University of Sussex
Business, Management & Economics

Economics Department Working Paper Series

No. 3-2010

An Analysis of Life Satisfaction in Albania: An Heteroscedastic Ordered Probit Model Approach

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Abstract: This paper uses the nationally representative Albanian Living Standards Measurement Survey from 2005 to investigate the determinants of life satisfaction. In common with much of the existing empirical economics literature that models life satisfaction (or subjective well-being) this paper exploits an ordered probit model. In contrast to the existing literature, however, the current study places an important emphasis on regression model evaluation. Diagnostic testing revealed a number of econometric model deficiencies but the explicit incorporation of an heteroscedastic function into the ordered probit model resolved all detected problems. The tenor of the key findings generally reflects that found in the literature on the determinants of life satisfaction for both advanced capitalist and transitional economies. However, a number of additional themes with a strong Albanian dimension were interrogated. In particular, our study revealed evidence of long memories among Albanian respondents with respect to the collapse of that country's notorious pyramid schemes and the scarring effects of the episode continue to impact on life satisfaction even with the passage of almost eight years. A sizeable effect for communal level crime activity on life satisfaction was also detected. In addition, our econometric estimates provided some empirical insights on the monetary value of friendship and the costs of children.

JEL Classification: C25; D60; I31

Key Words: Albania, life satisfaction, household welfare, ordered probit model, heteroscedasticity

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The authors acknowledge constructive comments provided on an earlier draft of this paper by participants at the 'From GDP to Well-being: Economics on the Road to Sustainability?' Conference in Ancona, Italy 3rd – 5th December 2009. In particular, the authors acknowledge comments provided by Lucio Esposito, Barkley Rosser and Bram Vanhoutte. In addition, the technical advice of Adriana Castaldo and Carlo Azzari on aspects of the dataset is also acknowledged. However, the usual disclaimer applies.

Introduction

Data on subjective well-being have been used extensively by psychologists interested in defining happiness. For instance, Diener (1984) refers to the pioneering work of the psychologist Wilson (1967) as providing one of the first studies to report the characteristics of a happy individual. Studies undertaken by other psychologists reveal that results based on survey responses to questions on life satisfaction or subjective well-being are fairly reliable yielding responses that tend to be highly correlated with alternative indicators of happiness.[1] In addition, such responses appear fairly insensitive to the specific circumstances that impact on the life of the respondents at the time of interview.

The study of subjective well-being in the field of economics has its origins in the work of Easterlin (1974) and, after a protracted period of very limited interest, a sizeable economics literature has emerged in more recent times (e.g., see Clark and Oswald (1994), Di Tella, MacCulloch and Oswald (2001), Easterlin (2001), Frey and Stutzer (2000), Ravallion and Lokshin (2002), Clark, Frijters and Shields (2008), and Dolan, Peasgood and White (2008)). An interesting use of subjective well-being data is the investigation of poverty according to the multi-dimensional definition suggested by Sen (1999). This definition incorporates a broader concept of deprivation across several characteristics including household expenditure, housing access, health, job security and political freedom. It is not implausible that the type of factors that inform Sen's multi-dimensional measure of deprivation are implicitly considered when individuals are asked to provide responses on their well-being (e.g., see Winter *et al.* (1999)).

Despite the potentially important informational content of subjective well-being data with respect to the multi-dimensional nature of poverty, some economists have expressed reservations that different definitions of subjective well-being and/or the role of unobservable characteristics vitiate the use of such measures (see Bertrand and Mullainathan (2001)). In contrast, the research of psychologists suggests that self-reported subjective well-being is a stable concept that is amenable to reliable measurement over time (e.g., see Larsen Diener and Evans (1985), Pavot and Diener (1993), Winter *et al*. (1999)). Further confidence in the use of such data has been provided by the empirical evidence that reports, when estimating the determinants of well-being across different countries, fairly robust empirical relationships (e.g., see Blanchflower and Freeman (1997), Blanchflower and Oswald (2001), Di Tella, MacCulloch and Oswald (2001), and Alesina, Di Tella and MacCulloch (2004)).

The finding of such reassuringly robust results has encouraged researchers to exploit subjective well-being data in order to address issues beyond the determinants of well-being or subjective poverty. In particular, the capacity of subjective well-being data to capture national welfare in the presence of social turmoil and ongoing political reforms has prompted use of such data across a range of transition countries[2] to examine, *inter*

[1] For example, see Kahneman, Diener and Schwartz (1999).

[2] See Sanfey and Teksoz (2005), Hayo (2007), Hayo and Seifert (2003), Namazie and Sanfey (2001), Winter *et al.* (1999), Ravallion and Lokshin (2002), Eggers, Gaddy and Graham (2006), and Senik (2004).

alia, the influence of institutions, ideology, psychological traits, and selected macroeconomic variables on individual well-being. For instance, Frey and Stutzer (2000) investigate the impact of Swiss institutions of direct democracy on individual well-being, while Blanchflower and Freeman (1997) test ideological convictions using this type of data. Hayo and Seifert (2003) assess the perception of the communist regime and the impact of an individual's religion and religious service attendance on life satisfaction. These latter two sets of variables are interpreted as capturing an ideology, different and distinct from a political one, which might be just as important as politics in shaping an individual's satisfaction with life.

The present paper investigates the determinants of life satisfaction in Albania using the 2005 wave of the nationally representative Living Standard Measurement Study (ALSMS). We investigate the impact on life satisfaction of, among other things, a household welfare metric, religion, health, residential dwelling characteristics, the nature of the communities within which individuals reside, and some distinctive features of the country's recent economic history. A distinctive feature of the current paper is its emphasis on refining the econometric approach that has traditionally been adopted by economists to model the impact of covariates on the survey responses on subjective welfare. The conventional strategy pursued by economists is to model the ordinal responses using either ordered probit or ordered logit models estimated by maximum likelihood techniques.[3] The econometric approach adopted in this paper is to investigate, using appropriate diagnostic tests, whether the assumptions inherent in the use of such ordinal modelling are satisfied by the data and provide remedial treatment if any econometric assumptions are violated. We believe such an approach provides for greater confidence in the empirical findings obtained using such ordinal response models.

The structure of the current paper is now outlined. The next section provides a description of the data used and is followed by a section outlining the econometric methodology. The penultimate section provides the empirical results and a final one provides a summary with some concluding remarks.

Data

The current paper uses the 2005 wave of the Albanian Living Standards Study (ALSMS), which comprised separate household, community and price questionnaires. The 2005 ALSMS employed a two-stage stratified sampling approach. The Primary Sampling Units (PSUs) were the Enumeration Areas (EAs) used in the 2001 Population Census. The EAs were selected according to their geographical location and the present study

[3] For example, the studies of Clark and Oswald (1994), Blanchflower and Freeman (1997), Blanchflower and Oswald (2001), Graham and Pettinato (2002), Eggers, Gaddy and Graham (2006), and Hayo (2007) all adopt such a modelling approach. In contrast, Ferrer-i-Carbonell and Frijters (2004) argue in their application that the estimated effects appear to be invariant to whether responses are treated ordinally, as in an ordered probit (or logit) model, or cardinally, as with the OLS procedure. However, the findings of Ferrer-i-Carbonell and Frijters (2004) may not be subject to generalization as they exploited an 11-number scale. Thus, given we only have a four-number scale we follow the established tradition in the economics literature and explicitly exploit the ordinal structure of the responses in modelling life satisfaction in Albania.

uses the 455 EAs which were randomly sampled. The Second Stage Sampling Units (SSUs) were provided by the households and within each EA, 12 were selected for interview. Eight of these constituted the main interview sample, while the remaining four were used for purposes of replacement in the case of non-response. The respondent or interviewee was either the head of household or someone deputed as the most knowledgeable person within the household to answer the questions on his/her behalf.

The key dependent variable is ordinal in nature and based on the interviewee's response to the question: '*How satisfied in general are you with your current life?'* The mutually exclusive responses permitted were: '*fully satisfied', 'rather satisfied', 'less than satisfied'* and '*not at all satisfied'*. The sample used in the analysis is restricted to individuals aged between 15 and 65 years who are not students. After data cleaning across all the relevant variables, the resultant dataset comprised 2,923 useable observations. In this sample, 2% of the respondents enjoyed the highest level of life satisfaction while about 20% were '*rather satisfied*'. The largest percentage was in the '*less than satisfied'* group (close to one-half) and the remaining 29% registered their responses within the '*not at all satisfied'* category.

The demographic and human capital explanatory variables included in the analysis comprise the age, gender, religion and educational background of the interviewee. Labour market status is also captured with the unemployed defined as those individuals who, during the last four weeks, have tried either to find a job or to start an independent business but have failed to do so. The other labour force status categories capture whether the individual is wage employed, self-employed, engaged in household activity or out of the labour force.

A diary recording household consumption provides information on household expenditure patterns. The monthly household expenditure measure used excludes housing and health expenses. The absence of a well-developed housing rental market in Albania prevents the computation of reliable values for imputing housing rents for those who own property. Likewise, health expenditure is excluded since health provision is highly subsidized in Albania. As these separate components (i.e., rent and health expenditures) are likely to distort the aggregate expenditure measure, both are excluded from the measure used in this study as recommended by the World Bank (2003).

The household expenditure measure is transformed into per capita terms. Given regional differences in prices, the nominal household expenditures are deflated using the Paasche price index calculated at the PSU level, standardized with respect to the capital Tirana and expressed at 2002 prices. Finally, we follow Senik (2004) in taking the natural logarithm of the real per capita expenditure to account for a possible non-linear relationship with respect to life satisfaction.

The independent variables also include a set of controls for household size and the number of dependent children, residential size and quality, and the location and settlement type within which the residence is situated. A set of mutually exclusive binary variables indicating whether the household receives zero, one, and two or more public

transfers is also included to capture the extent of a household's receipt of government welfare payments. The Albanian transfers include subsidies for economic hardship, pensions for the elderly, the disabled, as well as benefits for the unemployed, war veterans, those on maternity leave, those who are ill or in social care. Following Winkelman and Winkelman (1998), the inclusion of this set of binary variables is intended in part to capture the psychological effects of a resort to government transfers in order to assist in the funding of household consumption patterns.

We also incorporate into the analysis significant features of recent Albanian economic history. During the late 1990s, the Albanian currency devalued by more than 40%, GDP contracted by 7%, the inflation rate rose to 42%, the budget deficit increased to 12% of GDP, and unemployment rose sharply (ETF, 2006). This period was also characterised by the infamous pyramid scandals, which occurred at the start of 1997, and partly triggered the economic crisis experienced over this period. Thus, we include a control for whether or not the household suffered from the collapse of the pyramid credit scheme. It is anticipated that the variable will capture the 'memory' individuals possess of this psychologically damaging phenomenon.

The number of friends of the respondent is also included and assumed to capture the size of social networks. It may also capture whether the individual (or household) has access to informal insurance networks. Friends might be a good source of informal credit in the absence of a fully developed official credit market. Moreover, friends might also enable collaboration in either small business and/or child-minding activities. Likewise, it appears a potentially useful variable to account for some unobservable personality traits reflecting the fact that outgoing individuals may be happier the larger the social network.
We also introduce a number of variables that reflect the characteristics of the community within which the individual resides. The inclusion of a variable that captures an individual's perception of an increase in population at the local level attempts to proxy for the effects of the additional strain imposed on under-developed local infrastructures and public services. For instance, UNEP (2000) reports that water supply and solid waste systems are utilized beyond capacity, especially in urban areas. The presence of a community organization captures the degree of social cohesion within the local population and reflects its proactive attitude towards tackling and solving common problems. A measure reflecting the incidence of thefts in the commune is also included.[4] A commune level variable capturing whether land disputes occur locally also features in the empirical model and is included to capture the effects of poor governance and the lack of contract enforcement on life satisfaction.

A full list and a description of explanatory variables in conjunction with their corresponding summary statistics are reported in Table 1.

[4] Alesina, Di Tella and MacCulloch (2004) also used a measure for thefts in an analysis of life satisfaction in their study of more advanced economies.

Table 1: Variable Descriptions and Summary Statistics

Variable	Variable Description	Mean
UNEMPL	=1 if the respondent is unemployed, =0 otherwise	0.0458
OLF	=1 if the respondent is out of the labour force, =0 otherwise.	0.2915
HEMPL	=1 if the respondent is employed on a household business, =0 otherwise	0.1632
SELF_EMP	=1 if the respondent is a self employed or an employer, =0 otherwise	0.1803
WEMPL	=1 if the respondent is employed in a non household related business, =0 otherwise	0.3192
PRIMARY_4	=1 if the respondent has no diploma or has a primary 4 diploma, =0 otherwise.	0.4122
PRIMARY_8	=1 if the respondent has a diploma from primary 8, =0 otherwise	0.1738
SEC_DIPLOMA	=1 if the respondent has a secondary diploma, =0 otherwise	0.2190
VOC_DIPLOMA	=1 if the respondent has a vocational diploma, =0 otherwise	0.1085
UNIV	=1 if the respondent has an university and more education title, =0 otherwise	0.0866
ILLNESS	=1 if the respondent has a medically ascertained chronic illness, =0 otherwise	0.2070
MUSLIM	=1 if the respondent is Muslim, =0 otherwise	0.7852
ORTHODOX	=1 if the respondent is Orthodox, =0 otherwise	0.0992
OTHERREL	=1 if the respondent is from other religions, =0 otherwise	0.0393
CATHOLIC	=1 if the respondent is Catholic, =0 otherwise.	0.0763
MARRIED	=1 if the respondent is married, =0 otherwise	0.8909
OTHMARIT	=1 if the respondent enjoys other marital statuses, =0 otherwise	0.0766
SINGLE	=1 if the respondent is single, =0 otherwise.	0.0325
HHHEAD	=1 if the respondent is the household head, =0 otherwise.	0.6189
AGE	Age of the respondent in years.	45.36
MALE	=1 if the respondent is male, =0 otherwise.	0.5696
PRCONS	Real per capita household monthly consumption (in 2002 Leks)	10,087.4
LNPRCONS	Natural logarithm of real per capita monthly household consumption (in 2002 Leks)	9.0742
TRANSFER1	=1 if the household receives one state transfer, =0 otherwise	0.4034
TRANSFER2	=1 if the household receives two or more state transfers, =0 otherwise	0.0961
TRANSFER0	=1 if the household receives no state transfers, =0 otherwise.	0.5005
NCHILDR	Number of children in the household.	2.1444
NFRIENDS	Number of friends of the respondent.	1.9319

HHSIZE	The number of individuals in the household.	4.6073
PYRAMID	=1 if the household of the respondent was affected by the collapse of the pyramid schemes between 1989 and 2005, =0 otherwise.	0.3134
SINGLE_H	=1 if the household of the respondent lives within a single household home, =0 otherwise.	0.6620
INSIDEWC	=1 if the dwelling the household of the respondent lives in has a toilet inside, =0 otherwise.	0.7465
AREA<70	=1 if the dwelling the household of the respondent lives in has an area of less than 70 square meters, =0 otherwise.	0.3900
AREA70_99	=1 if the dwelling the household of the respondent lives in has an area between 70 and 99 square meters, =0 otherwise.	0.3832
AREA100_130	=1 if the dwelling the household of the respondent lives in has an area between 100 and 130 square meters, =0 otherwise.	0.1752
AREA130+	=1 if the dwelling the household of the respondent lives in has an area above 130 square meters, =0 otherwise	0.0517
LAND_DISPUTE	=1 if the community the respondent belongs to is afflicted by disputes over land possession, =0 otherwise.	0.5631
THEFTS	=1 if the community the respondent belongs to is affected by thefts, =0 otherwise.	0.3579
POP_INCREASE	=1 if the community the respondent belongs to enjoys an increase in population, =0 otherwise.	0.5867
COMM_ORG	=1 if the community the respondent belongs to enjoys the presence of a community organization, =0 otherwise.	0.8980
URBAN	=1 if the respondent resides in an urban location, = 0 otherwise.	0.5631
COASTAL	=1 if the respondent resides in a coastal area, = 0 otherwise.	0.2887
CENTRAL	=1 if the respondent resides in the central area, = 0 otherwise.	0.2621
MOUNTAIN	=1 if the respondent resides in the mountain area, = 0 otherwise.	0.2713
TIRANA	=1 if the respondent is in the Tirana area, = 0 otherwise.	0.1779

Notes: (a) Albanian Living Standards Study (2005) using 2923 individual-level observations.

(b)The mean column reports the sample proportion for binary variables and conventional means for the continuous variables.

Econometric Methodology

In comport with other studies undertaken by economists modelling individual-level survey responses on life satisfaction, an ordered probit model is used. Let y_i denote an observable ordinal variable coded 0, 1, 2 and 3 on the basis of responses to the life satisfaction question discussed in the previous section. Let y_i^* represent an unobservable

variable that captures the satisfaction level of the i^{th} individual. The satisfaction outcome can be expressed as a function of a vector of explanatory variables ($\mathbf{x}_i$) using the following linear relationship:

$$y_i^* = \mathbf{x}_i'\boldsymbol{\beta} + u_i \qquad \text{where } u_i \sim N(0, 1) \qquad [1]$$

where $\boldsymbol{\beta}$ is a vector of unknown parameters. It is assumed that y_i^* is related to the observable ordinal variable y_i as follows:

$y_i = 0$ [‘*not at all satisfied’*] if $-\infty < y_i^* < \theta_0$

$y_i = 1$ [‘*less than satisfied’*] if $\theta_0 \le y_i^* < \theta_1$

$y_i = 2$ [‘*rather satisfied*’] if $\theta_1 \le y_i^* < \theta_2$

$y_i = 3$ [‘*fully satisfied*’] if $\theta_2 \le y_i^* < +\infty$

In general terms we can write prob $[y_i = j] = \Phi(\theta_j - \mathbf{x}_i'\boldsymbol{\beta}) - \Phi(\theta_{j-1} - \mathbf{x}_i'\boldsymbol{\beta})$ for j = 0,1,2,3 where $\Phi(\cdot)$ denotes the cumulative distribution function operator for the standard normal. The first and the final intervals are open-ended, so for j=0, $\Phi(\theta_{j-1}) = \Phi(-\infty) = 0$ and for j=3, $\Phi(\theta_j) = \Phi(+\infty) = 1$. If the $\mathbf{x}$ vector contains a constant term, the remaining set of threshold parameters $[\theta_0, \theta_1, \theta_2]$ is not identified. The exclusion of either the constant or one of the fixed threshold parameters permits identification. In our application we set $\theta_0 = 0$. Another identification restriction is also required as the parameters of the ordered probit are only identified up to some factor of proportionality. As with the standard probit, the convenient normalization that $\sigma^2 = 1$ is also imposed and this is reflected in the assumption made for u_i in [1] above. This restriction arbitrarily fixes the scale of the latent dependent variable. The imposition of this restriction implicitly incorporates the assumption of homoscedasticity. In the presence of heteroscedasticity, the effects of covariates on the location and scale of the latent dependent variable cannot be separated. The general expression for the log-likelihood function for this particular model is expressed as:

$$L = \sum_{i=1}^{n} \sum_{j=0}^{3} \delta_{ij} \log_e[\Phi(\theta_j - \mathbf{x}_i'\boldsymbol{\beta}) - \Phi(\theta_{j-1} - \mathbf{x}_i'\boldsymbol{\beta})] \qquad [2]$$

where $\delta_{ij} = 1$ if the i^{th} individual’s response falls within the j^{th} category and 0 otherwise, and $\log_e(\cdot)$ denotes the natural logarithmic operator. Conventional algorithms can be employed to provide maximum likelihood estimates for the $\boldsymbol{\beta}$ parameter vector and the remaining two threshold parameters $[\theta_1, \theta_2]$. The inverse of the regression model’s information matrix provides the asymptotic variance-covariance matrix for the parameter vector and the threshold parameters.

We subject the estimated mean regression model to a variety of diagnostic tests to determine its adequacy. Machin and Stewart (1990), extending the work of Chesher and Irish (1987), provide the computational details for efficient score tests in the case of the ordered probit model. The test statistics focus on four properties of the econometric specification. These are (a) threshold homogeneity, (b) pseudo-functional form, (c) homoscedasticity, and (d) normality. The assumption of threshold homogeneity is crucial to the specification of the ordered probit model. The specified model assumes that the thresholds delineating the life satisfaction responses are independent of the explanatory variables. This is a testable proposition and the testing principle adopted explores threshold constancy across the full set of explanatory variables. The pseudo-functional form tests are based on the RESET principle conventionally applied in the linear regression model (see Ramsey (1969)). The test uses the predicted ordered probit standardised index values raised to polynomials of the fourth order as auxiliary variables to capture potential model mis-specification. Peters (2000) provides some evidence on the power of the test for a number of different limited dependent variable models. The generalised (or pseudo) residuals from the ordered probit model are also assessed to explore departures from normality through skewness and/or excess kurtosis. A general test of departures from the assumption of homoscedastic errors is also implemented using the score test framework.

The ordered probit model estimates are known to be subject to bias and inconsistency in the presence of heteroscedasticity.[5] The inconsistency only assumes significance if the investigator is concerned with identifying mean effects. If it is not a primary concern, then it is immaterial whether the effects of the covariates are mediated through the mean or the variance functions of the underlying model. However, given we are interested in determining the separate impacts of covariates on the mean and variance of the latent dependent variable a modification to the conventional model incorporating a fairly general form of heteroscedasticity is provided by:

$$\sigma_i = \exp(\mathbf{w}_i\boldsymbol{\gamma}) \qquad [3]$$

where $\mathbf{w}_i$ comprises a matrix of variables found to be the source for the residual dispersion, and $\boldsymbol{\gamma}$ is a vector of unknown parameters**.** These variables can comprise all or a sub-set of the $\mathbf{x}_i$ variables. The log-likelihood function incorporating this multiplicative form of heteroscedasticity is then re-expressed as:

$$L_{Het} = \sum_{i=1}^{n} \sum_{j=0}^{3} \delta_{ij} \log_e[\Phi(\frac{\theta_j - \mathbf{x}_i\boldsymbol{\beta}}{\exp(\mathbf{w}_i\boldsymbol{\gamma})}) - \Phi(\frac{\theta_{j-1} - \mathbf{x}_i\boldsymbol{\beta}}{\exp(\mathbf{w}_i\boldsymbol{\gamma})})] \qquad [4]$$

The standard algorithms can again be used to obtain the maximum likelihood estimates for the mean function (i.e., the $\boldsymbol{\beta}$ parameter vector and the two threshold parameters θ_1

[5] A general response of practitioners to potential (and generally undiagnosed) model assumption violations (e.g., homoscedasticity and normality) is to use the Huber (1967) adjustment for the estimated variance-covariance matrix rather than the conventional inverse of the information matrix of the parameters. This is potentially an otiose approach given the potential for parameter inconsistency associated with model violations of this type.

and θ_2), and the variance function (γ). The inverse of the regression model's information matrix again provides the asymptotic variance-covariance matrix for the two parameter vectors.[6]

Empirical Results

The first two columns of Table 2 contain the maximum likelihood estimates for the ordered probit mean regression model. Columns one and two refer to the homoscedastic and heteroscedastic variants of the model (expressions [2] and [4] above respectively). The estimated coefficients provide the average *ceteris paribus* effect of a characteristic on the standardised probit index measured in terms of a standard deviation. The signs on the estimated coefficients provide the directional impact of the characteristics on an individual's life satisfaction as measured along the real line by the latent dependent variable.

The mean regression estimates reported in columns 1 and 2 generally concur with findings reported in the existing literature. However, the diagnostic test results reveal that the homoscedastic regression model marginally violates the normality assumption, and the null hypothesis of homoscedasticity is decisively rejected by the data. In addition, the assumption of constant thresholds across the set of included variables is also fairly decisively rejected by the data. In order to respond to the model violations encountered, the model is re-estimated catering for the presence of heteroscedasticity using expression [4] to determine whether such an approach improves matters in regard to the set of other econometric assumptions. The explicit modelling of heteroscedasticity in the current application generally acts to inflate both the absolute magnitude of the mean estimates and their corresponding standard errors. While most of the results are qualitatively the same, the heteroscedastic model suggests that the more conventional approach leads to an underestimate in absolute terms of the importance of the determinants of mean life satisfaction. It should also be noted that the heteroscedastic model passes all the key diagnostic tests, which affords some degree of confidence in the estimated effects reported for our more general model.

We initially focus on the third column of Table 2, which reports the variance function estimates. We experimented with the inclusion of the full set of regressors from the mean regression in the variance equation and tested down to a more parsimonious specification. The test for the overall statistical significance of the variables excluded from the variance equation in table 2 yielded an insignificant likelihood ratio test of $20.46 \sim \chi^2_{23}$ (prob-value = 0.61). The estimates for the labour force status variables reveal a greater residual dispersion in life satisfaction responses for all categories other than the wage employed. There is greater variation in the responses if the head of household was the interviewee and dispersion also increases with per capita household expenditure levels, which reflects a fairly standard form of heteroscedastic relationship in the applied econometrics

[6] Diagnostic tests for the heteroscedastic ordered probit model are also computed using the efficient score tests after suitable amendments are introduced to the relevant formula to cater for the heteroscedastic form introduced.

literature. In addition, living in a property that has an inside water closet reduces the variance around these responses. However, a greater variance in responses is noted for those residing in the largest-sized dwellings perhaps suggesting great variability in the quality of such dwellings. Residing in an urban settlement yields responses that are more dispersed, while the variation in responses appears more compressed in those locations outside Tirana (with the exception of the coastal region). The presence of community organizations is also found to reduce the dispersion in responses around the latent dependent variable.

Our interpretational focus now turns to the mean estimates using the heteroscedastic model's coefficients. Overall, the sign of the estimates for the key variables are in comport with those reported in the literature. For instance, being unemployed in Albania reduces life satisfaction, a finding also detected in the studies of Alesina, Di Tella and MacCulloch (2004), Eggers, Gaddy and Graham (2006), Hayo and Seifert (2003), Hayo (2007), Sanfey and Teksoz (2005), and Winkelman and Winkelman (1998). The estimated and well determined positive effect on mean life satisfaction associated with possessing a university degree is also congruent with other evidence for Eastern Europe provided by Hayo (2007), Hayo and Seifert (2003), Sanfey and Teksoz (2005) and by Eggers, Gaddy and Graham (2006) for transitional Russia. The number of children in the household reduces life satisfaction, which is in accord with Alesina, Di Tella and MacCulloch (2004), though in conflict with the positive effect noted in Lelkes (2006). The negative effect obtained in the current study might reflect the additional strain imposed on household resources given the additional spending required on health and education for younger children. The relationship between life satisfaction and age is found to be U-shaped for Albania with the minimum computed at around 41 years of age with a corresponding asymptotic standard error of 2.2. This result is more consistent with empirical evidence from developed countries (see Hayo and Seifert, 2003 and Sanfey and Teksoz, 2005) than transitional ones where the turning point is found to occur considerably later in life (e.g., Sanfey and Teksoz, 2005 and Namazie and Sanfey, 2001).

Our findings also reveal than men are less satisfied with life than women, which is redolent of the findings reported in Alesina, Di Tella and MacCulloch (2004), Di Tella, MacCulloch and Oswald (2001), Sanfey and Teksoz (2005) and with the survey review of Dolan, Peasgood and White (2008). Being married is associated with a positive impact on satisfaction compared to being single and this resonates with the findings of both Sanfey and Teksoz (2005) for transitional economies and Graham and Pettinato (2002) for Peru. Urban dwellers appear less satisfied with life than their rural counterparts, but there is no evidence of a regional variation in this outcome across Albania. Suffering from a chronic illness, perhaps surprisingly, is not found to impact on life satisfaction in the heteroscedastic model.[7] Muslims register higher life satisfaction levels compared to Roman Catholics[8], on average and *ceteris paribus*, and this may

[7] It is acknowledged that an individual's health status may be a function of life satisfaction. However, this reverse causality is not the subject of empirical investigation here given its failure to achieve statistical significance in the life satisfaction model.

[8] Clark and Lelkes (2005) and Hayo (2007) report a positive relationship between life satisfaction and engagement in religious activity. This is not something we can provide any insights on here though it may

reflect the effect of an isolationism associated with being a member of a minority religion strongly associated with the country's former colonial power.

The number of state transfers received is found to reduce life satisfaction once we control for household income using the log per capita expenditure measure. This may be taken to reflect the negative psychological impact that a dependency on government hand-outs creates.[9] The estimates also reveal evidence of long memories among Albanian respondents with respect to the collapse of that country's infamous pyramid schemes. The estimated effect is sizeable and well determined and reveals that the average psychological effect of the pyramid scandal remains potent for those individuals who had direct experience of the collapse. This may be related to the fact that negative unexpected episodes are more likely to stay in the mind rather than positive ones. In contrast, the existence of social networks, as proxied by the number of friends the respondent has, exerts a positive effect on life satisfaction. In addition, living conditions are found to be an important determinant of life satisfaction with satisfaction levels positively associated with the presence of an internal water closet in the dwelling and, moreover, satisfaction increases monotonically with the size of the dwelling's living area.

The estimated effects for the community level variables reveal that land disputes and the presence of a community organization are intuitively signed but only the point estimate for the latter is statistically significant at a conventional level. Thefts and the perceived increase in the local population induce a reduction in average life satisfaction. The estimated effect for the theft variable is as anticipated and confirms the adverse effect criminality exerts on life satisfaction. We interpret the negative effect corresponding to the increase in community population as either reflecting the perceived difficulties and congestion costs individuals face when using local infrastructures and public services or alternatively, and perhaps more prosaically, to an aversion to internal migrants originating from other areas within Albania.

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be the case that the degree of engagement is less if the religion is a minority one like Roman Catholicism in Albania.

[9] It is certainly the case that lower income households are less satisfied and also receive more state transfers. There is thus likely to be a high negative correlation between the household expenditure measure and state transfers and this is likely to induce higher standard errors for the estimated effects for these inter-correlated variables. This is thus not seen as an important issue here given all relevant estimates are found to be well determined.

Table 2: Estimates for Ordered Probit Life Satisfaction Models

Variables	Mean Function	Mean Function	Variance Function
Constant	-7.9124*** (0.6565)	-16.7515*** (6.5927)	§
UNEMPL	-0.4540*** (0.1142)	-1.0058** (0.4643)	0.2652** (0.1145)
OLF	-0.2322*** (0.0657)	-0.4876** (0.2354)	0.1319*** (0.0540)
HEMPL	-0.2342*** (0.0771)	-0.4420* (0.2326)	0.1368** (0.0692)
SELF_EMP	0.1320** (0.0644)	0.2774 (0.1757)	0.0976* (0.0549)
PRIMARY_8	0.0026 (0.0881)	-0.0073 (0.1856)	§
SEC_DIPLOMA	0.0543 (0.1013)	0.0733 (0.2134)	§
VOC_DIPLOMA	0.0768 (0.0971)	0.1164 (0.2048)	§
UNIV	0.3525*** (0.1144)	0.7064** (0.3573)	§
ILLNESS	-0.0941* (0.0578)	-0.2021 (0.1459)	§
MUSLIM	0.2378*** (0.0876)	0.4676* (0.2568)	§
ORTHODOX	0.1849* (0.1078)	0.3901 (0.2654)	§
OTHERREL	0.0410 (0.1382)	0.0179 (0.3028)	§
MARRIED	0.4861*** (0.1288)	0.9571** (0.4472)	§
OTHMARIT	-0.1711 (0.1628)	-0.4267 (0.4021)	§
HHHEAD	0.0106 (0.0951)	-0.0474 (0.1945)	0.2018*** (0.0446)
AGE	-0.0495*** (0.0180)	-0.0999* (0.0523)	§
AGESQ	0.0006*** (0.0002)	0.0012** (0.0006)	§
MALE	-0.2070** (0.0955)	-0.4065* (0.2498)	§
LNPRCONS	0.9648*** (0.0549)	2.0270*** (0.7927)	0.0872** (0.0424)
TRANSFER1	-0.1084** (0.0504)	-0.2427* (0.1381)	§
TRANSFER2	-0.2151*** (0.0869)	-0.3976* (0.2261)	§
NCHILDR	-0.1234*** (0.0278)	-0.2435** (0.1095)	§
NFRIENDS	0.0278** (0.0117)	0.0574* (0.0337)	§
HHSIZE	0.1243*** (0.0225)	0.2442** (0.1054)	§
PYRAMID	-0.1672*** (0.0486)	-0.3627** (0.1769)	§

SINGLE_H	-0.1294** (0.0564)	-0.2595 (0.1627)	§
INSIDEWC	0.3514*** (0.0611)	0.8170*** (0.3357)	-0.1207** (0.0575)
AREA70_99	0.1398*** (0.0513)	0.2907** (0.1508)	-0.0444 (0.0460)
AREA100_130	0.3704*** (0.0664)	0.7258** (0.3141)	0.0362 (0.0590)
AREA130+	0.5748*** (0.1066)	1.2657** (0.5576)	0.1716** (0.0842)
LAND_DISPUTE	-0.0765 (0.0461)	-0.1651 (0.1146)	§
THEFTS	-0.1526*** (0.0477)	-0.3181** (0.1634)	§
POP_INCREASE	-0.1676*** (0.0601)	-0.4138** (0.2015)	§
COMM_ORG	0.1103 (0.0773)	0.4151* (0.2331)	-0.2334*** (0.0697)
URBAN	-0.1638*** (0.0636)	-0.4153** (0.2079)	0.1467*** (0.0565)
COASTAL	-0.0025 (0.0726)	-0.0435 (0.1643)	0.0671 (0.0611)
CENTRAL	0.0980 (0.0745)	0.2576 (0.1858)	-0.1336** (0.0637)
MOUNTAIN	0.0335 (0.0878)	0.0648 (0.1830)	-0.1589*** (0.0632)
θ_1	1.6478*** (0.0330)	3.4165*** (1.3282)	§
θ_2	3.2522*** (0.0643)	6.9726*** (2.7593)	§
Observations	2923	2923	
Log-Likelihood Value	-2742.8	-2702.8	
Pseudo-R^2	0.156	0.150	
RESET ~ χ^2_3	2.70	3.46	
Normality ~ χ^2_2	7.91**	2.80	
Threshold Homogeneity~ χ^2_{76}	145.2***	63.3	
Homoscedasticity ~ χ^2_{38}	119.8***	§	

Notes: (a) ***, **, * denotes statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests; (b) § denotes not applicable in estimation; (c) See expressions [2] and [4] for the relevant log-likelihood functions.

The log of per capita household expenditure[10], which could be taken to proxy for permanent income in the current context, exerts a well determined positive impact on life satisfaction though this is somewhat at odds with evidence from other transitional economies (e.g., Namazie and Sanfey (2001) for Kyrgyzstan and Ravallion and Lokshin (2000) for Russia). There is some dispute in the literature about how income affects life satisfaction or subjective well-being and whether relative is more important than absolute income change (see Easterlin (1995), Clark and Oswald (1996) and Layard (2005)). Layard (2005) has argued that absolute income may only affect life satisfaction for low-income countries and suggested US $15,000 per capita as the satiation point beyond which income per capita and happiness are independent. More recently, the detailed empirical work of Stevenson and Wolfers (2008) has raised questions about the existence of such a threshold and, while acknowledging a minor role for relative income, confirms the key importance of absolute income changes in determining life satisfaction. A relative expenditure variable (defined as the log difference between the household's per capita expenditure level and the corresponding average at the PSU level) was introduced into the reported specifications but yielded a vanishingly small t-ratio and was thus excluded from the final specification reported here. Thus, absolute expenditure change effects appear more important than relative change effects in Albania.

We now use our estimate of the absolute income effect (i.e., the estimate for log per capita household expenditure) to provide some sense of what would be required in terms of a change in its value to move an average respondent from one satisfaction category to another. We note that for the ordered probit model the change required, *ceteris paribus*, in variable x_k to move an individual from category j to category j+1 is given by $\frac{\theta_{j+1} - \theta_j}{\beta_k}$ where β_k is the ordered probit estimate corresponding to the x_k variable in the mean regression model (see Holmes (2003)). The sampling variances for these effects are computed using the delta method.

Table 3 reports the estimates for such an exercise using both the homoscedastic and heteroscedastic ordered probit estimates. All the reported estimates are well determined at a conventional level of statistical significance. We again focus on the preferred heteroscedastic model's estimates. Table 3 reveals that the change in log per capita household expenditure required to move an average respondent from the '*less than satisfied'* to the '*rather satisfied*' category is 1.754. Given the use of a log form for the covariate, this represents an almost six-fold increase in the per capita household expenditure level, *ceteris paribus*. If we translate this into macroeconomic terms, a 'back-of-the-envelope' calculation (using GDP per capita data for 2007) suggests that this type of increase would be comparable to increasing Albanian per capita GDP from its current level of about US $3,400 to close to US $20,000. The resultant living standard would

[10] It is arguable that there is a potential reverse causality in the relationship between household income and life satisfaction (see Dolan, Peasgood and White (2008)). The exogeneity of the log per capita household expenditure measure was thus empirically tested using a valid set of instruments and found to be data coherent. The details are available from the corresponding author on request. In addition, we also explored the use of piece-wise log-linear splines based on quintiles in place of the log form but this was also rejected by the data in favour of the simple log form used here.

then be equivalent to that currently enjoyed by say Portugal. The estimated effect required to move a respondent from the '*not at all satisfied*' category to the '*less than satisfied'* category is of a broadly similar magnitude. Thus, while these calculations in regard to Albania should be treated as suggestive rather than compelling, they do serve to highlight the scale of the future challenge with respect to economic growth required in Albania to enhance life satisfaction levels. Sizeable increases in income are cleary required to induce fairly modest movements in subjective well-being.

Table 3: Required Change in Log Expenditure to Change Life Satisfaction Category

Change in log per capita household expenditure required to move average respondent from:	**Homoscedastic Ordered Probit**	**Heteroscedastic Ordered Probit**
'not at all satisfied' to *'less than satisfied'*	1.7080*** (0.0955)	1.6854*** (0.0959)
'less than satisfied' to *'rather satisfied'*	1.6629*** (0.1162)	1.7543*** (0.1236)

Notes: (a) ***, **, * denotes statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests; (b) These are computed as the difference in the relevant ordered probit threshold coefficients divided by the expenditure coefficient from Table 2 and the asymptotic standard errors are computed using the delta method.

The estimates for the continuous variables from the ordered probit model can also be used to determine 'indifference curves' between any two of the continuous variables used in our analysis. These provide combinations of the two variables that yield the same level of life satisfaction. The specification in [1] ensures the 'indifference curves' are actually straight lines and the slope of the 'indifference curve' is minus the ratio of the estimated coefficients with the form of the ratio determined by what is implicitly placed on the vertical and horizontal axes. For the analysis undertaken here, we implicitly place the log expenditure variable on the vertical axis. The sampling variances for the ratios are again computed using the delta method.

Table 4 reports the estimated slopes for a couple of interesting 'indifference curves'. We first examine the case of log expenditure and the number of friends. Using the heteroscedastic model coefficients, the estimated slope indicates that for the average respondent to have the same level of life satisfaction, a 2.8% reduction in the household welfare measure compensates for an extra friend. In other words, this estimated ratio represents the marginal rate of substitution (MRS) between 'friends' and log expenditure and provides an insight into how much log expenditure an individual is willing to exchange for an extra friend to ensure that the individual's satisfaction (or utility) level remains constant. The statistically significant nature of the estimated ratio confirms there is a trade-off and that the 'indifference curve' is downward-sloping. The magnitude of this estimate serves to highlight the important role friends play in enhancing life satisfaction in Albania. The monetary value of this friendship is computed at 282 Leks per month at 2002 prices which is approximately equivalent to US $2.5 per month.[11]

[11] This estimate is computed by taking the sample average per capita expenditure level reported in table 1 and incrementing it by 2.8% and then applying the relevant exchange rate to covert to US dollars.

The second 'indifference curve' examines the relationship between the same welfare metric and the number of children in the household. The 'indifference curve' in this case is upward sloping. The estimated ratio indicates the average respondent requires a 12% increase in the household welfare metric to compensate for an extra child if he satisfaction level is to be held constant. This illustrates how expensive an additional child in Albania is and suggests the perceived cost of an extra child in terms of per capita household expenditure, holding life satisfaction constant, is about 1,210 Leks per month at 2002 prices, which is approximately US $12 per month.[12] In their separate ways, these 'indifference curve' estimates highlight the value of a friendship and the cost of child in Albania.

Table 4: Slopes of Selected 'Indifference Curves'

Slope holding satisfaction level constant	**Homoscedastic Ordered Probit**	**Heteroscedastic Ordered Probit**
The change in log per capita household expenditure required to compensate for an extra friend.	-0.0288** (0.0124)	-0.0283** (0.0126)
The change in log per capita household expenditure required to compensate for an extra child.	0.1279*** (0.0301)	0.1201*** (0.0288)

Notes: (a) ***, **, * denotes statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests; (b)The trade-offs are computed as the negative of the ratio of the relevant ordered probit coefficients from table 2 and the asymptotic standard errors are computed using the delta method.

Summary and Conclusions

In common with much of the economics literature devoted to the empirical modelling of life satisfaction, this paper exploited an ordered probit model. However, in contrast with this literature, the current study placed an important emphasis on subjecting the estimated specifications to a battery of diagnostic tests. Not surprisingly for a cross-sectional application, the estimated mean regression model was found to be characterised by heteroscedasticity and, among other things, the assumption of threshold homogeneity was also decisively rejected.

The empirical strategy adopted in this study was novel in both its emphasis on econometric model evaluation and use of an ordinal heteroscedastic model. The failure to explicitly control for the presence of heteroscedasticity was found to impact both the magnitude and the precision of the ordinal mean regression estimates. A benefit provided through modelling heteroscedasticity is the additional empirical insights provided on how selected covariates impact the variance in satisfaction responses across individuals. The explicit incorporation of a heteroscedastic function into the modelling also, perhaps efficaciously, resolved all diagnosed problems of model mis-specification. This provides for a high degree of confidence in the empirical evidence reported in this study and emphasises the benefits of using a fairly general model in these types of application.

[12] This estimate is computed by taking the sample average per capita expenditure level reported in table 1 and incrementing it by 12% and then applying the relevant exchange rate to covert to US dollars.

The tenor of our findings on the determinants of life satisfaction generally reflects that found in the economics literature for both advanced capitalist and transitional economies. In particular, we found an important and well determined positive role for the absolute household welfare measure used but no role for a relative measure. The specific context of Albania allowed a number of additional themes to be interrogated. In particular, our study revealed evidence of very long memories among Albanian respondents with respect to the collapse of that country's notorious pyramid schemes. The estimated effect was sizeable and very well determined. It is clear that the psychological scars remain raw for those individuals who had direct experience of the collapse even with the passage of time.[13] As anticipated, individuals who reside in communes blighted by theft experienced lower levels of satisfaction with the estimated effect statistically indistinguishable from that associated with the pyramid scandal.[14] However, in communes where community organizations were active mean life satisfaction was found to be higher with the variance in responses lower, on average and *ceteris paribus*.

Our approach also allowed the interrogation of a number of important sub-themes. We found that the increase in the household welfare measure necessary to move individuals from the *'less than satisfied'* to the *'rather satisfied'* category was substantial requiring an increase in per capita household expenditure by almost a factor of six. In addition, we computed slope effects for a number of 'indifference curves', which provided insights on the monetary value of friendship and the cost of children in Albania.

Nevertheless, in spite of the foregoing findings, we do acknowledge an important limitation associated with the work undertaken here. Our analysis used cross-sectional data, which obviously does not permit control for individual unobservable effects. This type of neglected heterogeneity may be important in the analysis of life satisfaction. The work of Ferrer-i-Carbonell and Frijters (2004) highlights how controlling for such unobservables can influence the findings of what does and does not impact subjective well-being. However, in order to introduce such individual-level heterogeneity effectively panel data with a reasonable temporal dimension are required. Such data are not readily available for Albania currently and are unlikely to be so even in the near future. Moreover, the use of panels with relatively short time dimensions may not prove entirely informative on this matter as time invariant factors (i.e., the individual fixed effects) may absorb most of the variance in the included covariates which, over a relatively short span of time, may possess minimal temporal variance. Thus, in countries characterised by the absence of panel data, we argue that use of cross-sectional data in conjunction with an adequately specified econometric model can provide valuable insights on the determinants of subjective well-being.

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[13] Since life satisfaction is highly correlated with memories of the past through personality, this may represent a conflation of the pyramid effect and the role of personality. Since we cannot control for individual level heterogeneity in our analysis the influence of personality is not something we can isolate in our cross-sectional dataset.

[14] The null hypothesis of no difference between the scarring effects of the pyramid collapse and the effect of crime on life satisfaction is upheld by the data using the heteroscedastic model with an absolute asymptotic t-value of 0.31.

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