

# Subjective Well-Being across the Lifespan in Europe and Central Asia

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## Abstract

This paper uses data from the Integrated Values Survey, the Life in Transition Survey, and the Russia Longitudinal Monitoring Survey to analyze the relation between age and subjective well-being in the Europe and Central Asia region. Although the results generally confirm the findings of previous studies of a U-shaped relation between subjective well-being and age for most of the lifecycle, the paper also finds that well-being declines again after

people reach their 60s and 70s, giving rise to an S-shaped relation across the entire lifespan. This pattern generally remains robust for most of the cross-sectional and panel analyses. Hence, despite significant heterogeneity in the pattern of well-being across the lifespan in the Europe and Central Asia region, the paper does not observe high levels of cross-country or cross-cohort variation.

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# Subjective Well-Being across the Lifespan in Europe and Central Asia<sup>1</sup>

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# Subjective Well-Being across the Lifespan in Europe and Central Asia

## 1. Introduction

A large body of literature on the relation between age and subjective well-being has emerged in the past few years. This new field of research has been strongly influenced by the seminal paper of Blanchflower and Oswald (2008), which documents a U-shaped relation for well-being over the lifespan (with a minimum at around middle age) in most of the approximately 74 countries included in the analysis. Yet some controversy still remains over this U-shaped relation with as many papers refuting it (e.g., Frijters and Beatton, 2012; Kassenboehmer and Haisken-DeNew, 2012; Baetschmann, 2014) as supporting it (e.g., Clark, 2007; Van Landeghem, 2008, 2012; Blanchflower and Oswald, 2011; Weiss *et al.*, 2012).<sup>2</sup> Most notably, Fischer (2009), using an OECD sub-sample of the World Values Survey (WVS), concludes that an S-shape with a cubic functional form in which well-being decreases in old age is a more accurate description of the well-being pattern across the lifecycle. Much of the ensuing literature also focuses almost exclusively on large-scale panel data in high-income countries; for example, the British Household Panel, the German Socioeconomic Panel, and the Household Income Labour Dynamics in Australia.

Deaton (2008) expands this focus to include developing countries, arguing that the well-being/age relation may be mediated by culture. In his analysis of cross-sectional data from the 2006 Gallup World Poll, he reveals that the age profiles of self-reported life satisfaction differ significantly from country to country. Although this analysis does not control for covariates, his use of World Gallup Poll data facilitates cross-country comparisons and encompasses nationally representative samples of individuals from over 130 countries. Based on his observation of general life satisfaction among individuals from different age groups, Deaton (2008) argues that the U-shaped relation is present only in rich English-speaking countries. Similar results are obtained by a subsequent analysis of the World Gallup Poll; the age pattern of multiple well-being measures shows substantial differences between high-income English-speaking countries; countries in Sub-Saharan Africa; countries in Latin America and the Caribbean; and countries from the former Soviet Union and Eastern Europe. The U-shape is only present in the high-income English-speaking group, while well-being seems to decline with age in the last group (Stephoe *et al.*, 2015).

Our study examines the relation between age and subjective well-being in a region that to date has received relatively scarce attention in the literature: the Europe and Central Asia (ECA)

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<sup>2</sup> See Lopez Ulloa *et al.* (2013) for a recent literature review.

region.<sup>3</sup> This region warrants investigation not only because of the diverse cultures it encompasses but also because of the significant institutional and economic transformations many of its countries have undergone in the past few decades. Whereas the region's cultural diversity permits us to test the universality of the U-shape hypothesis across different country contexts, the transformations experienced by most of these countries in the 1990s enable us to capture variations across cohorts whose economic and social environments differed radically at different points in the lifecycle. The finding of a U-shape across a diverse set of ECA countries and across cohorts within these countries would thus support the view that this U-shaped relation is fairly universal and resilient to contextual changes.

With few exceptions (Blanchflower and Oswald, 2008; Deaton, 2008; Steptoe *et al.*, 2015), studies of subjective well-being in the ECA region have not focused on an in-depth analysis of the interdependence between this variable and age. Rather, well-being regressions in most studies use age only as a potential covariate that is controlled when examining the association between well-being and such aspects as income (Frijters *et al.*, 2006), the transition process (Hayo, 2007), and/or the correlations among different subjective welfare measures (Cojocaru and Diagne 2015). In contrast to Deaton (2008) and Steptoe *et al.* (2015), these ECA studies consistently find a U-shaped pattern across the region, although they differ in both the way that well-being is defined<sup>4</sup> and the precise shape and location of the minimum. Country-specific evidence from the WVS also supports the U-shape for most countries in the ECA region (Namazie and Sanfey, 2001; Blanchflower and Oswald, 2008).<sup>5</sup>

For the Russian Federation, cross-sectional analyses using the Russia Longitudinal Monitoring Survey (RLMS) also find life satisfaction to be U-shaped in age, with a minimum in well-being between 45 and 55 (Graham and Pettianto, 2002; Ravallion and Lokshin, 2002; Graham *et al.*, 2004). However, by exploiting the panel aspect of the RLMS (data from 1994 to 2010) and accounting for individual fixed effects, Massin and Kopp (2014) estimate a non-linear specification of age that places the lowest levels of well-being at age 30–39. They also find that the level of well-being for the oldest age group (70 and above) is statistically similar to that for people aged 20 years and younger.

Our contribution to the research is twofold: first, by performing a systematic assessment of the relation between subjective well-being and age across the entire ECA region, we greatly

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<sup>3</sup> The ECA region is defined by the World Bank as covering 30 countries, ranging from Kazakhstan in the east to Poland in the west. The complete list of countries can be found at: <http://www.worldbank.org/en/region/eca/brief/country-program-snapshots>.

<sup>4</sup> Minima vary from 37 (Hayo and Seifert, 2003) to 44 (Hayo, 2007) to 46.5 (48.2) for men (women) (Blanchflower and Oswald, 2008).

<sup>5</sup> Specifically, the U-shaped relation is found for Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Kyrgyz Republic, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Serbia, Slovakia, Turkey and Russian Federation.

expand on the findings from more geographically limited studies. We accomplish this expansion by using three large-scale surveys: the Integrated Values Survey (IVS), the Life in Transition Survey (LiTS), and the Russia Longitudinal Monitoring Survey (RLMS). Indeed, our analysis may be the first in-depth study of the relation between age and well-being using a large-scale *panel* data set from a non-Western country (i.e. the Russian Federation). Second, by adding indicators for birth decades into our regressions, we are able to disentangle some of the age-specific correlation with subjective well-being from the variation attributable to cohort effects. Our results generally support the presence of a U-shaped relation for most of the lifecycle, even when the panel data accounts reasonably well for the cohort effects. We also, however, find evidence of another turning point later in life (during the 60s or 70s), after which well-being in ECA begins to decline again, giving rise to an S-shape across the entire lifespan.

The remainder of the paper proceeds as follows: Section 2 describes our three data sets and our different methodological approaches to determining the shape of subjective well-being over the lifespan in the ECA region. Section 3 reports our empirical results, together with the conclusions drawn about the (non-)universality of the U-shape. Section 4 rounds out the paper by summarizing the contributions our methodological approach makes to the research stream.

## **2. Data and methods**

### *2.1 Data*

The empirical results of this study are based on three different data sets: the Integrated Values Survey (IVS), the Life in Transition Survey (LiTS), and the Russia Longitudinal Monitoring Survey (RLMS). The IVS data set merges the four-wave European Values Study (EVS, 1981–2009) with the five-wave World Values Survey (WVS, 1981–2008). The EVS, begun in 1981 and repeated every 9 years, is a large-scale, cross-national, longitudinal survey that provides insights into the ideas, beliefs, preferences, attitudes, values, and opinions of citizens all over Europe. Nationally representative of the population 18 years and older, in its first wave, it sampled 1,000 individuals per country, and then for its fourth wave, administered in 2008, expanded to a multistage random sampling of 1,500 interviews per country. This last wave covers 25 of the 30 ECA countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kosovo Republic, Latvia, Lithuania, FYR Macedonia, Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Turkey and Ukraine.

The WVS, administered in six waves from 1981 to 2014, is a global research project that investigates the changes in individual's beliefs and values and how these changes influence social and political development throughout the world. It samples a minimum of 1,000 interviewees aged 18–85 in 23 ECA countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia

and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kyrgyz Republic, Latvia, FYR Macedonia, Moldova, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Turkey and Ukraine. The resulting compilation, the IVS, assesses individual life satisfaction with the following question: *All things considered, how satisfied are you with your life as a whole these days?* Responses are measured on a scale from 1 (dissatisfied) to 10 (satisfied).

The LiTS, a joint project of the European Bank for Reconstruction and Development (EBRD) and the World Bank, examines the impact of economic and political transition on individuals' lives (and well-being), as well as their future hopes for Central Eastern Europe, the Baltic States, and South Eastern Europe. Its two waves, conducted in 2006 and 2010, covered approximately 58,000 individuals in 29 ECA countries (all except Kosovo). In the LiTS, individual life satisfaction is measured as follows: *To what extent do you agree with the following statements? All things considered, I am satisfied with my life now.* Responses on this question are assessed on a scale from 1 (strongly disagree) to 5 (strongly agree).

The RLMS, a nationally representative survey of households in the Russian Federation, is designed to evaluate the impact of Russian reforms on welfare and health. Although the survey has collected data on about 10,000 individuals aged 14 and above 21 times since 1992, our analysis is based on 16 waves during the 1995–2013 period. The RLMS evaluates individual life satisfaction as follows: *To what extent are you satisfied with your life in general at the present time?* Responses are assessed on a 5-point scale from 1 (not at all satisfied) to 5 (fully satisfied). Summary statistics for subjective well-being and respondent socio-demographics from all the above data sources are given in Appendix 1.

## 2.2 Estimation approaches

### 2.2.1 Ordinary least squares (OLS): IVS

For the IVS data, we adopt the standard regression approach applied in the majority of studies on subjective well-being (e.g. Blanchflower and Oswald, 2008). Because well-being is measured on an ordered 5-point or 10-point scale, a latent variable analysis might seem the most appropriate method. However, because the bias introduced by a standard ordinary least squares estimation (OLS) is fairly small (Ferrer-i-Carbonell and Frijters, 2004), we rely mostly on OLS. In general, the model is as follows:

$$LS_i = \beta_0 + \beta_1 AGE_i + \beta_2 X_i + \beta_3 C + \beta_4 Y + \varepsilon_i \quad (1)$$

where  $LS_i$  denotes the life satisfaction of individual  $i$ .  $AGE_i$  is included either as a linear or multinomial function of age (i.e. quadratic and cubic terms) or as a set of 5-year age group

indicators. We adopt the 5-year clustering for two reasons: (i) to balance the trade-off between cell size and within-group heterogeneity in well-being and (ii) to facilitate the distinction between age groups, cohort effects, and time.<sup>6</sup> This specification, adopted in prior studies, also helps to avoid co-linearity problems between age, survey year, and birth year (the cohort effect).<sup>7</sup> As in Blanchflower and Oswald (2008), cohort effects are modelled as birth decades.  $X_i$  represents the characteristics of individual  $i$  (see Appendix 2 for a detailed description of the covariates included for each data source). Adding in self-reported health not only extends Blanchflower and Oswald's (2008) model but is likely to reduce any bias in our estimates of age's relation with well-being.  $C$  designates country indicators,  $Y$  denotes year dummies, and  $\varepsilon_i$  denotes the individual error term. Heteroskedasticity-adjusted standard errors are estimated for coefficients in all specifications.

### 2.2.2 Synthetic panel estimation: LiTS

Following Deaton (1985) and Russell and Fraas (2005), we construct a synthetic (or pseudo) panel for the LiTS data that follows groups<sup>8</sup> of individuals over the 2006–2010 inter-wave period and uses their group-specific means for inference. To ensure equal sample means for each group, these groups (or cells) must be created based on time-invariant characteristics, which in our case are birth-year decades, gender, and country. Because the estimation requires a sufficiently large cell size, we exclude the earliest and latest birth-year decade and drop all countries not covered by both LiTS waves.<sup>9</sup>

For this analysis, we create 672 cells based on 28 countries, 6 birth decades, 2 sexes, and 2 survey waves (2006 and 2010). For each cell, we estimate the mean of the covariates, including age, marital status, employment, education, self-reported health, and relative income. By assuming the existence of a fixed group that remains constant over both periods, we can apply a fixed-group effects estimator, a feasible step if the sample size in each cell is relatively large. To address any heteroskedasticity produced by unequal cell sizes, we also weight each cell by its sample size (Russell and Fraas, 2005).<sup>10</sup> The model used is as follows:

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<sup>6</sup> We assume that the well-being of a 50-year-old does not differ systematically from that of a 51-year-old and that a certain category size is needed to capture possible differences in well-being with age. In addition, smaller age groups would result in small cell sizes, especially at the extremes of the age distribution.

<sup>7</sup> For a critical discussion on the approach and identification, see Baetschmann (2014).

<sup>8</sup> Such groups are sometimes referred to as “cohorts,” but we avoid this term because this paper also examines birth cohorts.

<sup>9</sup> The gender differences in life expectancy are notably substantial in some ECA countries. In the Russian Federation, for instance, women live on average more than 10 years longer than men, which must be taken into account when looking at the joint distribution. However, the gender split analysis of the RLMS data shows no major differences in well-being/age patterns between the sexes.

<sup>10</sup> This weighted method has some limitations related to data availability. On the one hand, if the sample size within each group does not exceed thousands of observations, the measurement error can be large (Devereux, 2007). On the other, the groups must be sufficiently homogeneous for the assumption of fixed group effects to remain justifiable, meaning that clustering groups over different countries would introduce another bias. We thus treat the results of this approach with caution but compare them with our pooled cross-sectional analysis estimates to check robustness.



$$\overline{LS}_{gt} = \beta_1 \overline{AGE}_{gt} + \beta_2 \overline{X}_{gt} + \mu_g + \varepsilon_{gt}, g = 1, \dots, 348; t = 1, 2, \quad (2)$$

where  $\overline{LS}_{gt}$  and  $\overline{X}_{gt}$  represent the average life satisfaction and average time-variant characteristics, respectively, of individuals in group  $g$  at time  $t$ .  $\mu_g$  denotes group-specific time-invariant unobservable characteristics, and  $\varepsilon_{gt}$  is the disturbance error term (see Russell and Fraas, 2005).

### 2.2.3 Fixed-effects panel estimation: RLMS

For the RLMS, we explore the U-shape in the age/well-being nexus using a fixed effects approach expressed as follows:

$$LS_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it}, \quad (3)$$

where  $LS_{it}$  and  $AGE_{it}$  indicates the life satisfaction and age, respectively, of individual  $i$  at time  $t$ .  $X_{it}$  is a vector of individual  $i$ 's time-variant characteristics,  $\mu_i$  represents unobservable time-invariant individual effects, and  $\varepsilon_{it}$  is the disturbance error term.

## 3. Results

Although Blanchflower and Oswald (2008) provide comprehensive evidence of a robust U-shaped pattern for most subsamples of the IVS data set, Fischer (2009) proposes an S-shaped relation with decreasing well-being in higher age as a better fit. We thus test different age specifications to determine the most adequate model for the ECA region. First, we compare the age coefficients, in different forms, between a set of ECA countries<sup>11</sup> and Western European countries.<sup>12</sup> Table 1 presents the results of a comparison between the two IVS subsamples from 1981 until 2009 for individuals aged 18 to 108, while Figure 1 illustrates the corresponding average marginal effects for regressions (1) to (6). In line with the U-shape hypothesis, the squared terms are significant for both samples. The average individual in an ECA country reaches the nadir of well-being at age 48.8 (column 1), more than 10 years later than the average Western European, whose well-being starts increasing after age 35.4 (column 2).

Estimations (3) and (4) in Table 1 add a cubic term for age, which allows for a more flexible relation with well-being. The coefficient on the cubic term is significant for both ECA and Western Europe, implying an S-shape with decreasing well-being in old age. For ECA countries, controlling for other covariates, well-being decreases with age to a local minimum

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<sup>11</sup> Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, Ukraine, and Uzbekistan.

<sup>12</sup> France, United Kingdom, Austria, Belgium, Luxembourg, the Netherlands, Switzerland, West Germany, and East Germany.

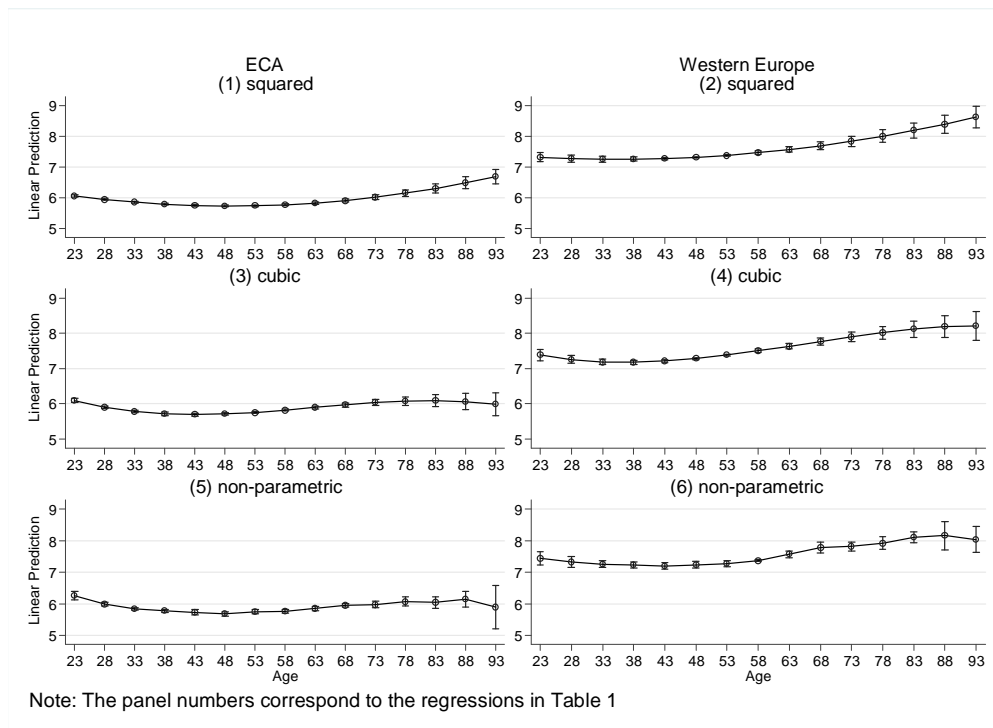
at 42.8 and recovers to the average value reported by youth by the early 80s (see Figure 1, middle-left panel). Thereafter, well-being declines for the oldest old, even though the small sample size leads to larger standard errors, which makes precise interpretation difficult. Although the coefficient on the cubic term of age for Western Europe is also significant and negative, the maximum occurs much later (93 versus 82 in the ECA) and the level of well-being reached at the maximum is higher than that observed for youth (Figure 1, middle-right panel).

The final two columns in Table 1 impose no specific functional form on age but rather use age group clusters. Compared to the omitted reference age group of 18–22, well-being in ECA countries is lower for all other age groups, a pattern evident in column (5). Figure 1 demonstrates that well-being in ECA decreases until the late 40s and then recovers slightly over the next 40 years (bottom-left panel). It does not, however, reach levels comparable to those experienced by youth until the early 80s and never significantly exceeds those levels. The largest negative coefficients occur in the 43–47 age group, echoing the results from regression (3).

For the Western European comparison group (column 6), the age dummies show only a slight decrease in well-being from the levels attained in youth, with a minimum for those in their 30s. Thereafter, well-being seems to remain somewhat constant, with the coefficients losing significance until the 60s, which implies that well-being resembles that of the 18–22 reference age group. The point estimates then become positive and significant in the 70s and increase up to the second-oldest age group (83–87).

Figure 1 clearly shows that well-being in the ECA countries tends to be generally lower and exhibits a different lifecycle pattern from the Western European comparison group. Whereas in Western Europe the highest level of well-being occurs among the oldest old across all specifications, in ECA countries higher levels among the old appear only in the squared specification. Subsequently, therefore, we employ a more flexible specification, which reveals a decrease in well-being at a very high age. Comparing (3) and (5) in Figure 1, for example, shows that the dummy mimics the cubic S-shape slightly better than the U-shape, which is in line with previous studies by Deaton (2008), Fischer (2009), and Gwozdz and Sousa-Poza (2010).

**Figure 1. Average marginal effects of subjective well-being over the lifespan: IVS data (1981–2009)**



**Table 1. OLS estimates for ECA countries and Western Europe: IVS data (1981–2009)**

	(1)	(2)	(3)	(4)	(5)	(6)
	ECA	Western Europe	ECA	Western Europe	ECA	Western Europe
Age	-0.0478*** (0.005)	-0.0294*** (0.004)	-0.1367*** (0.022)	-0.1140*** (0.024)		
Age squared	0.0005*** (0.000)	0.0004*** (0.000)	0.0024*** (0.000)	0.0022*** (0.000)		
Age cubic			-0.00001*** (0.000)	-0.00001*** (0.000)		
Age 23-27					-0.2740*** (0.074)	-0.1158* (0.059)
Age 28-32					-0.4131*** (0.066)	-0.1848** (0.059)
Age 33-37					-0.4818*** (0.068)	-0.2055* (0.101)
Age 38-42					-0.5272*** (0.094)	-0.2374 (0.128)
Age 43-47					-0.5741*** (0.085)	-0.2021 (0.126)
Age 48-52					-0.5096*** (0.081)	-0.1749 (0.109)
Age 53-57					-0.4985*** (0.072)	-0.0666 (0.120)
Age 58-62					-0.4050*** (0.070)	0.1273 (0.152)
Age 63-67					-0.3085*** (0.074)	0.3423* (0.163)
Age 68-72					-0.2791*** (0.086)	0.3759** (0.155)
Age 73-77					-0.1847* (0.098)	0.4839* (0.206)
Age 78-82					-0.2115* (0.110)	0.6625** (0.191)
Age 83-87					-0.1106 (0.154)	0.7177* (0.324)
Age 88-108					-0.3627 (0.359)	0.5997** (0.253)
Minimum	48.8	35.4	42.9	36.6		
Maximum			82.4	93.8		
N	77527	17389	77527	17389	77527	17389
Adj. R <sup>2</sup>	0.246	0.241	0.246	0.242	0.246	0.242

*Note:* The dependent variable is self-rated individual life satisfaction (10-point scale). Age ranges from 18 to 108, with age 18–22 as the reference in (5) and (6). Controls are gender, employment status (full-time employed, part-time employed, self-employed, with not employed as the reference), marital status (married/living together, divorced/separated, widowed, with single/never married as the reference), education (medium level education and high level education, with low level education as the reference), income quintiles, self-reported health (5-point scale), country dummies, and year dummies. Robust standard errors clustered at the country level in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

### 3.1 Impact of cohort effects

To disentangle the age-specific correlation with well-being from that of the cohort effect, we add indicators for birth decades to the above regressions. The results for the IVS data and regressions with individual controls are given in Table 2, which reveals that not all functional forms of age remain significant when we control for cohort effects. For instance, although the U-shape remains robust for the ECA countries in column (1), the squared specification for Western Europe (column 2) fails to reach significance for the linear term even though it remains jointly significant. This latter could imply that well-being increases throughout the lifespan. The cohort effects themselves take varying signs but mostly fail to reach significance. Moreover, a within-comparison of the cohort dummies reveals only small differences, with only those born in 1990 and after showing significantly higher well-being in ECA countries.

The second pair of columns, regressions (3) and (4), illustrate the S-shape of well-being for ECA and Western European countries. Comparing these specifications (see Tables 1 and 2) reveals that the inclusion of cohort effects has only a small impact on the age coefficients: as minima and maxima move toward younger age, well-being levels become lower in older age, a pattern observable for both ECA countries and Western Europe. The non-functional form of age mostly mimics the cubic term (Figure 2, bottom panels): the age coefficients for ECA lose their significance after the late 50s, but those for Western Europe show only a small decrease from 18–22 until the early 40s. In line with the functional form, the point estimate for well-being appears to decline for Western Europeans in the oldest age group, even though it is not significantly different from that for the young reference group. Interestingly, the cohort dummies for the ECA region (column 5) are also not significant, except for the 1930 birth cohort, which experienced the deprivation related to World War II at a very young age. Most cohort dummies for Western Europe, in contrast, are significant and negative, pointing to the relatively higher well-being of those in the oldest cohort (born before 1919).<sup>13</sup> The marginal effects in Figure 2 show quite constant well-being over time, with slight downturns in middle and old age.

To confirm the importance of cohort effects and their interplay with the age specification, we apply the same method used for the IVS data to the LiTS data set (age range of 18–99), although we cannot make direct comparisons between the ECA and Western Europe because the LiTS only covers ECA countries in more than one wave. The age pattern revealed by the LiTS results (Figure 3) is similar to that from the IVS with some noteworthy exceptions: First, the LiTS results for the cubic age specification provide little support for a second turning point in well-being, as maxima are estimated to be beyond normal life expectancy, and thus suggest

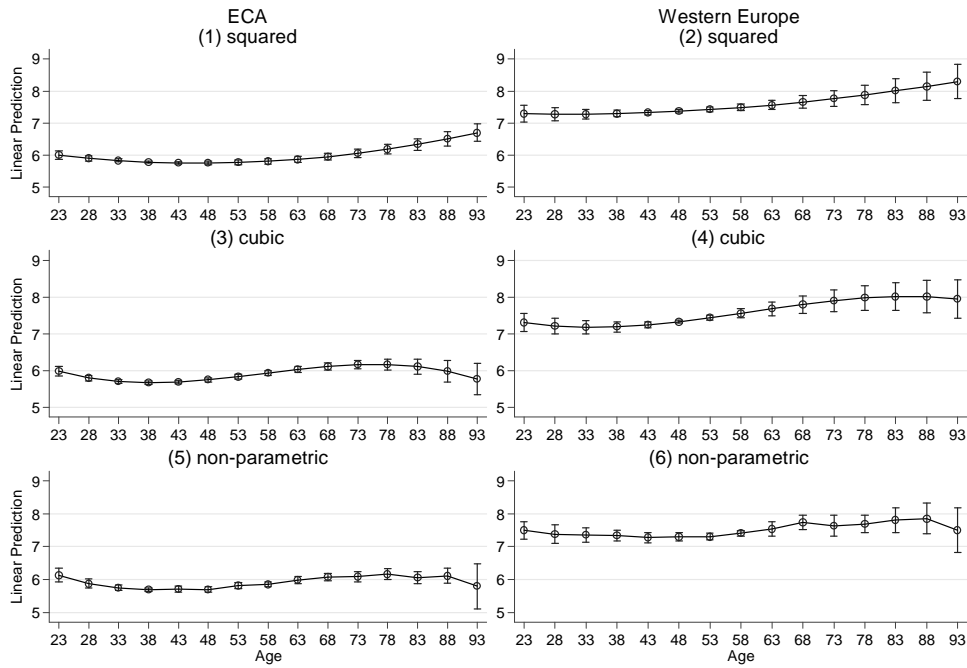
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<sup>13</sup> It should be noted, however, that the reference cohort (born before 1919) is a very select sample, not only because of their survival but also because their early years coincide with turbulent times (e.g., the 1917 October Revolution and WWI).

a U-shape. Second, adding cohort dummies to the regressions has little effect on the age coefficients and, therefore, minima and maxima remain fairly unchanged.

**Figure 2. Average marginal effects of subjective well-being over the lifespan with cohort dummies:**

**IVS data (1981–2009)**

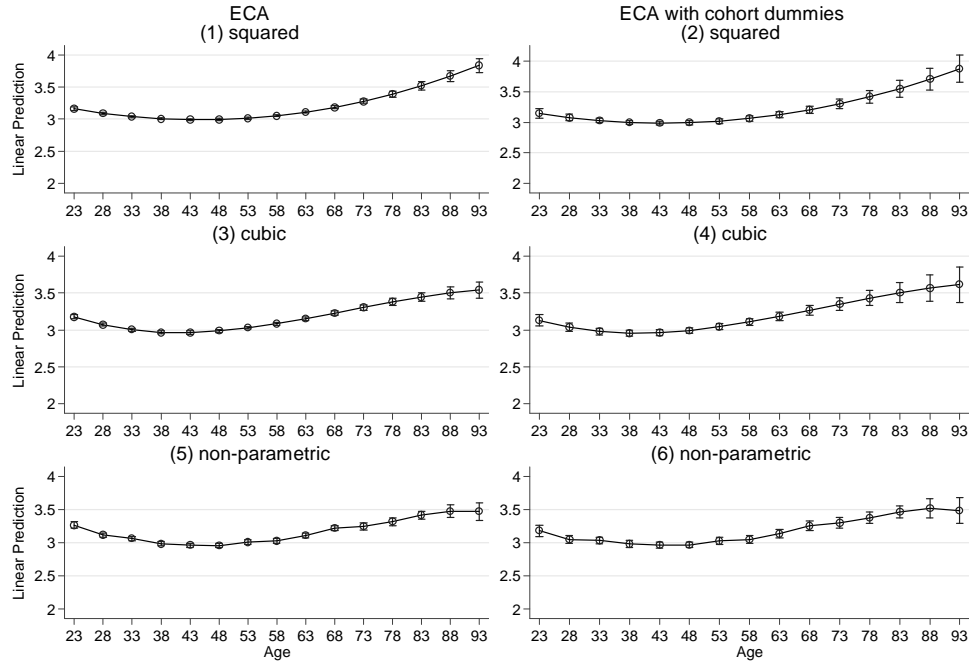


**Table 2. Well-being over the lifespan in ECA countries and Western Europe with cohort dummies:**

IVS data (1981–2009)						
	(1)	(2)	(3)	(4)	(5)	(6)
	ECA	Western Europe	ECA	Western Europe	ECA	Western Europe
Age	-0.0413*** (0.009)	-0.0143 (0.011)	-0.1641*** (0.027)	-0.1094*** (0.021)		
Age squared	0.0004*** (0.000)	0.0002** (0.000)	0.0032*** (0.001)	0.0023*** (0.001)		
Age cubic			-0.00002*** (0.000)	-0.00001*** (0.000)		
Age 23-27					-0.2572*** (0.077)	-0.1204* (0.059)
Age 28-32					-0.3884*** (0.084)	-0.1453*** (0.036)
Age 33-37					-0.4387*** (0.094)	-0.1616* (0.085)
Age 38-42					-0.4219*** (0.140)	-0.2211* (0.097)
Age 43-47					-0.4410*** (0.133)	-0.1955 (0.115)
Age 48-52					-0.3163** (0.139)	-0.1898 (0.161)
Age 53-57					-0.2807** (0.135)	-0.0928 (0.166)
Age 58-62					-0.1555 (0.149)	0.0375 (0.239)
Age 63-67					-0.0565 (0.150)	0.2371 (0.230)
Age 68-72					-0.0462 (0.165)	0.1333 (0.289)
Age 73-77					0.0354 (0.168)	0.1932 (0.263)
Age 78-82					-0.0820 (0.168)	0.3045 (0.316)
Age 83-87					-0.0167 (0.185)	0.3564 (0.339)
Age 88-108					-0.3394 (0.381)	-0.0005 (0.448)
Born 1920-29	0.1519 (0.158)	-0.1624 (0.131)	-0.1199 (0.156)	-0.2128 (0.145)	-0.1340 (0.153)	-0.3534** (0.104)
Born 1930-39	0.1258 (0.171)	-0.1557 (0.120)	-0.2635 (0.169)	-0.2632* (0.121)	-0.2956* (0.162)	-0.4217** (0.146)
Born 1940-49	0.1634 (0.175)	-0.2329 (0.171)	-0.2231 (0.174)	-0.3112 (0.167)	-0.2697 (0.162)	-0.6026** (0.187)
Born 1950-59	0.1275 (0.189)	-0.3656 (0.208)	-0.1604 (0.189)	-0.3650 (0.223)	-0.2130 (0.179)	-0.6670** (0.276)
Born 1960-69	0.1523 (0.200)	-0.3405 (0.223)	-0.0440 (0.200)	-0.2737 (0.258)	-0.0978 (0.186)	-0.6782* (0.318)
Born 1970-79	0.2165 (0.207)	-0.2955 (0.246)	0.0208 (0.208)	-0.2218 (0.294)	-0.0181 (0.204)	-0.7127* (0.362)
Born 1980-89	0.2319 (0.209)	-0.1342 (0.263)	-0.0196 (0.214)	-0.1471 (0.290)	-0.0483 (0.220)	-0.6181 (0.418)
Born 1990-99	0.5546** (0.244)	-0.3161 (0.381)	0.1843 (0.255)	-0.4497 (0.377)	0.2565 (0.259)	-0.8493* (0.400)
Minimum	46.6	28.8	38.3	34.0		
Maximum			76.0	85.1		
N	77527	17389	77527	17389	77527	17389
Adj. R <sup>2</sup>	0.246	0.242	0.246	0.242	0.246	0.242

*Note:* The dependent variable is self-rated individual life satisfaction (10-point scale). Age ranges from 18 to 108, with age 18–22 as the reference in (5) and (6). For the cohort dummies, the reference group is those born between 1881 and 1919. The controls are gender, employment status (full-time employed, part-time employed, self-employed, with not employed as the reference), marital status (married/living together, divorced/separated, widowed, with single/never married as the reference), education (medium level education and high level education, with low level education as the reference), income quintiles, self-reported health (5-point scale), country dummies, and year dummies. Robust standard errors clustered at the country level in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Figure 3. Average marginal effects of subjective well-being over the lifespan: LiTS data (2006–2010)**



### 3.2 Well-being in a synthetic panel using LiTS

To account for the time-constant effects shared by certain population groups, we construct a synthetic panel from the ECA countries in the LiTS data, whose results support the findings from the cross-sectional analysis (Table 3). Above all, once fixed-group effects are accounted for, the estimates find an overall negative linear relation between age and well-being. In addition, the squared specification is highly significant, with a minimum around 60, while the cubic term supports the U-shape until age 80, after which well-being decreases. The estimates become less precise, however, at older ages, when the standard errors are quite large (see Appendix 3 for the corresponding marginal plots). We are therefore unable to reject either the U-shape or a second turning point.



**Table 3. Well-being over the lifespan in a synthetic panel with group-fixed effects: LiTS data (2006–2010)**

	(1)	(2)	(3)
Age	-0.0141*** (0.005)	-0.0783*** (0.016)	-0.1813*** (0.051)
Age <sup>2</sup>		0.0007*** (0.000)	0.0029*** (0.001)
Age <sup>3</sup>			-0.00001** (0.000)
Minimum		59.2	51.2
Maximum			82.2
Adj. R <sup>2</sup>	0.255	0.285	0.293
Number of groups	672	672	672

*Note:* Individuals are grouped by birth-year decades, country, gender, and survey year. The dependent variable is group average life satisfaction (5-point scale). Age ranges from 18 to 99. The individual controls are group averages of marital status (married versus unmarried as the reference), self-reported health (5-point scale), education (medium level education and high level education, with low level education as the reference), income quintiles, and employment (employed versus not employed as the reference). Robust standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

### 3.3 Well-being in a panel data set for the Russian Federation

The comprehensive RLMS panel data for the Russian Federation permit us to follow the same individuals over time and include individual fixed effects (Clark and Oswald, 2006; Clark, 2007; Gwozdz and Sousa-Poza, 2010). Because the first four RLMS waves are problematic and Wave 5 lacks important socio-demographic controls, for this analysis, we rely on RLMS rounds VI (1995) to XXI (2013). We first compare the results of the pooled OLS to those for the model with fixed effects (see Table 4) using specifications similar to the cross-sectional analysis above.<sup>14</sup> By comparing age as a linear, quadratic, and cubic term, as well as a dummy specification (age range of 14–104), we are able to quantify the differences in the results produced by the two methods and thereby show the robustness of the pattern in our other regressions. Although the linear specification yields a negative correlation between age and subjective well-being (column 1) that loses significance when fixed effects are included (column 2), when age is treated as linear, the cohort effects are significantly different from those of the comparison birth cohort (born 1919 and earlier). Interestingly, the coefficients on cohort dummies exhibit a U-shape, with the lowest well-being observed among those born in the 1960s, who are middle aged (37–52) during the survey period. This latter provides evidence of the cohort dummies picking up the residual variation left by the linear (as opposed to quadratic) age specification.

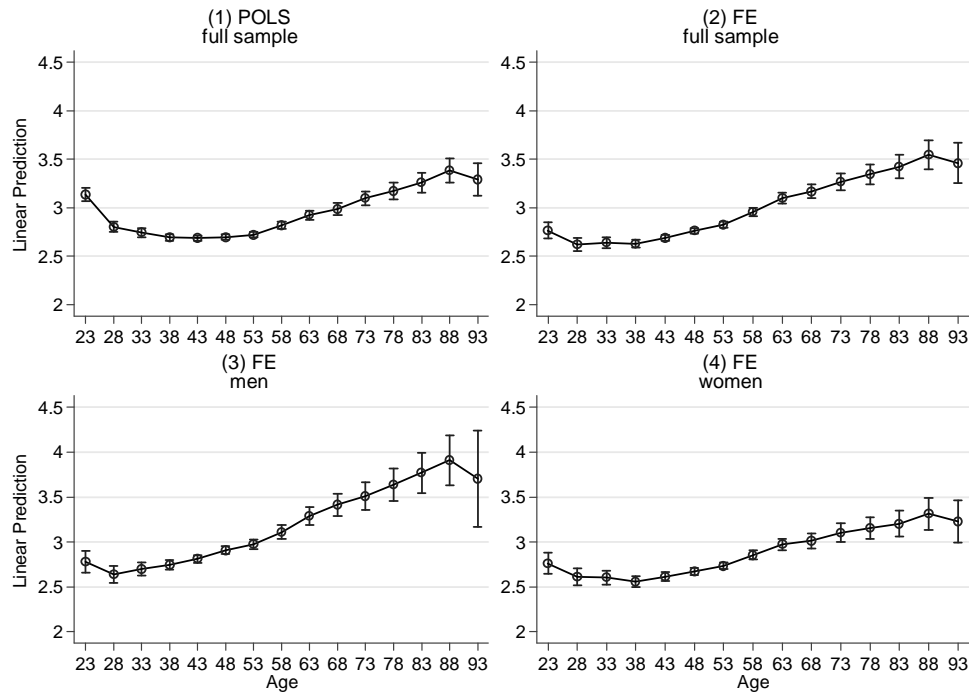
The quadratic and cubic results for the pooled OLS and FE specifications are fairly similar: the minima of the U-shape differ slightly, with the fixed effects regression indicating a minimum 5 years later than the pooled OLS. Here, the cohort effects mostly remain insignificant, although the cubic specification yields a maximum for the pooled OLS that is 10 years later in life than in

<sup>14</sup> As we do not include survey weights into the cross-sectional regressions, we followed the recommendation of Heeringa (1997) and re-estimated the models including dummies for rural/PTG/urban and 176 areas to account for the non-random sampling procedure: the results remain robust and do not substantially differ from Table 4.

the fixed effects regression. Moreover, the cohort coefficients, although significant, show no particular pattern. A similar pattern does emerge, however, for the age dummies, although the pooled OLS exhibits a more pronounced shape. Separate regressions by gender, on the other hand, yield no major pattern differences even though men tend to have higher overall levels of well-being. The corresponding average marginal effects for the non-functional forms in Table 4 and the gender split analysis are plotted in Figure 4.

**Figure 4. Average marginal effects of a methodical and gender comparison of well-being over the lifespan:**

**RLMS data (1995–2013)**



**Table 4. Comparison of well-being over the lifespan in the pooled OLS versus fixed-effects regressions:**

RLMS data (1995–2013)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
Age	-0.0051*** (0.002)	-0.0068 (0.008)	-0.0598*** (0.003)	-0.0442*** (0.008)	-0.1586*** (0.006)	-0.1351*** (0.010)		
Age squared			0.0006*** (0.000)	0.0004*** (0.000)	0.0028*** (0.000)	0.0025*** (0.000)		
Age cubic					-0.00002*** (0.000)	-0.00001*** (0.000)		
Age 23-27							-0.3316*** (0.018)	-0.1460*** (0.020)
Age 28-32							-0.3929*** (0.022)	-0.1265*** (0.027)
Age 33-37							-0.4405*** (0.027)	-0.1341*** (0.033)
Age 38-42							-0.4444*** (0.032)	-0.0738* (0.040)
Age 43-47							-0.4363*** (0.038)	0.0005 (0.047)
Age 48-52							-0.4124*** (0.044)	0.0652 (0.054)
Age 53-57							-0.3120*** (0.050)	0.1970*** (0.060)
Age 58-62							-0.2060*** (0.055)	0.3405*** (0.068)
Age 63-67							-0.1424** (0.062)	0.4113*** (0.075)
Age 68-72							-0.0310 (0.068)	0.5069*** (0.083)
Age 73-77							0.0458 (0.075)	0.5871*** (0.090)
Age 78-82							0.1310 (0.082)	0.6647*** (0.099)
Age 83-87							0.2576*** (0.091)	0.7894*** (0.110)
Age 88-104							0.1696 (0.108)	0.7036*** (0.135)
Born 1920-29	-0.2613*** (0.049)		0.0508 (0.052)		-0.2168*** (0.052)		-0.1073** (0.051)	
Born 1930-39	-0.4766*** (0.055)		0.0450 (0.059)		-0.3233*** (0.060)		-0.1538*** (0.057)	
Born 1940-49	-0.6815*** (0.066)		-0.0029 (0.071)		-0.3663*** (0.072)		-0.1686*** (0.065)	
Born 1950-59	-0.8258*** (0.077)		-0.0781 (0.083)		-0.3556*** (0.083)		-0.1340* (0.073)	
Born 1960-69	-0.8946*** (0.090)		-0.1688* (0.095)		-0.3480*** (0.094)		-0.0973 (0.082)	
Born 1970-79	-0.8218*** (0.104)		-0.2069* (0.107)		-0.3480*** (0.106)		-0.0141 (0.092)	
Born 1980-89	-0.6666*** (0.117)		-0.1982* (0.119)		-0.3986*** (0.118)		0.0597 (0.101)	
Born 1990-99	-0.4030*** (0.129)		-0.0635 (0.130)		-0.3728*** (0.129)		0.2093* (0.108)	
Minimum			51.5	56.1	42.2	42.9		
Maximum					82.6	74.4		
N	162808	162808	162808	162808	162808	162808	162808	162808
Adj. R <sup>2</sup>	0.197	0.085	0.204	0.087	0.208	0.090	0.204	0.087

*Note:* The dependent variable is self-rated individual life satisfaction (5-point scale). Age ranges from 14 to 104, with age 14–22 as the reference in (5) and (6). For cohort dummies, the reference group is those born between 1894 and 1919. The controls are gender, employment status (employed versus not employment as the reference) marital status (married/ living together, divorced/separated, widowed, with single/never married as the reference), education (medium level education and high level education, with low level education as the reference), income quintiles, self-reported health (5-point scale), and year dummies. Robust standard errors clustered at the individual level are in parentheses. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

### 3.4 Country-specific differences in ECA countries

To test whether the results described above hold within the diverse ECA sample, we conclude by conducting country-specific analysis using the LiTS data, which covers most relevant countries in two waves. The results, shown in Table 5, produce a heterogeneous picture, with 17 countries exhibiting an S-shaped relation between age and well-being. For all other countries, the cubic term is insignificant, but the squared-term specification yields significant coefficients, suggesting a U-shape relation; a heterogeneity also evident from the variation in minima (32.9 to 51.3) and maxima (67.4 to 101.8).

**Table 5. Country-specific differences of life satisfaction in age minima and maxima: LiTS data (2006-2010)**

Country	Minimum	Maximum	Observations
<i>Countries with age minimum and maximum (S shape)</i>			
Albania	37.4	81.3	1973
Bosnia and Herzegovina	42.2	70.7	1988
Czech Republic	39.5	79.0	1977
Hungary	38.5	84.6	2028
Moldova	40.5	92.0	1943
Montenegro	37.2	77.6	1790
Poland	39.6	84.1	2557
Romania	39.6	80.8	2030
Serbia	41.8	93.2	2420
Slovak Republic	39.7	79.4	1975
Turkey	36.2	73.2	1970
Ukraine	44.3	92.9	2369
Azerbaijan	40.1	78.2	1978
Estonia	40.1	95.2	1977
Kyrgyz Republic	32.9	67.4	1964
Latvia	41.8	91.7	1981
Lithuania	44.0	101.8	1968
<i>Countries with age minimum (U shape)</i>			
Belarus	43.8		1587
Bulgaria	48.1		1981
Croatia	44.8		1878
FYR Macedonia	38.3		1967
Slovenia	49.2		1917
Armenia	37.8		1899
Georgia	51.3		1978
Kazakhstan	45.7		1938
Russian Federation	49.8		2477
Tajikistan	40.4		1968
Uzbekistan	45.0		2443

*Note:* The dependent variable is self-rated individual life satisfaction (5-point scale). Age is specified using linear, squared, and cubic terms. The controls are gender, employment status (employed versus not employed as the reference), marital status (married, not married as the reference), education (medium level education and high level education, with low level education as the reference), income quintiles, self-reported health (5-point scale), and year dummies.

## 4. Conclusions

This analysis of the relation between age and well-being in Europe and Central Asia (ECA) takes advantage of panel and cross-sectional data from three large surveys: the Integrated Values Survey (IVS), the Life in Transition Survey (LiTS), and the Russia Longitudinal Monitoring Survey (RLMS). By focusing on the ECA region, the analysis makes two important contributions. First, by expanding the current research focus on high-income countries, it is better able to assess the universality of the U-shaped relation identified for Western countries. Second, it is able to leverage the disparate impacts of recent political and economic transformation in most ECA countries on the well-being of different cohorts to address the methodological problem of distinguishing between age and cohort effects. As Frijters and Beaton (2012) point out, the ideal would be to ‘follow representative individuals throughout their whole life, starting at birth’ (p. 529), but such data are not available. We overcome this limitation by examining well-being across the lifespan in a synthetic panel data set for ECA countries and a true panel data set for the Russian Federation.<sup>15</sup> We hypothesize that if a U-shape is observable in societies that have witnessed dramatic economic and social changes in past decades then, once cohort effects are corrected for (albeit imperfectly), they are most probably not the explanation for any observed U-shaped relation. In the aggregate, our findings mostly support the existence of a U-shape in individual well-being in the ECA up until the 60s and 70s but point to an apparent decrease in well-being among the oldest old, even after we control for self-reported health. This pattern remains robust for most of our cross-sectional and panel analyses, although within the ECA, there is significant heterogeneity in the pattern of well-being across the lifespan.

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<sup>15</sup> In the absence of large-scale panels that follow the same individuals across their lifespan, the most promising way to address the cohort issue is most probably by using less subjective measures of well-being such as in Weiss *et al.*’s (2012) ape study.

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## Appendix 1: Descriptive statistics

IVS		LiTS		RLMS	
Variable	Mean	Variable	Mean	Variable	Mean
Well-being	5.876	Well-being	3.101	Well-being	2.865
Scales of well-being	1-10	Scales of well-being	1-5	Scales of well-being	1-5
Age	43.878	Age	46.070	Age	45.093
Male	0.456	Male	0.399	Male	0.424
<i>Employment</i>					
Unemployed	0.119	Yes	0.455	Yes	0.545
Other	0.382				
Part time	0.051				
Full time	0.383				
Self employed	0.064				
<i>Marital status</i>					
Single	0.200	Married	0.574	Single	0.169
Married	0.641			Married/living together	0.602
Divorced	0.059			Divorced/separated	0.098
Widowed	0.100			Widowed	0.131
<i>Education</i>					
Low	0.358	Low	0.186	Low	0.407
Medium	0.427	Medium	0.626	Medium	0.380
High	0.215	High	0.188	High	0.212
Health	3.488	Health	3.389	Health	3.142
Observations	77,527		57,950	(person/year)	162,808

*Note:* Well-being in the IVS is measured from 1 (dissatisfied) to 10 (satisfied); in the LiTS and RLMS, it is measured from 1 = not at all satisfied to 5 = fully satisfied. Health is measured from 1 = very poor to 5 = very good. Income is not reported because there is no useful interpretation for the mean of income quintiles.



## Appendix 2: Description of variables

### *European Value Study and World Value Survey (IVS)*

**Life satisfaction:** The IVS assesses individual life satisfaction as follows: *All things considered, how satisfied are you with your life as a whole these days?* Responses are measured on a scale from 1 (dissatisfied) to 10 (satisfied).

**Employment:** It classifies individual employment status into five types: *non-employed* (reference group), *full-time employed*, *part-time employed*, *self-employed* and *other*, which includes *retired*, *housewife*, *student*, and those who selected *other* in the survey.

**Marital status:** The survey categorizes marital status into three states: *single/never married* (reference category), *married/living together as married*, and *divorced/separated/widowed*.

**Health:** In our analysis, we evaluate health based on self-reported health status, a subjective health indicator assessed by the following: *All in all, how would you describe your state of health these days?* Responses are measured on a 5-point scale: 1 = very poor, 2 = poor, 3 = fair, 4 = good and 5 = very good.

**Income:** The IVS data contain income deciles based on survey year and country. We reduce these to quintiles to facilitate income comparisons.

**Education:** For manageability, we reduce the original IVS education levels to only three states: *Low* (omitted reference), containing *inadequately completed elementary education*, *completed (compulsory) elementary education*, *incomplete secondary school: technical/vocational type/ (compulsory) elementary education*, and *basic vocational qualification incomplete secondary: university-preparatory type/secondary, intermediate general qualification*;

*Medium*, consisting of *complete secondary school: technical/vocational type/secondary, intermediate vocational qualification* and *complete secondary: university-preparatory type/full secondary, maturity level certificate*; and

*High*, covering *some university without degree/higher education lower-level tertiary certificate* and *university with degree/higher education – upper-level tertiary certificate*.

### *The Life in Transition Survey*

**Life satisfaction:** In the LiTS, individual life satisfaction is based on the following question: *To what extent do you agree with the following statements? All things considered, I am satisfied with my life now*, with answers assessed on a scale from 1 = strongly disagree to 5 = strongly agree.

**Household satisfaction:** The wording of the item on household life satisfaction differs slightly in the 2006 and 2010 LiTS waves: *My household lives better nowadays than around 1989* and *my household lives better nowadays than around 4 years ago*, respectively. Responses to both are assessed on a 5-point scale from 1 = strongly disagree to 5 = strongly agree.

**Employment status:** Because precise data are unavailable, employment status is a binary variable that equals 1 if the respondent is currently employed and 0 otherwise.

**Marital status:** Marital status is rescaled as a binary variable (1=married, 0=not married).

**Health:** As before, we assess self-reported health status using a subjective health measure based on the following question: *How would you assess your health?* evaluated on a 5-point scale from 1 = very bad to 5 = very good. This variable is very close to the IVS, in which only wording and category names differ slightly.

**Income:** Because none of the income measures are sufficient for an international comparison, we proxy household expenses with spending, which differs slightly between the two waves. In 2006, spending included *food, beverages, and tobacco, clothing and footwear, transport and communication (fixed-line phone, mobile phone, Internet) expenses, and recreation, entertainment, meals outside the home, etc.* In 2010, it covered *food, beverages and tobacco, utilities (electricity, water, gas, heating, fixed line phone) and transportation (public transportation, fuel for car).* Based on these expenses, we calculate country-specific expense quintiles for every survey year.

**Education:** We reduce the original six LiTS education levels to only three: *low, medium* and *high*, constructed as follows: For 2006, low includes *no degree/education and compulsory school education*; *medium* comprises *secondary education and professional, vocational school/training*, and *high* consists of *higher professional degree (university, college) and post-graduate degree*. For 2010, the *medium* category contains three different classifications: *lower secondary, (upper) secondary and post-secondary non tertiary*. Both the other categories are constructed as in 2006.

### ***Russia Longitudinal Monitoring Survey***

**Life satisfaction:** The RLMS evaluates individual life satisfaction as follows: *To what extent are you satisfied with your life in general at the present time?* , evaluated on a 5-point scale from 1 = not at all satisfied to 5 = fully satisfied.

**Employment:** Using the RLMS data, the individual employment status is a binary measure equal to 1 if the respondent is currently employed, 0 otherwise. The reference group is *non-employed*.

**Marital status:** We recode the 5-point scale for marital status (1 = never married, 2 = married, 3 = married but not living together, 4 = divorced and 5 = separated/ widowed) as a 3-point scale: 1 = *never married*, 2 = *married/ married but not living together* and 3 = *divorced/separated/widowed*, with *never married* as the reference group. It should be noted, however, that no marital status information is available for Round V.

**Health:** Self-rated health status is measured by the question, *Tell me, please, how would you evaluate your health status?*, assessed on a 5-point scale: 1 = very bad, 2 = bad, 3 = average, 4 = good and 5 = very good.

**Income:** To enable comparison with other data sets, we recode nominal household income into household income quintiles.

**Education:** We recode education levels on a 7-point scale: 0 = *no education*, 1 = *obtaining a diploma of professional course* (e.g. typing or accounting courses), 2 = *obtaining a PTU, FZU or*

*FZO diploma without a secondary education, 3 = obtaining a PTU diploma with a secondary education, 4 = obtaining a technical education diploma, including medical, music, pedagogical and art school, 5 = obtaining a university degree and 6 = obtaining a graduate degree and/or residency. The reference category is further education.*

## Appendix 3: Additional Material

Average marginal effects of well-being over the lifespan in the synthetic panel regressions using

LiTS data (2006–2010)

