

Human Development Index as a Predictor of Life Satisfaction

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Abstract

Since 1990, the Human Development Index (HDI) has been used by the United Nations to rank countries into four tiers of human development. Using data from the 2010 Human Development Report, this study has analyzed the mean life satisfaction of citizens from 144 countries that are at different levels of HDI. Simple regression analysis shows that HDI alone accounts for 63% of the variation in the mean life satisfaction across the countries. A strong positive correlation has been shown to exist between life satisfaction and HDI. However, countries with about the same level of HDI can have vastly different life satisfaction. Results from the Multiple Regression Analysis indicate that part of the variations in life satisfaction in countries with similar HDI is attributed to the personal dimensions of well-being – that being the percentage of the population that is satisfied with jobs, health, and standard of living, and to a lesser extent elements of happiness such as having a purposeful life and social support, and being treated with respect. In conclusion, while HDI is an important predictor of life satisfaction, there are many other socio-political and cultural factors as well, such as an individuals' traits and outlook in life throughout the world, also influence life satisfaction, to various degrees.

Keywords

Human Development Index (HDI); life satisfaction; well-being; happiness; development

Introduction

For many years gross domestic product (GDP) per capita was widely accepted as the sole indicator of national development. However, recently it has been argued that economic performance, as measured by GDP, is not the only factor, and that it only has value in so far as it contributes to overall human happiness for the citizens residing in a given country (Kusago, 2007; Frey & Stutzer, 2002; Nitschke, 2008, Leigh & Wolfers, 2006; Graham, 2005; Graham, 2010a; Costanza et al., 2009; Easterlin, 1974). While economic growth has been found to have a positive effect on happiness, there are numerous variables that influence well-being. Realizing the inadequacy of GDP per capita in explaining the variations of well-being and happiness, researchers developed composite indices to more fully gauge the multiple dimensions of well-being (Takeuchi, Hine & Chavez, 2015; Costanza et al., 2009; Li et al., 1998; Graham, 2010a).

Beginning in 1990, the Human Development Index (HDI), a ranking system that is updated annually by the United Nations, is one such composite index that amalgamates three equally weighted sub-indices: life expectancy, education, and per capita income (Anand & Sen, 2000;

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Ogwang & Abdou, 2003). HDI was created to emphasize that people and their capabilities, and not economic growth alone, should be the ultimate criteria for assessing the development of a country. The 2000 Human Development Report stated that the concept of human development is much deeper and richer than what can be sufficiently measured in any composite index or even by a detailed set of statistical indicators (UNDP 2000, p. 147).

Although HDI has been adopted as a measure of development for almost three decades now, a cursory review of the literature indicates that there has been no analysis on the association between HDI and overall life satisfaction in a cross-country analysis globally, nor whether it is part of a broader set of factors that influence happiness. The few macro-level studies on this topic were confined to a few countries or regions (Leigh & Wolfers, 2006; Kusago, 2007; Bonini, 2008; Narayana, 2009; Lanzi & Delbono, 2008; Nitschke, 2008; Blanchflower & Oswald, 2005; Ogwang & Abdou, 2003). Moreover, these studies produced contradictory results, with some studies showing a strong association between HDI and life satisfaction, and others finding a lack of association between the two.

Critics have consistently maintained that HDI can only provide a partial explanation of people's life satisfaction; and although this is an admission that even to them it has a degree of importance, these critics have also been adamant that some aspects of well-being, such as having or lacking equality, social trust, public safety, governance, peace, and environmental protection, all of which are essential to the well-being of the citizens are also important predictors of happiness and well-being (Mikucka, Sarracino & Dubrow, 2017; Bilbao-Ubillos, 2013; Hicks, 1997; Kusago, 2007; Alesina, Di Tella & MacCulloch, 2004; Sagar & Najam, 1998). These assertions have led to the introduction of Inequality-Adjusted HDI (IHDI). Detailed computation of IHDI is explained on pages 218-219 in the Technical Notes of the 2010 HDR.

Studies on subjective well-being, happiness, and life satisfaction are guided by various theories. Both the Hedonic Treadmill Theory and the Set Point Theory posit that regardless of the changes in life, and regardless whether those changes are positive, people tend to adapt to them while using to the changes and go back to their "hedonic neutrality" as their approach to life (Diener, Lucas & Scollon, 2006). The general idea is that happiness is raw subjective feeling, and it is that feeling of pleasure that people seek after. A happy life maximizes the feeling of pleasure and minimizes pain (Peterson, Park & Seligman, 2005).

The Desire Theory postulates that the fulfillment of a desire contributes to one's sense of happiness (Seligman & Royzman, 2003), and the Objective List Theory posits that people derive happiness from achieving some of their more worthwhile pursuits, including career accomplishments, friendship, freedom from disease and pain, material comforts, civic spirit, beauty, education, love, knowledge, and good conscience (Nussbaum, 1992; Sen, 1999; Seligman & Royzman, 2003). In a similar vein, the Authentic Happiness Theory (Seligman, 2002) emphasizes three elements: a pleasant life (pleasures), a good life (engagement), and a meaningful life. These three elements are linked to positive emotion, as one reminisces about the past with an attitude of gratitude and forgiveness, and looks forward to a pleasant life in the future.

Happiness and life satisfaction are two commonly used measurements of subjective well-being. Some scholars assert that "happiness" and "life satisfaction" are bandied about interchangeably (Frey, 2008; Veenhoven, 2007; Griffin, 2007), but others claim that they are not the same thing at all, particularly as measured in surveys (Haller & Hadler, 2006). "Happiness," according to them, is an outcome of positive experiences in close personal relationships and hence it tends to focus on how people feel and is experiential in nature. Conversely, life satisfaction entails evaluative assessments of the whole life of a given

individual, including material and social aspirations and achievements (Haller & Hadler, 2006; McFarlin, 2008; Brülde, 2007; Diener & Diener, 2009; Stevenson & Wolfers, 2008). Put simply, life satisfaction measures how an individual evaluates his or her life as a whole rather than emotional inclinations and motivations at a given moment in time (OECD, n.d).

According to Pavot and Diener (1993), as subjective well-being covers both affective and cognitive constructs, a better sense of subjective well-being is happiness conflated with that of overall life satisfaction. However, if affective evaluation is the emphasis, it is better measured by an indicator of happiness, which, after all, consists of emotions and feelings. On the other hand, life satisfaction, as measured by various life domains (satisfaction on the job, neighbours, environment, and other factors), is a better indicator of the cognitive construct (Duncan, 2010).

In lieu of “happiness,” the writers of this paper have chosen to use “life satisfaction” as the measurement of subjective well-being, as it is the only subjective well-being indicator available from the 2010 HDR. Moreover, cognitive evaluation is deemed to be more stable than affective evaluation, as measured by happiness (Duncan, 2010).

The association between GDP per capita and life satisfaction has been widely studied (Frey & Stutzer, 2002; Hagerty & Veenhoven, 2003; McFarlin, 2008; Clark, Frijters & Shields, 2008; Deaton, 2008; Easterlin, 1995; Oswald, 1997; Proto & Rustichini, 2013; Stevenson & Wolfers, 2008). HDI is a multidimensional indicator that has been used since 1990 to rank the level of development of a country, but there is little research directly linking HDI with life satisfaction. In this paper, HDI instead of GDP per capita, is used as the main explanatory variable. And it is used with the overarching objective of contributing to the literature on this global study of well-being. Now the availability of data on HDI and life satisfaction allows for a more comprehensive examination of the linkage between human development and life satisfaction. As such, it allows the realization of the objectives of this paper, which are: i) to identify countries that have much higher and much lower life satisfaction, given their level of development, and portray them in one *scatter plot*, ii) to examine other correlates of life satisfaction such as personal dimensions of well-being and elements of happiness, and iii) to highlight the need to take into account the different factors affecting life satisfaction for policy formulation that might improve the well-being of citizens of respective nations.

Data Source

This article is based on aggregate country-level data from the 2010 Human Development Report (UNDP, 2010). Table 9 of the report provides information on the average score of life satisfaction, satisfaction from personal dimensions of well-being, and elements of happiness for respondents in each country. These measures are based on responses from the 2010 Gallup World Pollⁱ. A standard structured questionnaire was used to ask respondents from each country to rate their life satisfaction on a scale of 0 (meaning the worst possible ranking for life satisfaction) to 10 (meaning the best possible life satisfaction). The overall life

ⁱ Gallup is an 80 years research organization, which is primarily involved in government studies, well-being, behavioral economics, and many other data collection surveys. <http://www.gallup.com>. Much of the information contained herein on life satisfaction and well-being is adopted data from Gallup. https://scholar.google.com/scholar?hl=en&q=gallup+world+poll&btnG=&as_sdt=1%2C5&as_sdtp=

satisfaction for the period 2006-2009 was calculated based on the “Cantril ladder” method (Cantril, 1965; OECD, 2013; Helliwell et al., 2009).

A total of 169 countries were included in the HDR report. However, this analysis was confined to 144 countries in which data on life satisfaction was readily available. These included 39 countries from Africa, 34 countries from Asia, 44 countries from Europe, 25 countries from North, Central and South America, and two countries from Oceania.

The Variables

The dependent variable in this analysis is the mean life satisfaction of citizens for each of the 144 countries. The mean life satisfaction is a ratio scale variable ranging from 2.4 to 8.2, with a mean of 5.9 and a standard deviation of 1.4. The HDI, which ranges from 0.337 to 0.944, with a mean of 0.644 and a standard deviation of 0.188, is the main independent variable in this study.

The HDI has three components: to provide an assessment of the ability to maintain a long and healthy life, to assess whether individuals gain access to education and knowledge, and assess if most citizens of a given country have an adequate standard of living. The means for ascertaining a long and healthy life is based upon life expectancy that is calculated using a minimum value of 20 years and a maximum value of 83.2 years. The knowledge component is measured based on the number of years of schooling of an adult aged 25 years or older, and the expected years of schooling for children of school going age. A decent standard of living is measured by GNI per capita (PPP US\$) using the logarithm of income to reflect the diminishing importance of income with increasing GNI (UNDP, 2010). The scores for the three HDI dimension indices are aggregated into a composite index using a geometric mean (see Technical Notes in UNDP, 2010).

Sources of data for inequality-adjusted HDI (IHDI) were only available for 128 countries, which meant that 16 countries were not included in the analysis. Of the 34 Asian countries, 10 countries did not have information on IHDI. Hence, as this paper is reliant on HDI, it should also note the limitations of this data.

Life satisfaction is affected by myriad variables, and so even the best studies on this topic must concentrate on several salient factors to the exclusion of smaller influences. Using data from 2010 HDR, the objective of this study is to add to the literature on the effects of personal dimensions and elements of happiness on life satisfaction. For this, HDI, is used as the main independent variable in the multivariate analysis.

Generally, there are various types of well-being; and this becomes ever more apparent when investigating what constitutes this sense of self satisfaction and harmony and what it is predicated on. These varieties are shaped, among other things, by vocational, social, financial, physical, communal, emotional, environmental, and spiritual considerations, which are salient factors. This notwithstanding, the most measurable indicators of well-being are satisfaction with work, health, and standard of living. Most people spend a great deal of time at work and depend on earning from work for sustenance. Various studies have confirmed the primacy of health as a determinant of well-being (Chou & Chi, 1999; Wikman, Wardle & Steptoe, 2011; Piazza, Charles & Almeida, 2007; Ng, Tey & Asadullah, 2017). The standard of living is defined as the degree of wealth and material comfort available to a person or community.

According to Maslow's hierarchy of needs, the next level of human need, once physiological and safety considerations are secure, is interpersonal. It involves a yearning to belong to others or a particular cause. *Self-esteem needs* involve ego or status needs, in which one is concerned with getting recognition, status, importance, and respect from others. The final tier of needs requiring fulfilment to gain a more enriched form of happiness is referred to as self-actualization, in which there is a realization, or a prospective realization, of a person's full potential. The 2010 HDR focused on the three elements of happiness which were considered to be that of having a purposeful life, having social support, and being treated with respect. The first element of having a purposeful life is important to discovering the path to true happiness mainly because it portrays the existential purpose of an individual's life. The perceived value of one's life will affect a person's decisions and actions and lead to his or her happiness. Just as the English Renaissance poet John Donne states that "No man is an Island", so it is that having social support is an important determinant of life satisfaction.

Methodology

Scatter plot and ordinary least square (OLS) regression on HDI and life satisfaction

The study began by examining summary statistics of HDI and life satisfaction, followed by scatter plots of HDI and life satisfaction for 144 countries. Next, least squares regression analyses were done to examine the relationship between life satisfaction and HDI. Ordinary least squares regression has been used in many studies to determine the impact of socio-economic variables on life satisfaction (Welsch, 2006; Ho, Cheung & Cheung, 2008; Adams & Serpe, 2000; Forsyth, Roberts & Robin, 1992; Jung, 2014).

The simple regression model rendered in this study is specified as the following:

$$LS_i = \alpha + \beta_1 HDI + \varepsilon_i$$

where the subscript i ($i=1\dots N$) denotes country i , LS is Life Satisfaction, HDI is the Human Development Index, β_1 is the regression coefficient of the independent variable, and ε is the error term.

As stated earlier, life satisfaction is influenced by other factors which may be correlated with HDI. To assess the net effect of HDI, multiple regressions were performed by adding the three variables of personal dimensions of life satisfaction together with HDI. This was done for Model 2, and then subsequently three variables of the elements of happiness were entered with HDI in Model 3, and all the six variables with HDI were entered in Model 4. In the final model, there was a further inclusion of dummy variables for four continents: Europe (the reference group), Asia, Africa, and the Americas in Model 5. This is seen in the formula of:

$$LS_i = \alpha + \beta_1 HDI + \beta_2 X_2 + \beta_3 D_3 + \varepsilon_i$$

with the index i ($i=1\dots N$) denoting country, LS as Life Satisfaction, HDI as the Human Development Index, and X stands for a set of explanatory variables. D stands for the dummy variables for the continents, β s stands for the regression coefficients of the independent variables, and ε is the error term.

Actual versus expected life satisfaction

For each country estimates of life satisfaction was made based on simple regression analyses. The differences between observed and expected values were divided by the

expected values, and this was used to identify which countries performed better or worse than expected given their respective levels of HDI.

Results

HDI and life satisfaction

The mean value of HDI for the 144 countries was 0.644 with a standard deviation of 0.189. The mean in life satisfaction was 5.86 with a standard deviation of 1.41, and it ranged from 2.4 to 8.5. Of the three components in personal dimensions of well-being, the mean score was highest, at 76, when it was concerned with satisfaction over personal health, and the lowest, at 57, for satisfaction concerning one's standard of living. Job satisfaction was in between at 70. The mean satisfaction level in elements of happiness ranged from 79 for the social support network to 83 for being treated with respect (Table 1).

Table 1: The mean, standard deviation, maximum and minimum for all of the variables

Variable	Mean	Standard Deviation	Max	Min
Overall life satisfaction	5.9	1.4	8.5	2.4
HDI	0.644	0.189	0.938	0.140
Personal Dimensions of well-being:				
Job	70	22	95	30
Personal Health	76	12	95	40
Standard of living	57	21	93	11
Elements of Happiness:				
Purposeful life	82	26	100	60
Treated with respect	83	12	97	43
Social support network	79	15	98	28

Note: Overall life satisfaction and HDI are the mean values, and the domains of personal dimensions of well-being and elements of happiness are the percentages of respondents who are satisfied.

The mean HDI ranged from 0.384 among countries in the low HDI group to 0.857 in the very high HDI group, while the corresponding mean life satisfaction ranged from 4.264 to 7.171. Variations in HDI and mean life satisfaction across countries within each group were largest in the low HDI group and smallest in the high HDI group (Table 2).

Table 2: Mean HDI and life satisfaction by HDI level

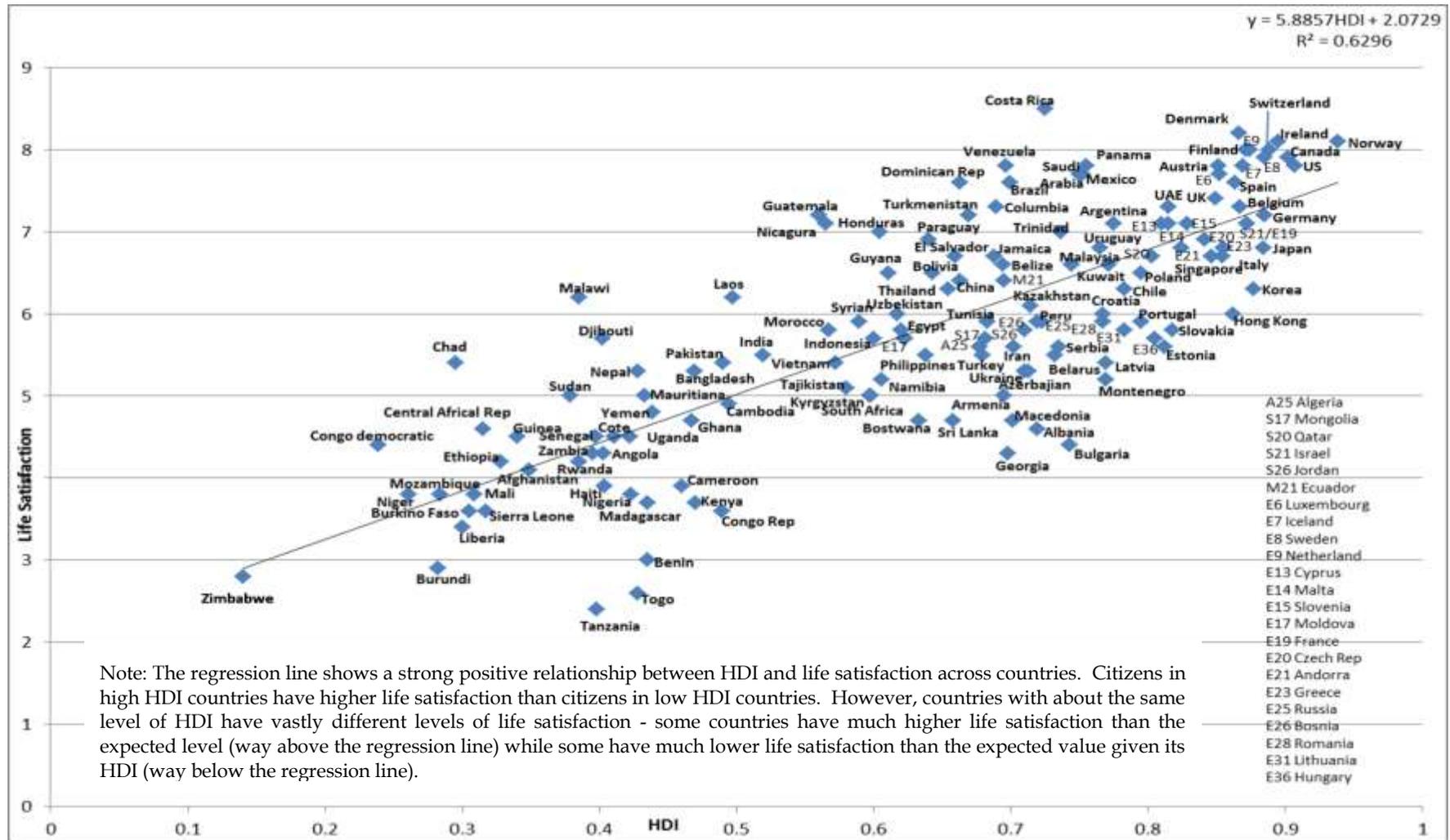
	HDI level	N	Mean	Std. Deviation	Minimum	Maximum	Coefficient of variation
HDI	Very high HDI	38	.857	.037	.795	.938	4.29
	High HDI	39	.726	.033	.677	.783	4.54
	Medium HDI	31	.598	.054	.489	.669	9.07
	Low HDI	36	.384	.105	.140	.815	27.3
Life satisfaction	Very high HDI	38	7.171	.744	5.60	8.20	10.37
	High HDI	39	6.141	1.025	4.30	8.50	16.69
	Medium HDI	31	5.877	.907	3.60	7.60	15.42
	Low HDI	36	4.264	.989	2.40	7.10	23.20

Figure 1 shows that HDI varied widely across countries, from 0.14 in Zimbabwe to 0.94 in Norway. Whereas most African countries had low HDI, European countries had high levels. In Africa 19 out of 39 countries had an HDI below 0.4 with the mean value of 0.41 and a high range from 0.14 in Zimbabwe to 0.68 in Algeria. In contrast, 25 out of 44 countries in Europe had an HDI of 8.0 (which is also the mean) or higher, and it ranged from 0.62 in Moldova to 0.94 in Norway. In Asia, the HDI value averaged 0.65 and ranged from 0.349 in Afghanistan to 0.88 in Japan. Of the 34 Asian countries, seven had an HDI below 5.0 while seven had 8.0 and above. Most countries in Central and South America had an HDI between 0.6 and 0.8 (with a mean of 0.67 and ranging from 0.40 in Haiti to 0.78 in Chile and Argentina). The only two countries in North America that had very high HDI were the USA with 0.902 and Canada with 0.888. Australia and New Zealand also had very high HDI of 0.937 and 0.907 respectively.

The life satisfaction index ranged from a low of 2.4 in Tanzania, 2.6 in Togo, 2.8 in Zimbabwe, and 2.9 in Burundi (all in Africa) to a high of 8.5 in Costa Rica in Central America, followed by four European countries with a life satisfaction index of 8.0 and above (Denmark, Norway, Ireland and Switzerland), and Canada at 8.0. The mean life satisfaction varies from 4.32 in Africa (ranging from 2.4 in Tanzania to 5.9 in Tunisia), 5.91 in Asia (ranging from 4.1 in Afghanistan to 7.7 in Saudi Arabia), 6.46 in Europe (ranging from 4.3 in Georgia to 8.2 in Denmark), and 6.91 in Central and South America (ranging from 3.9 in Haiti to 8.5 in Costa Rica). Out of the 40 countries in Africa, 27 (or 67.5%) had life satisfaction index of less than 5.0, compared to 7 out of 34 (20.6%) in Asia, none in Europe, and only one (Haiti) in the Caribbean.

Figure 1 shows that most European countries had high HDI and high life satisfaction, while most African countries had low HDI and low life satisfaction. It also shows that life satisfaction was positively correlated with HDI. Citizens of countries with low HDI generally had low life satisfaction, while citizens from high HDI countries tended to have high life satisfaction. However, countries with about the same level of HDI had a vast difference in the level of life satisfaction with some faring much better than expected (considerably above the regression line in Figure 1), while others fared much worse than expected (countries that fell far below the regression line).

Figure 1: Scatter Plot of Life Satisfaction and HDI in the year 2009



Note: The regression line shows a strong positive relationship between HDI and life satisfaction across countries. Citizens in high HDI countries have higher life satisfaction than citizens in low HDI countries. However, countries with about the same level of HDI have vastly different levels of life satisfaction - some countries have much higher life satisfaction than the expected level (way above the regression line) while some have much lower life satisfaction than the expected value given its HDI (way below the regression line).

Source: Constructed using data from United Nations, Human Development Report 2010

Simple regression analyses show that HDI alone accounted for 63% of the cross-country variation in life satisfaction, as compared to 60% accounted for by the logarithm of GDPPC. Table 3 shows that a 0.1 unit increase in HDI led to an increase of 0.589 units in life satisfaction (± 0.076 at 95% confidence level). For instance, a country with an HDI of 0.80 was expected to have 2.36 (± 0.304) higher life satisfaction than one that had an HDI of 0.40. Information on IHDI is available for 128 countries, and using this variable instead of HDI reduces the regression coefficient from 0.589 to 0.516, and the R^2 value from 0.63 to 0.55.

Table 3: Regression results of Life Satisfaction by HDI, IHDI, and LGDPPC

Dependent variable: Life satisfaction								
Independent variables								
Constant	Coefficient	2.07***	Constant	Coefficient	3.16***	Constant	Coefficient	5.16***
	s.e.	0.26		s.e.	0.23		s.e.	0.13
	t	8.05		t	14.02		t	41.11
HDI	Coefficient	5.89***	IHDI	coefficient	5.16***	LGDPPC	Coefficient	4.18
	s.e.	0.38		s.e.	0.41		s.e.	4.86E-06
	t	15.41		t	12.62		t	8.60
	N	144		N	128		N	144
Adjusted $R^2 = 0.63$			Adjusted $R^2 = 0.55$			Adjusted $R^2 = 0.60$		

Note: ***denotes $p < 0.01$. *t* stands for *t* statistics, *s.e.* stands for the standard error of the coefficient
 HDI = Human Development Index, IHDI = Inequality-adjusted HDI, LGDPPC = log GDP per capita
 Gross Domestic Product per capita (GDPPC) was obtained from the World Development Indicator (World Bank, 2010). GDPPC in the year 2010 was available for 125 countries

Countries with higher or lower than expected life satisfaction

Although citizens in countries with high HDI tend to have higher life satisfaction than those from low HDI countries, the amount of that life satisfaction varies considerably as countries with about the same level of HDI are shown to have vastly different levels of life satisfaction. For instance, while Hong Kong has about the same HDI as Scandinavian countries, its level of life satisfaction is shown to be much lower than that of the latter. In the study, Bulgarians were much less satisfied with life as compared to citizens in a number of countries in Central and South America which had about the same level or a lower level of HDI. Life satisfaction was much higher in Malawi and Chad than in Tanzania and Togo although the four countries had about the same level of HDI (see Figure 1).

The study showed that countries lying above the regression line had higher than expected life satisfaction, while those lying below the regression line had lower than expected life satisfaction. Out of the top ten countries that had higher than expected life satisfaction, four were from Africa and six from the Americas, and on average they were performing 42% higher than the expected level, as in the case of the African countries of Malawi and Chad. Conversely, six out of the ten worst performing countries in terms of lower than expected life satisfaction were from Africa with Tanzania and Togo under-performing by as much as 43-46%, and four were from Europe (Table 4). None of the countries from Asia fell under the top ten countries in terms of over-performing or under-performing. This indicates that HDI may be a better predictor of life satisfaction in Asia than in other continents.

Regression of life satisfaction on HDI, personal dimensions of well-being and elements of happiness

Life satisfaction is affected by a host of variables. Hence, multiple regressions were performed to examine the combined and independent effects of HDI, personal dimensions of well-being, and elements of happiness on overall life satisfaction, and to understand its ubiquitous significance more clearly. Adding personal dimensions of well-being (model 2 in Table 5) were found to increase the coefficient of determination from 63% in a model with HDI as the only variable to 80.3%. However, adding elements of happiness (model 3 in Table 5) in addition to HDI increased the coefficient of determination by only 4.5 percentage points to 67.5%. In model 4, adding the elements of happiness to the model containing HDI and personal dimension of happiness had no effect on the explanatory power of the regression model.

Table 4: Countries with higher or lower than expected life satisfaction

Continent	Country	HDI	Life satisfaction	Life satisfaction expected value	Difference	Difference divided by expected (%)
Higher life satisfaction than expected given the level of development						
Africa	Malawi	0.385	6.2	4.34	1.86	42.89
Africa	Chad	0.295	5.4	3.81	1.59	41.76
Americas	Guatemala	0.56	7.2	5.37	1.83	34.11
Americas	Costa Rica	0.725	8.5	6.34	2.16	34.07
Americas	Nicaragua	0.565	7.1	5.40	1.70	31.52
Africa	Djibouti	0.402	5.7	4.44	1.26	28.41
The Caribbean	Dominican Republic	0.663	7.6	5.98	1.62	27.19
Africa	Congo (Democratic Republic of the)	0.239	4.4	3.48	0.92	26.45
South America	Venezuela (Bolivarian Republic of)	0.696	7.8	6.17	1.63	26.43
Central America	Honduras	0.604	7.0	5.63	1.37	24.38
Lower life satisfaction than expected given the level of development						
Africa	Tanzania (United Republic of)	0.398	2.4	4.42	-2.015	-45.60
Africa	Togo	0.428	2.6	4.59	-1.99	-43.38
Africa	Benin	0.435	3.0	4.63	-1.63	-35.25
Europe	Bulgaria	0.743	4.4	6.45	-2.046	-31.74
Europe	Georgia	0.698	4.3	6.18	-1.88	-30.43
Africa	Congo	0.489	3.6	4.95	-1.35	-27.29
Europe	Albania	0.719	4.6	6.30	-1.70	-27.04
Europe	The former Yugoslav Republic of Macedonia	0.701	4.7	6.20	-1.50	-24.18
Africa	Kenya	0.47	3.7	4.84	-1.14	-23.54
Africa	Burundi	0.282	2.9	3.73	-0.83	-22.31

Source: Authors' own computation based on Human Development Report 2010

Models 2 and 4 accounted for around 80% of life satisfaction. In model 2, when HDI increased by one unit, life satisfaction increased by as much as 3.666. This is significantly different than a raised standard of living, the only significant component in the personal dimensions of well-being. For every unit increase in standard of living there was merely a 0.037 increase in life satisfaction. Adding elements of happiness to the model containing

HDI resulted in a relatively small gain in the coefficient of determination, but a much larger regression coefficient for HDI. Specifically, an increase of HDI by one unit was found to increase life satisfaction by 5.018, *ceteris paribus*. Of the three elements of happiness in this analysis, life satisfaction was significantly associated with being respected and having social support. A unit increase in each of these variables tended to enhance life satisfaction by 0.013 and 0.018 respectively.

In model 4, besides HDI, satisfaction with standard of living was the only significant variable in life satisfaction. Results from multiple regressions show that HDI emerged as the most significant factor in explaining life satisfaction, after adjusting for dimensions of well-being and elements of happiness. The inclusion of "continent" into Model 5 increased the coefficient of determination to 0.856 from 0.802 in Model 4. Controlling for HDI, dimensions of well-being and elements of happiness, Asians and Africans had significantly lower life satisfaction than Europeans ($p < 0.05$), but Americans had higher life satisfaction than Europeans ($p < 0.1$). In model 5, the regression coefficient of HDI decreased from around 3.6 (in Model 4) to 2.76, while the coefficient for satisfaction with standard of living remained unchanged at 0.038. Regression coefficients show that the continent was the most significant predictor of life satisfaction, followed by HDI.

Table 5: Regression of life satisfaction by HDI, personal dimensions of well-being & elements of happiness

Independent Variables		Model 1 HDI	Model 2 HDI and personal dimensions of well- being	Model 3 HDI and elements of happiness	Model 4 HDI, personal dimensions of well-being & elements of happiness	Model 5 HDI, personal dimensions of well-being & elements of happiness with region
Constant	Coefficient	2.07***	1.692***	1.113	1.586**	2.803***
	s.e.	0.26(8.05)	0.448(3.78)	0.529(0.22)	0.508(3.12)	0.513(5.46)
HDI	Coefficient	5.89***	3.666 ***	5.018***	3.628***	2.756***
	s.e.	0.38 (15.41)	0.362(10.12)	0.436(11.51)	0.415(8.74)	0.493(5.59)
Job	Coefficient		-0.001		-0.002	-0.004*
	s.e.		0.003(0.20)		0.003(-0.83)	0.002(-1.65)
Health	Coefficient		-0.003		-0.006	-0.01
	s.e.		0.007(-0.38)		0.008(-0.67)	0.07(-0.09)
Standard of living	Coefficient		0.037*		0.038***	0.038***
	s.e.		0.005(7.67)		0.005(7.80)	0.04(8.95)
Life	Coefficient			0.001	0.003	0.01
	s.e.			0.003(0.20)	0.002(1.41)	0.002(0.36)
Respect	Coefficient			0.013**	-0.019	-0.008
	s.e.			0.006(2.00)	0.005(-0.35)	0.005(-1.60)
Support	Coefficient			0.018***	0.004	0.002
	s.e.			0.006(2.77)	0.006(0.63)	0.005(0.44)
d_Asia	Coefficient					-0.370**
	s.e.					0.152(-2.43)
d_Africa	Coefficient					-0.454**
	s.e.					0.205(-2.22)
d_America	Coefficient					0.635*
	s.e.					0.152(4.19)
Adjusted R ²		0.630	0.803	0.675	0.802	0.856

Note: *t* statistics are shown inside the brackets, and *denotes $p < 0.10$, **denotes $p < 0.05$, ***denotes $p < 0.01$

Under personal dimensions of well-being: satisfaction with job, personal health and standard of living.

Under elements of happiness: % answering "yes" to having the purposeful life, being treated with respect and having social support.

Regions

Asia region (*d_Asia*): 1 if the Asia region, 0 otherwise

Africa region (*d_Africa*): 1 if the Africa region, 0 otherwise

North, Central (and the Caribbean) and South America region (*d_Americas*): 1 if in the Americas, 0 otherwise

Europe is the reference group

Discussion

The Determinants of Life Satisfaction at Country Level

HDI has been shown to be a strong predictor of life satisfaction. It accounted for 63% of the variation in life satisfaction across countries, but there was still an unexplained variance of 37%. Hence, it is not surprising that countries with about the same level of development would have different life satisfaction, due to the influence of these other factors (Bonini, 2008; Jagodzinski, 2010; Böhnke, 2008), as well as different ideas about what constitutes life satisfaction (Jagodzinski, 2010).

Past studies have found that some countries fared better than others and some fared worse than others given their level of development. Leigh and Wolfers (2006) found that populations in the Philippines, Brazil, Mexico, and Chile appeared unusually happy given their relatively low levels of development, but the former Warsaw Pact communist countries appeared particularly unhappy despite having a relatively high level of development, as compared to some of the developing countries. The paradoxes may be attributed to the individual, cultural, socio-political, and environmental factors. Freedom or lack of it, as well as different perceptions and expectations may also be contributing factors to life satisfaction (Cummins, 1998; Costanza et al., 2009; Alesina et al., 2004). Analyzing data from 70 countries, Bjørnskov, Dreher and Fischer (2008) found that factors such as openness, business climate, post-communism, the number of chambers in parliament, having a Christian majority, and infant mortality have a powerful influence on life satisfaction across countries. Based on a review of happiness research, Graham concluded that "there is a remarkable human capacity to adapt to both prosperity and adversity; and as such, people can adapt to tremendous adversity and retain their natural cheerfulness, while they can also have virtually everything and still be miserable" (Graham, 2005, 2010b).

Contrary to the findings of a study by Tian (2013) which concluded that a lack of correlation between personal socio-economic status (including standard of living, household income, health, education, job and satisfaction with housing) with life satisfaction, this study found a significant correlation between life satisfaction and standard of living, job satisfaction, and perceived health at the bivariate level. However, the strength of the correlation between life satisfaction and each of these factors differed across levels of HDI.

Personal Dimensions of Well-being and Elements of Happiness

Haller and Hadler (2006) argue that happiness and satisfaction must be understood as the outcome of a process of interaction between individual characteristics and aspirations on the one side, and social relations and macrosocial structures on the other side. Although "macrosocial factors" such as the distribution of income and political freedom are important predictors of life satisfaction (Haller & Hadler, 2006, p.181), "microsocial factors" (Haller & Hadler, 2006, p. 178) also exert an influence. Microsocial factors relate to the ability to maintain good health and have close social relationships. Interaction is needed in order to enhance life satisfaction or happiness. It creates a sense of belonging to society and meeting social norms which improves a person's sense of happiness (Helliwell, Layard & Sachs, 2011). Although friendship contributes to happiness, it is also predicated on the quality of that relationship (Demir, Simsek & Procsal, 2013; Demir, Ozdemir & Weitekamp, 2007). Results from the bivariate analysis show that satisfaction with one's job and health status, living a purposeful life, being treated with respect, and having social support are strongly related to life satisfaction, and are tenets consistent with the Authentic Happiness Theory.

Likewise, job satisfaction is related to one's perception of his or her ability to succeed, and the stability obtained from having a job as well as the positive emotions gained from the appraisal of oneself in a larger communal context are important to an overall sense of well-being (Gamboa, García-Suaza & Rodríguez-Acosta, 2011). However, at the multivariate level, with the inclusion of HDI in the regression models, all these microsocial factors are of lesser significance. This indicates that macrosocial development variables, as measured by HDI, are dominant factors in influencing life satisfaction for residents of a given country. But any findings must be interpreted cautiously as the analysis of data at the individual or household level may show different results.

Differences in HDI and life satisfaction across the continents

The findings on regional differences in life satisfaction are consistent with a number of previous studies (Pittau et al., 2010; Bonini, 2008; Jagodzinski, 2010). Although HDI is a very significant predictor of life satisfaction, large deviations from the expected values may well be due to differences in regional characteristics such as differences in politics, governance, freedom of speech, safety and security, environment, income inequality, and unemployment. Furthermore, there are often large regional differences in life satisfaction in the multivariate context that may also be attributed to a different culture, diverse values between the East and West, personality traits, and outlook in life, religion and beliefs, and other factors which require further investigation.

Theoretical and Practical Implications

This study finds that HDI is a strong predictor of life satisfaction at the macro level, but the relationship is far from perfect. The causal effects between HDI and life satisfaction are rather straightforward, and they can be generalized as better income, education, and health that should lead to higher life satisfaction. From a theoretical perspective, this idea evinced in the Relative Income Hypothesis is sensible and the ideas therein are corroborated, to some degree, by specific pieces of evidence. But the issue is much more complicated. Citizens even in high HDI countries in Europe may feel dissatisfied when they start to compare themselves with neighbouring countries that are seen to be doing better. More detailed analyses using micro-level individual data are needed to provide empirical evidence in support of the various theories on happiness and life satisfaction. Thus, the important finding from this study is that citizens of different countries at about the same level of development can have vastly different levels of life satisfaction. For example, citizens from former Communist block countries in the transitional stage appeared to be relatively dissatisfied with life compared to those of neighbouring communist countries.

But considerations of the Relative Income Hypothesis notwithstanding, one important question that should be addressed is whether governance or lack of freedom have made people dissatisfied with life. Policymakers in countries in which life satisfaction is lower than expected should address the root causes of any dissatisfaction or unhappiness amongst its citizens, learn from other countries, and put in place appropriate policies and programs to raise the well-being of the population.

Limitations of the Study

Life satisfaction is one of the measurements of subjective well-being. There are problems of conceptualization and measurements. The perceptions and expectations of people and their

outlook on life may differ from country to country, and such differences are not easily reflected in standard measurements of life satisfaction including this particular analysis.

This paper is based on analysis of secondary data obtained from the 2010 HDR, and this precludes a more detailed analysis of other relevant factors as data is simply not available. Due to the fact that data on subjective secondary factors that affect happiness are not available, this study is limited in the scope of its impact. As noted in the Human Development Report, the HDI can only assess objective factors that are measurable. The impact of inequality, poverty, human security, and empowerment on life satisfaction are topics which require further investigation. As such, it would be better to use IHDI instead of HDI in the analysis, but this entails more efforts to collect the relevant data.

Using data from cross-sectional surveys from different countries could raise the possibilities of structural and sampling bias, but as these surveys for the annual World Happiness Reports were conducted by Gallup Poll, which has vast experience in this line of work, any untoward effects would be nominal. Their use of standardized core questionnaires and trained enumerators would have reduced the possibility of biases in the responses within the respective countries.

Besides socio-cultural factors, individual characteristics and outlook in life may influence life satisfaction of the various sub-groups of a population differently. An obvious limitation of this study is the use of country-level data that deals with averages, and does not allow for detailed examination of innate cultural differences in respective countries. Thus, more attention should be directed at examining the differentials of life satisfaction within each country.

Conclusion

HDI has a rather high predictive power of life satisfaction at the country level; and generally, it can be said that citizens from countries that score high in an HDI ranking tend to have higher life satisfaction than those from a low HDI ranking. This suggests that money, health, and education, the three components in HDI, do have a major role in improving well-being and life satisfaction. However, there are still other factors that have a major impact on life. Hence, these factors (constituting 37 percent) shape how countries with similar HDI rankings differ from each other in life satisfaction. This is especially evident in Africa and Central and South America in which many neighboring countries fare much better than others in life satisfaction despite having the same level of development. Clearly, the deviations of life satisfaction from expected values are caused by factors other than income, health, and education.

The findings of this study reinforce previous findings which attest that the well-being of a population differs from one country and region to the next, and that salient differences exist even with countries that have similar HDI rankings. And certainly, in some situations it is easy enough to imagine how life satisfaction results are antithetical to the country's high HDI ranking. Clearly, in a country that is engaged in hostilities that are domestic or international, the life satisfaction of the citizens of that country will be lower despite the HDI ranking. Making good quality friendships or having a sense of belonging can be factors that are as strong in shaping life satisfaction as accessible health care, coming from a country with a flourishing economy, or having job satisfaction.

Each country is unique and has different needs. Raising the HDI is the universal goal of all governments, but the effects of increased HDI on life satisfaction will differ from one

country to another due to the differences in cultures and political conditions. Therefore, government policies must be targeted appropriately in order to improve the life satisfaction of the people, taking into consideration the personal dimensions of well-being as well as the elements of happiness. Efforts must be made to collect reliable data based on more refined gauges of happiness, life satisfaction, and subjective well-being, for purposes of monitoring and evaluation.

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