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Research Article

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

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Abstract: Most of the studies on subjective well-being focus on the determinants of absolute life satisfaction or happiness levels. This paper asks an important but understudied question, namely, could countries achieve the same or even higher subjective well-being by using the same resources more efficiently? We provide the first country panel evidence on whether nations efficiently transform their endowments (income, education, and health) into subjective well-being and which factors influence the conversion efficiency. Using data on 91 countries from 2009 to 2014, we find that that well-being efficiency gains are possible worldwide. We show that poor labor market conditions as proxied by unemployment and involuntary part-time employment are associated with lower 'subjective well-being efficiency,' while social support, freedom, and the rule of law improve it. These findings are useful to policymakers in helping identify inefficiencies, reducing wasteful resource use, and developing policies that promote sustainable development and human well-being. Our results are robust to a battery of sensitivity checks and raise policy-relevant questions about the appropriate instruments to improve subjective well-being efficiency.

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1 Introduction

Subjective well-being measures – comprising assessments of positive and negative emotions, life evaluations, and life purpose – have gained popularity in assessing the non-monetary consequences of different behaviors and events.[1] Most papers in the so-called Economics of Happiness literature ask the question: what factors enhance or diminish subjective well-being? In our paper, we ask an important but understudied question, namely, could countries achieve the same or even higher subjective well-being by using the same resources more efficiently? While the determinants of absolute subjective well-being levels are well documented (MacKerron 2012), much less is known about how individuals and countries use their resources and endowments to reach given subjective well-being levels.

Coined by Binder and Broekel (2012a), the term 'happiness efficiency' or 'subjective well-being efficiency' refers to the efficiency with which individuals or countries convert resources such as income into subjective well-being.[2] The central question of such analyses is how wastefully or productively nations and persons utilize their available resources to reach certain subjective well-being levels, relative to peers with similar or lower resources. In this framework, the most efficient countries and individuals are positioned on a frontier and serve as benchmarks. This benchmark shows the highest achievable subjective well-being, given current resources. Subjective well-being efficiency scores are thus the distance to the country or individual with similar resources and achieving similar absolute subjective well-being levels.[3] More importantly, they also reveal whether there is any waste in the current use of resources, which is a first step towards understanding how it can be minimized.

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1 In this paper, by 'subjective well-being,' we mean the evaluative dimension, i.e., the subjective evaluation of the individual's overall life quality.

2 Throughout the paper, we use the terms 'happiness efficiency' and 'subjective well-being efficiency' interchangeably.

3 Broadly defined, the term 'efficiency' refers to the ratio between output and input. Alternatively, efficiency can be defined as the *distance* between the quantity of input and output and the best possible frontier (Daraio and Simar 2007). In this paper, like Binder and Broekel (2012a), we use the term rather loosely to denote happiness levels given current resources and relative to nations or individuals with similar or lower levels of resources.

Subjective well-being efficiency is, therefore, a *relative* rather than an *absolute* measure. It is useful for policymakers and society because it demonstrates whether countries could achieve their current levels of subjective well-being with fewer resources (Binder and Broekel 2012a). More importantly, relative subjective well-being analyses reveal why inefficiencies exist and under what conditions these inefficiencies can be reduced. The real value of subjective well-being efficiency analyses for policymakers is in understanding whether and how factors, such as institutions, social norms, and the general socio-demographic composition of the country, help or hinder the conversion of resources into subjective well-being. Such knowledge can help design policies that seek to reduce inefficiencies and empower people to derive satisfaction and meaning from their lives.

Even efficient countries can benefit from such relative subjective well-being analysis. Specifically, they can use subjective well-being efficiency to monitor and identify inefficiencies over time, or understand whether there are inequalities and disparities within particular regions of the country. As such, subjective well-being efficiency analysis can be an additional welfare indicator. Even if enough countries have reached efficiency, the real contribution of the relative subjective well-being measures is decreasing inefficiencies and understanding why they exist.

Thus, by focusing on revealing inefficiencies, relative subjective well-being analyses can be an important complement to standard measures of human progress and absolute subjective well-being. Using a country's endowments more efficiently and freeing up resources and achieving flourishing with less has implications for sustainability, which has become a key policy priority in recent years. For example, the adoption of the Sustainable Development Goals (SDGs) and the Paris Agreement have highlighted the importance of developing and embracing approaches to well-being that do not harm the environment but rather preserve it for future generations (Patrick et al. 2019).

A measure of relative subjective well-being also contributes to debates in ecological economics, according to which achieving well-being and progress cannot hinge on continued GDP growth (Hickel 2020). While GDP growth is instrumental for satisfying basic consumption needs, it does not necessarily contribute to subjective well-being in the long-run (Easterlin 2017). Therefore, by utilizing resources more efficiently or equitably, well-being can be achieved without excessive use of resources and endangering the planet's carrying capacity. This sort of policy-based approach to sustainability and resource use is, in fact, at the heart of the Happy Planet Index, which relates the inequality-adjusted happy life years to the resources it takes to achieve these (Pillarisetti and van den Bergh 2013). The growing consensus that human well-being, poverty reduction, and development must go hand-in-hand with preserving the health of the environment and embracing sustainability (Patrick et al. 2019) will likely make analyses such as

those advocated in this paper critical inputs in public policy decision-making in the future.

Our paper both confirms extant findings from Binder and Broekel (2012a) and Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017) and offers novel insights. We substantively contribute to the emergent scholarship on subjective well-being efficiency by applying the approach by Binder and Broekel (2012a) to a balanced country panel setting. Using a robust nonparametric order-α approach (Aragon, Daouia, and Thomas-Agnan 2005), we are the first to utilize a 91-country panel to examine whether these nations optimally reach their subjective well-being levels given their current resources (i.e., income, education and health). Moreover, in our second stage analysis, we also explore the contextual factors that help or hinder efficiency at the country level. For example, none of the existing studies explain which macroeconomic and institutional conditions matter for happiness efficiency, which is a knowledge gap that we fill. Therefore, our study's insights have direct policy implications for the policy instruments and investments in social infrastructure that can help reduce inefficiencies and provide a sustainable future path.

Our cross-country analyses reveal that subjective well-being efficiency gains are possible worldwide, meaning that nations in our sample could enjoy higher subjective well-being levels given their incomes, health, and human capital. As proxied by unemployment and involuntary part-time employment, poor labor market conditions hinder the conversion of resources into perceived well-being. At the same time, the rule of law, social support, and freedom perceptions improve it. Our findings are robust to a battery of sensitivity checks and raise policy-relevant questions about the appropriate instruments to happiness efficiency.

We contribute to the policy debate and societal knowledge by providing an understanding of well-being that goes beyond the determinants of absolute subjective well-being levels. Instead, we focus on relative subjective well-being and reveal whether inefficiencies exist and what could be done to reduce them to make better use of societies' scarce resources. Our research also contributes to the new science of well-being measurement by showing that subjective well-being efficiency analyses can be helpful to policymakers and society even in the case of adaptation to bad equilibria. For example, even if people living in countries with dysfunctional institutions report high life satisfaction due to adaptation, subjective well-being efficiency analyses can reveal these inefficiencies and point out their sources.

2 Subjective Well-being Efficiency

Subjective well-being has separate but related dimensions that have different correlates (Graham, Laffan, and Pinto 2018; Graham 2016; Graham and Nikolova 2015; Nikolova 2019; OECD 2013; Stone and Mackie 2014). First, hedonic well-being relates to positive emotions, such as joy and happiness, and negative feelings, such as sadness, worry, anger, and stress at a point in time. Second, evaluative well-being refers to a reflective assessment of one's life as a whole. This dimension is typically measured using survey questions on life satisfaction or Cantril's ladder of life, 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 subjective well-being 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).

While the subjective well-being approach has primarily focused on studying the determinants of happiness and life satisfaction, the capability approach has focused 'conversion efficiency' (Binder and Broekel 2011, 2012b; Hick 2016; Martinetti 2000). The idea of subjective well-being efficiency closely relates to the conversion efficiency from the capability approach. According to the conversion efficiency framework, individuals translate income and resources into achieved functionings, which are states of being and doing, such as being happy, educated, well-fed, clothed (Binder and Broekel 2012b; Sen 1999). The idea is that people with the same access to resources may differ in their capacity to benefit from these resources. 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, and the environment can also play a role (Binder and Broekel 2011). As Binder and Broekel (2011) note, information about conversion efficiency can be useful to policymakers in changing institutional or individual factors, such as disability or unemployment. Yet, both relative subjective well-being and conversion efficiency have received relatively little attention in the literature.

To date, three papers have explored happiness efficiency at either the individual (Binder and Broekel 2012a; Cordero, Salinas-Jiménez, and Salinas-Jiménez 2017) or country level (Debnath and Shankar 2014). First, Binder and Broekel (2012a, 2012b) use individual-level panel data from the British Household Panel study and find that 20–27% of the population efficiently reaches its life satisfaction levels. In their second-stage fixed effects regression, the authors document that unemployment reduces efficiency, while marriage and cohabitation increase it.

Finally, retirement is efficiency-enhancing among males, while maternity leave has the same influence on females.

Second, Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017) use cross-sectional data on *individuals* from 26 nations from the 2005–6 World Values Survey and include individual- and country-level variables, discovering that the most efficient countries are also those with the highest absolute life satisfaction levels (for example, Netherlands, Sweden, Finland, New Zealand), while Russia, South Korea, China, and Indonesia are among the least efficient. In regressions using efficiency scores as the dependent variable, the authors also document that women, the religious, the married, and those who are not unemployed are efficient in reaching their subjective well-being levels. The results regarding having children are less clear-cut, and age is conducive to happiness efficiency but turns negative after age 85. Adding country-level variables reveals that health, education expenditures, and institutional quality improve efficiency, while the unemployment rate and gender inequality reduce it. GDP per capita is not significant in these efficiency regressions, meanwhile. A major drawback of the Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017) study is its cross-sectional nature and the lack of cross-country variation.

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 calculate the efficiency index as a weighted sum of outputs (average happiness and happiness inequality) divided by the weighted sum of inputs (various indicators of good governance). The authors reach the surprising conclusion that most developed countries are rather inefficient in increasing the population's happiness using 'good governance' policies, while some developing nations are surprisingly efficient (for example, Nepal). The authors do not go beyond the calculation and classification of the efficiency scores and do not explore which factors help or hinder efficiency.

We extend the nascent happiness efficiency literature in several ways. First, we provide the first subjective well-being efficiency insights from a country-level panel comprising nations at different levels of development. The panel structure ensures that countries are compared to the same set of peers year after year. Second, in the second-stage regressions, we also explore the factors enhancing or reducing efficiency. Third, we also provide guidance on how analyses of relative subjective well-being can inform policy debates related to sustainability.

In this paper, we focus on *output*-oriented efficiency, which relates to how much additional output (if any) could be produced with current resources.[4] Countries are compared to a peer nation or a sample of nations with a similar or lower level of resources that achieve similar subjective well-being levels. More formally, countries are compared to peers at a particular percentile of the SWB distribution, as explained in the next section. Given our balanced panel structure, nations are compared to the same set of potential peers over time, which is an advantage of our paper over Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017) and Debnath and Shankar (2014).

Revealed inefficiencies could be due to a variety of factors, such as institutional hindrances or a lack of information about how to utilize resources productively. In this paper, we provide evidence about which institutional or macroeconomic variables help to reduce inefficiencies. These insights can be directly translated into policy advice, by, for example, revealing that institutional reforms improve not only absolute levels of well-being but also help achieve this well-being more sustainably and efficiently. We detail our methodology in the next section.

3 Methods

Following Binder and Broekel (2012a), our analytical strategy comprises two steps: first, we use the input (i.e., income, education and health) and output (i.e., subjective well-being) variables to estimate efficiency scores using nonparametric robust frontier analysis (Daraio and Simar 2007); and second, using the efficiency scores as the dependent variables, we conduct country-fixed effects regressions to offer insights into which background characteristics increase or reduce efficiency. We detail the choice of inputs and background characteristics in section 3.3.

The fact that we have a country panel offers several advantages compared to cross-sectional studies, such as Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017) and Debnath and Shankar (2014). Specifically, given our longitudinal data, in the first stage, we compare countries to a fixed set of potential peers, minimizing the possibility that changes in the analysis sample composition drive changes in efficiency scores from year to year. Second, the country-fixed effect estimations in the second stage allow us to mitigate sources of endogeneity related to time-

4 Input-oriented efficiency, which relates to the notion of saving inputs to produce the current levels of output, can be a relevant metric in countries that have already reached very high subjective well-being and – due to the bounded nature of subjective well-being questions – higher scores are impossible on the given scale (Binder and Broekel 2012a).

invariant heterogeneity. These include culture and norms when discerning the role of different factors for determining efficiency. As the empirical strategy is identical at the individual- and country- levels, we only detail the specifications at the country level.

3.1 First Stage

We rely on the order-α method (Aragon, Daouia, and Thomas-Agnan 2005) based on the conditional quantiles of the appropriate distribution of the production process. In the output-oriented case, the efficiency score reflects the maximum possible increase in subjective well-being that could be achieved if current resources are used efficiently. In the simplest scenario, we assume that for each country $i = 1,\ldots, N$, we have one input $\boldsymbol{x_i}$ and one output $\boldsymbol{y_i}$. We compare country i to a set of countries $\boldsymbol{B_i}$ that have similar or lower levels of input(s) ($x_j \leq x_i$) and achieve subjective well-being levels at the $100^{\star}\alpha$ percentile $\boldsymbol{P}$ of the subjective well-being distribution (α ranges from 0 to 1). Thus, $100^{\star}(1-\alpha)\%$ demonstrates the probability that country i is dominated by those countries in the peer set with a similar or lower level of resources.

The efficiency score is defined as:

$$\widehat{\theta}_i = \underset{j \in B_i}{p_{\alpha}} \min \left\{ \frac{y_j}{y_i} \right\} \tag{1}$$

Efficiency scores greater than one indicate inefficiency. Values equal to one indicate efficiency and values less than one indicate super efficiency (i.e., countries achieving *higher* well-being than expected given current resources). Importantly, super efficiency is possible as the robust nonparametric methods do not envelope all data points, making the method less sensitive to outliers. Efficiency scores greater (smaller) than one show the possible proportionate increase (decrease) in subjective well-being 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 and Simar 2007).

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.' In the main analyses, we set α to 0.95 and rely on bootstrapped standard errors with 500 replications but also offer specifications with different α values in Tables B3–B6 in Online Appendix B.

We also provide robustness checks with the order-m approach (Cazals, Florens, and Simar 2002) (see Tables B15–B16 in Online Appendix B). Despite some similarities, the order-m and order-α approaches 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 $100^{\star}(1-\alpha)$th percentile, as explained above (Tauchmann 2012). It is also our preferred approach because it is less computationally intensive and easily implemented via Stata's routine *orderalpha* (Tauchmann 2012).

3.2 Second Stage

In the second stage, we examine the determinants of efficiency scores using country-fixed effects regressions. Specifically, we estimate the following:

$$E_{ct} = \alpha + B'_{ct}\beta + \pi_c + \tau_t + u_{ct} \tag{2}$$

whereby E is the efficiency score estimated in step one, B is a vector of background variables (the rule of law, generosity, social support, and employment status), π and τ are country and year fixed effects, respectively, and u is the stochastic error term. All regressions thus rely on within-country variation and include robust standard errors clustered at the country level. The time fixed effects ensure that our second-stage regressions mitigate endogeneity issues related to common shocks (such as economic crises or business cycles) as well as certain time-invariant characteristics at the country level, such as social norms, culture, geography, and others via the country fixed effects.[5] For comparison purposes and to understand

5 Since the second-stage regressions rely on within-country variation, we comment on the within-country standard deviation of the included measures of institutions. Naturally, the overall standard deviation reported in Table A1 in Online Appendix A is larger than the within-country standard deviation. For example, for generosity, the overall standard deviation is about 0.097 but is 0.034 within-country. The rule of law, which proxies the quality of formal institutions, has an overall standard deviation of 0.96 but within-country standard deviation of just 0.088. While we document this fact, we also offer specifications without country fixed effects. Moreover, despite being slow-moving, the background variables attract statistically significant coefficient estimates in the second-stage estimations, suggesting sufficient within-country variation to identify our models.

the role of time-invariant heterogeneity, we also provide specifications without country fixed effects in Table C1 in Online Appendix C.

3.3 Inputs and Background Characteristics

The choice of inputs and background variables when implementing two-stage efficiency analyses is subject to debate (Cordero et al. 2016; Ravallion 2005). While we cannot settle this debate, we motivate the choices of input and background factors based on existing studies in the literature. In addition, Like Binder and Broekel (2012a), we do not define happiness efficiency in a deterministic and all-encompassing way. Rather, we select the key inputs while also allowing for the influence intervening or background factors in the second stage analysis.

Our primary argument for the selection of the resources in the first stage and the environmental factors in the second one is that certain 'capital' factors are necessary to create subjective well-being. In contrast, the conversion process of resources into subjective well-being depends on the quality of the social fabric, formal and informal institutions, and labor market conditions. As such, we see the capital variables as inputs and institutions and labor market conditions as background factors.

Specifically, following Binder and Broekel (2012a) and Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017), our inputs feature income, education, and health, which we measure as log real GDP per capita, the share of individuals with secondary educational attainment, and life expectancy.[6] We follow the subjective well-being literature in logging GDP, although in the efficiency literature logging GPD is unnecessary (Binder and Broekel 2012a). In addition, theoretically, income, health, and education are proxies of 'capital' –financial, health, and human capital – whereby an increase in these variables is positively associated with subjective well-being (Helliwell, Huang, and Wang 2016). Specifically, in addition to generosity, social support, the rule of law, and freedom, GDP per capita, education, and health explain 75% of the cross-country variation in life evaluations (Helliwell, Huang, and Wang 2016). Furthermore, income, health, and education often feature in indices of development or progress. For example, these three factors comprise the three components of the Human Development Index, which is conceptually based on Sen's capability approach. As such, it represents the key ingredients (or inputs) of human well-being. Income promotes subjective well-being, at least in the short run (Easterlin 2017), and health and education are basic

6 Note that Binder and Broekel (2012a) also use social interactions as part of their inputs but do not provide a rationale for this.

capabilities enabling quality of life. Importantly, as Anand and Sen (2000) point out, while income may be correlated with health and education, control over resources does not necessarily result in good healthcare and education.[7] As expected, the correlation coefficients between some of these input variables are moderate to high. For example, the correlation coefficient between income and life expectancy is 0.8, and that between income and education is 0.6. Income and education are also correlated ($\rho = 0.5$). Nevertheless, each of these variables has its contribution to life evaluations above and beyond the other ones, as shown in Table C2.

Conceptually, background characteristics should capture the environmental variables affecting the conversion of inputs to subjective well-being and reflect institutions and the quality of the social fabric. We thus rely on the variables from Helliwell, Huang, and Wang 's (2016) list of factors explaining three-quarters of the cross-country variation in life evaluation scores and have included additional employment controls, which capture the state of the labor markets. Specifically, we use the rule of law, generosity, freedom, social support, as well as country-level employment status variables. The rule of law reflects contract enforcement, property rights, and the functioning of the legal system and, as such, is a measure of legal institutions (Berggren and Bjørnskov 2020). Like others in the literature (Adsera, Boix, and Payne 2003; Nikolova 2016), we argue that measures, such as good governance, control of corruption, and government stability are consequences of good institutions and not institutions themselves.

Generosity and social support capture the quality of the social interactions, or social capital, while the employment status controls reflect the functioning of the labor markets. In Online Appendix B, we provide a battery of sensitivity checks with different input, output, and background variables, which suggest that our results are not sensitive to the choice of the input and background variables or their measurement.

3.4 Empirical Considerations

Efficiency analyses and the cross-country panel regressions assume comparability of subjective well-being scores across countries. Specifically, if the differences in subjective well-being scores among countries are due to noise, measurement error, and cultural differences in reporting styles, international comparisons of subjective well-being are arguably uninformative. Nonetheless, the literature shows that

7 Table C2 in Online Appendix C details the determinants of life evaluations in our sample for 2009–2014.

only a small component of subjective well-being is due to noise. As noted above, Helliwell, Huang, and Wang (2016) show that up to one-fifth of the variation in cross-country life evaluation scores is attributable to unobservables, measurement error, and cultural bias. Exton, Smith, and Vandendriessche (2015) show that the plausible magnitude of cultural bias in life evaluations 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, suggesting that country-level subjective well-being differences are meaningful.

Furthermore, efficiency analysis compares countries and individuals to a benchmark comprising the best-performing peers, that is, units with the same or lower level of resources achieving the same or higher subjective well-being levels. Therefore, defining and empirically estimating the benchmark is an important practical issue. Binder and Broekel (2011) and Ravallion (2005) summarize the different empirical approaches to determining the frontiers. Parametric methods 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* envelops the data, and no observations are left outside of it. In other words, for a given input level, no production unit (i.e., country) achieves more output 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, misspecification of the functional form can lead to errors, including wrongly classifying countries as inefficient (Ravallion 2005). As the exact process of converting resources into subjective well-being is unknown, picking one functional form over another and assuming that all countries utilize the same production technology is problematic (Binder and Broekel 2011).

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 subjective well-being. This criticism relates to the interdependency of inputs; for example, individuals or countries use income as an input in the perceived well-being production process. However, income itself may also influence how other resources are translated into subjective well-being. 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 and Broekel 2012a). In summary, parametric methods only allow single production technology and require the specification of the functional

Table 1: Variable definitions.

Variable	Explanation
Output variable	
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?'
Inputs	
GDP per capita at 2011 PPP (log scale)	Log-transformed GDP per capita at 2011 PPP
Secondary education	Share of Gallup World Poll respondents who completed some secondary education and/or up to three years of tertiary education (i.e., 9–15 years of education)
Life expectancy	Life expectancy at birth, both sexes combined (years)
Background	
Out of the labor force	Share of Gallup World Poll respondents reporting to be out of the workforce
Involuntary part-time	Share of Gallup World Poll respondents reporting to be employed part-time but wants to be employed full-time
Unemployed	Share of Gallup World Poll respondents reporting to be unemployed
Voluntary part-time	Share of Gallup World Poll respondents reporting to be employed part-time and does not want full-time
Full-time	Share of Gallup World Poll respondents reporting to be employed full-time for an employer
Self-employed	Share of Gallup World Poll respondents reporting to be employed full-time for self
Social support	Share of Gallup World Poll respondents 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 of Gallup World Poll respondents reporting 'yes' to 'Have you done any of the following in the past month? How about donated money to a charity?'
Rule of Law	Country-level information based on the Worldwide Governance Indicators, '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, Kraay, and Mastruzzi 2010, p. 4)
Freedom	Share of Gallup World Poll respondents reporting 'satisfied' to 'Your freedom to choose what you do with your life.'

Sources: Authors based on Gallup Analytics (Gallup Inc 2015). Income data from the World Development Indicators Database, Rule of Law data from the Worldwide Governance Indicators Life expectancy from UNDP (United Nations; Department of Economic and Social Affairs; Population Division, 2015). All variables are measured at the country level.

form, modeling the endogeneity among the inputs, and assumptions regarding the error term (Tauchmann 2012).

Nonparametric techniques such as the Free Disposal Hull (FDH) and DEA address some of the critiques outlined above. As they are fitted by mathematical optimization processes, nonparametric methods do not require a parametric model specification. Nonetheless, the DEA – which is used in Debnath and Shankar (2014) – has several shortcomings (Dyson et al. 2001) and is inappropriate in our case because it assumes convexity, meaning 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 not defensible. 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 nonparametric methods or partial frontier approaches, such as the order-m, and order-α (Aragon, Daouia, and Thomas-Agnan 2005; Cazals, Florens, and Simar 2002; Daouia and Simar 2005, 2007; Daraio and 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 (Aragon, Daouia, and Thomas-Agnan 2005; Tauchmann 2012). In other words, these techniques involve a *partial* rather than a *full* frontier

Table 2: Efficiency scores, $\alpha = 0.95$, a balanced panel of 91 countries, 2009–2014.

Year	Mean efficiency	Median efficiency	Pct. inefficient	Mean life eval.	Mean life eval. If efficient	Possible life eval. Gain
2009	1.098	1.032	0.538	5.500	6.039	0.539
2010	1.098	1.055	0.549	5.512	6.052	0.540
2011	1.081	1.037	0.550	5.512	5.959	0.447
2012	1.070	1.000	0.484	5.475	5.858	0.383
2013	1.070	1.000	0.495	5.444	5.825	0.381
2014	1.088	1.047	0.582	5.489	5.972	0.483

Sources: Authors based on education and life evaluations data from Gallup Analytics; Income data from the World Development Indicators Database, Life expectancy data from the United Nations.
Notes: The efficiency scores are computed based on an order-α procedure using country-level information on income (GDP per capita), education, and health as inputs and life evaluations (best possible life evaluations) as an output. The method, described in detail in Section 3, compares each country i to a set of countries that have similar or lower levels of inputs and achieve subjective well-being levels at the 95th percentile of the subjective well-being distribution. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its subjective well-being with current resources. Efficiency scores equal to one indicate that resources, i.e., income, education, or health are optimally used, and no subjective well-being improvements are possible without changing the inputs.

Table 3: Life evaluations (output), income, education, health (inputs), and subjective well-being efficiency scores, 2014.

Country	Life evaluations (output)	Log GDP per capita (2011 PPP) (input 1)	Secondary education share (input 2)	Life expectancy (input 3)	Efficiency score	Std. error of efficiency score	Z-stat of efficiency score	Rank 1 = best, 91 = worst, based on efficiency score	Reference for efficiency score calculation
Afghanistan	3.1	7.520	0.240	60.362	1.290	0.134	2.161	86	Mali
Albania	4.8	9.224	0.320	77.771	1.229	0.089	2.566	77	El Salvador
Armenia	4.5	8.949	0.620	74.717	1.200	0.134	1.490	69	Pakistan
Austria	6.9	10.690	0.790	81.391	1.014	0.026	0.557	39	Brazil
Azerbaijan	5.3	9.724	0.750	70.814	1.057	0.048	1.188	51	Indonesia
Bahrain	6.2	10.678	0.570	76.578	1.048	0.064	0.758	47	Guatemala
Bangladesh	4.6	7.999	0.470	71.609	1.087	0.056	1.558	60	Nepal
Belarus	5.8	9.761	0.650	71.317	0.966	0.043	0.810	7	Indonesia
Bolivia	5.9	8.752	0.670	68.348	1.000	0.072	0.000	9	Bolivia
Bosnia and Herz.	5.2	9.158	0.490	76.482	1.212	0.079	2.675	73	Nicaragua
Brazil	7.0	9.623	0.510	74.472	1.000	0.077	0.000	9	Brazil
Bulgaria	4.4	9.703	0.480	74.209	1.341	0.114	2.989	88	El Salvador
Cambodia	3.9	8.043	0.090	68.358	1.077	0.035	2.193	56	Niger
Cameroon	4.2	7.950	0.400	55.516	1.000	0.080	0.000	9	Cameroon
Canada	7.3	10.664	0.590	82.044	0.959	0.034	1.217	6	Brazil
Chad	3.5	7.641	0.130	51.581	1.000	.	.	9	Chad
Chile	6.8	9.998	0.610	81.660	1.029	0.034	0.873	43	Brazil
Colombia	6.4	9.453	0.590	74.038	1.000	0.064	0.000	9	Colombia
Costa Rica	7.2	9.563	0.390	79.427	1.000	0.114	0.000	9	Costa Rica
Croatia	5.4	9.905	0.540	77.319	1.296	0.060	4.954	87	Brazil
Cyprus	5.6	10.298	0.500	80.156	1.250	0.071	3.506	81	Thailand
Czech Republic	6.5	10.265	0.680	78.606	1.015	0.031	0.500	41	Panama
Denmark	7.5	10.663	0.830	80.245	0.933	0.036	1.852	2	Brazil

Table 3: (continued)

Country	Life evaluations (output)	Log GDP per capita (2011 PPP) (input 1)	Secondary education share (input 2)	Life expectancy (input 3)	Efficiency score	Std. error of efficiency score	Z-stat of efficiency score	Rank 1 = best, 91 = worst, based on efficiency score	Reference for efficiency score calculation
Dominican Rep.	5.4	9.446	0.240	73.470	1.000	0.078	0.000	9	Dominican
Ecuador	5.9	9.292	0.700	75.890	1.068	0.049	1.383	55	Nicaragua
Egypt	4.9	9.215	0.460	71.132	1.102	0.057	1.783	61	Pakistan
El Salvador	5.9	8.983	0.270	73.019	1.000	0.087	0.000	9	El Salvador
France	6.5	10.524	0.670	82.162	1.046	0.032	1.424	45	Chile
Georgia	4.3	8.886	0.550	74.871	1.256	0.152	1.687	83	Pakistan
Germany	7.0	10.683	0.680	80.917	1.000	0.029	0.000	9	Brazil
Ghana	3.9	8.267	0.510	61.350	1.077	0.045	1.694	56	Cameroon
Greece	4.8	10.101	0.550	80.877	1.458	0.057	8.033	91	Brazil
Guatemala	6.5	8.869	0.440	71.828	1.000	0.111	0.000	9	Guatemala
Honduras	5.1	8.452	0.370	73.136	1.059	0.066	0.898	52	Pakistan
India	4.4	8.601	0.430	67.988	1.227	0.091	2.488	75	Pakistan
Indonesia	5.6	9.214	0.490	68.871	1.000	0.067	0.000	9	Indonesia
Iraq	4.5	9.573	0.320	69.430	1.200	0.108	1.844	69	Pakistan
Ireland	7.0	10.788	0.590	80.870	1.000	0.027	0.000	9	Brazil
Israel	7.4	10.357	0.680	82.365	0.946	0.032	1.687	5	Brazil
Italy	6.0	10.405	0.400	83.143	1.167	0.087	1.922	66	Thailand
Japan	5.9	10.481	0.620	83.532	1.153	0.037	4.132	63	Chile
Jordan	5.3	9.350	0.640	74.021	1.113	0.072	1.567	62	El Salvador
Kazakhstan	6.0	10.048	0.630	69.378	0.933	0.054	1.233	2	Indonesia
Kenya	4.9	7.944	0.420	61.609	1.000	0.093	0.000	9	Kenya

Table 3: (continued)

Country	Life evaluations (output)	Log GDP per capita (2011 PPP) (input 1)	Secondary education share (input 2)	Life expectancy (input 3)	Efficiency score	Std. error of efficiency score	Z-stat of efficiency score	Rank 1 = best, 91 = worst, based on efficiency score	Reference for efficiency score calculation
Kyrgyzstan	5.3	8.061	0.690	70.569	1.000	0.048	0.000	9	Kyrgyzstan
Lebanon	5.2	9.721	0.480	79.274	1.288	0.082	3.528	85	Mexico
Lithuania	6.1	10.159	0.500	73.322	1.000	0.062	0.000	9	Lithuania
Macedonia	5.2	9.416	0.450	75.379	1.212	0.079	2.689	73	Nicaragua
Malaysia	6.0	10.105	0.690	74.738	1.083	0.063	1.332	59	Guatemala
Mali	4.0	7.330	0.160	58.003	1.000	.	.	9	Mali
Mauritania	4.5	8.225	0.320	63.055	1.000	0.070	0.000	9	Mauritania
Mexico	6.7	9.698	0.420	76.775	1.000	0.066	0.000	9	Mexico
Moldova	5.9	8.467	0.640	71.561	1.000	0.072	0.000	9	Moldova
Montenegro	5.3	9.584	0.600	76.245	1.208	0.073	2.834	72	Colombia
Nepal	5.0	7.725	0.160	69.615	1.000	0.098	0.000	9	Nepal
Nicaragua	6.3	8.454	0.400	74.923	1.000	0.098	0.000	9	Nicaragua
Niger	4.2	6.796	0.050	61.428	1.000	.	.	9	Niger
Nigeria	5.0	8.638	0.550	52.762	1.000	0.142	0.000	9	Nigeria
Pakistan	5.4	8.432	0.160	66.171	1.000	0.125	0.000	9	Pakistan
Palestinian Territories	4.7	8.367	0.640	72.898	1.064	0.022	2.843	54	Nepal
Panama	6.6	9.900	0.550	77.579	1.015	0.041	0.369	40	Mexico
Paraguay	5.1	9.048	0.510	72.902	1.275	0.132	2.087	84	Guatemala
Peru	5.9	9.345	0.720	74.557	1.000	0.049	0.000	9	Bolivia
Philippines	5.3	8.802	0.590	68.200	1.019	0.046	0.410	42	Pakistan
Poland	5.8	10.085	0.630	77.425	1.155	0.045	3.412	64	Mexico

Table 3: (continued)

Country	Life evaluations (output)	Log GDP per capita (2011 PPP) (input 1)	Secondary education share (input 2)	Life expectancy (input 3)	Efficiency score	Std. error of efficiency score	Z-stat of efficiency score	Rank 1 = best, 91 = worst, based on efficiency score	Reference for efficiency score calculation
Portugal	5.1	10.173	0.350	80.927	1.373	0.142	2.616	90	Thailand
Romania	5.7	9.857	0.570	74.693	1.228	0.095	2.389	76	Brazil
Russia	6.0	10.056	0.600	70.098	0.933	0.055	1.201	2	Indonesia
Saudi Arabia	6.3	10.810	0.580	74.299	1.000	0.053	0.000	9	Saudi Arabia
Senegal	4.4	7.708	0.250	66.493	1.000	0.065	0.000	9	Senegal
Serbia	5.1	9.451	0.500	74.890	1.157	0.088	1.789	65	El Salvador
Slovenia	5.7	10.245	0.750	80.386	1.175	0.045	3.906	67	Mexico
South Africa	4.8	9.429	0.680	57.391	1.047	0.088	0.531	46	Nigeria
South Korea	5.8	10.423	0.460	81.870	1.207	0.067	3.066	71	Thailand
Spain	6.5	10.367	0.750	82.579	1.077	0.036	2.145	58	Brazil
Sri Lanka	4.3	9.275	0.480	74.884	1.372	0.125	2.985	89	El Salvador
Sweden	7.2	10.693	0.700	82.180	0.972	0.027	1.038	8	Brazil
Tajikistan	4.9	7.851	0.600	69.425	1.000	0.068	0.000	9	Tajikistan
Tanzania	3.5	7.792	0.190	64.968	1.200	0.070	2.872	68	Niger
Thailand	7.0	9.617	0.350	74.437	1.000	0.107	0.000	9	Thailand
Tunisia	4.8	9.297	0.410	74.833	1.229	0.078	2.937	77	El Salvador
Turkey	5.6	9.845	0.590	75.260	1.250	0.075	3.327	81	Brazil
Uganda	3.8	7.432	0.380	58.500	1.053	0.025	2.147	50	Mali
Ukraine	4.3	9.020	0.640	70.965	1.233	0.043	5.359	79	Philippines
United Kingdom	6.8	10.550	0.580	80.694	1.029	0.032	0.917	43	Brazil
United States	7.2	10.861	0.660	79.084	0.931	0.035	1.974	1	Mexico
Uruguay	6.6	9.900	0.520	77.196	1.061	0.049	1.238	53	Brazil
Venezuela	6.1	9.726	0.620	74.207	1.049	0.057	0.868	48	Colombia

Table 3: (continued)

Country	Life evaluations (output)	Log GDP per capita (2011 PPP) (input 1)	Secondary education share (input 2)	Life expectancy (input 3)	Efficiency score	Std. error of efficiency score	Z-stat of efficiency score	Rank 1 = best, 91 = worst, based on efficiency score	Reference for efficiency score calculation
Vietnam	5.1	8.589	0.520	75.790	1.235	0.111	2.126	80	Nicaragua
Yemen	4.0	8.271	0.270	63.838	1.050	0.058	0.858	49	Niger
Zimbabwe	4.2	7.444	0.580	57.534	1.000	.	.	9	Zimbabwe

Sources: Authors based on education and life evaluations data from Gallup Analytics; Income data from the World Development Indicators Database, Life expectancy data from the United Nations.

Notes: For each country in the analysis sample in the year 2014, the table shows the absolute life evaluation levels (output), the levels of the three inputs (income, education, and health), the calculated efficiency score, standard error and z-statistic associated with the efficiency score, and the reference country. The presented rankings are based on the efficiency scores, i.e., on relative rather than absolute SWB scores. The efficiency scores are computed based on an order-α procedure using country-level information on income, education, and health as inputs and life evaluations (best possible life evaluations) as an output. The method, described in detail in Section 3, compares each country *i* to a set of countries that have similar or lower levels of inputs and achieve subjective well-being levels at the 95th percentile of the subjective well-being distribution. Efficiency scores greater than one indicate inefficiency and show the extent to which a country can increase its subjective well-being with current resources. Efficiency scores equal to one indicate that resources, such as income, education, or health, are optimally used, and no subjective well-being improvements are possible without changing the inputs. The standard errors are bootstrapped (500 replications). The bootstrapping cannot determine non-zero standard errors (z-statistics) for countries, for which no or very few peers are available in the analysis sample, besides the country itself. For these cases, no standard errors are reported.

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 and 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 and Simar 2007). Given that there are only 91 countries in our panel, the curse of dimensionality problem would have been serious with traditional nonparametric estimators.

4 Data, Sample, and Variables

We rely on country-level data from Gallup Analytics (2009–2014), based on the GWP, a yearly survey of about 150 countries worldwide. The GWP data are collected via in-person interviews in developing and transition countries and via landline and cell phone interviews in the OECD countries. 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 (2015), and in our robustness checks, with 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, and Mastruzzi 2010). As a robustness check, we replace the rule of law with aggregate generalized trust in Table B2 in Online Appendix B.

Our cross-country analyses include macro-level variables for the output, inputs, 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. Specifically, respondents are asked to imagine 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) and to rate their current life on this ladder. The ladder-of-life question is self-anchoring, which means that the scale is relative to each respondent's aspirations and understanding of his/her best possible life. In the macro-level analyses, we use the country-average value of the individual-level survey responses. In Tables B7 and B8, we show that our conclusions are robust to testing our specifications with financial satisfaction as the output.

Since the order-α 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 some observations by replacing missing values with the simple averages. For completeness, we also note that specifications without the imputations, shown in Tables B17 and B18 in Online Appendix B, are virtually identical to the main results. As Table A1 in Online Appendix A demonstrates, the number of imputed values is low, and the averages

Table 4: Second stage fixed effects regressions, $\alpha = 0.95$, 2009–2014.

	Full sample of 91 countries				Sample without the low-income countries			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Out of the labor force		−0.189	−0.082			−0.200	−0.067	
		(0.356)	(0.093)			(0.368)	(0.104)	
Involuntary part-time		−0.331	−0.228			−0.345	−0.212	
		(0.356)	(0.146)			(0.380)	(0.165)	
Unemployed		−0.550	−0.451***			−0.595	−0.466***	
		(0.378)	(0.151)			(0.384)	(0.169)	
Voluntary part-time		0.014		0.284*		−0.060		0.218
		(0.414)		(0.164)		(0.402)		(0.146)
Full-time		−0.167		0.093		−0.174		0.100
		(0.381)		(0.119)		(0.400)		(0.130)
Self-employed		−0.097		0.165*		−0.110		0.172
		(0.344)		(0.090)		(0.346)		(0.108)
Social support	0.173**	0.154*	0.151*	0.164*	0.197**	0.164	0.163*	0.179*
	(0.083)	(0.084)	(0.082)	(0.086)	(0.097)	(0.099)	(0.097)	(0.100)
Generosity	0.014	0.022	0.024	0.021	0.010	0.019	0.018	0.017
	(0.043)	(0.043)	(0.042)	(0.043)	(0.047)	(0.048)	(0.046)	(0.047)
Rule of Law	0.091***	0.077**	0.074**	0.086**	0.115***	0.099***	0.097***	0.112***
	(0.033)	(0.032)	(0.032)	(0.034)	(0.038)	(0.036)	(0.037)	(0.039)
Freedom	0.120**	0.100*	0.101*	0.104*	0.076	0.061	0.063	0.063
	(0.059)	(0.056)	(0.055)	(0.057)	(0.058)	(0.056)	(0.054)	(0.056)
Constant	0.461***	0.718**	0.614***	0.429***	0.391***	0.678*	0.546***	0.361**
	(0.122)	(0.347)	(0.134)	(0.123)	(0.140)	(0.355)	(0.154)	(0.142)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	546	546	546	546	492	492	492	492

Table 4: (continued)

	Full sample of 91 countries				Sample without the low-income countries			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Adjusted R^2	0.725	0.731	0.732	0.728	0.744	0.748	0.750	0.745
Number of countries	91	91	91	91	82	82	82	82
F-stat	3.367	2.464	2.971	2.696	2.733	2.179	2.546	2.261

Sources: 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. Models (5)–(8) exclude low-income countries. FE = fixed effects.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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 Online Appendix A).

5 Results

5.1 First Stage: Efficiency Scores

Table 2 shows the country-level 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, on average, about 1.1 over the analysis period. For example, the efficiency score of 1.088 in 2014 suggests that given their resources in 2014, the 91 nations could have achieved life evaluation levels that were, on average, 8.8% higher than was actually the case. In other words, in 2014, the 91 countries had an average absolute life evaluation score of 5.49, whereas if they had they efficiently used their resources, they could have achieved a score of 5.97. Table 2's fourth column details that about half of the countries in the sample are happiness-inefficient, suggesting that large subjective well-being efficiency gains are possible worldwide. These findings are in line with the findings in Cordero, Salinas-Jiménez, and Salinas-Jiménez (2017), who document an efficiency score of about 1.2–1.7 (depending on the specification) for the individual-level sample based on data from 26 countries for 2005–2006 (and using similar input variables). While the magnitude of the possible subjective well-being gain is instructive, it is most useful as a diagnostic to reveal whether and where inefficiencies exist. The second stage analysis provides complementary policy-relevant information about what could be done to minimize or eliminate such inefficiencies.

Furthermore, our results have substantive implications for development economics because they imply that subjective quality of life for the world could be improved without increasing current resources or relying on continuous economic growth. As such, this has important implications for recent debates over sustainability because reducing the inefficiencies in the current use of resources can provide large global gains in terms of human well-being and flourishing.

In Table 3, we detail the efficiency scores for all 91 countries for 2014. This table reveals several important insights. First, we show that low life evaluations do not necessarily translate into low happiness efficiency. For example, Albania, Greece, Tunisia, and South Africa all had life evaluation scores of 4.8 points (on a scale of 0–10) in 2014. Yet, Greece performed the worst among this country set in terms of efficiency, while South Africa performed the best among this group. Such comparisons reveal that relative and absolute subjective well-being measures provide

complementary information and help reveal nuances that can be informative to policy. For example, this information could be useful to a policymaker in Greece to raise awareness about the inefficiency in the first place and then examine what could be done to reduce it. Second, even countries that appear to be using their endowments relatively efficiently could benefit from the analyses detailed in Table 3. For example, South African policymakers can compare their relative performance over time, as efficiency scores can and do change. They can also rely on within-country happiness efficiency analysis to better understand if all regions and individuals within these regions benefit equally from resources or whether particular cities or areas or socio-demographic groups require specific policy interventions.[8] Second, high levels of absolute subjective well-being also do not automatically entail happiness efficiency. Improvements in relative happiness are even possible in Denmark, which is often at the top of different world rankings on life evaluations. Therefore, even countries with already high absolute subjective well-being scores can gain knowledge about their relative subjective well-being.

Nonetheless, readers should exert caution when interpreting the efficiency scores for very poor developing countries. While these countries often appear efficient, this could be because of a lack of comparison countries with lower levels of resources, meaning that the method automatically picks the country itself as the frontier. To ensure that outliers do not drive our results in the second stage, we report all regressions in Table 4 as well as those in Online Appendix B with and without the worst-endowed countries (see the list of low-income countries in Online Appendix Table A2).

5.2 Second Stage: Country Fixed-effects Regressions

In Table 4, we explore the factors that improve or hinder the efficiency with which countries in our sample translate endowments into subjective well-being. This analysis is especially policy-relevant as it helps identify what kind of interventions can help countries improve or maintain their relative subjective well-being scores.

All regressions include time and country fixed effects, which mitigate the influence of shocks, such as the recent economic crisis, and time-invariant country-specific factors, such as culture or norms. Models (1)–(4) use the sample of 91 nations, while models (5)–(8) exclude the low-income countries listed in

8 South Africa presents an interesting case of ethnically and economically divided society. The ways to improve subjective well-being in this country should involve specific policy interventions for different socio-demographic groups (Møller 2001, 2004).

Table A2. Models (1) and (5) incorporate controls for social support, generosity, the rule of law and freedom, Models (2) and (6) add all employment status variables, while the rest of the models vary in terms of the included employment status controls. Each country's *efficiency score* and not *absolute* life evaluation levels is the dependent variable in these regressions. We transformed the efficiency score, so that positive coefficient estimates indicate efficiency improvements while negative ones designate efficiency reductions.

The results demonstrate that freedom perceptions and a better institutional environment – as proxied by the rule of law – improve efficiency. While the coefficient estimate for freedom is statistically insignificant in Models (5)–(8), its positive sign indicates that countries in which citizens have the freedom to choose the kinds of lives that they value are also more efficient in translating income, health, and education into subjective well-being. This finding resonates with the capability approach's insights and its emphasis on capabilities and freedoms to achieve well-being. Indeed, freedom of choice and the opportunities for people to pursue the kind of lives they have reasons to value seems to be a key factor determining how they use the resources that they have at their disposal.

Moreover, the rule of law variable is statistically significant throughout the specifications, implying that countries with well-functioning institutions that guarantee freedoms are relatively more happiness-efficient. This finding parallels the finding that institutions are also determinants of absolute subjective well-being levels (Bjørnskov et al. 2010; Frey and Stutzer 2000; Frey and Stutzer 2002; Helliwell and Huang 2008; Nikolova 2016; Otrachshenko et al. 2016; Rode 2013). Functioning institutions and the rules of the game they impose can enable individuals to invest in their health or human capital or increase their incomes by safeguarding their investments, making it possible to achieve relatively high levels of subjective well-being. Formal institutions also shape the quality of society's social fabric and functioning (Berggren and Bjørnskov 2020), which means that people can feel free and safe to take full advantage of the resources they have. From a policy perspective, these results imply that improving the quality of formal institutions will improve both relative and absolute subjective well-being.

In addition, social support, which is a measure of the quality of social interactions and informal institutions' functioning, also improves efficiency. However, its coefficient estimate is only marginally statistically significant. This result is above and beyond the cultural norms captured in the country fixed-effects and formal institutions, which are measured using the rule of law. As such, this result implies that informal interactions and the overall social capital in society can be decisive in reducing inefficiencies. Fostering trust and relatedness in society not

only has direct benefits in terms of improving absolute well-being but also in terms of reducing and eliminating subjective well-being inefficiencies.

Next, we discuss the employment status controls, which reflect labor market conditions. In Models (4) and (8), employment status variables associated with choice and flexibility, such as voluntary part-time employment and self-employment, attract positive, albeit marginally or non-statistically significant coefficient estimates, suggesting that they enhance well-being efficiency. By contrast, unemployment unequivocally reduces efficiency (Models (3) and (7)). This finding resonates with the results in Binder and Broekel (2012a). It suggests that unemployment is not only detrimental to absolute life evaluation levels but also to the efficiency with which subjective well-being levels are achieved.

Online Appendix B also features a battery of additional analyses as well as a commentary accompanying these results. Specifically, we offer heterogeneity analyses by World Bank country income classification. We also perform several sensitivity checks: we replace the rule of law with generalized trust, we change the value of α and rely on the order-m technique; we rely on financial satisfaction rather than life evaluations, as the output variable; we change the measurement of the input variables, show results only using GDP per capita as an input, and document the findings without the imputations necessary to achieve a fully balanced sample. All these alternative specifications provide unequivocal support for the robustness of our findings.

For completeness, the estimations of the determinants of efficiency scores without country fixed effects are available in Table C1 in Online Appendix C. As such, these specifications do not hold constant time-invariant heterogeneity at the country level. The most notable distinction with the baseline results showcased in Table 4 is that the rule of law variable now attracts a negative and statistically significant coefficient estimate. The coefficient estimate for freedom is positive and statistically significant when we do not control for country fixed effects in Table C1. However, it is statistically insignificant in the main results, suggesting that it is driven by country-level factors that do not change over time.

All in all, the second-stage analyses reveal several important findings, which have direct policy implications. Specifically, fostering social cohesion, freedom, and formal institutions will likely improve relative subjective well-being and help societies reach the same, or even higher, levels of flourishing and well-being without relying on continuous economic growth.

6 Limitations, Discussion, and Conclusion

The approach used in this paper helps identify inefficiencies in how countries achieve subjective well-being, given a set of resources. We acknowledge that the happiness efficiency approach cannot deal with the reverse causality between life evaluations and determinants, such as health, education, and income. While health affects life satisfaction, for example, those who are more satisfied with their health also have better health outcomes. As such, the insights generated by the first stage analyses are purely descriptive. Also, health may make the conversion of other factors into happiness more efficient, a point also made by Binder and Broekel (2012a). More substantively, the approach offers no guidance into what factors are resources as opposed to background characteristics. Indeed, a similar problem exists in the capability approach, whereby functionings, resources, and conversion factors are highly interdependent, which Binder and Coad (2011) call "the circularity problem." Dealing with these interdependencies, both conceptually and econometrically, while challenging, should be prioritized in future research.

These limitations notwithstanding, we substantively contribute to the novel science of well-being measurement by estimating the happiness efficiency scores for a balanced panel of 91 countries at different development levels. In addition, we demonstrate which factors and background characteristics enhance or reduce efficiency, which has direct implications for policy and society. Importantly, from a development economics perspective, we demonstrate that large improvements in subjective well-being efficiency are possible worldwide. Such improvements could be achieved by enhancing formal institutions, such as the rule of law, or increasing freedom of choice. Social networks – which are often stronger in poorer countries – also reduce inefficiencies, as we show in the second-stage results in Online Appendix B.

As such, our results have direct implications for informing discussions about sustainable development, which are becoming increasingly important in light of international agreements and frameworks, such as the Sustainable Development Goals (SDGs) and the Paris Agreement. The idea that current levels of subjective well-being can be sustained and even increased without generating further economic growth is also appealing from an ecological economics viewpoint.

Our analyses are useful to policymakers in countries with low and high relative subjective well-being. First, this research reveals inefficiencies and also the factors that can help reduce these. Second, relatively efficient countries can use the approach proposed in this paper to monitor their performance over time as relative

rankings change. In addition, such countries can also apply relative subjective well-being analysis to explore differences between rural and urban areas better.

Furthermore, our results can 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 events initially lower or increase subjective well-being, whereas, after some time, subjective well-being levels return to their original levels. If subjective well-being levels always return to a genetically predetermined set point, policy interventions aiming to improve efficiency may be ineffective. While earlier work suggested that the genetic component of subjective well-being could be as high as 52% (Lykken and Tellegen 1996), more recent studies suggest that it is at most 33% (De Neve et al. 2012). Regardless of the exact share of the genetic component of SWB, complete adaptation would imply that efficiency-enhancing interventions would only lead to temporary rather than long-lasting improvements in subjective well-being. Nevertheless, arguably, even non-permanent increases in subjective well-being can be socially-optimal, given that a large literature shows that even temporary improvements in SWB lead to higher productivity, for example (Oswald, Proto, and Sgroi 2015). Moreover, even in the presence of adaptation, researchers can learn under what conditions temporary improvements in SWB can become long-lasting (Diener, Lucas, and Schollon 2006). However, a large body of 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, pollution, and the loss of their own business (Clark 2016; Nikolova and Ayhan 2019; Nikolova, Nikolaev, and Popova 2020). Yet, even if there is a complete hedonic adaptation, efficiency analyses can help shed light on reaching given levels of SWB with the least possible levels of resources, which underscores the approach's usefulness.[9]

Well-being efficiency analyses can thus yield important policy-relevant information when it comes to collective adaptation. Specifically, at the country level, collective adaptation implies that nations can report high subjective well-being 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 2011). Collectively, adaptation is sub-optimal as it promotes the persistence of bad equilibria, such as poor healthcare systems and public goods and undemocratic institutions, which may result in the erroneous policy conclusion that improving absolute subjective

9 We are grateful to a referee for pointing this out to us.

well-being scores requires no policy intervention. Happiness efficiency scores can help to shed light on identifying such bad equilibria. Consider, for example, a country with a poor institutional environment but high absolute levels of subjective well-being due to adaptation. As a first step, efficiency analyses will reveal that this country is achieving its (high) subjective well-being levels inefficiently relative to other countries. As a second step, analyzing which factors help explain efficiency differentials across countries can reveal that improving institutional or other characteristics can yield efficiency gains. The country can achieve higher well-being levels if institutions, to which people have adapted, are improved. Although a country's *absolute* subjective well-being score may be high due to adaptation to bad circumstances, *relative* happiness, as reflected by the efficiency score, will suggest that absolute happiness levels could be higher. Nonetheless, whether improving long-term subjective well-being through enhancing efficiency is possible and what the appropriate instruments to do so remain an open question.

In a world where there is growing pressure on governments to look beyond the traditional way of formulating policies, research on relative subjective well-being in general, and our study in particular, can encourage considering policies that will not only increase endowments but also using existing endowments more efficiently to increase the quality of life of their citizens. Given the growing importance of subjective well-being measures in economics and public policy, there has been a growing urgency in understanding what determines subjective well-being but also how to use measures, such as life satisfaction and happiness in policy decisions. Thus, our research poses an important question about whether the same policy instruments that raise *absolute* life evaluation levels or happiness are relevant in improving the efficiency with which flourishing and well-being are achieved, which future research should prioritize.

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