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ABSTRACT

Subjective Measures of Economic Well-Being and the Influence of Income Uncertainty*

This paper provides evidence that subjective measures of individual well being can be used to study the impact of income uncertainty from an *ex ante* point of view. Two different measures of subjective well being are under study: Satisfaction with household income and the income evaluation question as developed by Van Praag. It can be shown that satisfaction with income is more affected by *ex ante* than by *ex post* volatility of income. The ordinal version of the Van Praag approach might be biased if income uncertainty is essential. The paper was written in 1994.

JEL Classification: C23, D12, D81, I31

Keywords: income uncertainty, subjective well-being, satisfaction, income evaluation

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Introduction

Although the importance of income uncertainty on economic well-being has become increasingly recognized, little empirical evidence of this relationship exists. Indeed, there are no empirical studies analyzing the impact of income uncertainty on individual welfare directly. Most of the empirical studies dealing with this topic use indirect utility functions where the degree of risk aversion is assured to be exogenous (see, for example, Zeldes 1989). To date, the relation between utility and uncertainty has been studied directly only within experimental designs (e.g., Allais 1991).

When measuring individual welfare most economists use actual income because they believe that utility can only be measured indirectly. Realized income is treated as a proxy for revealed preference or obtained behavior and used as the base for modern neoclassical welfare measurement.

However, when using actual income as a measure of economic well-being, an important factor of income utility may be overlooked, the uncertainty of future income. This would not matter if income uncertainty affected all individuals in the same way, but such an assumption is not very realistic. For example, it is likely that well-being and income uncertainty is a decreasing function of age, especially in well developed welfare states where income uncertainty plays only a minor role once retirement age is reached.

More sophisticated studies of economic well-being attempt to remove the transitory component of income by using panel data to estimate permanent income (see, for example, Burkhauser, Duncan, and Hauser 1994 or Burkhauser, Frick, and Schwarze 1994). Although such an approach can exclude income variance from measures of well-being, it does not analyze how income uncertainty influences the utility or satisfaction with income.

There are at least two reasons for the shortage of empirical work on the importance of income uncertainty and economic well-being. First, to measure the impact of income uncertainty it is neccessary to abandon traditional neoclassical measurement using indirect utility functions. Second, there is no universally accepted empirical measure of *ex ante* income uncertainty (see for this point Bird 1991).

In this paper subjective measures of individual well-being are used to measure utility to empirically analyze the impact of income uncertainty. Embedded in a general framework two different approaches are considered. The first is the Income Evaluation Question approach

developed by Van Praag and the Dutch school. Although this approach has made some inroads into the poverty literature (see Hagenaars 1986), it is mostly used by the researchers of the Van Praag school (see Hartog 1988). The second approach is a measure of income satisfaction originally developed by sociologists (see Andrews and Withey 1976), it has also been used as a measure of income utility by economists (see Vaughan and Lancaster 1979, Dubnoff, Vaughan, and Lancaster 1981).

Both approachs ask people to evaluate their current income on a scale which is later defined as a measure of utility from income. However, it is argued here that these so called "soft" measures of income utility are not only influenced by income, but also by income uncertainty. In this paper these secret effects are analyzed empirically using data from the German Socio-Economic Panel Study (GSOEP).

A serious problem in estimating income uncertainty is whether to use an *ex post* measure of income variability or an *ex ante* estimation of "real" income uncertainty. The estimation of income uncertainty used in this paper is purely *ex ante*, because the panel data are used prospectively.

In the next section a general framework of income risk, individual welfare and subjective measurement will be developed. Then the Van Praag and Satisfaction approach will be discussed and it will be shown that both measures are influenced by income uncertainty.

Income risk, individual welfare, and subjective measurement: A general approach

A well known result of expected utility theory is that individuals are willing to exchange a distribution of income Y for its certain expected value[1]. This result depends heavily on the assumption of concave utility, which implies risk-aversion (see Sinn 1983, McKenna 1982 or Karni and Schmeidler 1990).

1 Y is originally treated as a end-of-wealth distribution. However, Sinn (1983, 42) pointed out that "Instead of end-of-period distributions of wealth it is equally possible to consider the period income distributions." Therefore, an empirical investigation can deal with any period of income, e.g. monthly or yearly income or different approximations of permanent income.

Sinn (1983) introduced a general class of "two parameter substitutive criteria" where one parameter measures a mean return and another parameter measures risk[2]. Such an approach is starting point in this paper. A logarithmic function of expected utility is assumed:

(1) $EU = EU(\ln Y) \approx EU[\,p(\ln Y), v(\ln Y)]$

Expected utility is a function of the future income distribution. The future income distribution can be described approximately by two components. p indicates a measure for permanent or expected value of future income and v is a measure for transitory shifts or income uncertainty. The first derivative with respect to p has a positive sign, but the first derivative with respect to v is not so clear. If the utility function is strictly concave, it can be shown that the expected utility of the further income distribution decreases if income uncertainty increases.

The empirical specification of the models estimated later is based on this approach. A necessary assumption is risk aversion but the degree of risk aversion can be studied explicitly. The approach is straightforward trying to measure all three components, utility, permanent income, and uncertainty.

Subjective measures of individual welfare are rarely used by economists. However, the approach developed first by Van Praag (1968) have gained some attention in empirical welfare measurement. Subjective measures are not used in the theoretical welfare literature.

It was often argued, that the need to use cardinal measurement was the main reason for not using subjective measures. But Van Praag (1991) shows that his approach is compatible with traditional ordinal assumptions. A more serious issue between those supporting the use of subjective measures and their detractors is how individual preferences are measured. Modern neoclassical welfare measurement rests fundamentally on the concept of "revealed preferences". Only oberserved behavior can be used in measurement. In contrast subjective measures used "verbal preferences" or individual judgement. Mainstream economists argue that models based on subjective measures cannot be used to explain individual decisions (see Hartog 1988 or Watts 1985).

One problem in the measurement of individual income uncertainty is, that it is often measured as the *ex post* variation of income rather than as the "real" *ex ante* income risk (see for a

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2 Throughout this paper utility functions are always ex ante-functions, depending on future income rather than ex post-functions which depend on given income.

discussion Bird 1991). A solution of this problem is part of the general approach described in the following.

Suppose a panel study on individual is available containing (*T-R*) to T observations of income (household or labor, monthly or yearly):

- Y_{it} $\quad i = 1,...,N;\ t = (T-R),...,T$

At the same time there are observations of a subjective evaluation of this income, where τ_{it} can be interpreted as a measure of individual utility of income:

- $\tau_{it} = \tau_{it}(Y_{it})$ $\quad i = 1,...,N;\ t = (T-R),...,T$

At least there is one observation of τ_i observed at time (*T-R*):

- $\tau_{i,T-R} = \tau_{i,T-R}(Y_{it})$ $\quad i = 1,...,N;\ t = (T-R),...,T$

Under special assumptions the income process described by Y_{it} can be used to construct the future income process and get estimators for p and v:

- $\hat{p}_i = \hat{p}(Y_{it})$ $\quad i = 1,...,N;\ t = (T-R),...,T$
- $\hat{v}_i = \hat{v}(Y_{it})$ $\quad i = 1,...,N;\ t = (T-R),...,T$

All together, the following model can be specified:

(2) $\tau_{i,T-R} = \tau(\hat{p}_i, \hat{v}_i; Z_{i,T-R})$

where Z is a vector of "taste variables". The exact specification of τ depends on the empirical evaluation concept used, the Van Praag or the Satisfaction approach. The data used here only has a measure for (T-R) for the Satisfaction concept. The Van Praag question is only available for T. However, the relation specified in (2) can also be used for *ex post* estimation:

(3) $\tau_{i,T} = \tau(\hat{p}_i, \hat{v}_i; Z_{i,T})$

This is the usual empirical relation if income risk is studied and it might be of interest to test the *ex ante* model described by (2) against the *ex post* model described by equation (3). This will be done in the present paper and it can be shown that there is a significant difference between both models.

Data and estimation of income uncertainty

The data used for the present analysis is drawn from nine waves of a 95 percent sample of the German Socio-economic Panel Study (GSOEP) (see Wagner, Burkhauser, and Behringer 1993). The

GSOEP started in 1984 with a sample of 6,000 households including a disproportionate number of "guest workers". In 1990 a new sample of East Germans was added to the GSOEP. For the present analysis only the original sample of West Germans is used excluding the foreign workers. A cross section data set for 1992 is used as well as longitudinal data set including only persons with respond to wave 1 (1984) to wave 9 (1992).

The GSOEP contains much of the information necessary for this analysis, including two subjective measures of well-being. The income information used here is the monthly after government household income reported by the called 'head of the household'. This income information is used because both measures of subjective well- being are related to the monthly household income.

All income reported in 1984 Deutsche Mark. In the case of the Satisfaction approach household income is used as income per equivalent person. Income is divided by the number of household members weighted by a special equivalence scale. The scale used here was original developed by the Luxembourg Income Study (LIS, see Buhmann et al. 1988).

Measuring income uncertainty causes a two-dimension problem. First, a special model of a lifetime income process must be chosen, because permanent shifts in income have to be separated from transitory shifts. There is a huge literature dealing with this topic. Uncertainty is often obtained from the stochastic process of earnings (see Eden and Pakes 1981, MaCurdy 1982, Hall and Mishkin 1982, Jorgenson 1990, Carroll 1992 or Topel and Ward 1992).

The second topic is the main problem in measuring individual income uncertainty. Is income uncertainty measured by sophisticated models only a *ex post* measure of income variability or a "real" measure of *ex ante* uncertainty faced by individuals? The solution of the "*ex ante* problem" used in this paper was described above. Thus, only the first topic is discussed here.

Income Uncertainty is often measured using a life-time income process as suggested by Hall and Mishkin (1982). They assume that income can be decomposed into the sum of two separate components, a permanent and a transitory component. The permanent component follows a random walk and the transitory component is assumed to follow a second order moving average process. In constructing those models several assumptions of the underlying error structure must be made and this causes critics (see, for example, Bird 1991). Caballero (1991, 863) concludes: "These estimates

have to be taken with caution. First of all, they represent the uncertainty as measured by the econometricans, which is not necessarily the same as the uncertainty faced by individuals".

Most econometric approaches looking at uncertainty use earnings data. Only a few look at individual household income (e.g. Hall and Mishkin 1982) and it might be very difficult to construct an adequate model.

The approach of measuring uncertainty of household income used here is not the result of econometric modeling. Individual income uncertainty is measured as the standard deviation of the percentage change in individual income (this is also suggested by Caballero 1991). First, the yearly percentage change in individual income is computed as:

$$(4) \qquad \Delta \ln Y_{it} = \frac{\ln Y_{it} - \ln Y_{i,t-1}}{\ln Y_{i,t-1}} \qquad i = 1,\ldots,N;\ t = (T-R+1),\ldots,T$$

An estimator for *v* is:

$$(5) \qquad \hat{v}i = \sqrt{\frac{1}{T-(T-R)-1} \sum_{t=T-R}^{T-1} (\Delta \ln Y_{it} - \overline{\Delta \ln Y_i})^2} \qquad i = 1,\ldots,N;\ t = (T-R+1),\ldots,T$$

where ln*Y* is the natural logarithm of monthly post-government household income as described above.

How can this measure of income uncertainty be interpreted? An underlying assumption is that individuals calculate a certain up- or downward development of their future income according to expected changes of life prospects or global changes. All noise around this expected trend is interpreted and measured as income uncertainty.

As a future extension of the paper a more sophisticated look on income uncertainty have to be done. If the general approach described above can be verified empirically it can be probably shown what definition of income uncertainty influenced individual well-being most.

Last but not least an estimator for p have to be found. p can be estimated as permanent income (see, for example, Burkhauser, Frick, and Schwarze 1994).:

$$(6) \qquad \hat{p}_i = \frac{1}{T-(T-R)} \sum_{t=T-R}^{T} \ln Y_{it}$$

Descriptive information on all income and income related variables are shown by Table 1.

Subjective measures of welfare: the Van Praag and the Satisfaction Concept

In the present, paper two different approaches of subjective measuring of individual well-beeing are used. The Van Praag approach has already been mentioned. The second approach is less known by economists and is called the satisfaction approach (see, for example, Dubnoff, Vaughan, and Lancaster 1981 or Vaughan and Lancaster 1979). Below both approaches are briefly discussed.

The Van Praag approach

The Van Praag approach rests on several assumptions. For references see Van Praag (1968), (1971), (1981), (1991), Van Praag and Van der Sar (1988), Danziger et al. (1984), Goedhart et al. (1977), Hartog (1988), Van de Stadt et al. (1985), Van Dorn and Van Praag (1988), Plug et al. (1994).

Van Praag redefines the consumers' problem as one of maximization over a restricted relevant set of goods rather than as over all goods. Futhermore, individuals are assumed to able evaluating money income y by a cardinal indirect utility function from the form U(y;p,z). Van de Stadt et al. (1985, 180) summarize the assumptions as follows: "... that individuals are able to rate income levels on a bounded ratio scale. More specifically, his theory (Van Praag 1986, remark from author) implies that an individual n will evaluate any income y according to his individual welfare function." The utility function can be normalized in a way such as $U(0) = 0$ and $U(\infty) = 1$. A further assumption implies that certain verbal statements on income are related to fixed values on this utility scale.

The verbal statements are obtained by asking the so called income evaluation question, which can be considered as the heart of the Van Praag concept. The evaluation question was asked in the 1992 GSOEP household-questionnaire and was answered by one member of each household:

Question:

What would you consider a very bad household income, based on your circumstances? (amount in DM per month).

Also based on your circumstances the following incomes would be how much?

a bad income	*(amount in DM per month)*
an insufficient income	*(amount in DM per month)*
a sufficient income	*(amount in DM per month)*
a good income	*(amount in DM per month)*
a very good income	*(amount in DM per month)*

This six income levels (k=1,...,6) observed from N individuals i (or one individual from each household) are denoted as c_{ki}.

Using his assumptions and the responses on the income question Van Praag et al. introduce an empirical individual welfare function of the following form:

(7) $$U(y) = \Lambda(y;\mu_i,\sigma_i) = N(\ln y;\mu_i,\sigma_i) \qquad (i=1,...,N)$$

where Λ and N indicate the log-normal and normal distribution functions, respectively. The individual welfare function varies with μ_i and σ_i only. Under special assumptions μ_i and σ_i can be estimated as follows (see Van Praag 1991):

(8) $$\hat{\mu}_i = \frac{1}{K}\sum_{k=1}^{K} \ln c_{k,i} \qquad (i=1,...,N;\ k=1,...,6)$$

(9) $$\hat{\sigma}_i = \sqrt{\frac{1}{(K-1)}\sum_{k=1}^{K}(\ln c_{k,i} - \hat{\mu}_i)^2} \qquad (i=1,...,N;\ k=1,...,6)$$

After standardizing the c_{ki}'s using (9) and an assumption called equal-quantile-assumption log-normal utility function are developed with a range between 0 and 1. More interesting are the empirical estimations of μ_i and σ_i. As the subscripts indicate, both parameters vary over individuals. A stable empirical relationship was found only for μ_i.

The basic relationsship, measured in different papers using survey data from different countries is:

(10) $$\mu_i = \beta_0 + \beta_1 \ln\ famsize_i + \beta_2 \ln Y_{c,i} + e_i$$

where *famsize* stands for size of household and Y_c is current post government household income. e_i is an error term with well-known properties. OLS-estimates for β_1 and β_2 are very similar across coutrys and are typical around 0.10 for β_1 and 0.60 for β_2 . The share of explained variance is around 60 percent (Van Praag 1991).

Table 2 shows the estimation results for equation (10) using the 1992 GSOEP cross-section data (for first results see Plug et al. 1994) The parameter estimations come very close to results usually obtained by this approach and should not discussed here more detailed. The results should only used as a reference for the estimation results based on a longitudinal sample.

The Satisfaction Approach

In contrast to the Van Praag approach the Satisfaction approach is seldom used by economists. Dubnoff et al. (1981, 348) summarize the Satisfaction approach including a comparison to the Van Praag approach: "Rather than using the respondent' s estimate of the income necessary to achieve a given level of utility, as with the Dutch approach, we use an alternative and direct measure of each respondent' s utility, that is, satisfaction with current income and standard of living. By regressing this measure on income and a difference in circumstances, such as family size, we can use the resulting coefficients to find the level of income at which individuals in different circumstances will achiev the same level of satisfaction or utility."

It is not discussed here whether this simple straightforward approach measures something like utility in the economics sense or not. For a closer discussion of this topic see Dubnoff et al. (1981), but they argue that something like satisfaction is measured on a bounded scale.

Each wave of GSOEP data contains a question about satisfaction with household income. The question is embedded in a question-complex dealing with satisfaction on different items.

Question:

How satisfied are you today with the following areas of your life?
(Please answer by using the following scale, in which 0 means totally dissatisfied, and 10 means totally satiesfied.)

How satisfied are you with your...

health	*scale(0,1,2,3,4,5,6,7,8,9,10)*
....	
....	
household income	*scale(0,1,2,3,4,5,6,7,8,9,10)*
....	
....	
environmental conditions in your area	*scale(0,1,2,3,4,5,6,7,8,9,10)*

Satisfaction scales are widely used in psychology and sociology and there is a body of literature dealing with empirical and theoretical stability of this method of measurement, especially in longitudinal analyses (see, for example, Atkinson 1982, Berger-Schmitt 1994, Landua 1993).

Dubnoff et al. (1981) simply regresses this measure of satisfaction (*s*) on the logarithm of current household income Y_C and some 'taste-variables' z.

(11) $s_i = \beta_0 + \beta_1 z_i + \beta_2 \ln Y_{c,i} + e_i$

Dubnoff et al. (1981) assume that the scale *s* can be interpreted as metric and use OLS. Also Hauser et al. (1993, 19) interpreting the scale in a similar way: "We interpret the values on the scale as metric units of cardinal utility; the gap between each set of values can then be regarded as measuring the same difference in utility." However, it is also possible to work with the stronger assumption of an ordinal scale using a ordinal probit model. Schwarze (1994) compares both models using an approach suggested by Veall and Zimmermann (1992) and it can be shown that OLS is a sufficient method here. In the present paper only the OLS-version of the model will be discussed.

How income uncertainty influence subjective measures of individual well-being

Interpreting both measures μ_i and s_i as (indirect) measure for τ_i according to the general approach discussed above the following relationship holds, which will be named Thesis 1:

(Thesis 1) $\tau_{i,T-R} = \tau\left(Y_{i,T-R}; Z_{i,T-R}\right)$

where $Y_{i,T-R}$ is current household income $Y_{c,i}$. An important assumption of this paper is that the discussed measures can be used for measuring the degree of risk aversion. Thus, it is necessary that the measures are influenced by income uncertainty. Therefore, additional Theses are developed.

Following the permanent income hypothesis it is likely that respondents' answers are not only related to the current household income but also to expected or permanent income. This relationship can be formulated as follows:

(Thesis 2) $\tau_{i,T-R} = \tau\left(\hat{p}_i; Z_{i,T-R}\right)$

Testing Thesis 2 can be interpreted as another test of the permanent income hypothesis.

Assuming risk-aversion, not only is permanent income important but also income uncertainty. Individuals facing income uncertainty will evaluate a current income c. p. lower than in a situation where income uncertainty does not exists, because they calculate a certain insurance premium to cover future income uncertainty. In other words, the higher the expected income uncertainty the lower current income will be evaluated. The degree of risk-aversion can be analysed using Thesis 3:

(Thesis 3) $\tau_{i,T-R} = \tau\left(\hat{p}_i, \hat{v}_i; Z_{i,T-R}\right)$

Finally, subjective measures of individual well-being probably depend on current income as well as permanent income and uncertainty as shown by Thesis 4:

(Thesis 4) $\tau_{i,T-R} = \tau\left(Y_{i,T-R}, \hat{p}_i, \hat{v}_i; Z_{i,T-R}\right)$

All four theses will be tested empirically using the *ex ante* version (as the Theses are formulated here) as well as the *ex post* version.

Estimation results from the Satisfaction approach

The Satisfaction question was asked of every person (16 years of age and older). It is assumed household income is equally shared and hence a person's household's share is a function of both household income and the number of people in the household. Therefore household income used in the following estimation (current income, permanent income, and income uncertainty) is assured to be dependent on equivalent after government household income per equivalent person.

In a first estimation Satisfaction with household income in 1984 was used as dependent variable (see Table 3 for the results). Therefore, the influence of $\hat{p}$ and $\hat{v}$ on individual welfare

can be analyzed from a "real" *ex ante* point of view. Four estimations are done based on Thesis 1 to Thesis 4 and the number in brackets are related to the Thesis number. As expected, Model 4 has the best fit and is discussed here. Current (equivalence) household has the strongest effect on satisfaction with income. This can be seen when comparing Model 1 and Model 2. Although current household income is already included, additional explanation comes from expected permanent household $\hat{p}$.

The most interesting result is the coefficient of $\hat{v}$. He is significantly negative, meaning that individual well-being decreases when income uncertainty increase. This result is consistent with theory, but it is the first time empirical evidence of it using a real *ex ante* measure of income uncertainty.

Table 4 shows the same estimations but using Satisfaction with 1992 household income. Therefore the influence of income uncertainty is measured from the usual *ex post* point of view. Although the coefficient of $\hat{v}$ is also significantly negative it is clearly lower than it was in Table 3.

Estimation results from the Van Praag approach and some additional considerations

As mentioned above, testing the Van Praag approach with respect to income uncertainty is only possible from the *ex post* point of view. All income information used is monthly household income. To avoid income changes due to changes in household composition households with "high" membership mobility are excluded. Table 5 shows the results for the four models. The dependet variable is μ the individual mean of the income evaluation question. Comparing Column 1 to the model estimated for the cross-section population in Table 2, it can be seen that the parameter estimates are very close.

It can be seen from model 1 and model 2 in table 5 that the coefficient for the current income and the permanent income are nearly the same, but current income explains variance of the dependent much more than permanent income.

Of more interest are models 3 and 4. For both models the coefficient for $\hat{v}$ is clearly not significant. Either the income evaluation question is not sensitive with respect to income uncertainty or income uncertainty does not play a role when individuals evaluate their current income. The later conclusion is not supported by the Satisfaction model.

Thus, some additional considerations about how uncertainty will influence the Van Praag measure are necessary.

Suppose there is a world where income uncertainty does not exists. Thus $\hat{v}_i = 0$. Suppose further that this causes results c_{ki} (k=1,...,6 and i=1,...,N) for the income evaluation question. Indeed, these results are expected by the Van Praag school, even in a world with positive income risk because they believe that c_{ki} are related to current income only (see Thesis 1). As a next step suppose that $\hat{v}_i > 0$ and Thesis 3 holds. In this case the answers to the income evaluation question will differ from c_{ki} with respect to the degree of risk aversion:

A person who is asked to estimate a **very good income** will add a risk premium x_i to $c_{6,i}$ and the result $w_{6,i}$ will be higher than expected by Van Praag et al.

*a **very good income**?* $w_{6,i} = c_{6,i} + x_i$

In a risky world a very good income will have to be higher, enabling protection against risk.

When one asks an individual about a **very bad income**, in a risky world a **very bad income** will be lower than in a world without risk because the worst case has to be taken into account. In contrast to a good income the risk premium x will be deducted:

*a **very bad income**?* $w_{1,i} = c_{1,i} - x_i$

The changing syntax from a 'positive' to a 'negative' evaluation of income causes a change in answering behavior. For the first three parts of the income evaluation question, a risk premium will be deducted whereas it will be added in case of the last three parts.

This is the theory, but will it be supported by empirical findings? To test the considerations Model 4 was not only estimated for μ but also for c_1 and c_6. If the considerations hold the coefficient for $\hat{v}$ have to be negative in the c_1 model and positive in the c_6 model respectively. The estimated coefficients shown in Table 6 have the expected significant signs.

What follows from these results for the Van Praag approach? It might assumed that the estimated level of μ is not influenced by income uncertainty because the "risk premium" is deducted

three times and added three times. However, Van Praag (1991) suggests that his approach can also be used in the context of neoclassical ordinal welfare measurement, when regressions are estimated for each "welfare level" c_1 to c_6 separately. But it was shown above that these estimation might be biased if income uncertainty plays a role. This have to be proofed more detailed in future research.

Summary

This paper provides evidence that subjective measures of individual well-being can be used to study the impact of income uncertainty from an *ex ante* point of view. This was shown using two different measures of individual well being, the Van Praag and the Satisfaction approach.

In case of the Van Praag approach the results are twofold. On the one hand the assumption might be made that μ is not biased by income uncertainty. On the other hand the income evaluation question and the derivated poverty lines might be biased if the ordinal version of the Van Praag approach is used.

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Table 1: **Subjective Measures of Well-Being, and Income Information: Descriptives Statistics. Longitudinal Sample 1984 to 1992**

Variable	Mean Value	Stand. Dev.
Satisfaction with Household Income measured on a scale 0 to 10		
- 1984	6.51	2.55
- 1992	6.90	2.03
Income Evaluation Question, Van Praag		
- μ	8.03	0.34
- ln c_1	7.59	0.41
- ln c_6	8.59	0.42
Monthly After Government Household Income		
- ln Y 1984	7.87	0.49
- ln Y 1992	8.08	0.51
- $\hat{p}$ (1984-1992)	7.97	0.42
- $\hat{v}$ (1984-1992)	0.033	0.027
Household Income per Equivalent Person		
- ln Y 1984	7.10	0.45
- ln Y 1992	7.39	0.43
- $\hat{p}$ (1984-1992)	7.24	0.37
- $\hat{v}$ (1984-1992)	0.035	0.029

N=3,813

Source: German Socio-economic Panel, 95% sample of German heads, 1984 to 1992.

Table 2: **Individual Welfare and Income Uncertainty. Income Evaluation Question 1992. Dependent Variable is μ. Linear Regression. Cross Section Analysis 1992**

Variable	All	Female	Male
Intercept	3.248	3.265	3.285
	(0.077)	*(0.119)*	*(0.103)*
ln famsize	0.097	0.12	0.079
	(0.012)	*(0.020)*	*(0.015)*
ln Y (1992)	0.585	0.577	0.586
	(0.009)	*(0.015)*	*(0.012)*
Age 1992	-0.001	-0.001	-0.002
	(0.0002)	*(0.0004)*	*(0.0003)*
R^2	0.60	0.60	0.59
N	2,843	1,160	1,683

For restrictions on the sample, see text.

Source: German Socio-economic Panel, 95% sample of German heads, 1992.

Table 3: **Individual welfare and income uncertainty. Individual Welfare is measured as satisfaction with household income on a scale 0 to 10, 1984. OLS-regression**

Variable	(1)	(2)	(3)	(4)
Intercept	-7.313	-9.649	-8.551	-8.881
	(0.608)	*(0.756)*	*(0.774)*	*(0.766)*
ln Y (1984)	1.887	-	-	1.238
	(0.085)			*(0.134)*
$\hat{p}$ (1984-1992)	-	2.158	2.056	0.896
		(0.103)	*(0.104)*	*(0.163)*
$\hat{v}$ (1984-1992)	-	-	-0.083	-0.081
			(0.013)	*(0.013)*
Age 1984	0.010	0.012	0.0107	0.0089
	(0.0024)	*(0.0025)*	*(0.0025)*	*(0.002)*
R^2	0.120	0.108	0.116	0.136

N = 3,813. Standard deviation in brackets. All income used is equivlance income. For restrictions on the sample see the text.

Source: German Socio-economic Panel, 95% sample of German heads, 1984 to 1992.

Table 4: **Individual welfare and income uncertainty. Individual Welfare is measured as satisfaction with household income on a scale 0 to 10, 1992. OLS-regression**

Variable	(1)	(2)	(3)	(4)
Intercept	-7.081	-7.451	-6.998	-7.708
	(0.518)	*(0.593)*	*(0.609)*	*(0.601)*
ln Y (1992)	1.831	-	-	1.445
	(0.068)			*(0.118)*
$\hat{p}$ (1984-1992)	-	1.940	1.898	0.510
		(0.081)	*(0.082)*	*(0.139)*
$\hat{v}$ (1984-1992)	-	-	-0.034	-0.040
			(0.010)	*(0.010)*
Age 1992	0.0087	0.0059	0.0052	0.0071
	(0.002)	*(0.002)*	*(0.002)*	*(0.002)*
R^2	0.160	0.133	0.135	0.167

N = 3,813. Standard deviation in brackets. All income used is equivlance income. For restrictions on the sample see the text.

Source: German Socio-economic Panel, 95% sample of German heads, 1984 to 1992.

Table 5: **Individual Welfare and Income Uncertainty. Income Evaluation Question 1992. Dependent Variable is μ. Linear Regression. Longitudinal Sample 1984 bis 1992.**

Variable	(1)	(2)	(3)	(4)
Intercept	3.048	3.107	3.109	2.736
	(0.116)	*(0.148)*	*(0.154)*	*(0.133)*
ln famsize	0.075	0.152	0.152	0.076
	(0.019)	*(0.022)*	*(0.022)*	*(0.019)*
ln Y (1992)	0.621	-	-	0.509
	(0.014)			*(0.023)*
$\hat{p}$ (1984-1992)	-	0.624	0.624	0.155
		(0.018)	*(0.019)*	*(0.026)*
$\hat{v}$ (1984-1992)	-	-	-0.0001	-0.002
			(0.027)	*(0.002)*
Age 1992	-0.003	-0.004	-0.004	-0.003
	(0.0004)	*(0.0005)*	*(0.0005)*	*(0.0004)*
R^2	0.66	0.55	0.55	0.67
N	1,300	1,300	1,300	1,300

Source: German Socio-economic Panel, 95% sample of German heads, 1984 to 1992.

Table 6: **Individual Welfare and Income Uncertainty. Income Evaluation Question 1992. Estimation results for μ, c_1, and c_6. Linear Regression. Longitudinal Sample 1984 bis 1992.**

Variable	μ mean of IEQ	c_1 very bad income	c_6 very good income
Intercept	2.736	2.866	2.641
	(0.133)	*(0.205)*	*(0.188)*
ln famsize	0.076	0.163	-0.014
	(0.019)	*(0.029)*	*(0.027)*
ln Y (1992)	0.509	0.459	0.575
	(0.023)	*(0.035)*	*(0.033)*
$\hat{p}$ (1984-1992)	0.155	0.126	0.181
	(0.026)	*(0.041)*	*(0.037)*
$\hat{v}$ (1984-1992)	-0.002	-0.009	0.006
	(0.002)	*(0.003)*	*(0.003)*
Age 1992	-0.003	-0.003	-0.003
	(0.0004)	*(0.0007)*	*(0.0006)*
R^2	0.67	0.43	0.54
N	1,300	1,300	1,300

Source: German Socio-economic Panel, 95% sample of German heads, 1984 to 1992.