122	*7.091*	0.092	*3.779*	-0.032	*-1.479*	0.061	*2.041*
Living together?	0.000	*-0.020*	-0.033	*-1.139*	0.016	*0.878*	-0.021	*-0.600*
Ln(leisure time)	0.004	*2.292*	-0.002	*-0.681*	-0.001	*-0.807*	-0.007	*-2.357*
Mean (ln(f.inc)	0.160	*6.085*	0.124	*2.908*	0.092	*3.083*	0.041	*0.822*
Mean (ln(les.time))	0.006	*1.743*	-0.006	*-1.084*	0.014	*4.323*	-0.001	*-0.265*
Std Deviation v_i	0.653		0.579		0.665		0.587	
Variance due to v_i as % of the total variance	0.476		0.437		0.462		0.399	
Number Observations	30606		12346		20865		8523	
R-squared: within	0.051		0.075		0.051		0.068	
R-squared: between	0.022		0.043		0.036		0.038	
R-squared: overall	0.036		0.050		0.045		0.051	
Num. Of Individuals	8145		3235		6417		2697	

* This is the age at which the minimum of the quadratic form in ln(age) is reached.

Table 8: **General Satisfaction**

Ordered Probit with Individual Random Effect and Time Effects

	West Workers		East Workers		West Non-Workers		East Non-Workers	
	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev	Estimate	Estimate/ Std. Dev	Estimate.	Estimate/ Std. Dev
Constant	4.131	83.940	4.644	52.317	3.906	87.323	3.918	59.491
Dummy for 1992	0.255	11.046	-0.077	-2.127	0.254	9.107	-0.165	-3.723
Dummy for 1993	0.191	8.504	-0.063	-1.707	0.208	7.688	-0.152	-3.667
Dummy for 1994	0.123	5.336	0.047	1.295	0.035	1.275	-0.187	-4.295
Dummy for 1995	0.140	6.141	0.125	3.335	0.079	2.995	-0.056	-1.279
Dummy for 1996	0.121	5.160	0.100	2.635	0.072	2.626	0.003	0.078
Job Satisfaction	0.254	27.497	0.278	20.754	XXX	XXX	XXX	XXX
Finan. Satisfaction	0.233	25.993	0.287	19.387	0.198	20.229	0.222	14.235
House Satisfaction	0.135	14.030	0.144	9.334	0.132	9.987	0.157	8.391
Health Satisfaction	0.313	30.402	0.200	10.960	0.402	34.403	0.312	15.784
Leis. Satisfaction	0.114	11.556	0.071	4.526	0.122	9.978	0.121	7.089
Envir. Satisfaction	0.082	8.363	0.087	5.425	0.091	8.100	0.055	3.189
Mean (Job S.)	0.132	5.138	0.088	2.452	XXX	XXX	XXX	XXX
Mean (Financial S.)	0.427	19.728	0.458	11.306	0.613	22.982	0.556	13.864
Mean (House S.)	-0.027	-1.287	-0.076	-2.559	0.015	0.721	-0.055	-1.851
Mean (Health S.)	0.160	8.916	0.177	5.519	0.183	10.470	0.087	2.878
Mean (Leisure S.)	0.029	0.860	0.063	1.513	-0.019	-0.896	0.174	4.826
Mean (Environ. S.)	-0.012	-0.576	0.074	1.910	-0.230	-5.386	-0.050	-0.716
Z	-0.153	-2.297	-0.136	-1.313	-0.294	-3.859	-0.122	-0.886
Std Deviation v_i	0.593	66.771	0.586	38.524	0.672	58.039	0.646	34.775
Variance due to v_i	0.260		0.256		0.311		0.294	
as % of the total variance								
Number Observations	29636		11941		20427		8335	
Log Likelihood	-43442		-18313		-33125		-14367.1	
LogLik/Observation	-1.466		-1.534		-1.622		-1.724	
Num. Of Individuals	7995		3157		6353		2651	

Table 9: Level Effects of DS on GS

Level Effects	West Workers	East Workers	West Non-Workers	East Non-Workers
Job Satisfaction	0.352	0.429	XXX	XXX
Finan. Satisfaction	0.637	0.859	0.760	0.896
House Satisfaction	0.148	0.184	0.200	0.327
Health Satisfaction	0.501	0.445	0.658	0.659
Leis. Satisfaction	0.224	0.269	0.182	0.535
Envir. Satisfaction	0.050	0.221	0.066	0.311