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Abstract

A comparison of measures of happiness and life evaluation indicates significant differences in correlates. Life evaluation is less dependent on external circumstances than happiness. Temporary changes in health, labour market status and income have a smaller impact on life evaluation than on happiness. Despite the differences both types of well-being exhibit a positive relation between current and past well-being. This result contradicts the hypothesis of general habituation.

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1 Introduction

The question of hedonic adaptation in empirical studies that exploit longitudinal data from national surveys is approached in two distinct ways. One strand of the literature focuses on the reaction of individuals to life events and analyses the persistence of changes in self-reported well-being. There is a long tradition of this type of research covering wide range of circumstances that people partially or fully adapt to.[1]

The second approach that has emerged only recently studies well-being as an autoregressive process (Lee and Oguzoglu, 2007; Pudney, 2008; Bottan and Perez Truglia, 2011; Piper, 2012). In this approach the time dimension of well-being is not restricted to the relation between past events and current well-being, but the link between past and current well-being is taken into account. The rationale behind the inclusion of lagged well-being in the set of explanatory variables refers to the concept of general adaptation. Contrary to the specific adaptation that can be described as the process of getting used to a specific life event, the general adaptation appeals to the idea that past levels of well-being affect its current level. According to this hypothesis the past higher or lower than normal well-being levels should result in the reversion to the individual's set point.

Other reasons for having a lagged dependent variable in the model are purely from a technical point of view. It can be perceived as a method to obtain correct standard errors of estimators in case of the serial correlation. Moreover, a dynamic model as indicated by Piper (2012) may be a solution to the misspecification of the static regression. Nevertheless, leaving behind theoretical aspects, I try to answer the question: are people that were happy in the past happy today? To answer this meaningfully one has to control for various socio-economic variables and individual effects. The results from a dynamic random effects probit model indicate, in accordance with previously mentioned studies, that well-being depends positively on its past value. Hence, higher well-being in the past means higher well-being in the present. This result clearly contradicts the general happiness adaptation theory.

Besides testing general adaptation hypothesis the objective of this study is to compare the correlates of different well-being measures. From this point the precise distinction between different concepts of well-being will be introduced as it is crucial for avoiding confusion. While in most research the words well-being, happiness and life evaluation are used interchangeably, I will assign strict meanings to those. The well-being will be used as the broadest concept including happiness and life evaluation. Happiness

[1]See, e.g., Headey and Wearing (1989),Clark, Diener, Georgellis and Lucas (2004), Clark (2006), Gardner and Oswald (2006), Zimmermann and Easterlin (2006), Clark, Diener, Georgellis and Lucas (2008), Binder and Coad (2010), Di Tella, Haisken-De New and MacCulloch (2010).

will correspond to the subjective evaluation of the emotional state in terms of how happy a person is in recent times. On the other hand, the measure of life evaluation is cognitive and is based on the question how individual think of his or her life. The measure reflects the perception of how good or bad life was.[2]

Despite the importance of distinction of different types of well-being most empirical studies in the field ignore the variety of measures or use it only as a robustness check. Among the exceptions is the study conducted by Kahneman and Deaton (2010) that compares the correlates of life satisfaction and daily satisfaction. They came to the conclusion that life and daily satisfaction have different determinants. Nevertheless, extensive studies by psychologists have characterized and stressed the importance of different forms of well-being.[3] Seligman (2011) distinguishes three types of well-being: pleasure, engagement and meaning. Pleasure is associated with a hedonistic approach to life when one seeks pleasant experiences and avoids pain. The concept is rooted in the utilitarian tradition of maximizing positive emotion at the same time minimizing the negative. The engagement happens when a person is absorbed by experiencing something. This might be for example a piece of art, sports activity or work. On the other hand, meaning is associated with having a purpose of life. The *onion* theory of psychological well-being proposed by Czapinski (1991) describes three layers of well-being: willingness to life (the most basic and the least dependent on external circumstances), general subjective well-being (evaluation of the life), domain satisfaction (for example, satisfaction with financial or family life). Czapinski (1991) did not only describe the layers of the well-being, but also showed that the inner levels are less dependent on changes in circumstances. Kahneman (1999) distinguished two different types of well-being: experienced and remembered. The first is associated with present experiences and the second is about how the life was in the past. Others identify even more categories, for example Dolan, Peasgood and White (2006) distinguish five different accounts of well-being, they are: objective lists, preference satisfaction, flourishing (self-realization), hedonic and evaluative (assessment of individual life). To sum up the paragraph, it is clear that psychologists has recognized that it is impossible to treat well-being as one-dimensional. This point is made explicitly by Wong (2011), who stresses the importance of distinction between good meaningful life and hedonistic attitude when studying psychological well-being.

The theoretical concepts correspond with the distinction between different types of

[2]More precise definitions are provided in the second section devoted to data description.

[3]The mentioned studies mostly use the word *happiness*, but for the sake of consistency with the introduced typology in the previous paragraph I use word *well-being*.

well-being in this study. Obviously due to empirical nature of the research it is impossible to project the dependent variables on one of the mentioned typologies. However, there are strong similarities between theoretical accounts of well-being and variables used in the empirical model. Most typologies distinguish between some form of life evaluation and happiness. Life evaluation is a retrospective measure of well-being and involves thinking of life as a whole in terms of past experiences. It could be expected that individuals when faced with the evaluation of their lives are more concentrated on the meaning and values. On the other hand, happiness is more rooted in the present as it defines how one feels. One might speculate the happiness is more about comparing good and bad experiences.

The presented hypothesis about what individuals think when evaluating their well-being is speculative and cannot be tested within the proposed framework. Nevertheless, what can be determined from the econometric analysis is how significant for the self-reported well-being are external factors.

The remainder of the article develops the concepts of general habituation and dependence on external circumstances from an empirical perspective. First, in the second section the description of the data source with the information about the process of variable selection is provided. The third section covers the econometric method in detail. The fourth section presents the results obtained from the model. The fifth section concludes.

2 Data description

The data used in the study come from Social Diagnosis[4] survey that is conducted every two years in Poland. It is a comprehensive household survey that provides information about numerous topics ranging from material conditions, health, political opinions to subjective well-being.

With exception of 2000-2003 period when the time difference between the first and the second wave was three years, the survey is conducted every two years since 2003. Due to this irregular time gap, that might distort the state-dependence of well-being, the sample was restricted to the period from 2003 to 2011. Based on this data a three-wave balanced panel was constructed. The panel includes 3706 individuals for whom the data for three consecutive waves were available. In case that an individual took part in more than three surveys in a row only the first three were included in the panel.

[4]The survey is conducted by Council for Social Monitoring. The information about the survey is available on the website: *http://www.diagnoza.com/index-en.html*.

The practical obstacle when dealing with comparison of different types of well-being is the fact that different measures are recorded on different scales. To solve this problem happiness and life evaluation are projected on a binary scale. The value one corresponds with the positive feelings or evaluation and zero is associated with negative evaluation. In other words all answers concerning subjective well-being were reduced to the yes-no framework. This step is justified, because all measures have a clear point that marks the line between positive and negative feelings or evaluation. However, it is not always possible, as in the case of a scale proposed by Cantril (1966) that is extensively used in cross country comparisons, see for example Easterlin (1974), Stevenson and Wolfers (2013). The Cantril's ladder enables to assess well-being in numerical values from zero to ten, but has no threshold that indicate the transition from positive to negative evaluation.

Happiness and life evaluation are measured on ordinal scales. The possible answers for life evaluation question are: delighted, pleased, mostly satisfied, mixed, mostly dissatisfied, unhappy and terrible.[5] In case of happiness there are four levels: very happy, rather happy, not very happy and unhappy. Despite the differences those questions share one important characteristic, the distinction between a positive (happy/satisfied) and negative (unhappy/not satisfied) assessment is evident. Hence, based on this feature the binary variable is constructed in such a way that one is assigned to positive evaluation and zero to negative. Neutral answers, like *mixed* in the question about life evaluation, are coded as zeros.[6]

The variables that are considered as a determinants of the well-being can be divided into three categories: individual, household and regional. The individual characteristics used in the regression include gender, age, personal income, martial status, labour market status, mental and physical health, education, number of friends and religion practices. On the other hand, variables like the size of a apartment and household income are the same for all members of the household. Moreover, the empirical model has also a regional variable that assigns every observation the unemployment rate of the voivodoship that he or she lives in.[7]

Among variables used only gender and the size of an apartment are constant over time for every individual. To be precise the apartment size variable exhibited time variation due to measurement error, because people tended to answer giving an approximate size of the apartment. In the Social Diagnosis survey the households were chosen at random

[5]The precise question for life evaluation is *How do you perceive your entire life? Could you say it was:*. For happiness it is *Considering all, how would you assess your life in the recent times would you say you are:*.

[6]The case when this answer is coded as one is also discussed to assess sensitivity to coding practice.

[7]A voivodoship is an administrative region in Poland. There are sixteen voivodoships.

by address, so the apartment size was unchanged, only the answer might vary in different waves. To avoid the impact of measurement the time average was calculated for every household. The time varying variables follow standard coding practices. Labour status indicates, if the individual is employed, unemployed or inactive. Martial status can be: single, married or divorced. Educational levels were coded at three levels: primary, secondary and tertiary.

Due to lack of objective variables describing health I use two measures of health that are based on self-assessment of respondents. One question reflects the physical indisposition - like problems with walking. The second one is about health problems that make the performance of daily activities difficult. Both questions have three answers that indicate the frequency of experienced problems: never, sometimes and often. Both variables are highly correlated, so I use only one. In the section presenting results the variable describing health problem (not physical indisposition) is used as a proxy for health. The estimation with physical indisposition are included in the appendix. Beside physical health I also proxy mental health by the observation if the individual visited a psychotherapist or psychiatrist in the last year.

The special interest in empirical studies of well-being is devoted to the question how does the income affect well-being. To obtain a more accurate picture of the relation I use three different variables of income: household income per member, individual income, and equivalent household income.[8] The preferred measure is logarithm of relative household income per household member. There are three reasons for this. First, many studies emphasized (Clark, Frijters and Shields, 2008; FitzRoy, Nolan, Steinhardt and Ulph, 2011) the role of social comparison when assessing individual well-being. I calculated the reference income as a median income in a sample in a given year. Second, the household income per capita also can be perceived as an approximation of individual consumption. Headey, Muffels and Wooden (2004) show that consumption has at least the same impact as income on well-being. Lastly, according to the standard economic theory with higher income the same increases in income should have smaller effect on well-being. This effect is captured by a logarithmic transformation of income. Despite the main results are presented with relative household income per member I show estimates for other variables in the appendix.

[8]This method of calculating equivalence scales is described in Czapinski (2011).

3 Econometric model

The choice of the method is mostly dictated by the type of question that is investigated. As at the centre are two measures of well-being in the form of binary variables the model itself also has to be binary. From this point there two possibilities: a linear or non-linear model. In this regard a standard econometric approach is followed and a random effect probit model is applied to the data. However, inclusion of the lagged dependent variable in the model leads to biased estimates due to presence of both past values of well-being and unobserved heterogeneity.

The problem of biased estimates when lagged dependent variable is included is called an initial value problem. Since in the initial period the lagged dependent variable is taken as exogenous, but it is correlated with unobserved heterogeneity, the strict exogeneity assumption of random effect model is invalidated. There are three estimation strategy that deals directly with this problem proposed by: Heckman (1981), Wooldridge (2005) and Orme (1996). The study by Akay (2009) show that Heckman's estimator has better performance in small samples. On the other hand, Arulampalam and Stewart (2007) and Panos (2008) provide evidence from simulation studies that the differences between methods are minor. Taking this into account results of those studies and the fact the panel has only three periods I prefer the Heckman's method.

The most general form of the model can be presented as:

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* \geq 0 \\ 0 & \text{if } y_{it}^* < 0 \end{cases} \tag{1}$$

Where y is a dependent variable that represents well-being, the index i stand for individual and t for time period. The y^* is a latent variable defined by the equation 2. The other notation used involve x as exogenous variables, α that stands for a individual random effect that is normally distributed with standard deviation σ_0 for $t = 0$ and σ for $t > 0$. The error terms is defined as ϵ and it is assumed that it has normal distribution with standard deviation set to one. Additionally, the error term is independent from individual effect.

What distinguishes the Heckman's method from standard random effect probit is the separate treatment of the initial period. The well-being in the initial period is taken as endogenous with respect to dependent variables, but the lagged dependent variable is omitted. In most application the set of explanatory variables is the same for both initial and consequent periods. The specification of the model can be expressed in a latent variable form that summarizes the difference between initial period and the rest:

$$\begin{cases} y_{it}^* = \rho y_{it-1} + x_{it}'\beta + \sigma\alpha_i + \epsilon_{it}, & t \geq 1 \\ y_{i0}^* = z_{i0}'\gamma + \sigma_0\alpha_i + \epsilon_{i0}, & t = 0 \end{cases} \tag{2}$$

The Heckaman's estimator is based on the idea of joint distribution of $y_0, ..., y_T$ characterized by equation 2 and the assumption regarding the disturbance. By stated assumptions and the model specification the likelihood function might be formulated as:

$$\prod_{i=1}^{N} \int_{\alpha} \Big[\Phi[(z_{i0}'\gamma + \sigma_0\alpha)(2y_{i0} - 1)] \prod_{t=1}^{T} \Phi[(\rho y_{it-1} + x_{it}'\beta + \sigma\alpha)(2y_{it} - 1)] \Big] dF(\alpha) \tag{3}$$

Random effects models demand the exogeneity assumption, $E[\alpha_i | x_{it}] = 0$. This is a strict assumption and it not always possible to guarantee that it holds. The method to relax this assumption was proposed by Mundlak (1978). The most popular form of Mundlak's correction involves specifying conditional random effect by adding time averages of all time-varying variables. The idea behind this step is that the individual effects are probably correlated with time-invariant component of the independent variables. So the individual effects take the form of:

$$\alpha_i = \alpha_i^* + \bar{x}_i'\beta^* \tag{4}$$

Besides the improved statistical properties of the model the introduction of time averages also might be useful as a tool of distinguishing a short-term and long-term impact of changes in variables. While in the model equation both variables and time-averages of those variables are included the coefficient of time-varying variables can be interpreted as the deviation from the steady-state. This can be expressed by regrouping the independent variables and coefficients associated with them, asterisks were assigned to time-averages:

$$x_i'\beta + \bar{x}_i'\beta^* = (x_i' - \bar{x}_i')\beta + \bar{x}_i'(\beta^* + \beta) \tag{5}$$

To avoid unnecessary complication of notation the asterisks will be dropped and it will be simply assumed that the variables that are time averages belong to the set of independent variables. Having the complete specification (equation 2) of the model under the assumption of the normal distribution of α the heterogeneity can be integrated out using Guasian-Hermite quadrature (Arulampalam and Stewart, 2007) or approximated by simulation. In this study the simulation is applied to evaluate the integral. To

approximate the integral from equation 3 it is possible to take R draws from normal distribution, calculate for each draw the value of integrand and take the mean of obtained values. The formula for approximation of the likelihood function is presented below:

$$\prod_{i=1}^{N}\left[\frac{1}{R}\sum_{r=1}^{R}\left[\Phi[(z_{i0}'\gamma+\sigma_0\alpha_r)(2y_{i0}-1)]\prod_{t=1}^{T}\Phi[(\rho y_{it-1}+x_{it}'\beta+\sigma\alpha_r)(2y_{it}-1)]\right]\right] \tag{6}$$

Using pseudo-random numbers however might be computationally inefficient. As it was indicated by Train (2003) the application of the Halton sequence, which is a quasi-random number sequence, in simulations might provide satisfactory results with a relatively small number of draws. The advantage of the Halton sequence is better coverage due negative correlation of consecutive draws. As a result the error in the evaluation of the log-likelihood function is reduced. In my simulation I use 500 Halton draws.

The models' coefficients have no quantitative interpretation due to the fact that error term was normalized to one. However, to assess how a change in some variable affects the probability of being happy or feeling satisfaction with own life one might calculate average partial effects. They are obtained by averaging the impact of change in a variable of interest on probability across individuals. The formula for a discrete case is:

$$\frac{1}{N}\sum_{i=1}^{N}\left[\Phi(\overline{x}'\beta+\rho+\overline{x}_i'\beta)-\Phi(\overline{x}'\beta+\overline{x}_i'\beta)\right] \tag{7}$$

A separate formula is used for continuous variables:

$$\frac{1}{N}\sum_{i=1}^{N}\beta_k\Phi(\overline{x}'\beta+\rho\overline{y}+\overline{x}_i'\beta) \tag{8}$$

In the next section I will present the results from the Heckman random effect probit model with the Mundlak correction estimated using a simulated maximum likelihood method. I will also look at average partial effects to assess the quantitative impact on probabilities.

4 Estimation results

Before moving to the discussion of differences between life evaluation and happiness it is worth analysing similarities. One common feature of both well-being measures is

their state-dependence. The past well-being has a positive effect on the current level. The statistically significant impact of the past well-being stays in the opposition to the hypothesis of general adaptation.

The table 1 shows that the lagged dependent variables are significant for both models with 0.05 significance level. The values of estimates and their standard deviations for both well-being are similar 0.25 (with 0.10 standard deviation) for life evaluation and 0.22 (with standard deviation 0.1) for happiness. The results are not only statistically significant, but also quantitatively large. The value one of lagged life evaluation increases the probability of positive life evaluation on average by about 6.6 percentage points. Similarly being happy in the previous period increases the probability of happiness by about 4.1 percentage points. Expressing the influence of past values of well-being in terms of relative income shows that the positive life evaluation of the previous period is equivalent to the increase in relative income from the median to 1.75 of the median. In case of happiness the value one for the lagged dependent variable is equivalent to the difference between the median relative income and 1.85 of the median. Different proxies of variables describing income and health do not affect statistical or quantitative significance of the parameter of the lagged well-being. The estimates of the different specifications are presented in the appendix.

Other similarities concern specific determinants of the well-being. In both cases the significant, time-changing variables are: income and number of friends. Moreover, the quantitative impact measured by average partial effects of those variables is similar for life evaluation and happiness. As for the time-averages, health problems and religion influence both type of well-being in a similar way. Nevertheless, so strong similarities are rather an exception that the rule.

Despite mentioned similarities there are major differences how the socio-economic variables affect happiness and life evaluation. From a general point of view there two major differences. First, more time-varying variables are statistically significant in the model explaining happiness. The variables that are significant in case of happiness, but insignificant for life evaluation include labour status and health. This means that temporary changes in employment status or health have no significant effect on life evaluation, but affect happiness. Moreover, income is significant at the lower level in the model of life evaluation. Second, in case of happiness the main channels of influence are deviations from time-averages. The opposite can be observed for life evaluation. The changes in time-averages are driving the changes in life evaluation.

The more detailed discussion of the results will begun with description of the relation between well-being and income. The average relative income during the six years has

Table 1. Estimation results.

variables	life evaluation		happiness	
independent variables:				
lagged dependent variable	0.252 [0.100]	*	0.221 [0.095]	*
intercept	1.357 [0.258]	***	1.319 [0.218]	***
female	-0.053 [0.053]		-0.097 [0.051]	
age	0.002 [0.026]		0.095 [0.025]	***
relative household income (log)	0.160 [0.080]	*	0.359 [0.079]	***
apartment size	0.004 [0.001]	***	0.004 [0.001]	***
married	0.008 [0.053]		0.014 [0.051]	
divorced	0.041 [0.102]		-0.045 [0.100]	
number of friends	0.010 [0.005]	*	0.011 [0.004]	*
religious practice	-0.018 [0.012]		-0.004 [0.012]	
health problems (often)	-0.130 [0.109]		-0.490 [0.097]	***
health problems (sometimes)	0.002 [0.079]		-0.192 [0.074]	**
mental health	-0.249 [0.144]		-0.315 [0.140]	*
inactive	-0.057 [0.121]		-0.204 [0.118]	
unemployed	0.019 [0.135]		-0.501 [0.131]	***
regional unemployment	-0.006 [0.008]		0.003 [0.008]	
secondary education	0.041 [0.050]		0.024 [0.048]	
tertiary education	0.011 [0.069]		0.052 [0.067]	
time averages:				
age	-0.012 [0.026]		-0.105 [0.026]	***
relative household income (log)	0.437 [0.106]	***	0.186 [0.099]	
married	-0.061 [0.105]		0.065 [0.097]	
divorced	-0.337 [0.202]		-0.026 [0.198]	
number of friends	0.008 [0.007]		0.009 [0.007]	
religious practice	0.066 [0.016]	***	0.050 [0.015]	***
health problems (often)	-0.614 [0.196]	**	-0.502 [0.150]	***
health problems (sometimes)	-0.337 [0.144]	*	-0.157 [0.114]	
mental health	-0.298 [0.217]		-0.222 [0.204]	
inactive	-0.074 [0.142]		0.082 [0.136]	
unemployed	-0.569 [0.198]	**	-0.289 [0.187]	
regional unemployment	-0.010 [0.010]		-0.029 [0.009]	**
sigma	0.953 [0.109]	***	0.870 [0.101]	***
log-likelihood	-5446.09		-5667.47	
Halton draws	500		500	

Note: For dummy variables the reference group is: male, single, without health problems, employed, with primary education. Statistical significance: *** 0.001, ** 0.01, * 0.05.

Table 2. Average partial effects.

variables	life evaluation	happiness
lagged dependent variable	0.066 [0.029]	0.041 [0.016]
female	-0.013 [0.011]	-0.018 [0.008]
age	0.001 [0.003]	0.018 [0.003]
relative household income (log)	0.040 [0.020]	0.066 [0.016]
apartment size	0.001 [0.000]	0.001 [0.000]
married	0.002 [0.010]	0.003 [0.007]
divorced	0.010 [0.020]	-0.008 [0.015]
number of friends	0.002 [0.001]	0.002 [0.001]
religious practice	-0.005 [0.003]	-0.001 [0.002]
health problems (often)	-0.033 [0.024]	-0.093 [0.021]
health problems (sometimes)	0.001 [0.015]	-0.036 [0.013]
mental health	-0.068 [0.035]	-0.060 [0.023]
inactive	-0.014 [0.024]	-0.038 [0.189]
unemployed	0.005 [0.026]	-0.095 [0.025]
regional unemployment	-0.002 [0.002]	0.001 [0.001]
secondary education	0.010 [0.010]	0.004 [0.007]
tertiary education	0.003 [0.013]	0.010 [0.010]

Note: Standard errors in the brackets are obtained by a simulation that exploits the variancecovariance matrix and the assumption that disturbances are normally distributed with the standard deviation one.

a significant impact on life evaluation - estimate 0.44 with 0.11 standard deviation. However, the coefficient of time-average income in the model of happiness is insignificant with p-value above 0.05. The reverse pattern of influence might be observed in case of a deviation from the average of the relative income. In case of happiness the parameter of a deviation from the average equals 0.36 with standard deviation 0.08. This contrasts the results for life evaluation - value of the parameter 0.16 with standard deviation 0.08.

The results can be interpreted in a following way: richer people are assessing their life better, but a temporary boost has a relatively small effect on life evaluation. The ratio of the coefficient of time average to time-varying is 2.74. A different pattern comes from the regression explaining happiness. In this model the deviation from the time average has a positive significant effect on the self-reported assessment. The ratio of coefficients is much smaller than in the model of life evaluation and is equal to 0.52. The results are also supported by looking at average partial effects. An increase in logarithm of relative household income per member by one is associated with a higher probability of being happy or having a positive assessment of life. The figure is larger for happiness and is equal to 0.07 in comparison to 0.04 in case of live evaluation. The standard error is also smaller in case of happiness, 0.02 and respectively 0.016 for life evaluation. Using the

Table 3. Life evaluation - recoding.

variables	life evaluation *mixed* = 0		life evaluation *mixed* = 1	
independent variables:				
lagged dependent variable	0.252 [0.100]	*	0.467 [0.177]	**
intercept	1.357 [0.258]	***	2.122 [0.494]	***
female	-0.053 [0.053]		-0.184 [0.089]	*
age	0.002 [0.026]		0.020 [0.042]	
relative household income (log)	0.160 [0.080]	*	0.025 [0.129]	
apartment size	0.004 [0.001]	***	0.007 [0.002]	***
married	0.008 [0.053]		0.058 [0.085]	
divorced	0.041 [0.102]		0.290 [0.179]	
number of friends	0.010 [0.005]	*	0.022 [0.009]	*
religious practice	-0.018 [0.012]		-0.026 [0.021]	
health problems (often)	-0.130 [0.109]		-0.273 [0.159]	
health problems (sometimes)	0.002 [0.079]		-0.044 [0.124]	
mental health	-0.249 [0.144]		-0.053 [0.196]	
inactive	-0.057 [0.121]		0.049 [0.203]	
unemployed	0.019 [0.135]		-0.223 [0.208]	
regional unemployment	-0.006 [0.008]		-0.008 [0.014]	
secondary education	0.041 [0.050]		0.015 [0.081]	
tertiary education	0.011 [0.069]		0.057 [0.115]	
time averages:				
age	-0.012 [0.026]		-0.030 [0.043]	
relative household income (log)	0.437 [0.106]	***	0.513 [0.174]	**
married	-0.061 [0.105]		-0.131 [0.167]	
divorced	-0.337 [0.202]		-0.237 [0.331]	
number of friends	0.008 [0.007]		0.016 [0.013]	
religious practice	0.066 [0.016]	***	0.096 [0.029]	**
health problems (often)	-0.614 [0.196]	**	-0.264 [0.244]	
health problems (sometimes)	-0.337 [0.144]	*	-0.080 [0.195]	
mental health	-0.298 [0.217]		-1.185 [0.298]	***
inactive	-0.074 [0.142]		-0.114 [0.234]	
unemployed	-0.569 [0.198]	**	-0.245 [0.299]	
regional unemployment	-0.010 [0.010]		-0.006 [0.016]	
sigma	0.953 [0.109]	***	1.169 [0.200]	***
log-likelihood	-5446.09		-2348.66	
Halton draws	500		500	

relative income without logarithmic transformation with additional squared value does not affect results. Nevertheless, in general the logarithmic transformation yields better fit that quadratic form.

The pattern showing that happiness is more dependant on current changes in income is visible also for equivalent household income. The value of the parameter in the model of happiness of the equivalent income change equals 0.36 with 0.08 standard deviation. The numbers for life evaluation are -0.03 and 0.06 respectively. The impact of equivalent income changes in case of life evaluation is even negative, but insignificant. The influence of personal income on the well-being is negligible in both models.

The major difference between life evaluation and happiness in the context of health is due to different strength of the impact of temporary changes in a health variable. In case of happiness physical and mental health variables are significant and the effect is quantitatively important. Having often health problem is associated with reduced probability of being happy by 9 percentage points. The same figure for life evaluation is 3 percentage points. Mental problems translate into lower probability of happiness by 6 percentage points. This suggests that health is quantitatively significant contributor to happiness. Additionally, none of the time varying health variables are significant in the model of life evaluation. Replacing the health problems variable with disability variable shows the same pattern of a strong impact of the deviations from the average in case of happiness.

Changes in unemployment of a given individual are a significant determinant of happiness. The value of the parameter of time-varying unemployment is 0.50 with a standard deviation 0.13. The an average partial effect equals 0.10. This shows that the state of unemployment increase the probability of being unhappy by 10 percentage points. However, the same cannot be said of life evaluation. Moreover, for time average there seems to be no relation between happiness and unemployment, but for life evaluation the estimates depends on how life evaluation was coded. The time-average of regional unemployment has negative impact on well-being, but it is significant only in case of happiness.

While the independent variable was constructed from ordinal scale there is possibility that at least some results are driven by the coding method. To check this point I recoded the life evaluation variable by setting 1 for the *mixed* answer. The table 3 shows that there is little difference between both models. The conclusions that might be reached using the modified life evaluation are even sharper in comparison to the original specification, while the new measure shows stronger state-dependence and is slightly less dependant on external factors. The only difference is with the time average of mental

health variable. It is insignificant in the original model, but strongly significant with new coding. For the new variable also long-term health is less important when determining life evaluation. Nevertheless, the main results are consistent with both coding practices.

5 Conclusions

The study compares determinants and state-dependence of two different types of well-being: life evaluation and happiness. The life evaluation represents a cognitive measure and happiness is associated with an emotional assessment. The comparison indicates that the evaluation of both types of well-being depend on their past values. The past well-being has a statistically and quantitatively significant impact on the probability of a positive assessment. The past positive life evaluation increases on average the probability of having positive life evaluation by about 6 percentage points. In case of happiness the corresponding figure is 4 percentage points.

Despite the common features both types of well-being differ in their determinants. Life evaluation is less dependant on the external factors. The deviations from time averages in case of income, labour status or health have relatively smaller influence on life evaluation than on happiness. On the other hand, temporary changes in determinants play a more important role in the model of happiness than of life evaluation.

Appendix

The appendix provides the estimation results of different specifications of the model. I test for different types of income and health variables. The time-averages were excluded due to limited space, but the figures are available at request.

Table 4. Estimation results - life evaluation.

variables	model I	model II	model III	model IV
lagged dependent variable	0.258 [0.103]	0.225 [0.115]	0.377 [0.105]	0.287 [0.098]
intercept	0.837 [0.288]	1.129 [0.281]	0.032 [0.194]	1.310 [0.215]
female	-0.049 [0.053]	-0.017 [0.057]	-0.045 [0.049]	-0.050 [0.052]
age	-0.009 [0.027]	-0.002 [0.026]	-0.004 [0.025]	-0.000 [0.025]
relative household income:				
level	0.227 [0.106]			
logarithm				0.153 [0.080]
squared	-0.031 [0.016]			
personal income:				
logarithm		0.013 [0.009]		
equivalent income			-0.033 [0.059]	
apatament size	0.004 [0.001]	0.004 [0.001]	0.003 [0.001]	0.004 [0.001]
martial status:				
married	0.011 [0.052]	-0.003 [0.053]	0.002 [0.051]	0.005 [0.052]
divorced	0.043 [0.102]	0.030 [0.103]	0.036 [0.099]	0.042 [0.105]
number of friends	0.010 [0.005]	0.009 [0.005]	0.010 [0.005]	0.010 [0.005]
religious practice	-0.018 [0.012]	-0.019 [0.012]	-0.020 [0.012]	-0.019 [0.012]
health:				
problems (often)	-0.135 [0.098]	-0.120 [0.094]		
problems (sometimes)	-0.005 [0.075]	0.009 [0.073]		
disability (often)			-0.084 [0.098]	-0.092 [0.100]
disability (sometimes)			0.051 [0.069]	0.035 [0.071]
mental	-0.253 [0.144]	-0.269 [0.145]	-0.238 [0.141]	-0.255 [0.141]
labor status:				
inactive	-0.058 [0.118]	-0.075 [0.126]	-0.106 [0.116]	-0.066 [0.127]
unemployed	0.009 [0.132]	0.008 [0.136]	-0.032 [0.128]	0.011 [0.156]
regional unemployment	-0.007 [0.008]	-0.008 [0.008]	-0.008 [0.008]	-0.007 [0.008]
education:				
secondary	0.038 [0.049]	0.042 [0.050]	0.037 [0.048]	0.042 [0.049]
tertiary	0.009 [0.068]	0.015 [0.070]	0.012 [0.066]	0.014 [0.068]
sigma	0.942 [0.115]	1.014 [0.148]	0.803 [0.118]	0.917 [0.107]
log-likelihood	-5431	-5539	-5414	-5445
Halton draws	500	500	500	500

Table 5. Estimation results - happiness.

variables	model I	model II	model III	model IV
lagged dependent variable	0.220 [0.096]	0.338 [0.096]	0.276 [0.095]	0.233 [0.090]
intercept	0.698 [0.213]	0.913 [0.204]	0.191 [0.186]	1.331 [0.228]
female	-0.095 [0.051]	-0.054 [0.047]	-0.080 [0.048]	-0.085 [0.050]
age	0.093 [0.025]	0.083 [0.025]	0.074 [0.025]	0.091 [0.025]
relative household income:				
level	0.382 [0.099]			
logarithm				0.358 [0.079]
squared	-0.038 [0.013]			
personal income:				
logarithm		0.008 [0.007]		
equivalent income			0.151 [0.063]	
apartment size	0.004 [0.001]	0.004 [0.001]	0.003 [0.001]	0.004 [0.001]
martial status:				
married	0.016 [0.051]	0.003 [0.049]	0.004 [0.050]	0.008 [0.050]
divorced	-0.049 [0.100]	-0.063 [0.096]	-0.051 [0.096]	-0.043 [0.099]
number of friends	0.011 [0.004]	0.012 [0.004]	0.010 [0.004]	0.010 [0.004]
religious practice	-0.004 [0.012]	-0.004 [0.011]	-0.005 [0.012]	-0.005 0.012
health:				
problems (often)	-0.492 [0.096]	-0.480 [0.096]		
problems (sometimes)	-0.197 [0.073]	-0.191 [0.072]		
disability (often)			-0.492 [0.099]	-0.507 [0.099]
disability (sometimes)			-0.209 [0.070]	-0.229 [0.071]
mental	-0.323 [0.142]	-0.321 [0.138]	-0.309 [0.137]	-0.315 [0.138]
labor status:				
inactive	-0.223 [0.116]	-0.259 [0.113]	-0.234 [0.115]	-0.190 [0.118]
unemployed	-0.524 [0.128]	-0.559 [0.126]	-0.546 [0.128]	-0.503 [0.127]
regional unemployment	0.002 [0.008]	0.001 [0.007]	-0.001 [0.008]	0.002 [0.008]
education:				
secondary	0.021 [0.048]	0.029 [0.046]	0.022 [0.047]	0.023 [0.048]
teritary	0.051 [0.067]	0.060 [0.065]	0.050 [0.066]	0.048 [0.067]
sigma	0.870 [0.102]	0.783 [0.106]	0.780 [0.104]	0.842 [0.094]
log-likelihood	-5667	-5747	-5615	-5644
Halton draws	500	500	500	500

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