

DISCUSSION PAPER SERIES

IZA DP No. 10774

**Sometimes Your Best Just Ain't Good
Enough: The Worldwide Evidence on
Well-Being Efficiency**

Milena Nikolova
Olga Popova

MAY 2017

DISCUSSION PAPER SERIES

IZA DP No. 10774

Sometimes Your Best Just Ain't Good Enough: The Worldwide Evidence on Well-Being Efficiency

Milena Nikolova

IZA and Brookings

Olga Popova

*Leibniz Institute for East and Southeast European Studies (IOS),
CERGE-EI and Ural Federal University*

MAY 2017

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ABSTRACT

Sometimes Your Best Just Ain't Good Enough: The Worldwide Evidence on Well-Being Efficiency*

Despite the burgeoning happiness economics literature, scholars have largely ignored explorations of how individuals or countries translate given resources into well-being. Using a balanced panel on 91 countries from Gallup Analytics between 2009–2014 and borrowing insights from production theory, we investigate whether nations in our sample efficiently convert their current resources (i.e. income, education and health) into subjective well-being. Our results imply that well-being efficiency gains are possible worldwide. We find that unemployment and involuntary part-time employment are associated with lower efficiency, while good institutions as proxied by the rule of law, as well as social support and freedom perceptions improve it. Within-country investigations for Bulgaria – an upper-middle-income country that often lurks at the bottom of the international well-being rankings – demonstrate that efficiency is lower among the unemployed, divorced/separated, widowed, the old, large households and those with children, while living in a city, freedom, generosity and social support improve efficiency. This paper provides the first evidence from an international panel concerning the issue of whether higher well-being levels are possible with current resources and raises policy-relevant questions about the appropriate instruments to improve well-being efficiency.

JEL Classification: D60, I31, O15, P52

Keywords: happiness, subjective well-being, efficiency analysis, conversion efficiency, comparative analysis

Corresponding author:

Milena Nikolova

IZA

Schaumburg-Lippe-Str. 5-9

53113 Bonn

Germany

E-mail: nikolova@iza.org

* We are grateful to Carol Graham and Martin Binder for helpful comments and encouragement. In addition, we are grateful to IZA Brown Bag participants for constructive critiques. We thank Sarah Stahlmann and Daria Golokhvastova for research assistance, Margard Ody for locating literature, and Georgios Tassoukis of IZA and Jessica Chi Ying of WHO for data help and suggestions. Finally, we acknowledge copy-editing support from Richard Forsythe.

1. Introduction

Subjective well-being (SWB) research is becoming increasingly popular among economists and policy-makers. This is partly due to the emerging consensus that income and consumption statistics are insufficient to judge human progress (Stiglitz, Sen, & Fitoussi, 2009). Thus, SWB measures – comprising assessments of positive and negative emotions, life evaluations and life purpose – are increasingly used alongside objective data to assess the consequences of different behaviors or events.¹ While the determinants of SWB have been largely explored, little is known about whether individuals and countries achieve the maximum possible SWB given their endowments. We contribute to the nascent literature on SWB efficiency (Binder & Broekel, 2012a; Cordero, Salinas-Jiménez, & Salinas-Jiménez, 2016; Debnath & Shankar, 2014) by examining whether countries at different levels of development – and Bulgaria in particular – efficiently reach happiness levels given their current resources (i.e. income, education and health) and contextual factors (e.g. institutions, social trust and labor market conditions). Our paper is the first to provide evidence on happiness efficiency through both cross- and within-country analyses and the first to use a rich cross-country panel dataset.

¹ SWB has separate yet related dimensions that have different correlates (Graham, 2016; Graham & Nikolova, 2015; OECD, 2013; Stone & Mackie, 2014). First, hedonic well-being relates to positive (joy, happiness) and negative feelings (sadness, worry, anger, stress). This dimension is usually captured using survey questions concerning whether the respondent experienced a lot of happiness, stress, anger, etc. during the previous day. Second, evaluative well-being refers to a cognitive reflective assessment of one's life as a whole. This dimension is typically measured using survey questions on life satisfaction or Cantril's life evaluation, asking respondents to rate their current life relative to the best possible life that they can imagine on a scale of 0-10 (Cantril, 1965). Some scholars consider a third SWB dimension – eudaimonia - which refers to the Aristotelian notion of happiness as challenges, mastery, skills and achievement, meaning and purpose in life and the capacity to make life choices (Graham, 2016). Being the least well-understood SWB dimension, the debate remains open concerning whether eudaimonia is a separate SWB dimension or whether it is already reflected in both hedonic and evaluative assessments (Graham, 2016). For example, the OECD guidelines on SWB measurement include a recommendation to measure eudaimonic well-being using a survey question regarding the extent to which a respondent believes that his/her life is worthwhile (OECD, 2013).

Broadly, efficiency refers to the ratio between output and input.² Alternatively, efficiency can be defined as the *distance* between the quantity of input and output and the best possible frontier (Daraio & Simar, 2007). The efficiency is thus inferred from the calculated differences of an observed indicator from an efficiency frontier (Ravallion, 2005). In the SWB context, happiness efficiency scores are measured as the distance to the best-performing unit (individual or country), defined as a unit having similar or lower levels of resources but achieving at least the same SWB levels. Happiness efficiency scores thus indicate the maximum possible SWB that individuals or countries can achieve with their current resources.³ Following this approach, in this paper we pose the following questions: (i) Are countries in general – and Bulgaria in particular – optimally using their resources and achieving the highest possible SWB? (ii) How much additional SWB (if any) can be produced with current resources? (iii) Which background characteristics explain the (in)efficiency?

To analyze these questions, we rely on insights from the production efficiency literature and a robust non-parametric order- α approach (Aragon et al., 2005).⁴ We further exploit country-level panel data from the Gallup Analytics to rank nations based on how efficiently or otherwise they reach their absolute SWB scores given their current resources. Efficiency analysis also allows us to compare a given country – such as Bulgaria – relative to a “frontier,” i.e. a set of countries with similar or lower levels of resources that achieve similar or higher SWB levels. As

² For instance, Debnath and Shankar (2014) measure the efficiency of countries’ good governance policies in increasing happiness. The efficiency index is calculated as a weighed sum of outputs (average happiness and happiness inequality) divided by the weighted sum of inputs (various indicators of good governance). The results suggest that most developed countries are rather inefficient in increasing population’s happiness using “good governance” policies, while some developing nations are surprisingly efficient (e.g. Nepal).

³ Using this approach, it is also possible to understand how certain background factors and constraints influence efficiency. Variables such as institutional quality, social trust, and the quality of the social fabric, or labor market conditions are neither inputs nor outputs but rather circumstances which help explain the efficiency differentials among countries.

⁴ Specifically, Binder and Broekl (2012a) and Cordero et al. (2016) rely on an order- m approach and Debnath and Shankar (2014) rely on a data envelopment (DEA) estimation. We compare and contrast the techniques explain the superiority of the order- α approach in our application in Section 4 below.

such, the efficiency approach offers a *relative* rather than an *absolute* measure of SWB. In other words, we do not estimate parametric SWB regressions but rather a happiness index that weighs observed well-being with the resources necessary for its creation (Binder and Broekel, 2012a). Furthermore, to furnish insights into the policy instruments that may help to promote efficiency, in a second step we also examine which background characteristics (institutional, labor market and social) influence the efficiency with which nations convert resources into happiness. For this purpose, we conduct panel fixed effects regressions that mitigate certain sources of time-invariant endogeneity, which is an advantage over Cordero et al.'s (2016) approach. We contribute to the policy debate and public knowledge by providing an understanding of whether aggregate national well-being levels are efficiently achieved and – if not – how efficiency can be improved.⁵

Unlike other papers that adopt either a cross-country or individual-level analysis, we complement the country-level analysis by using pooled cross-sectional data for Bulgaria.⁶ Our focus on Bulgaria is motivated by the fact that Bulgaria is often found at the bottom of international SWB rankings despite being an EU member and from this perspective having completed its transition to democracy and a market economy. Since 2005/2006, the Gallup World Poll (GWP) has enabled international comparisons in terms of perceived well-being for about 140 countries for the first time. An article in *The Economist* in 2010 set the stage by labeling Bulgaria as the “saddest place in the world relative to its income per person” (TheEconomist, 2010). Moreover, according to 2009 GWP data on 142 countries, along with respondents in Zimbabwe, Egypt, Haiti and Lebanon, Bulgarians expected that their life in five

⁵ The issue also remains relevant for the sustainable economic development. The recent report by the Boston Consulting Group (BCG) underscores that the efficiency in converting economic growth to well-being is a key to sustainable economic development (Beal et al., 2016).

⁶ Unfortunately, we do not have access to other within-country-level datasets from the Gallup dataset.

years' time will be worse than at present (Gallagher, Lopez, & Pressman, 2013). Finally, the World Happiness Report – which is also based on GWP data – also ranks Bulgaria at the bottom of the global life satisfaction distribution.⁷ To illustrate, Figures 1 and 2 demonstrate that Bulgaria's life evaluation is lower than predicted by real per capita income in both the world sample and among the post-socialist bloc. Given Bulgaria's low relative ranking based on absolute life satisfaction scores, we explore the extent to which these scores are efficiently achieved with the extant resources and estimate whether SWB gains are possible.

[Insert Figure 1 and 2 here]

The efficiency analyses and the cross-country regressions rely on the assumption about the comparability of SWB scores across countries. This is important because if all of the SWB differentials are due to noise, measurement error and cultural differences in reporting styles, international comparisons of SWB are pointless. Nonetheless, the literature shows that only a small component of SWB is due to noise. For example, Helliwell, et al. (2016) show that about three-quarters of the cross-country variation in life evaluations is due to six variables – GDP per capita, healthy life expectancy, freedom, generosity, trust and social support – leaving only up to one-fifth of the variation as being due to unobservables, measurement error and cultural bias. In a detailed report, Exton, Smith and Vandendriessche (2015) furnish insights about the plausible magnitude of cultural bias, which is between 0.19 and 0.61 (on a scale of 0-10), comprising between 5.6% and 18% of the country-level unexplained variance. The conclusion that country-level SWB differences are meaningful forms the basis for our analytical strategy, comparing countries based on their resources and SWB scores.

⁷ For example, Bulgaria ranked 146th out of 155 countries in 2012 and 144th out of 156 countries in 2013. In the past two reports (2015 and 2016, respectively), it ranked 134th out of 158 countries and 129th out of 157 (Helliwell, Huang, & Wang, 2015, 2016; Helliwell & Wang, 2012, 2013).

The remainder of the paper is structured as follows. Section 2 furnishes a review of the SWB literature, while Section 3 discusses the literature on well-being and efficiency. Section 4 presents our methodological approach, while Section 5 describes the data and variables. Section 6 provides the main cross-country panel results and the within-country analysis for Bulgaria. Finally, Section 7 concludes and discusses policy implications.

2. SWB Research

Several consensuses exist in the SWB literature. First, more than four decades of research has convincingly demonstrated that SWB metrics are useful, valid and reliable, and that best practices in collecting such data exist (Kahneman & Krueger, 2006; Krueger & Schkade, 2008; OECD, 2013; Stone & Mackie, 2014).⁸ Consistency and validity studies reveal that self-reported and non-self-reported measures of SWB are strongly correlated (Diener, 1984; Fordyce, 1988). For instance, people with higher reported SWB frequently smile and are rated as happy by their family members and close friends (Costa & McCrae, 1988; Fernández-Dols & Ruiz-Belda, 1995; Lepper, 1998; Sandvik, Diener, & Seidlitz, 1993). Moreover, reliability tests suggest that SWB is relatively stable over the life course (Ehrhardt, Saris, & Veenhoven, 2000; Headey & Wearing, 1991). However, limits to validity include one-off events affecting a large number of respondents such as day-of-the-week effects and different circumstantial events such as interviewer effects, which should dissipate in large samples (OECD, 2013).

Second, there is broad consensus regarding the within-country individual-, macro- and institutional-level determinants of SWB, which have been widely investigated (Dolan, et al., 2008; Frey & Stutzer, 2002; Graham, 2011b; MacKerron, 2012). With the availability of the GWP, surveying about 140 countries worldwide since 2005/6, studies have shown that the key

⁸ For a comprehensive review, see Frey & Stutzer (2002), Dolan, Peasgood, and White (2008) and MacKerron (2012).

within-country SWB determinants are similar across different societies and levels of development (Graham, 2009; Helliwell & Barrington-Leigh, 2010). SWB is negatively correlated with unemployment, divorce and economic volatility, while the healthy, the married (as well as those in stable partnerships) and urban residents report high life satisfaction and happiness scores. SWB is also higher among the young and the old, with a dip occurring around age of 40 (Blanchflower & Oswald, 2008). Additionally, both absolute and relative income matter for happiness (Clark, Frijters, & Shields, 2008; Senik, 2009). Studies generally find that women are happier than men, except in places where gender rights are compromised (Graham & Chattopadhyay, 2013), although the evidence on having children remains mixed (MacKerron, 2012).

Finally, there is an emerging consensus regarding the cross-country comparability of SWB scores. Helliwell, et al. (2016) show that about three-quarters of the cross-country variation in life evaluations is due to six variables – GDP per capita, healthy life expectancy, freedom, generosity, trust and social support – leaving only up to one-fifth of the cross-country variation unexplained. The unexplained differences in SWB outcomes could be due to four sources: unmeasured country circumstances (omitted variables), differences in appraisal styles (e.g. differences in optimism or pessimism), language differences or cultural response styles of biases. The last bias relates to country-specific differences in terms of how people answer SWB questions, regardless of their actual experiences. Exton et al. (2015) review the extant literature on SWB and culture and distinguish between cultural bias (measurement error) and cultural impact (the culture shaping how people experience their lives). Among a number of methods attempting to study and control for culture in SWB responses, the vignette method has received strong attention among economists. This method asks respondents to rate the SWB of

hypothetical individuals whose life circumstances are described in a short story (vignette) (see, for example Angelini, Cavapozzi, Corazzini and Paccagnella (2014)). The intention is that all interviewees read the same hypothetical scenario, which should have the same meaning to all of them. In fact, some studies using the vignette adjustments find that life or job satisfaction country rankings can change (Angelini et al. (2014); Kapteyn, Smith and Van Soest (2013); Kristensen and Johansson (2008)). Therefore, cross-country differences in the vignette answers can be used to adjust respondents' own self-reports of SWB. Nevertheless, the vignette method suffers from several limitations. Most importantly, real differences in life circumstances and quality of life in a country influence the way in which people perceive the vignettes. As Exton et al. (2015) explain, Angelini et al.'s (2014) vignettes describe two individuals aged 63 and 72. Nonetheless, life expectancy, retirement age, norms and attitudes regarding retirement and health expenditures differ across countries, which influences how people in different countries evaluate vignettes. Another example from Kapteyn et al.'s (2013) study assumes that being on the median income level in the United States and the Netherlands has the same implications. As such, vignettes are liable to country-level differences in public goods, norms, aspirations and expectations, which suggests that they cannot reliably provide adjustments for cross-country SWB answers. Exton et al. (2015) provide the most extensive analysis regarding the cross-country comparability of SWB scores and conclude that culture could account for between 6% and 18% of the country-specific unexplained variance in SWB scores. Nevertheless, objective circumstances play a stronger role in explaining SWB outcomes compared with culture. We interpret this conclusion as indicating that SWB scores are largely comparable across countries overall. As noted in the results, the differences between the actual and potential SWB scores (i.e.

the SWB scores that would have been achieved had resources been used efficiently) are large and not likely driven by culture alone.

3. Happiness and Efficiency

A small body of empirical literature examines conversion efficiency in the context of Sen's capability approach (Binder & Broekel, 2011, 2012b; Hick, 2016; Martinetti, 2000). According to the conversion efficiency framework, individuals translate income and resources into achieved functioning (states of being and doing, such as being happy, educated, well-fed, clothed) (Binder & Broekel, 2012b; Sen, 1999). The idea is that while access to resources may be the same for all, not everyone has the capacity to benefit from these resources in the same way. Individual factors such as health conditions, risk preferences or personality traits could influence the conversion. External factors such as country characteristics, the rule of law, regulations, the environment and others can also play a role (Binder & Broekel, 2011). As Binder and Broekel (2011) note, information about conversion efficiency can be useful to policy-makers in changing institutional or individual factors such as disability or unemployment.

The term "happiness efficiency" was coined by Binder and Broekel (2012a) in a paper bringing production theory and efficiency analysis to the SWB literature.⁹ As such, it refers to the efficiency with which countries convert resources into happiness. To date, three papers have explored happiness efficiency (Binder & Broekel, 2012a; Cordero, et al., 2016; Debnath & Shankar, 2014). Binder and Broekel (2012) use individual-level panel data from the British Household Panel study and find that 20-27% of the population is efficient in achieving life satisfaction. The authors also discover that unemployment reduces efficiency, while marriage and cohabiting increases it. Finally, retirement is efficiency-enhancing among males, while

⁹ Binder and Broekel (2012a) provide a detailed discussion about the conceptual issues and the practical value of happiness efficiency for SWB research and policy. We adapt their language to the cross-country case.

maternity leave has the same influence for females. A study by Cordero et al. (2016) uses cross-sectional data on individuals from 26 OECD countries from the 2005-6 World Values Survey, discovering that the most efficient countries are in north-central Europe, while Central Asian respondents are the least happiness-efficient. The authors also note that traditional well-being factors such as age, marital status, religion and unemployment also matter for happiness efficiency but do not provide further information about the direction of the influence (i.e. positive or negative). Finally, Debnath and Shankar (2014) investigate the efficiency of good governance policies in 130 countries using the cross-sectional data from the World Database of Happiness. They find that similar policies affect happiness efficiency across countries differently. Surprisingly, developed countries are characterized by less happiness-efficient policies than developing countries. Building upon these three studies, our paper is thus the first to examine a country panel comprising nations at different levels of development and over time. The panel structure ensures that countries are compared to the same set of peers year after year. In the second-stage regressions, the country-fixed effects eliminate certain unobserved heterogeneity related to time-invariant unobservables. We are also the first to complement the cross-country panel analysis with a within-country estimation for Bulgaria.

Following Binder and Broekel (2012a), a country with certain resources is a “locus of production of happiness.” Countries utilize their available resources in a happiness production process and achieve certain well-being levels. They are subsequently compared to nations with similar or lower levels of resources that achieve the same or higher SWB levels. The benchmark or the frontier is *not* the theoretical maximum happiness that should be achieved, but rather it is empirically derived based on the data. Therefore, the benchmark shows the highest *achievable*

SWB given current resources. In this sense, the happiness efficiency score informs about how wastefully or otherwise a country reaches its SWB levels.

In this paper, we focus on *output*-oriented efficiency, which relates to the question of how much additional output (if any) could be produced with current resources.¹⁰ Countries are compared to a peer sample of nations with a similar or lower level of resources that achieve at least the same SWB levels. Given our balanced panel structure, nations are compared to the same set of potential peers over time. Scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Scores equal to one indicate that endowments such as income, education or health are optimally used and no SWB improvements are possible without increasing the inputs. The efficiency approach provides an index that weighs SWB as a function of the inputs necessary for achieving it (Binder & Broekel, 2012a). At the country level, revealed inefficiencies could be due to a variety of factors such as institutional hindrances or a lack of information about how to productively utilize resources. In this paper, we provide evidence about which institutional or macroeconomic variables help to reduce inefficiencies. The choice of institutional and macroeconomic factors that we examine in the second stage is based on the previous literature.

Furthermore, our results can help to shed light on one particular challenge in happiness economics, namely hedonic adaptation. Research shows that individuals adapt – albeit imperfectly – to most positive and negative life shocks and events such as divorce, the death of a spouse, marriage, rising income or the birth of a child. Complete adaptation implies that life

¹⁰ It is also possible to consider input-oriented efficiency, which relates to the notion of saving inputs to produce the current levels of output. Input-oriented efficiency would be a relevant metric in countries that have already reached very high SWB and - due to the bounded nature of SWB questions - higher scores are impossible on the given scale (Binder & Broekel, 2012a). Nonetheless, in both the general case and the specific case of Bulgaria - where absolute SWB scores are relatively low - the policy-relevant question is arguably about the possibility of achieving higher happiness levels given current endowments.

events initially lower or increase SWB, whereas after some time SWB levels return to their original levels. If SWB levels always return to a genetically pre-determined set point, policy interventions aiming to improve efficiency may be ineffective. Complete adaptation would imply that efficiency-enhancing interventions would only lead to a *temporary* rather than long-lasting improvements in SWB. However, the most recent economic research shows that adaptation to income and other aspects of economic and social life is incomplete. For instance, people do not fully adapt to illnesses and do not adapt at all to unemployment and pollution (Clark, 2016). Efficiency analyses can thus yield important policy-relevant information. Specifically at the country level, adaptation implies that nations can report high SWB levels despite poor institutions or circumstances because they adjust to what is considered possible or tolerable. For example, Latin Americans are happy with their daily lives despite high crime and corruption (Graham, 2011a). As they have adapted to the high crime and corruption levels, their hedonic well-being scores do not reflect the poor rule of law. Collectively, adaptation implies the persistence of bad equilibria such as poor healthcare systems and public goods and undemocratic institutions. This results in the persistence of such institutions and the erroneous policy conclusion that improving absolute SWB scores require no policy intervention. Happiness efficiency scores can help to shed light on identifying such bad equilibria.¹¹ Nonetheless, it remains an open question whether improving long-term SWB through enhancing efficiency is possible.

¹¹ Consider, for example, a country with a poor institutional environment but with high absolute levels of happiness due to adaptation. Efficiency analyses will reveal that this country is achieving its (high) SWBs levels inefficiently if another country has similar or lower level of resources but higher well-being levels. As a second step, analyses allowing to study which factors help explain efficiency differentials across countries may reveal that improving institutional characteristics can yield efficiency gains and that the country can achieve higher well-being levels if institutions, to which people have adapted, are improved. Even though a country's *absolute* happiness score is high due to adaptation to bad circumstances, *relative* happiness as reflected by the efficiency score, suggests that absolute happiness levels could be higher.

4. Empirical Strategy

Our empirical strategy uses the non-parametric robust frontier analysis (Daraio & Simar, 2007). Unlike other papers in the literature, which rely on the order- m or Data Envelopment Analysis (DEA) techniques, we utilize an order- α approach.¹²

Following Binder and Broekel (2012a), our analytical strategy comprises two steps: first, we use input (i.e. income, education and health) and output (i.e. SWB) variables to estimate efficiency scores; and second, using the efficiency scores as the dependent variables, we run country-fixed effects regressions to offer insights into which background characteristics increase or reduce efficiency. Background characteristics include environmental, social or institutional factors such as the rule of law, the structure of the labor market, social trust and others.¹³ The choice of background characteristics follows the extant literature and the research on variables explain cross-country differentials in SWB (e.g. Helliwell et al. (2016)). These background variables are not only important for absolute SWB levels but also explain differences in efficiency scores across the nations studied.

Efficiency analysis helps to ascertain whether countries are efficient compared to a benchmark comprising the best-performing peers, i.e. nations with the same or lower level of resources achieving the same or higher SWB levels. Therefore, defining and empirically estimating the benchmark is an important practical issue. Binder and Broekel (2011) and Ravallion (2005) offer a summary of the different empirical approaches used to define frontiers. Parametric approaches rely on the specification of a single production frontier, which describes the process of translating the inputs into maximum possible output. Econometric techniques are used to fit the frontier's parameters, whereby it *fully* envelopes the data and no observations are

¹² See Binder and Broekel (2011) and Ravallion (2005) for a summary of different approaches to measuring efficiency.

¹³ Input, output and background characteristics used in the analysis are described in the next section.

left outside of it. In other words, for a given input level, no production unit (i.e. country) achieves more output (i.e. SWB) than predicted by the function. The distance between the predicted and actual output is a measure of inefficiency. While this is the most common application of production theory in the literature, we share Ravallion's (2005) and Binder and Broekel's (2011, 2012a) criticism of parametric approaches, namely that the specification of a functional form is problematic. Importantly, a misspecification of the functional form can lead to errors, including wrongly classifying countries as inefficient (Ravallion, 2005). If the exact process of converting resources into well-being is unknown – as applies in our case – picking one functional form over another and assuming that all countries utilize the same production technology is problematic (Binder & Broekel, 2011).¹⁴

Binder and Broekel (2012a) offer a second criticism of the parametric approach, claiming that while the inputs such as income, education and health influence conversion efficiency, they may also affect the conversion of other inputs into well-being. This criticism relates to the interdependency of inputs; for example, individuals or countries use income as an input in the well-being production process but income itself may also influence how other resources are translated into SWB. A similar logic applies to health and education. Accordingly, it is difficult to model the complex relationships among the inputs and between each input and the output. Nonetheless, parametric approaches require modeling of the dependencies and as such are particularly problematic (Binder & Broekel, 2012a). To summarize, parametric methods only allow for a single production technology and require the specification of the functional form, modeling the endogeneity among the inputs and assumptions regarding the error term (Tauchmann, 2012).

¹⁴ Ravallion (2005) also offers critique regarding the regression-based efficiency analyses. In a regression framework, the efficiency frontier can be identified from the residuals of a particular outcome (e.g. SWB) on different controls such as income, public goods and institutions.

Non-parametric techniques such as the Free Disposal Hull (FDH) and DEA address the critiques outlined above. As they are fitted by mathematical optimization processes, non-parametric methods do not require the specification of a parametric model. Nonetheless, the DEA – which is used in Debnath and Shankar (2014) – is inappropriate in our case because it assumes convexity, i.e. that inputs (outputs) can be substituted. In our framework, this would imply that countries could substitute income for health – for example – on the inputs side, or happiness and life evaluations on the output end, which is an unjustifiable assumption. Moreover, the FDH is also inappropriate in our case as it is very sensitive to outliers, given that all variations among the observations are attributed to efficiency rather than a stochastic element.

Robust non-parametric methods or partial frontier approaches such as the order- m and order- α approach (Aragon, Daouia, & Thomas-Agnan, 2005; Cazals, Florens, & Simar, 2002; Daouia & Simar, 2005, 2007; Daraio & Simar, 2005) tackle these critiques and as such are our preferred estimation strategy. These approaches are robust to data outliers because not all points are used in creating the frontier and the production process is probability-based and described by a conditional distribution function (see Aragon, Daouia, & Thomas-Agnan, 2005 and Tauchmann, 2012). In other words, these techniques involve a *partial* rather than a *full* frontier enveloping all data. The idea is not to estimate the absolute highest technically feasible output for a given level of input, but rather to “estimate something close to it” (Simar & Wilson, 2008). The partial frontier approaches also avoid the “curse of dimensionality,” meaning that they do not demand thousands of observations to avoid statistical imprecision (Daraio & Simar, 2007). Given that there are only 91 countries in our panel, the curse of dimensionality problem would have been serious with traditional non-parametric estimators.

While Binder and Broekl (2012a) and Cordero et al. (2016) utilize an order- m approach, we rely on the order- α approach, which is based on the conditional quantiles of the appropriate distribution of the production process. Despite some similarities, the order- m (Cazals et al., 2002) and order- α (Aragon et al., 2005) also differ from each other. In the order- m approach, countries or individuals are benchmarked with the expected best performance among m peers (Tauchmann, 2012). In a re-sampling, which occurs D times, the units are compared to a randomly drawn sample of m peers. This method is time-consuming and choosing the appropriate m value is done by trial and error. Rather than the minimum input consumption among m peers as the benchmark, the order- α relies on the $100*(1-\alpha)$ th percentile, as explained below (Tauchmann, 2012). It is less time-consuming and now easily implemented in a Stata routine (Tauchmann, 2012).

In the output-oriented case, the efficiency score reflects the maximum possible increase in SWB that could be achieved if current resources are used efficiently. In the simplest scenario, we assume that for each country $i = 1, \dots, N$, we have one input x_i and one output y_i . We compare country i to a set of countries B_i that have similar or lower levels of input ($x_j \leq x_i$) and produce SWB levels at the $100*(1-\alpha)$ percentile (α ranges from 0 to 1).¹⁵ The efficiency score is defined as:

$$\hat{\theta}_i = P_{\alpha} \left\{ \frac{y_j}{y_i} \right\}_{j \in B_i}$$

Efficiency scores greater than one indicate inefficiency, values equal to one indicate efficiency and values less than one indicate super efficiency (i.e. countries that are producing

¹⁵ Note that $100*(1-\alpha)\%$ demonstrates the probability that country i is dominated by those countries in the peer set with a similar or lower level of resources. The value of α can be seen as a tuning parameter that determines how many observations would not be enveloped and would be considered “super-efficient.” We provide analyses using different values of α .

more than expected given current resources). Super efficiency is possible as the robust non-parametric methods do not envelope all points, which makes the method less sensitive to outliers. Efficiency scores greater (smaller) than one show the possible proportionate increase (decrease) in life evaluation given current resources. In other words, the efficiency score gives the proportionate increase or decrease in outputs needed to move the given country to the order- α output frontier, whereby it is dominated by countries using similar or fewer inputs with a probability $(1-\alpha)$ (Daraio & Simar, 2007).

We use the user-written *orderalpha* command in Stata (Tauchmann, 2012). In the main analyses, we set α to 0.95 and rely on bootstrapped standard errors with 500 replications. We run the analyses for each available year in the sample and store the efficiency scores. In a second stage, we examine the determinants of efficiency scores using country-fixed effects regressions. The fact that we have a country panel offers several advantages over other cross-country happiness efficiency studies (Cordero et al., 2016; Debnath and Shankar, 2014). Specifically, due to the panel data structure, in the first stage countries are compared to a fixed set of potential peers, thus minimizing the possibility that changes in efficiency scores from year to year are driven by changes in the sample composition. Second, the country-fixed effect estimations in the second stage allow us to mitigate sources of endogeneity related to time-invariant heterogeneity such as culture and norms.

5. Data, Sample Creation and Variables

The data in this paper are from the Gallup Analytics (2006-2014), which comprises country-level information based on the GWP, and the Bulgarian individual-level sample of the GWP. The Gallup Analytics is the country-level data based on the GWP, a yearly survey in more than 150 countries worldwide. The GWP data are collected via in-person interviews in

developing and transition countries – including Bulgaria – and via landline and cell phone interviews in the OECD countries. The GWP polled Bulgaria in 2006 and 2009-2014. For the cross-country regressions, we merge the Gallup data with GDP per capita information from the World Bank, life expectancy data from the United Nations and years of schooling from the United Nations Development Programme (UNDP). Finally, we use data on the rule of law from the Worldwide Governance Indicators (Kaufmann, Kraay, & Mastruzzi, 2010).

Our models include country-level variables for inputs, an output and background variables (Table 1). Our main output variable is life evaluations, measured on a scale of 0-10 using Cantril's ladder of life question.¹⁶ Specifically, respondents are asked to picture a ladder with steps going from 0 (the worst possible life that they can imagine for themselves) to 10 (the best possible life that they can imagine for themselves). Interviewees are subsequently asked to rate their current life on this ladder. This question is self-anchoring, which means that the scale is relative to each respondent's own aspirations and understanding of his/her best possible life. We use the country-average value of the responses.

[Insert Table 1 here]

The input and output variables are based on the previous literature and on the variables that explain much of the cross-country variation in SWB scores (e.g. Halliwell et al. (2016)) and subject to data availability constraints. Specifically, our inputs are the same as in Binder and Broekel (2012a) and (Cordero et al., 2016). Our *inputs* are GDP per capita, the share of individuals with secondary educational attainment and life expectancy. In separate regressions in our robustness checks, we use years of schooling rather than the share of respondents with secondary education and the share of the Gallup respondents without a health problem rather than life expectancy. The background characteristics are based on Helliwell et al.'s list of

¹⁶ In Tables B8 and B9, we show specifications with financial satisfaction as the output.

variables explaining three-quarters of the cross-country variation in SWB scores and an additional indicator for country-level employment. We include freedom, social support, generosity and the rule of law, as well as employment status variables as background characteristics helping to explain the inefficiencies. As a robustness check, we replace the rule of law with trust. However, note that we include these variables as the determinants of happiness *efficiency*, rather than of absolute SWB levels.¹⁷

As Ravallion (2005) notes, the choice of inputs in efficiency analyses is often a mysterious process subject to the researcher's discretion. In our case, it is motivated by the previous literature and data constraints. While we considered other variables from the World Development indicators such as public spending on healthcare and education, we would have had to lose many observations and thus comparison countries, which would have limited the reliability of our method. In particular, while using small sample sizes may be problematic with non-parametric methods (Ravallion, 2005), to demonstrate that our results are robust to how the inputs are measured, we provide specifications with alternative data for education and health. Meanwhile, as Binder and Brokel (2012a) note, when all resources and intervening factors are included in the assessment, there would be no unaccounted variance in efficiency (short of a stochastic component). This prompts the question concerning what is the suitable specification of happiness efficiency. As the authors explain, the benefit of the non-parametric method is that it weights SWB with the inputs necessary for achieving it and SWB is conditional on the input set. The input and background variables depend on the research context and different types of research questions may require different definitions of inputs and outputs.

¹⁷ Of course, the background characteristics, affect the inputs and the output, although in this model we assume that they do not. This may be a strong assumption. For alternative estimation techniques, see Cordero et al. (2016).

Since the method is sensitive to the composition of the sample and the number of observations, we created a fully balanced panel with as many country-years as possible. To achieve this goal, we impute a number of observations by replacing missing values with the simple averages. As Table A1 in Appendix A demonstrates, the number of imputed values is low. Moreover, the averages and standard deviations are virtually identical for the imputed and non-imputed samples. Our final sample comprises 91 countries at different levels of development (Table A2 in Appendix A).

5.1 Descriptive Statistics for Bulgaria

Figure A1 in Appendix A furnishes additional information regarding the time pattern and the SWB gap between Bulgaria and several other countries (United States, Romania and Serbia). While the world's average life evaluation is about 5.4 on a scale of 0-10, in Bulgaria, it is more than one point lower at 4.1. This difference is large and unlikely to be driven by cultural peculiarities of how people answer SWB questions across countries. The life evaluation differential between Bulgaria and the rest of the world ranges from 1.85 in 2009 to 0.5 in 2015. Whether it closes in subsequent GWP waves remains to be seen.

The peaks and slumps in the Bulgarian SWB levels evident in Figure A1 are not simply noise or measurement error. Importantly, the amplitudes are not unusual compared to the other countries shown. The SWB scores for Bulgaria are statistically significantly different from each other at the 5 percent level, aside from the differences in SWB levels between 2010-2011, 2011-2012 and 2012-2013. The other spikes and slumps in the Bulgarian SWB levels (2006-2009, 2009-2010 and 2013-2014) are correlated with important events. Specifically, the decline in SWB levels in the 2006-2009 period can be explained by the global economic crisis. In addition, Bulgaria lost 220 million euro of EU funding in November 2008 due to corruption and

embezzlement scandals (Andreev, 2009; EurActiv, 2008; Spendzharova & Vachudova, 2011). The SWB improvement in 2010 can be attributed to the 2009 parliamentary election and the associated hope for quality-of-life improvements. Among others, the new government managed to unblock EU funds and committed to infrastructure development and fighting organized crime and corruption (Andreev, 2012). Finally, the life evaluation decline between 2013 and 2014 is most likely driven by the protests and political instability dominating socio-political life during that period.¹⁸

Figure A2 further shows the distribution of life evaluations in Bulgaria for all available years. While the mode is clearly at 5 (on a scale of 1-10), the mean and the median are at 4 (the standard deviation is 2). Moreover, about 20% of respondents evaluate their lives at 6 or higher. For comparison purposes, in Romania life evaluations are much more stable over the analysis period (Figure A1), with an average of 5.1 (standard deviation of 2.3) and a median of 5.

The summary statistics presented in this section suggest that Bulgaria's SWB scores are not characterized by random noise but rather are connected to life events and mimic patterns found in other countries. Furthermore, the low SWB scores in Bulgaria are not driven by respondents choosing extreme values at the low end of the distribution. These preliminaries allow us to confidently proceed in estimating the worldwide well-being efficiency scores using Bulgaria as a case study.

¹⁸ SWB increased between 2014-2015, likely due to the improved political stability in the country and due to the expiration of the labor mobility restrictions for workers from Bulgaria and Romania for some EU countries. The SWB improvements in Bulgaria in the last few years mimic the general upward trend in transition economies documented in the literature (Helliwell, et al., 2016; Nikolova, 2016).

6. Results

6.1. Main Results

Table 2 shows the efficiency scores over the analysis period (2009-2014). The second column features the mean efficiency score for all 91 countries in the sample, which is about 1.1 for all years. For example, the efficiency score of 1.088 in 2014 suggests that given their resources in 2014, the 91 nations in the panel could have achieved SWB levels that were on average 8.8 percent higher than was actually the case. In other words, in 2014, the 91 countries had an average life satisfaction score of 5.49, whereas had they efficiently used their resources, they could have achieved a SWB score of 5.97. The fourth column in Table 2 demonstrates that about half of the countries in the sample are happiness-inefficient, suggesting that there are large efficiency gains to be made worldwide. The rest of the information in Table 2 relates to Bulgaria's efficiency. Specifically, Bulgaria was either the least efficient or among the least efficient countries in the sample. For example, in 2009, Bulgaria's life evaluation was 3.6, while its efficiency score of 1.806 suggests that it could have been 6.5 if its resources had been optimally translated into SWB. On average for the whole time period, given its endowments, Bulgaria's SWB could have been about 2 points higher, which is a substantial difference.

[Insert Table 2 here]

In Table 3, we show the efficiency scores for all 91 countries for 2014, suggesting that low life evaluations do not necessarily translate into low well-being efficiency. For example, Albania, Greece, Tunisia and South Africa all had SWB levels of 4.8 in 2014, yet Greece performed the worst in terms of efficiency, while South Africa performed the best among this group. Nonetheless, one has to be careful when interpreting the scores for very poor developing countries: while they often appear efficient, this could be due to the fact that a lack of

comparison countries were available with lower levels of resources, which means that the method automatically picks the country itself as the frontier.

[Insert Table 3 here]

Which background characteristics explain the large inefficiencies among the countries? In Table 4, we further explore the factors that improve or hinder the efficiency with which countries in our sample translate endowments into well-being. Note that the *efficiency scores* and not *absolute* life evaluation levels are the dependent variables in these regressions. This table presents the country- and year-fixed effects regression, whereby the explanatory variable is each country's efficiency score, which has been transformed so that positive coefficient estimates indicate efficiency improvements while negative ones designate efficiency reductions. The two-way fixed effects allow us to mitigate shocks over time that affect all countries such as the recent economic crisis and time-invariant country-specific factors such as culture or norms. Model (1) includes controls for social support, generosity, the rule of law and freedom, Model (2) adds all employment status variables, while Models (3) and (4) only include certain employment status controls.

[Insert Table 4 here]

The results unequivocally show that freedom perceptions and a better institutional environment – as proxied by the rule of law – improve efficiency.¹⁹ Countries in which citizens have the freedom to choose the kinds of lives that they value and have these freedoms guaranteed by well-functioning institutions are also more efficient in translating resources into well-being. This finding parallels the literature showing that institutions are also determinants of absolute well-being levels (Frey & Stutzer, 2000; Helliwell & Huang, 2008; Rode, 2013). In addition,

¹⁹ The rule of law reflects contract enforcement and property rights as well as aspects related to the functioning of the legal system and as such is a comprehensive measure of institutions.

social support also helps to improve efficiency, although its coefficient estimate is only marginally statistically significant. In Model (4), employment status variables associated with choice and flexibility such as voluntary part-time employment and self-employment are marginally significant, suggesting that they also enhance well-being efficiency. By contrast, unemployment reduces efficiency (Model (3)). This finding resonates with the results in Binder and Broekel (2012a) and suggests that unemployment is not only detrimental to absolute life evaluation levels but also to the efficiency with which well-being levels are achieved.

We also provide a number of additional heterogeneity analyses and robustness checks of our results, which are presented in Appendix B.

6.2. Within-Country Analysis for Bulgaria

Although Bulgaria is happiness-inefficient from a cross-country perspective, we next examine whether certain individuals are efficient in converting their resources into well-being and which individual characteristics are associated with efficiency (Table 5). For this purpose, we use the 2009-2014 GWP sample for Bulgaria at the individual level (N=5,333). The inputs are individual income, a binary indicator for completed secondary education and the absence of a health problem, while the output is the individual assessment of best possible life on a scale of 0-10. We have pooled cross-sections rather than an individual-level panel.

[Insert Table 5 here]

Our results demonstrate that the within-country mean efficiency score is 1.9 (median is 1.4), suggesting that the majority of Bulgarians do not optimally reach their well-being levels. Indeed, about nine in ten Bulgarians (87%) are inefficient in achieving their best possible life, which is much lower compared to the Brits (Binder and Broekel, 2012a). In Table 6, we present the factors explaining the Bulgarian inefficiency. The well-being efficiency is lower among the

unemployed, divorced/separated, widowed, the old, large households and those with children, while living in a city, freedom, generosity and social support improve efficiency.

7. Discussion and Conclusion

Happiness efficiency measures whether countries optimally use their resources to “produce” perceived well-being and – if not – the extent to which SWB scores can be improved by only using current resources. In this paper, we contribute to the novel science of well-being measurement by estimating the happiness efficiency scores for a balanced panel of 91 countries at different levels of development. In addition, we demonstrate which factors and background characteristics enhance or reduce efficiency. We provide evidence from both cross-country and within-country perspectives. Accordingly, we select Bulgaria as a case study, a country that is often at the bottom of the world’s life satisfaction distribution despite reasonable living standards and institutional features. We show – consistently with the results of Debnath and Shankar (2014) – that Bulgaria is also among the world’s most inefficient countries and that variables related to widowhood and divorce, as well as unemployment, involuntary part-time employment and being out of the labor force drive these inefficiencies, as also shown by Cordero et al. (2016). Importantly, from a development economics perspective, we demonstrate that large well-being efficiency gains are possible worldwide. Such improvements could be achieved through enhancing formal institutions such as the rule of law, or increasing freedom of choice. Social networks – which are often more developed in poorer countries – are also important efficiency-enhancing factors.²⁰

Our results have implications for development scholars and practitioners as concerning the role of foreign aid. Specifically, happiness efficiency improvements and increases in absolute well-being scores can be achieved with the current levels of income, health and education if

²⁰ This is shown in Appendix B.

these resources are used more productively. Providing technical assistance and informing people about their endowments or how to optimally use them can have large development pay-offs. Our research thus raises an important question about whether the same policy instruments that raise *absolute* levels of happiness are relevant in the context of improving the efficiency with which happiness scores are achieved. Our research also contributes to the new science of well-being measurement by showing that happiness efficiency analyses help to identify which factors contribute to inefficiency even if people adapt to bad equilibria. Specifically, even if people living in countries with dysfunctional institutions report being happy due to adaptation, happiness efficiency analyses can demonstrate whether higher SWB levels are possible if formal or informal institutional features are improved.

Acknowledgements. We are grateful to Carol Graham and Martin Binder for helpful comments and encouragement. In addition, we are grateful to IZA Brown Bag participants for constructive critiques. We thank Sarah Stahlmann and Daria Golokhvastova for research assistance, Margard Ody for locating literature, and Georgios Tassoukis of IZA and Jessica Chi Ying of WHO for data help and suggestions. Finally, we acknowledge copy-editing support from Richard Forsythe.

References

- Angelini, V., Cavapozzi, D., Corazzini, L., & Paccagnella, O. (2014). Do Danes and Italians Rate Life Satisfaction in the Same Way? Using Vignettes to Correct for Individual-Specific Scale Biases. *Oxford bulletin of Economics and Statistics*, 76(5), 643-666.
- Andreev, S. (2012). Bulgaria. In D. Ó. Beacháin, V. Sheridan & S. Stan (Eds.), *Life in Post-Communist Eastern Europe after EU Membership* (Vol. 37, pp. 205-220): Routledge.
- Andreev, S. (2009). The Unbearable Lightness of Membership: Bulgaria and Romania after the 2007 EU Accession. *Communist and Post-Communist Studies*, 42(3), 375-393.
- Aragon, Y., Daouia, A. & Thomas-Agnan, C. (2005). Nonparametric Frontier Estimation: A Conditional Quantile-Based Approach. *Econometric Theory*, 21(02), 358-389.
- Beal, D., Rueda-Sabater, E., Young, S. E., & Heng, S. L.. (2016). *The Private-Sector Opportunity to Improve Well-Being*. The 2016 Sustainable Economic Development Assessment, The Boston Consulting Group. Available online: <https://www.bcgperspectives.com/Images/BCG-The-Private-Sector-Opportunity-to-Improve-Well-Being-Jul-2016.pdf> (Last accessed July 24, 2016).
- Binder, M., & Broekel, T. (2011). Applying a Non - Parametric Efficiency Analysis to Measure Conversion Efficiency in Great Britain. *Journal of Human Development and Capabilities*, 12(2), 257-281.
- Binder, M., & Broekel, T. (2012a). Happiness No Matter the Cost? An Examination on How Efficiently Individuals Reach Their Happiness Levels. *Journal of Happiness Studies*, 13(4), 621-645.

- Binder, M., & Broekel, T. (2012b). The Neglected Dimension of Well-Being: Analyzing the Development of “Conversion Efficiency” in Great Britain. *The Journal of Socio-Economics, 41*(1), 37-47.
- Blanchflower, D. G., & Oswald, A. J. (2008). Is Well-Being U-Shaped over the Life Cycle? *Social Science & Medicine, 66*(8), 1733-1749.
- Bjørnskov, C., Dreher, A., & Fischer, J. A. (2010). Formal institutions and subjective well-being: Revisiting the cross-country evidence. *European Journal of Political Economy, 26*(4), 419-430.
- Cantril, H. (1965). *Pattern of Human Concerns*: Rutgers University Press, New Brunswick, New Jersey.
- Cazals, C, Florens, J-P, & Simar, L. (2002). Nonparametric Frontier Estimation: A Robust Approach. *Journal of econometrics, 106*(1), 1-25.
- Clark, A. E. (2016). Adaptation and the Easterlin Paradox *Advances in Happiness Research* (pp. 75-94): Springer.
- Clark, A. E., Frijters, P., & Shields, M. A. (2008). Relative Income, Happiness, and Utility: An Explanation for the Easterlin Paradox and Other Puzzles. *Journal of Economic Literature, 46*(1), pp. 95-144.
- Cordero, J. M., Salinas-Jiménez, J., & Salinas-Jiménez, M. M. (2016). Exploring Factors Affecting the Level of Happiness across Countries: A Conditional Robust Nonparametric Frontier Analysis. *European Journal of Operational Research.*
- Costa, P. T., & McCrae, R. R. (1988). Personality in Adulthood: A Six-Year Longitudinal Study of Self-Reports and Spouse Ratings on the Neo Personality Inventory. *Journal of personality and social psychology, 54*(5), 853.

- Daouia, A.i, & Simar, L.. (2005). Robust Nonparametric Estimators of Monotone Boundaries. *Journal of Multivariate Analysis*, 96(2), 311-331.
- Daouia, A., & Simar, L. (2007). Nonparametric Efficiency Analysis: A Multivariate Conditional Quantile Approach. *Journal of Econometrics*, 140(2), 375-400.
- Daraio, C., & Simar, L. (2005). Introducing Environmental Variables in Nonparametric Frontier Models: A Probabilistic Approach. *Journal of productivity analysis*, 24(1), 93-121.
- Daraio, C., & Simar, L. (2007). *Advanced Robust and Nonparametric Methods in Efficiency Analysis: Methodology and Applications*: Springer Science & Business Media.
- Debnath, R. M., & Shankar, R. (2014). Does Good Governance Enhance Happiness: A Cross Nation Study. . *Social Indicators Research*, 116(1), 235-253.
- Diener, E. (1984). Subjective Well-Being. *Psychological Bulletin*, 95(3), 542 – 575.
- Dolan, P. P., T., & White, M. (2008). Do We Really Know What Makes Us Happy? A Review of the Economic Literature on the Factors Associated with Subjective Well-Being. *Journal of Economic Psychology*, 29(1), 94-122.
- Ehrhardt, J. J., Saris, W. E., & Veenhoven, R. (2000). Stability of Life-Satisfaction over Time. *Journal of Happiness Studies*, 1(2), 177-205.
- EurActiv. (2008). Bulgaria Loses 220 Million Euro of EU Funding (Vol. 2016).
- Exton, C., Smith, C., & Vandendriessche, D. (2015). Comparing Happiness across the World. *OECD Statistics Directorate Working Paper No. 62*.
- Fernández-Dols, J.-M., & Ruiz-Belda, M.-A.. (1995). Are Smiles a Sign of Happiness? Gold Medal Winners at the Olympic Games. *Journal of personality and social psychology*, 69(6), 1113.

- Fordyce, M. W. (1988). A Review of Research on the Happiness Measures: A Sixty Second Index of Happiness and Mental Health. *Social Indicators Research*, 20(4), 355-381.
- Frey, B. S., & Stutzer, A. (2002). What Can Economists Learn from Happiness Research? *Journal of Economic Literature*, 40(2), 402-435.
- Gallup Inc. (2015). Gallup Analytics (2009 – 2014).
- Gallagher, M. W., Lopez, S. J., & Pressman, S. D. (2013). Optimism Is Universal: Exploring the Presence and Benefits of Optimism in a Representative Sample of the World. *Journal of Personality*, 81(5), 429-440.
- Graham, C. (2009). *Happiness around the World: The Paradox of Happy Peasants and Miserable Millionaires*. Oxford: Oxford University Press.
- Graham, C.(2011a). Adaptation Amidst Prosperity and Adversity: Insights from Happiness Studies from around the World. *The World Bank Research Observer*, 26(1), 105-137.
- Graham, C. (2011b). The Pursuit of Happiness: An Economy of Well-Being.
- Graham, C. (2016). Amitai Etzioni's Critique of Happiness. [journal article]. *Society*, 53(3), 287-288.
- Graham, C. & Chattopadhyay, S. (2013). Gender and Well-Being around the World. *International Journal of Happiness and Development*, 1(2), 212-232.
- Graham, C, & Nikolova, M. (2015). Bentham or Aristotle in the Development Process? An Empirical Investigation of Capabilities and Subjective Well-Being. *World Development*, 68, 163-179.
- Headey, B., & Wearing, A. (1991). Subjective Well-Being: A Stocks and Flows Framework. *Subjective well-being: An interdisciplinary perspective*, 21, 49-73.

- Helliwell, J. F., & Huang, H. (2008). How's Your Government? International Evidence Linking Good Government and Well-being. *British Journal of Political Science*, 38(04), 595-619.
- Helliwell, J. F., & Barrington-Leigh, C. P. (2010). Viewpoint: Measuring and Understanding Subjective Well-Being. *Canadian Journal of Economics*, 43(3), 729-753.
- Helliwell, J. F., Huang, H., & Wang, S. (2015). The Geography of World Happiness. In J. F. Helliwell, R. Layard & J. Sachs (Eds.), *World Happiness Report 2015* (pp. 12-41). New York.
- Helliwell, J. F., Huang, H., & Wang, S. (2016). The Distribution of World Happiness. In J. F. Helliwell, R. Layard & J. Sachs (Eds.), *World Happiness Report 2016* (pp. 8-48). New York.
- Helliwell, J. F., & Wang, S. (2012). The State of World Happiness. In J. F. Helliwell, R. Layard & J. Sachs (Eds.), *World Happiness Report* (pp. 10-57).
- Helliwell, J. F., & Wang, S. (2013). World Happiness: Trends, Explanations and Distribution. In J. F. Helliwell, R. Layard & J. Sachs (Eds.), *World Happiness Report* (pp. 8-37).
- Hick, R. (2016). Between Income and Material Deprivation in the UK: In Search of Conversion Factors. *Journal of Human Development and Capabilities*, 17(1), 35-54.
- Kahneman, D., & Krueger, A. B. (2006). Developments in the Measurement of Subjective Well-Being. *Journal of Economic Perspectives*, 20(1), 3-24.
- Kapteyn, A., Smith, J. P., & Van Soest, A. (2013). Are Americans really less happy with their incomes? *Review of Income and Wealth*, 59(1), 44-65.
- Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). The Worldwide Governance Indicators: Methodology and Analytical Issues. *World Bank Policy Research Working Paper No. 5430*. Available at SSRN: <http://ssrn.com/abstract=1682130>.

- Kristensen, N., & Johansson, E. (2008). New Evidence on Cross-country Differences in Job Satisfaction Using Anchoring Vignettes. *Labour Economics*, 15(1), 96-117.
- Krueger, A. B., & Schkade, D. A. (2008). The Reliability of Subjective Well-Being Measures. *Journal of Public Economics*, 92(8/9), 1833-1845.
- Lepper, H. S. (1998). Use of Other-Reports to Validate Subjective Well-Being Measures. *Social Indicators Research*, 44(3), 367-379.
- MacKerron, G. (2012). Happiness Economics from 35 000 Feet. *Journal of Economic Surveys*, 26(4), 705-735.
- Martinetti, E. C. (2000). A Multidimensional Assessment of Well-Being Based on Sen's Functioning Approach. *Rivista internazionale di scienze sociali*, 207-239.
- Nikolova, M. (2016). Minding the happiness gap: Political institutions and perceived quality of life in transition. *European Journal of Political Economy*, 45, Supplement, 129-148.
- OECD. (2013). *Oecd Guidelines on Measuring Subjective Well-Being*: Organisation for Economic Cooperation and Development, OECD Publishing.
- Ravallion, M. (2005). On Measuring Aggregate "Social Efficiency". *Economic Development and Cultural Change*, 53(2), 273-292.
- Rode, M. (2013). Do Good Institutions Make Citizens Happy, or Do Happy Citizens Build Better Institutions? *Journal of Happiness Studies*, 14(5), 1479-1505.
- Sandvik, E., Diener, E., & Seidlitz, L. (1993). Subjective Well - Being: The Convergence and Stability of Self - Report and Non - Self - Report Measures. *Journal of personality*, 61(3), 317-342.
- Sen, A. (1999). *Development as Freedom*. New York, NY: Anchor Books.

- Senik, C. (2009). Direct Evidence on Income Comparisons and Their Welfare Effects. *Journal of Economic Behavior & Organization*, 72(1), 408-424.
- Simar, L., & Wilson, P. W. (2008). Statistical Inference in Nonparametric Frontier Models: Recent Developments and Perspectives. *The Measurement of Productive Efficiency (H. Fried, CAK Lovell and SS Schmidt Eds)*, Oxford University Press, Inc, 421-521.
- Spendzharova, A. B., & Vachudova, M. A. (2011). Catching Up? Consolidating Liberal Democracy in Bulgaria and Romania after Eu Accession. *West European Politics*, 35(1), 39-58.
- Stiglitz, J., Sen, A., & Fitoussi, J.-P. (2009). The Measurement of Economic Performance and Social Progress Revisited. *Reflections and overview. Commission on the Measurement of Economic Performance and Social Progress, Paris*.
- Stone, A. A., & Mackie, C. (2014). *Subjective Well-Being: Measuring Happiness, Suffering, and Other Dimensions of Experience*: National Academies Press.
- Tauchmann, H. (2012). Partial Frontier Efficiency Analysis. *Stata Journal*, 12(3), 461-478.
- TheEconomist. (2010) The Rich, the Poor and Bulgaria. *From the print edition*. retrieved from <http://www.economist.com/node/17722557>
- United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.
- World Development Indicators, The World Bank.
- Worldwide Governance Indicators. The World Bank.

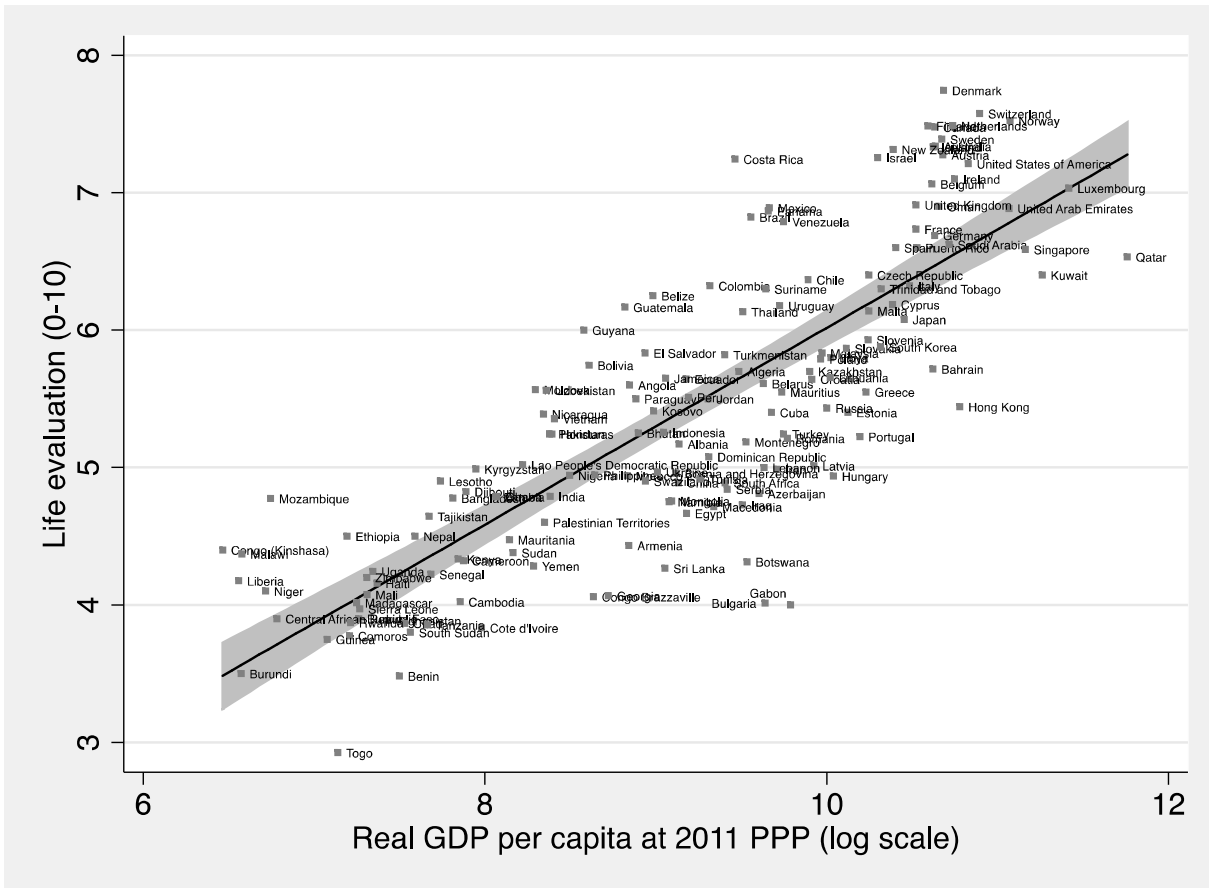


Fig. 1: Life evaluations and income, 2006-2014
 Source: Authors based on Gallup Analytics and World Development Indicators data.

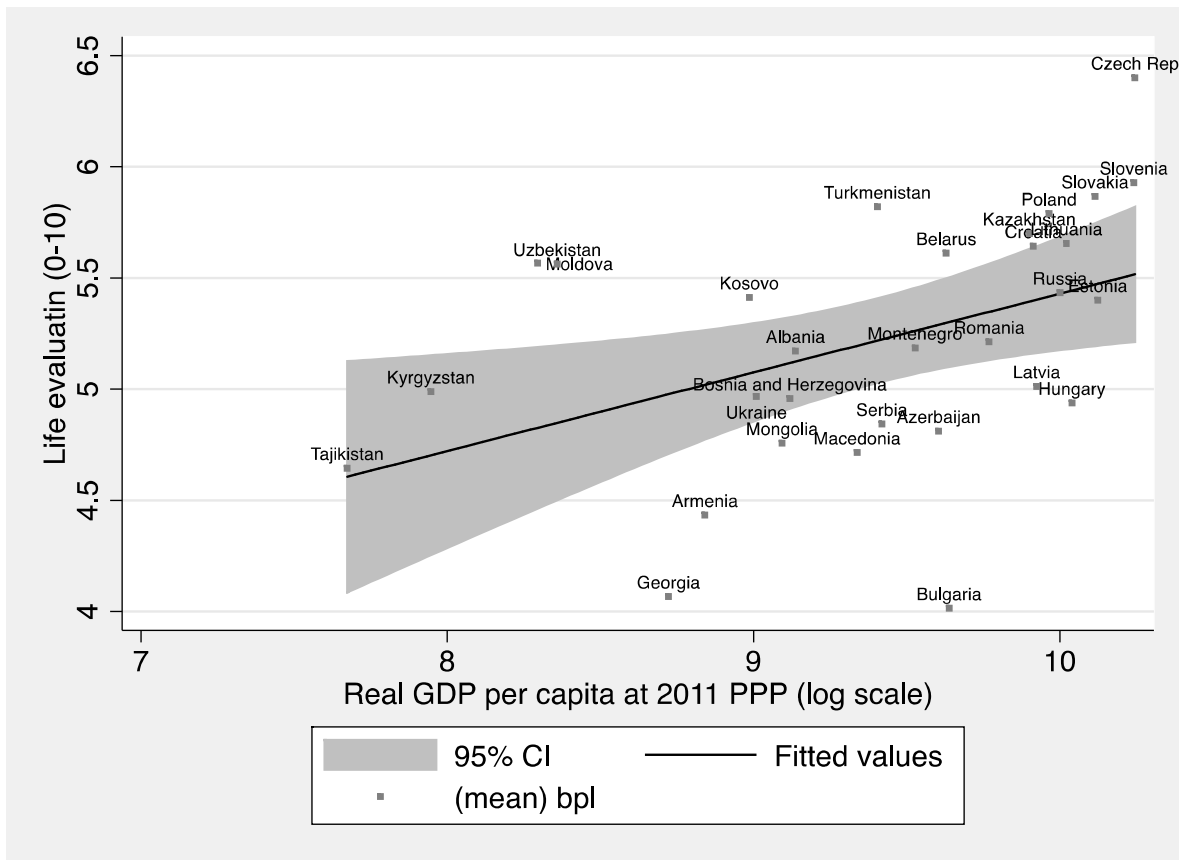


Fig. 2: Life evaluations and income, transition economies, 2006-2014
 Source: Authors based on Gallup Analytics and World Development Indicators data.

Table 1: Variable Definitions

Variable	Explanation
<i>Outcome variable</i>	
Life evaluation (0-10)	Country average of responses to “Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?”
<i>Inputs</i>	
GDP per capita at 2011 PPP (log scale)	Log-transformed GDP per capita at 2011 PPP
Secondary education	Share completed some secondary education up to three years tertiary education (nine to 15 years of education)
Life expectancy	Life expectancy at birth, both sexes combined (years)
<i>Background</i>	
Out of the labor force	Share out of workforce
Involuntary part-time	Share employed part-time but wants full-time
Unemployed	Share unemployed
Voluntary part-time	Share employed part-time and does not want full-time
Full-time	Share employed full-time for an employer
Self-employed	Share employed full-time for self
Social support	Share reporting “yes” to “If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them, or not?”
Generosity	Share reporting “yes” to “Have you done any of the following in the past month? How about donated money to a charity?”
Rule of Law	“capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (Kaufmann, et al., 2010, p. 4).
Freedom	Share reporting “satisfied” to “Your freedom to choose what you do with your life”

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Rule of Law data from the Worldwide Governance Indicators, Life expectancy from UNDP

Table 2: Efficiency scores, alpha=0.95, 2009-2014

Year	Mean (all)	Median (all)	Pct. inefficient	Eff. Score (Bulgaria)	SE (Bulgaria)	Rank (Bulgaria)	Life Eval. (Bulgaria)	Life Eval. (Bulgaria) if efficient	Possible Life Eval. Gain
2009	1.098	1.032	0.538	1.806	0.135	91/91	3.600	6.500	2.900
2010	1.098	1.055	0.549	1.405	0.117	86/91	4.200	5.900	1.700
2011	1.081	1.037	0.550	1.462	0.177	91/91	3.900	5.700	1.800
2012	1.070	1.000	0.484	1.405	0.064	90/91	4.200	5.900	1.700
2013	1.070	1.000	0.495	1.500	0.138	90/91	4.000	6.000	2.000
2014	1.088	1.047	0.582	1.341	0.117	88/91	4.400	5.900	1.500

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: N=546. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table 3: Life Evaluation and Efficiency Scores, alpha=0.95, 2014

Country	Life Evaluation	Efficiency Score	Std. Error	Z-stat	Rank 1=Best, 91=Worst	Reference
Afghanistan	3.100	1.290	0.134	2.161	86	Mali
Albania	4.800	1.229	0.089	2.566	77	El Salvador
Armenia	4.500	1.200	0.134	1.490	69	Pakistan
Austria	6.900	1.014	0.026	0.557	39	Brazil
Azerbaijan	5.300	1.057	0.048	1.188	51	Indonesia
Bahrain	6.200	1.048	0.064	0.758	47	Guatemala
Bangladesh	4.600	1.087	0.056	1.558	60	Nepal
Belarus	5.800	0.966	0.043	0.810	7	Indonesia
Bolivia	5.900	1.000	0.072	0.000	9	Bolivia
Bosnia and Herz.	5.200	1.212	0.079	2.675	73	Nicaragua
Brazil	7.000	1.000	0.077	0.000	9	Brazil
Bulgaria	4.400	1.341	0.114	2.989	88	El Salvador
Cambodia	3.900	1.077	0.035	2.193	56	Niger
Cameroon	4.200	1.000	0.080	0.000	9	Cameroon
Canada	7.300	0.959	0.034	1.217	6	Brazil
Chad	3.500	1.000	.	.	9	Chad
Chile	6.800	1.029	0.034	0.873	43	Brazil
Colombia	6.400	1.000	0.064	0.000	9	Colombia
Costa Rica	7.200	1.000	0.114	0.000	9	Costa Rica
Croatia	5.400	1.296	0.060	4.954	87	Brazil
Cyprus	5.600	1.250	0.071	3.506	81	Thailand
Czech Republic	6.500	1.015	0.031	0.500	41	Panama
Denmark	7.500	0.933	0.036	1.852	2	Brazil
Dominican Rep.	5.400	1.000	0.078	0.000	9	Dominican
Ecuador	5.900	1.068	0.049	1.383	55	Nicaragua
Egypt	4.900	1.102	0.057	1.783	61	Pakistan
El Salvador	5.900	1.000	0.087	0.000	9	El Salvador
France	6.500	1.046	0.032	1.424	45	Chile
Georgia	4.300	1.256	0.152	1.687	83	Pakistan
Germany	7.000	1.000	0.029	0.000	9	Brazil
Ghana	3.900	1.077	0.045	1.694	56	Cameroon
Greece	4.800	1.458	0.057	8.033	91	Brazil
Guatemala	6.500	1.000	0.111	0.000	9	Guatemala
Honduras	5.100	1.059	0.066	0.898	52	Pakistan
India	4.400	1.227	0.091	2.488	75	Pakistan
Indonesia	5.600	1.000	0.067	0.000	9	Indonesia
Iraq	4.500	1.200	0.108	1.844	69	Pakistan
Ireland	7.000	1.000	0.027	0.000	9	Brazil
Israel	7.400	0.946	0.032	1.687	5	Brazil
Italy	6.000	1.167	0.087	1.922	66	Thailand
Japan	5.900	1.153	0.037	4.132	63	Chile
Jordan	5.300	1.113	0.072	1.567	62	El Salvador
Kazakhstan	6.000	0.933	0.054	1.233	2	Indonesia
Kenya	4.900	1.000	0.093	0.000	9	Kenya
Kyrgyzstan	5.300	1.000	0.048	0.000	9	Kyrgyzstan
Lebanon	5.200	1.288	0.082	3.528	85	Mexico
Lithuania	6.100	1.000	0.062	0.000	9	Lithuania
Macedonia	5.200	1.212	0.079	2.689	73	Nicaragua
Malaysia	6.000	1.083	0.063	1.332	59	Guatemala
Mali	4.000	1.000	.	.	9	Mali
Mauritania	4.500	1.000	0.070	0.000	9	Mauritania

Mexico	6.700	1.000	0.066	0.000	9	Mexico
Moldova	5.900	1.000	0.072	0.000	9	Moldova
Montenegro	5.300	1.208	0.073	2.834	72	Colombia
Nepal	5.000	1.000	0.098	0.000	9	Nepal
Nicaragua	6.300	1.000	0.098	0.000	9	Nicaragua
Niger	4.200	1.000	.	.	9	Niger
Nigeria	5.025	1.000	0.142	0.000	9	Nigeria
Pakistan	5.400	1.000	0.125	0.000	9	Pakistan
Palestinian Territories	4.700	1.064	0.022	2.843	54	Nepal
Panama	6.600	1.015	0.041	0.369	40	Mexico
Paraguay	5.100	1.275	0.132	2.087	84	Guatemala
Peru	5.900	1.000	0.049	0.000	9	Bolivia
Philippines	5.300	1.019	0.046	0.410	42	Pakistan
Poland	5.800	1.155	0.045	3.412	64	Mexico
Portugal	5.100	1.373	0.142	2.616	90	Thailand
Romania	5.700	1.228	0.095	2.389	76	Brazil
Russia	6.000	0.933	0.055	1.201	2	Indonesia
Saudi Arabia	6.300	1.000	0.053	0.000	9	Saudi Arabia
Senegal	4.400	1.000	0.065	0.000	9	Senegal
Serbia	5.100	1.157	0.088	1.789	65	El Salvador
Slovenia	5.700	1.175	0.045	3.906	67	Mexico
South Africa	4.800	1.047	0.088	0.531	46	Nigeria
South Korea	5.800	1.207	0.067	3.066	71	Thailand
Spain	6.500	1.077	0.036	2.145	58	Brazil
Sri Lanka	4.300	1.372	0.125	2.985	89	El Salvador
Sweden	7.200	0.972	0.027	1.038	8	Brazil
Tajikistan	4.900	1.000	0.068	0.000	9	Tajikistan
Tanzania	3.500	1.200	0.070	2.872	68	Niger
Thailand	7.000	1.000	0.107	0.000	9	Thailand
Tunisia	4.800	1.229	0.078	2.937	77	El Salvador
Turkey	5.600	1.250	0.075	3.327	81	Brazil
Uganda	3.800	1.053	0.025	2.147	50	Mali
Ukraine	4.300	1.233	0.043	5.359	79	Philippines
United Kingdom	6.800	1.029	0.032	0.917	43	Brazil
United States	7.200	0.931	0.035	1.974	1	Mexico
Uruguay	6.600	1.061	0.049	1.238	53	Brazil
Venezuela	6.100	1.049	0.057	0.868	48	Colombia
Vietnam	5.100	1.235	0.111	2.126	80	Nicaragua
Yemen	4.000	1.050	0.058	0.858	49	Niger
Zimbabwe	4.200	1.000	.	.	9	Zimbabwe

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Note: Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table 4: Second-stage fixed effects regressions, alpha=0.95, 2009-2014

	(1)	(2)	(3)	(4)
	All	All	All	All
Out of the labor force		-0.189 (0.356)	-0.082 (0.093)	
Involuntary part-time		-0.331 (0.356)	-0.228 (0.146)	
Unemployed		-0.550 (0.378)	-0.451*** (0.151)	
Voluntary part-time		0.014 (0.414)		0.284* (0.164)
Full-time		-0.167 (0.381)		0.093 (0.119)
Self-employed		-0.097 (0.344)		0.165* (0.090)
Social support	0.173** (0.083)	0.154* (0.084)	0.151* (0.082)	0.164* (0.086)
Generosity	0.014 (0.043)	0.022 (0.043)	0.024 (0.042)	0.021 (0.043)
Rule of Law	0.091*** (0.033)	0.077** (0.032)	0.074** (0.032)	0.086** (0.034)
Freedom	0.120** (0.059)	0.100* (0.056)	0.101* (0.055)	0.104* (0.057)
Constant	0.461*** (0.122)	0.718** (0.347)	0.614*** (0.134)	0.429*** (0.123)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.725	0.731	0.732	0.728
Number of countries	91	91	91	91
F-stat	3.367	2.464	2.971	2.696

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Second-stage regressions, Bulgaria, individual-level results, alpha=0.95, 2009-2014

	(1)	(2)	(3)
Age	-0.011*** (0.001)	-0.010*** (0.001)	-0.010*** (0.002)
Age ² /100	0.010*** (0.001)	0.008*** (0.001)	0.009*** (0.001)
<i>Marital Status: Ref. Group: Married/Cohabiting</i>			
Single	-0.019 (0.015)	-0.021 (0.016)	-0.019 (0.012)
Separated/Divorced	-0.052*** (0.017)	-0.054*** (0.015)	-0.056*** (0.017)
Widow	-0.038*** (0.013)	-0.042*** (0.014)	-0.041*** (0.014)
Child in household	-0.026** (0.011)	-0.025** (0.011)	-0.028** (0.011)
Household size	-0.010** (0.004)	-0.012*** (0.004)	-0.009** (0.004)
Religiosity	0.013 (0.009)	0.010 (0.011)	0.009 (0.016)
Large city	0.055*** (0.014)	0.052*** (0.014)	0.040*** (0.014)
<i>Employment Status: Ref. Group: Voluntary Part-time</i>			
Full-time	0.005 (0.020)	0.004 (0.021)	-0.024 (0.018)
Self-employed	0.038* (0.022)	0.035 (0.023)	-0.005 (0.021)
Unemployed	-0.133*** (0.024)	-0.123*** (0.021)	-0.126*** (0.022)
Involuntary part-time	-0.060** (0.029)	-0.057** (0.026)	-0.060*** (0.020)
Out of the labor force	-0.060*** (0.019)	-0.055** (0.024)	-0.075*** (0.021)
Freedom		0.111*** (0.009)	0.092*** (0.009)
Social trust			0.011 (0.019)
Generosity			0.061*** (0.010)
Social Support			0.123*** (0.014)
Constant	1.028*** (0.042)	0.932*** (0.050)	0.850*** (0.053)
Observations	5,333	4,873	3,912
R ²	0.075	0.121	0.159

Source: Authors based on Gallup World Poll data

Notes: Trust is defined as the share in Gallup Analytics reporting “no” to “Is corruption widespread throughout the government in (this country), or not?” and “no” to “Is corruption widespread within businesses located in (this country), or not?” The dependent variable is the efficiency score for each individual in the 2009-2014 period. Robust standard errors in parentheses, clustered at the NUTS3 level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix A. Descriptive statistics.

Table A1: Descriptive Statistics, 2009-2014

Variable	Non-imputed sample					Imputed sample					Number imputed
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	
Life evaluation (0-10)	544	5.490	1.047	3.100	7.800	546	5.489	1.045	3.100	7.800	2
Log GDP per capita	545	9.253	1.010	6.669	10.861	546	9.251	1.010	6.669	10.861	1
Secondary education	544	0.503	0.175	0.050	0.850	546	0.504	0.175	0.050	0.850	2
Life expectancy	546	72.157	7.692	47.643	83.532	546	72.157	7.692	47.643	83.532	0
Out of the labor force	527	0.409	0.092	0.180	0.640	546	0.408	0.092	0.180	0.640	19
Involuntary part-time	527	0.070	0.042	0.010	0.320	546	0.070	0.042	0.010	0.320	19
Unemployed	527	0.067	0.039	0.010	0.300	546	0.068	0.039	0.010	0.300	19
Voluntary part-time	527	0.072	0.040	0.010	0.250	546	0.072	0.039	0.010	0.250	19
Full-time	527	0.254	0.111	0.040	0.540	546	0.254	0.110	0.040	0.540	19
Self-employed	527	0.127	0.087	0.000	0.430	546	0.127	0.087	0.000	0.430	19
Social support	545	0.807	0.102	0.460	0.970	546	0.807	0.102	0.460	0.970	1
Generosity	540	0.280	0.176	0.030	0.870	546	0.280	0.175	0.030	0.870	6
Rule of law	546	2.683	0.979	0.767	4.972	546	2.683	0.979	0.767	4.972	0
Freedom	543	0.680	0.152	0.250	0.950	546	0.679	0.152	0.250	0.950	3

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, RoL data from the Worldwide Governance Indicators, Life expectancy from UNDP

Notes: Life evaluation and GDP represent the averages for the sample. All other variables are reported in terms of shares.

Table A2: Countries Included In the Analyses, by World Bank Country Group Classifications

WB classification	Countries	Country-years	Life evaluation (0-10)	Financial Satisfaction (% Satisfied)
High income	Austria Bahrain Canada Chile Croatia Cyprus Czech Republic Denmark France Germany Greece Ireland Israel Italy Japan Lithuania Poland Portugal Russia Saudi Arabia Slovenia South Korea Spain Sweden United Kingdom United States of America Uruguay Venezuela	168	6.415	0.700
Upper-middle income	Albania Azerbaijan Belarus Bosnia and Herzegovina Brazil Bulgaria Colombia Costa Rica Dominican Republic Ecuador Iraq Jordan Kazakhstan Lebanon Macedonia Malaysia Mexico Montenegro Panama Paraguay Peru Romania Serbia South Africa Thailand Tunisia Turkey	162	5.550	0.566
Lower middle income	Armenia Bangladesh Bolivia Cameroon Egypt El Salvador Georgia Ghana Guatemala Honduras India Indonesia Kenya Kyrgyzstan Mauritania Moldova Nicaragua Nigeria Pakistan Palestinian Territories Philippines Senegal Sri Lanka Tajikistan Ukraine Vietnam Yemen	162	4.932	0.542
Low income	Afghanistan Cambodia Chad Mali Nepal Niger Tanzania Uganda Zimbabwe	54	4.094	0.464

Source: Authors

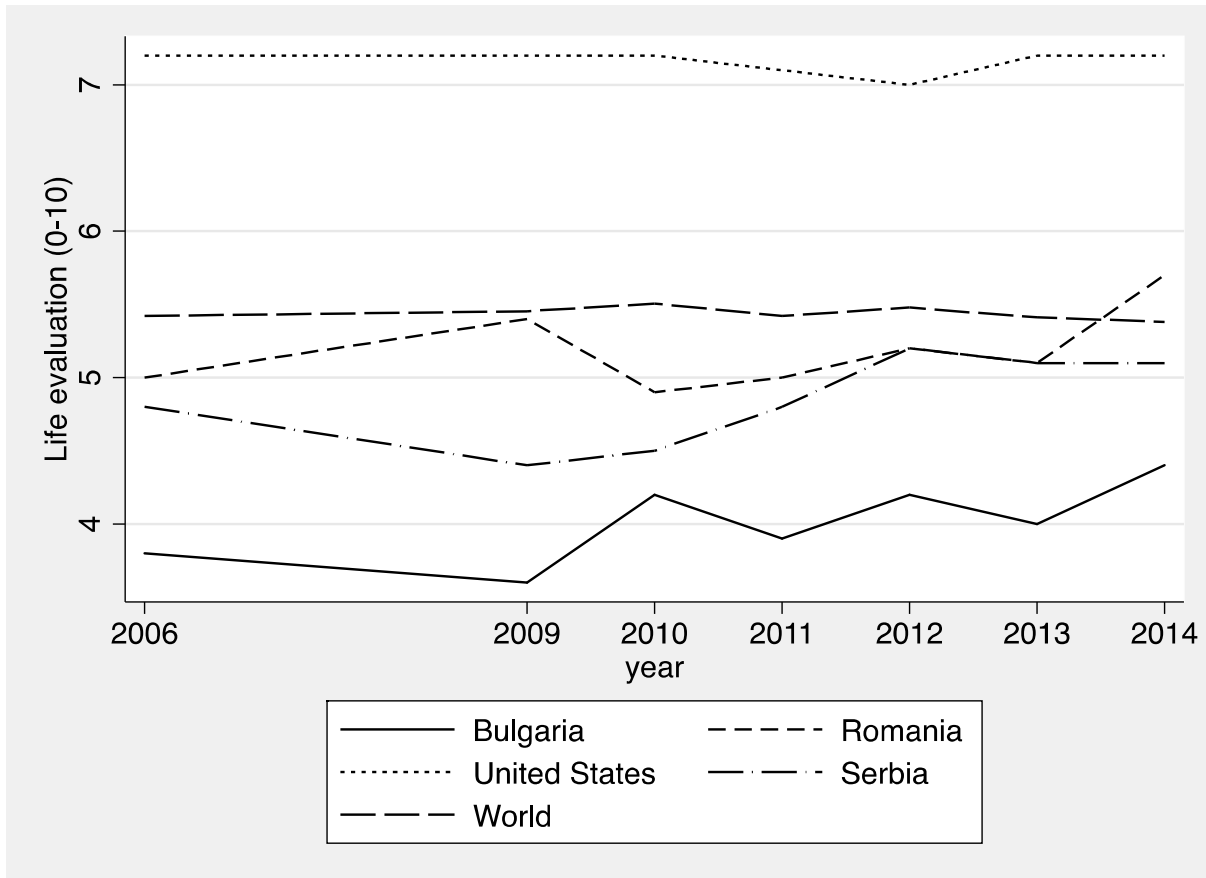


Fig. A1: Life evaluations in selected countries

Source: Authors based on Gallup Analytics data

Note: The data for all countries are for 2006 and 2009-2014 as Bulgaria was only polled in these years.

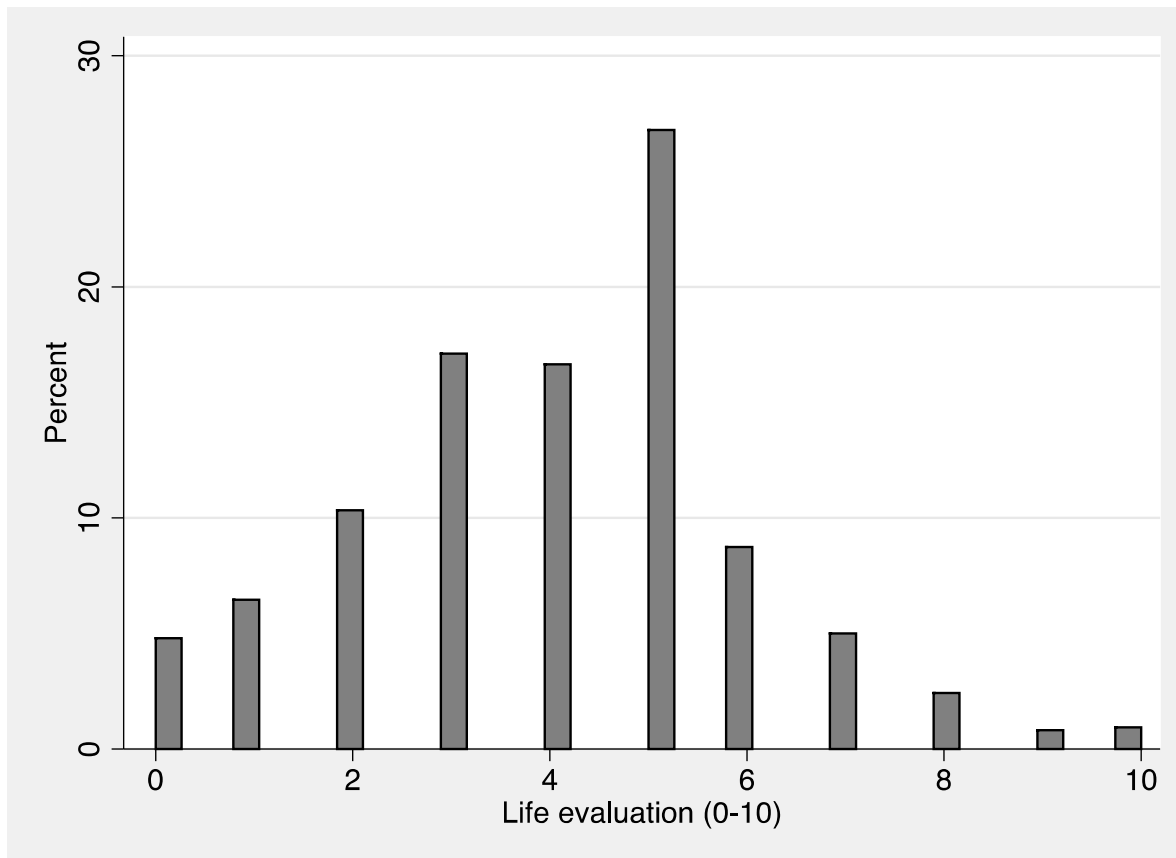


Fig. A2: The distribution of life evaluations in Bulgaria

Source: Authors based on Gallup World Poll data for Bulgaria

Note: The data are for 2006 and 2009-2014 as Bulgaria was only polled in these years.

Appendix B. Heterogeneity Analyses and Robustness Checks

In Tables B1-B2, we estimate the regressions in Table 4 by income group and post-socialist country status. One important result evident from Table B1 is that unemployment only reduces efficiency in upper-middle income countries in the sample but not in the lower-middle or lower income nations (Model (1) vs. Model (3)). One interpretation of this result could be that respondents in poor countries may be less attached to formal labor markets.

Table B2 shows that while unemployment is equally detrimental to well-being efficiency in both transition and non-transition countries, voluntary work arrangements improve efficiency in the latter but decrease it or do not alter it in transition countries. Social support – i.e. the share reporting having friends and family to rely on in times of need – only matters for efficiency in transition countries, while freedom only matters in non-transition societies.

In Table B3, we used the trust variable based on the Gallup Analytics data rather than the rule of law from the Worldwide Governance Indicators. Social trust is often considered a measure of the quality of informal institutions. Compared to Table 4, the coefficient estimate for the trust variable in Table B3 is statistically insignificant, although the freedom satisfaction variable becomes unambiguously statistically significant. This implies that the rule of law mediates the efficiency benefits derived from freedom of choice.

We test the robustness of our findings in a series of a sensitivity checks. First, we reduce α to 0.90, a less conservative tuning parameter. Indeed, the results in Table B4 show that countries appear to be slightly more efficient, although Bulgaria's relative ranking does not improve compared to the ranking presented in Table 2. The second-stage results in Table B5 are generally in line with those in Table 4, although the rule of law is not robustly associated with efficiency. Unemployment emerges as the strongest factor lowering efficiency.

In Tables B6 and B7, we report results using a more conservative α of 0.98, whereby countries appear less efficient. Based on Table B6, Bulgaria's relative ranking does not change much from that reported in Tables 2 and B4. The second-stage results in Table B7 are very consistent with those reported in Tables 4 and B5.

Second, we use financial satisfaction, rather than life evaluations, as the output variable (Tables B8 and B9). These findings confirm the same depressing story: not only are Bulgarians dissatisfied with their finances but they are also inefficient in terms of utilizing their resources to achieve financial well-being. Table B9 reveals that while the employment status variables are unimportant for efficiency in the statistical sense, social support, generosity, the rule of law and freedom are all factors promoting efficiency as related to financial well-being.

Third, we tested whether changing the input variables has an implication for the results. In Table B10, we report the happiness efficiency scores when using years of schooling data from the UNDP used in the calculations of the Human Development Index. These results unequivocally show that Bulgaria ranks as the least efficient country throughout the analysis period. The second-stage results in Table B11 are also strongly in line with our main findings (Table 4), although the freedom variable becomes a non-robust predictor of happiness efficiency.

Finally, in Table B12 we report results using the country-level self-reported health variable from Gallup Analytics as an input (rather than the life expectancy data in the main results). The results are a little more nuanced: the result that Bulgaria became efficient in 2013 is puzzling but can be attributed to the less precisely measured self-reported health status variable. In particular, health is defined as the share of respondents reporting no health problem limiting their daily activities, which is likely influenced by the country-specific norm of what constitutes a health limitation. An alternative explanation regarding the sharp improvement in efficiency in

2013 is the country-wide protests against corruption and systemic inefficiencies. Specifically, it is possible that the protests made Bulgarians more aware of their resources and better able to transform their resources into well-being. 2014 brought Bulgarians further disappointments with the political system at home, which could explain the higher inefficiency and worsened relative rank. However, this explanation should be taken with a grain of salt, given that the main results and the other robustness checks fail to show such a remarkable improvement in efficiency. The second-stage results in Table B13 are generally consistent with those reported in the other analyses.

Table B1: Second-stage fixed effects regressions, by World Bank country group, alpha=0.95, 2009-2014

	(1) Upper- middle income	(2) Upper- middle income	(3) Lower middle and low income	(4) Lower middle and low income
Out of the labor force	0.015 (0.095)		-0.107 (0.150)	
Involuntary part-time	-0.392 (0.317)		-0.095 (0.166)	
Unemployed	-0.514** (0.241)		-0.227 (0.207)	
Voluntary part-time		0.313 (0.254)		0.218 (0.275)
Full-time		0.103 (0.166)		-0.089 (0.179)
Self-employed		0.047 (0.161)		0.118 (0.116)
Social support	0.224 (0.166)	0.275 (0.175)	0.159 (0.101)	0.169 (0.108)
Generosity	0.042 (0.092)	0.014 (0.092)	-0.046 (0.060)	-0.036 (0.056)
Rule of law	0.029 (0.089)	0.041 (0.087)	0.055 (0.039)	0.061 (0.039)
Freedom	0.054 (0.083)	0.060 (0.089)	0.078 (0.079)	0.087 (0.078)
Constant	0.646** (0.306)	0.467 (0.303)	0.749*** (0.123)	0.632*** (0.081)
Year FE	Y	Y	Y	Y
Observations	162	162	216	216
Adjusted R ²	0.788	0.780	0.682	0.684
Number of countries	27	27	36	36
F-stat	3.145	2.352	2.166	2.459

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table B2: Second-stage fixed effects regressions, by transition status, alpha=0.95, 2009-2014

	(1)	(2)	(3)	(4)
	Transition	Transition	Non-Transition	Non-Transition
Out of the labor force	0.079 (0.161)		-0.152 (0.112)	
Involuntary part-time	-0.049 (0.303)		-0.326* (0.172)	
Unemployed	-0.364** (0.161)		-0.390** (0.176)	
Voluntary part-time		-0.528** (0.249)		0.434** (0.185)
Full-time		0.030 (0.195)		0.119 (0.149)
Self-employed		0.280 (0.163)		0.241** (0.106)
Social support	0.415** (0.156)	0.454** (0.166)	0.078 (0.100)	0.095 (0.102)
Generosity	-0.137 (0.092)	-0.106 (0.088)	0.029 (0.045)	0.020 (0.046)
Rule of law	0.142 (0.097)	0.150 (0.091)	0.046 (0.033)	0.055 (0.034)
Freedom	-0.143 (0.119)	-0.145 (0.108)	0.104* (0.058)	0.105* (0.058)
Constant	0.235 (0.307)	0.184 (0.236)	0.804*** (0.153)	0.563*** (0.131)
Year FE	Y	Y	Y	Y
Observations	132	132	414	414
Adjusted R ²	0.786	0.794	0.686	0.688
Number of countries	22	22	69	69
F-stat	9.722	6.655	1.682	1.749

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level. The transition countries include: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Kazakhstan, Kosovo, Kyrgyzstan, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovenia, Tajikistan and the Ukraine.

*** p<0.01, ** p<0.05, * p<0.1

Table B3: Second-stage fixed effects regressions, with trust control, alpha=0.95, 2009-2014

	(1) All	(2) All	(3) All	(4) All
Out of the labor force		-0.220 (0.358)	-0.089 (0.092)	
Involuntary part-time		-0.374 (0.364)	-0.247* (0.148)	
Unemployed		-0.619 (0.385)	-0.493*** (0.157)	
Voluntary part-time		-0.029 (0.419)		0.278* (0.166)
Full-time		-0.187 (0.383)		0.114 (0.119)
Self-employed		-0.118 (0.345)		0.186** (0.090)
Social support	0.185** (0.085)	0.162* (0.086)	0.159* (0.084)	0.175* (0.089)
Generosity	0.031 (0.042)	0.038 (0.042)	0.038 (0.041)	0.038 (0.042)
Trust	0.058 (0.065)	0.044 (0.066)	0.047 (0.066)	0.044 (0.067)
Freedom	0.145** (0.059)	0.119** (0.056)	0.119** (0.055)	0.126** (0.057)
Constant	0.663*** (0.081)	0.922** (0.358)	0.789*** (0.093)	0.616*** (0.088)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.719	0.727	0.728	0.723
Number of countries	91	91	91	91
F-stat	2.773	2.169	2.637	2.212

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level. Trust is defined as the share in Gallup Analytics reporting "no" to "Is corruption widespread throughout the government in (this country), or not?" and "no" to "Is corruption widespread within businesses located in (this country), or not?"

*** p<0.01, ** p<0.05, * p<0.1

Table B4: Efficiency scores, alpha=0.90, 2009-2014

Year	Mean (all)	Median (all)	Pct. inefficient	Eff. Score (Bulgaria)	SE (Bulgaria)	Rank (Bulgaria)	Life Eval. (Bulgaria)	Life Eval. (Bulgaria) if efficient	Possible Life Eval. Gain
2009	1.031	1.000	0.374	1.667	0.136	91/91	3.600	6.000	2.400
2010	1.045	1.000	0.473	1.381	0.093	86/91	4.200	5.800	1.600
2011	1.037	1.000	0.462	1.462	0.110	91/91	3.900	5.700	1.800
2012	1.025	1.000	0.418	1.381	0.096	90/91	4.200	5.800	1.600
2013	1.019	1.000	0.363	1.275	0.146	86/91	4.000	5.100	1.100
2014	1.028	1.000	0.451	1.227	0.095	88/91	4.400	5.400	1.000

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: N=546. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table B5: Second-stage fixed effects regressions, alpha=0.90, 2009-2014

	(1)	(2)	(3)	(4)
	All	All	All	All
Out of the labor force		-0.228 (0.343)	-0.054 (0.086)	
Involuntary part-time		-0.500 (0.349)	-0.331** (0.144)	
Unemployed		-0.729** (0.361)	-0.566*** (0.151)	
Voluntary part-time		0.005 (0.387)		0.353** (0.168)
Full-time		-0.253 (0.359)		0.081 (0.104)
Self-employed		-0.173 (0.337)		0.165* (0.091)
Social support	0.227*** (0.072)	0.204*** (0.074)	0.202*** (0.072)	0.218*** (0.075)
Generosity	0.034 (0.042)	0.042 (0.040)	0.044 (0.039)	0.039 (0.042)
Rule of Law	0.070** (0.034)	0.053 (0.033)	0.049 (0.033)	0.066* (0.034)
Freedom	0.176*** (0.056)	0.157*** (0.054)	0.158*** (0.054)	0.159*** (0.054)
Constant	0.491*** (0.114)	0.831** (0.337)	0.661*** (0.127)	0.456*** (0.116)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.723	0.753	0.753	0.746
Number of countries	91	91	91	91
F-stat	3.712	3.402	3.962	3.028

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year.

Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table B6: Efficiency scores, alpha=0.98, 2009-2014

Year	Mean (all)	Median (all)	Pct. inefficient	Eff. Score (Bulgaria)	SE (Bulgaria)	Rank (Bulgaria)	Life Eval. (Bulgaria)	Life Eval. (Bulgaria) if efficient	Possible Life Eval. Gain
2009	1.129	1.065	0.604	1.889	0.167	91/91	3.600	6.800	3.200
2010	1.127	1.074	0.582	1.595	0.143	89/91	4.200	6.700	2.500
2011	1.110	1.061	0.615	1.795	0.190	91/91	3.900	7.000	3.100
2012	1.104	1.053	0.604	1.405	0.113	87/91	4.200	5.900	1.700
2013	1.109	1.043	0.571	1.575	0.177	91/91	4.000	6.300	2.300
2014	1.115	1.061	0.637	1.477	0.140	88/91	4.400	6.500	2.100

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: N=546. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table B7: Second-stage fixed effects regressions, alpha=0.98, 2009-2014

	(1)	(2)	(3)	(4)
	All	All	All	All
Out of the labor force		-0.178 (0.351)	-0.101 (0.091)	
Involuntary part-time		-0.264 (0.362)	-0.194 (0.140)	
Unemployed		-0.571 (0.394)	-0.500*** (0.153)	
Voluntary part-time		-0.009 (0.403)		0.249* (0.149)
Full-time		-0.166 (0.384)		0.082 (0.121)
Self-employed		-0.005 (0.347)		0.244*** (0.083)
Social support	0.207*** (0.075)	0.192** (0.078)	0.182** (0.076)	0.204** (0.080)
Generosity	0.037 (0.036)	0.051 (0.037)	0.048 (0.036)	0.050 (0.037)
Rule of Law	0.061** (0.029)	0.043 (0.028)	0.042 (0.029)	0.053* (0.030)
Freedom	0.103* (0.054)	0.076 (0.049)	0.080 (0.049)	0.081 (0.050)
Constant	0.495*** (0.110)	0.739** (0.351)	0.664*** (0.127)	0.462*** (0.109)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.755	0.763	0.763	0.760
Number of countries	91	91	91	91
F-stat	2.589	2.353	2.534	2.478

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table B8: Efficiency scores, financial satisfaction, alpha=0.95, 2009-2014

Year	Mean (all)	Median (all)	Pct. inefficient	Eff. Score (Bulgaria)	SE (Bulgaria)	Rank (Bulgaria)	Fin. Sat. (Bulgaria)	Fin. Sat. (Bulgaria) if efficient	Possible Fin. Sat. Gain
2009	1.275	1.086	0.615	2.833	0.219	89/91	0.240	0.680	0.440
2010	1.302	1.068	0.681	2.379	0.081	86/91	0.290	0.690	0.400
2011	1.291	1.081	0.615	2.800	0.176	91/91	0.250	0.700	0.450
2012	1.321	1.113	0.604	2.483	0.335	88/91	0.290	0.720	0.430
2013	1.314	1.114	0.670	2.571	0.131	86/91	0.280	0.720	0.440
2014	1.304	1.114	0.758	2.108	0.094	84/91	0.370	0.780	0.410

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: N=546. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table B9: Second-stage fixed effects regressions, financial satisfaction, 2009-2014

	(1)	(2)	(3)	(4)
	All	All	All	All
Out of the labor force		-0.078 (0.383)	0.056 (0.108)	
Involuntary part-time		-0.466 (0.404)	-0.337* (0.177)	
Unemployed		-0.230 (0.420)	-0.104 (0.179)	
Voluntary part-time		-0.006 (0.418)		0.142 (0.158)
Full-time		-0.212 (0.421)		-0.071 (0.118)
Self-employed		-0.110 (0.418)		0.040 (0.133)
Social support	0.373*** (0.093)	0.378*** (0.093)	0.372*** (0.092)	0.378*** (0.093)
Generosity	0.153*** (0.054)	0.154*** (0.055)	0.154*** (0.052)	0.152*** (0.056)
Rule of Law	0.173*** (0.058)	0.170*** (0.059)	0.167*** (0.059)	0.175*** (0.059)
Freedom	0.272*** (0.074)	0.278*** (0.076)	0.280*** (0.076)	0.269*** (0.077)
Constant	-0.128 (0.180)	0.029 (0.437)	-0.103 (0.201)	-0.133 (0.181)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.885	0.886	0.886	0.885
Number of countries	91	91	91	91
F-stat	6.146	4.329	4.880	5.051

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table B10: Efficiency scores, using years of schooling data from UNDP as an input, alpha=0.95, 2009-2014

Year	Mean (all)	Median (all)	Pct. inefficient	Eff. Score (Bulgaria)	SE (Bulgaria)	Rank (Bulgaria)	Life Eval. (Bulgaria)	Life Eval. (Bulgaria) if efficient	Possible Life Eval. Gain
2009	1.109	1.058	0.571	1.889	0.101	91/91	3.600	6.800	3.200
2010	1.112	1.063	0.593	1.595	0.082	91/91	4.200	6.700	2.500
2011	1.089	1.045	0.561	1.667	0.130	91/91	3.900	6.500	2.600
2012	1.089	1.049	0.582	1.524	0.091	91/91	4.200	6.400	2.200
2013	1.084	1.016	0.538	1.575	0.084	91/91	4.000	6.300	2.300
2014	1.089	1.049	0.604	1.455	0.085	90/91	4.400	6.400	2.000

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators, Years of schooling data from UNDP

Notes: N=546. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table B11: Second-stage fixed effects regressions, using years of schooling data from UNDP as an input, 2009-2014

	(1) All	(2) All	(3) All	(4) All
Out of the labor force		0.057 (0.290)	-0.064 (0.084)	
Involuntary part-time		-0.029 (0.294)	-0.151 (0.149)	
Unemployed		-0.289 (0.334)	-0.412*** (0.140)	
Voluntary part-time		0.151 (0.337)		0.167 (0.142)
Full-time		0.105 (0.319)		0.108 (0.105)
Self-employed		0.139 (0.290)		0.146* (0.084)
Social support	0.243*** (0.077)	0.224*** (0.077)	0.223*** (0.076)	0.235*** (0.079)
Generosity	-0.001 (0.040)	0.006 (0.039)	0.006 (0.038)	0.006 (0.039)
Rule of Law	0.097*** (0.032)	0.083*** (0.031)	0.082** (0.032)	0.091*** (0.032)
Freedom	0.108* (0.061)	0.090 (0.058)	0.091 (0.057)	0.093 (0.059)
Constant	0.394*** (0.109)	0.397 (0.295)	0.522*** (0.124)	0.368*** (0.110)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.787	0.790	0.791	0.788
Number of countries	91	91	91	91
F-stat	3.902	3.043	3.482	3.058

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators, Years of schooling data from UNDP

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table B12: Efficiency scores, using self-reported health data as an input, alpha=0.95, 2009-2014

Year	Mean (all)	Median (all)	Pct. inefficient	Eff. Score (Bulgaria)	SE (Bulgaria)	Rank (Bulgaria)	Life Eval. (Bulgaria)	Life Eval. (Bulgaria) if efficient	Possible Life Eval. Gain
2009	1.030	1.000	0.374	1.444	0.044	91/91	3.6	5.200	1.600
2010	1.074	1.015	0.517	1.476	0.123	91/91	4.2	6.200	2.000
2011	1.063	1.000	0.473	1.359	0.109	89/91	3.9	5.300	1.400
2012	1.040	1.000	0.396	1.214	0.108	85/91	4.2	5.100	0.900
2013	1.040	1.000	0.385	1.000	0.042	13/91	4	4.000	0.000
2014	1.072	1.020	0.549	1.227	0.075	78/91	4.4	5.400	1.000

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: N=546. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its SWB with current resources. Efficiency scores equal to one indicate that resources such as income, education or health are optimally used and no SWB improvements are possible without changing the inputs.

Table B13: Second-stage fixed effects regressions, using self-reported health as an input, 2009-2014

	(1)	(2)	(3)	(4)
	All	All	All	All
Out of the labor force		-0.560 (0.446)	-0.024 (0.123)	
Involuntary part-time		-0.772* (0.446)	-0.245 (0.162)	
Unemployed		-0.984** (0.473)	-0.455*** (0.145)	
Voluntary part-time		-0.501 (0.497)		0.155 (0.209)
Full-time		-0.612 (0.493)		0.039 (0.168)
Self-employed		-0.502 (0.438)		0.148 (0.111)
Social support	0.090 (0.086)	0.078 (0.089)	0.070 (0.085)	0.089 (0.092)
Generosity	0.073 (0.050)	0.085* (0.050)	0.080* (0.048)	0.081 (0.052)
Rule of Law	0.096** (0.040)	0.078** (0.039)	0.079** (0.039)	0.092** (0.041)
Freedom	0.164*** (0.058)	0.147** (0.056)	0.151*** (0.056)	0.151*** (0.055)
Constant	0.526*** (0.130)	1.193** (0.473)	0.650*** (0.160)	0.506*** (0.130)
Year FE	Y	Y	Y	Y
Observations	546	546	546	546
Adjusted R ²	0.556	0.563	0.563	0.556
Number of countries	91	91	91	91
F-stat	5.614	4.070	5.020	4.439

Source: Authors based on Gallup Analytics. Income data from the World Development Indicators Database, Life expectancy data from the United Nations, Rule of Law data from the Worldwide Governance Indicators

Notes: The dependent variable is the efficiency score for each country and year. Robust standard errors in parentheses, clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1