How do you measure happiness and wellbeing?

Aristotle predicted that people would report greater life satisfaction if they had better life circumstances, in the form of family, friends, good health and sufficient means to support themselves, while also being supported from one side, by positive emotions and on the other side, by a sense of purpose. Happiness economics looks to test such hypotheses, to see how satisfied people are with their lives, and to decipher the key determinants that create differences in individual's reported life satisfaction[1]. Measurements of happiness and wellbeing allow policymakers to track progress over time. Bhutan was the first country to do so periodically, creating a Gross National Happiness Index in the 1970's, as a measure of progress to replace GDP.

We chose this to be the topic of our second research article because it is the area that happiness economics tends to get the most cynicism. Many cynics argue that measures of happiness are too weak to be used in statistical analyses, due to the lack of reliability in the subjective nature of the responses. The discussion below outlines that whilst happiness and wellbeing measures aren't perfect, they do produce statistically significant and highly informative results.

This article is split into three sections: we start by examining the strengths and weaknesses of an array of happiness and wellbeing measures currently available. Next, we provide a discussion of the reliability of these measures. And finally, we look ahead to the future of happiness measures by discussing how ground-breaking neuroscience research could change the way we measure happiness in the future.

Current measures of happiness and wellbeing[2]

The purpose of this section is to discuss some of the most influential happiness and wellbeing measures available. It is important to note at the outset that the purpose of these measures from an analytical and policy perspective are not always the same. Some measures are more useful in particular settings than others, but this isn't to say that this measure is always superior in all settings. It depends on the question the researcher is attempting to answer or the function of policy making it is being used for. There are three main policy purposes that wellbeing and happiness measures are used for: monitoring progress, informing policy design and policy appraisal.[3]

United Nations Happiness Indicator

Since 2012, the United Nations (UN) have produced an annual 'World Happiness Report'. As part of the report they produce a global distribution of happiness, bringing together subjective wellbeing measures and objective economic and development indicators using econometric analysis. The subjective wellbeing measure (SWB) is developed from the Gallup World Poll and it is the national average response to a question on life satisfaction (also known as the Cantril Ladder). The English wording is as follows: "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?".

At Exploring Happiness, we feel that the wording of this question could be improved to avoid confusion among participants answering the question, which should generate greater consistency in responses. The question is intended to gain an understanding of how satisfied people are with their life to date and does not include a forward-looking element. However, often people answer this question relative to what they would like to achieve in the future and consequently understate their score now, to reflect future aspirations. Additionally, it's not completely clear as to what the question is relative to, when it states worst or best possible life for you. This could be interpreted as the worst type of life you could imagine, within the realms of your own life, or within the realms of a person that is born

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[1] In this article, we tend to use life satisfaction and happiness and wellbeing as interchangeable terms, we provide a section in this paper that discusses how comparable the two are.
[2] Hyperlinks to all of the measures, indexes, reports and surveys are provided in the summary article on our website.
[3] See Dolan and Metcalfe (2012).

into less fortunate circumstances. As such, for two people that are equally satisfied with their lives but interpret the question differently, this would lead to different responses to the question.

This question is only one element of the UN happiness score. Other elements that feed into the measure include: GDP per capita[4], healthy life expectancy, perceptions of corruption, freedom to make life choices, inequality and two further Gallup World Poll measures of happiness and misery. These two measures hold shorter term information on emotional wellbeing that the life satisfaction SWB measure doesn't necessarily pick up on.

Despite our concerns on the SWB question, the overall index reports results which are informative and intuitive when comparing results across countries. For example, western European countries have much higher scores than eastern European countries. The Nordics are at the top of the index with Finland, Norway and Denmark taking up the top three spots. The report also shows how countries scores have changed over time; since 2008 the largest increases in scores were for Togo, Latvia and Bulgaria, whilst the largest decreases were for Venezuela, Malawi and Syria. All of these results can be explained by recent political, economic or social developments in these countries.

Happy Planet Index

At Exploring Happiness, we have developed our own definition of happiness economics, which we plan to use as our core goal when developing research, which is '*increasing happiness and wellbeing in society in a sustainable way'.* The Happy Planet Index (HPI) was developed by the New Economics Foundation, and it is a measure of sustainable wellbeing, meaning it is highly relevant for our research. The measure compares how efficiently residents of different countries are using natural resources to live long and happy lives. The equation below demonstrates, approximately[5], how HPI scores are calculated:

$$HPI \approx \frac{(Life\ Expectancy\ X\ Experienced\ Wellbeing)\ X\ Inequality\ of\ Outcomes}{Ecological\ Footprint}$$

HPI is constructed to be useful for governments that target long-term development goals. Therefore, a countries score should be reflective of how well-designed government policies can lead to better, more equal lives in society, that are also environmentally sustainable. By accounting for inequality of outcomes, scores reduce when a country's distribution of income becomes more unequal.

Costa Rica are top of the HPI and its due to the actions of their government. They have higher scores for wellbeing than many developed economies, including the UK and the USA, and live longer than people in the USA too. This is all achieved with a per capita ecological footprint that's just one third of the size of the USA's[6]. They have been forward thinking in their policies towards environmental protection; 99% of electricity used in Costa Rica comes from renewable resources and the government has committed to becoming carbon neutral by 2021.

Office of National Statistics Wellbeing Measure

In November 2010, David Cameron asked the Office of National Statistics (ONS) to start measuring the UK's happiness and wellbeing. They have chosen to do so by asking participants in their quarterly surveys the following four personal well-being related questions[7]:
- Overall, how satisfied with life are you nowadays?
- Overall, to what extent do you feel the things you do in your life are worthwhile?
- Overall, how happy did you feel yesterday?
- Overall, how anxious did you feel yesterday?

People are asked to respond on a scale of 0 to 10, with 0 being "not at all" and 10 being "completely". Figure 1 below shows the data collected thus far, for the first three questions.

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[4] Taken in purchasing power parity terms ($PPP).
[5] The equation is approximate because it excludes statistical adjustments that are fully explained in Annex 1. Please also see the Happy Planet Index 2016 Methods Paper (included in the reference list) for more details on how this index is constructed.
[6] The data is available for these variables within our Exploring Happiness database, which is linked on the about page of our website.
[7] The wellbeing estimates are broken down by age, disability, relationship status, ethnicity, religion, sex and sexual identity, using the Annual Population Survey three-year combined dataset.

Figure 1 shows that there has been a steady increase in these measures since they began in 2012. It is difficult to draw too many conclusions from the data just yet, but it will certainly be interesting to see how this data evolves throughout the business cycle. The interpretation currently could be that as the unemployment rate has decreased in the post-crisis era, this has caused these measures to increase and we should subsequently expect these scores to decrease during a downturn. This is a reasonable expectation, given we already know there is a negative correlation between happiness data and the unemployment rate, but of course we also know that there are many other factors that affect happiness, which could dominate over the unemployment effect. In terms of the reliability of the data, our view is the that the simpler wording of these questions should lead to greater consistency in responses than the SWB question in the Gallup World Poll.

The four different questions are aimed at being relevant across the three different policy purposes (monitoring progress, informing policy design and policy appraisal). In addition, the measures aim to capture the three different types of subjective wellbeing measures: evaluation (life satisfaction question – relevant for longer term studies of wellbeing), experience (happiness question – relevant for shorter term studies of wellbeing) and eudemonic (worthwhile question – relevant for longer term studies of wellbeing from a different angle to the life satisfaction question). This is outlined in Dolan and Metcalfe (2012) and it was this paper that provided recommendations to the ONS as to how the measures should be structured.[8] The only downfall of this measure is that it only currently covers a short time period, as such, as the time series extends it will become more and more useful for policy analysis.

Figure 1: ONS measures of Life Satisfaction, Happiness and Worth (Averages, 2012-18)
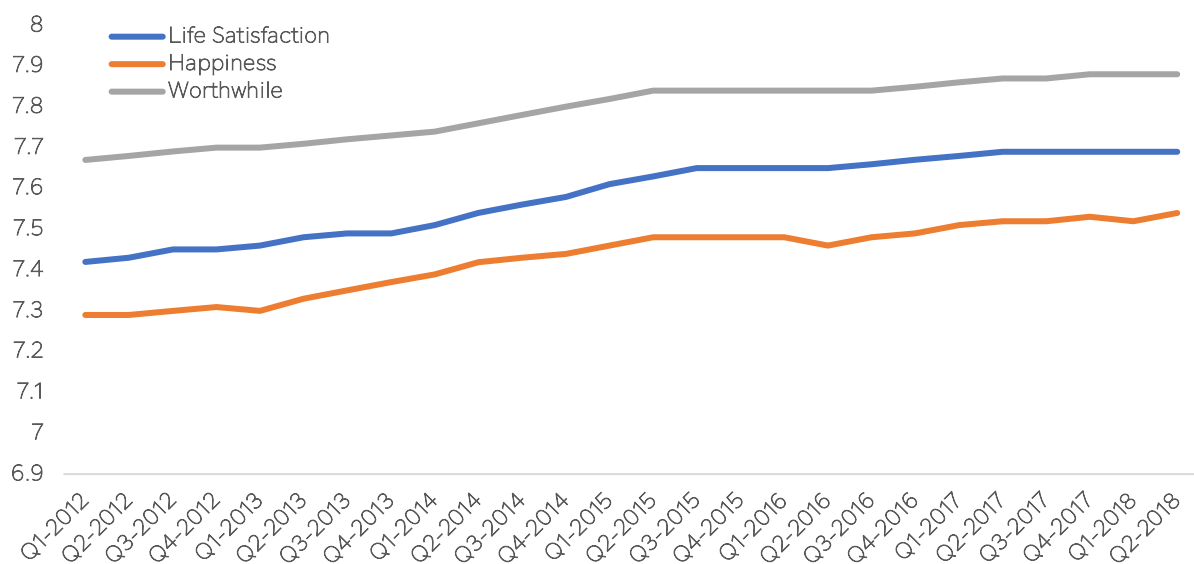
Other within-country measures include the US General Social Survey, which goes back to 1972, although the wording of the question doesn't allow for too much differentiation in responses, given only three responses are possible. The wording of the question is as follows: *"Taken all together, how would you say things are these days— would you say that you are very happy, pretty happy, or not too happy?"*. In Germany, the Deutsche Post Glücksatlas reports subnational averages of self-reported life satisfaction and currently has collected data for the same time period as the ONS measure (2012-2018), and therefore will become more useful as the dataset becomes larger.

Cross-country Surveys

As well as within country surveys there are also several cross-country surveys that are useful for happiness economics analysis. We have selected three below:
- The European Commission has been asking the countries within the EU a life satisfaction question since 1973. The wording of the question is similar to the US General Social Survey and as such, doesn't allow for too much differentiation in responses.

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[8] This paper also provides an overview of some of the challenges facing subjective wellbeing measures which are split across five conceptual and methodological issues: expectations, adaptation, scaling, salience and selection.

- The World Values Survey (WVS) collects happiness and life satisfaction data, as well as many other social and cultural characteristics from cross-national time-series surveys that go back to 1981. The WVS covers almost 100 societies, accounting for approximately 90% of the world's population. The positive of this survey is that the questionnaire is fairly extensive and asks participants several wellbeing related questions in different ways, which helps to develop a view of consistency of responses during the analysis.
- The Pew Global Attitudes Survey has been using the Cantril Ladder question, taken from the Gallup World Poll, since 2002 and has collected 38,000 responses from across 44 countries. The countries in the survey are dispersed across the globe well, meaning analysis of different societies and continents is possible using this data.

Other Useful Measurement Studies and Indexes

The Better Life Index developed by the Organisation for Economic Co-operation and Development (OECD) is very interesting for several reasons. Firstly, it doesn't actually rank countries included in the index, it allows the user to do this themselves. They identified 11 different topics that they felt contributed towards wellbeing but decide to leave the weighting of each topic up to you. Users can rate a topic from 1-5, with 5 holding the most weight. The resulting rankings of the countries in the index change depending on the relative weightings of each topic. Along with the interactive nature of the index, the OECD also produces the results of how people in each country choose to weight the different topics. This offers an interesting insight into what people think matters most, from a wellbeing perspective, in different parts of the globe. For example, in more developed economies, they selected life satisfaction or work-life balance as the most important variable whilst in developing and third-world economies health, education and income were more important.

The UN Human Development Report provides useful data for analysis that is focused towards a slightly different, but closely related area of research: quality of life and development. The infamous Human Development Index (HDI) was developed in 1990 and it gained traction largely due to its simplicity. The index splits human development into three categories: income, health and education and ranks them according their performance across the three variables.[9] In addition to this, the report also now includes several other development indicators created by the UN, such as the Multidimensional Poverty Index, Gender Development Index and the Gender Inequality Index. The data provided in this report is very useful for analysis related to wellbeing and countries economic and social development.

The International Organisation of Migration (IOM) produce reports that study the wellbeing and development of migrants and has been doing so since 2000. The analysis covers a broad range of topics, including different countries perceptions of immigration levels. Their migration data portal covers a highly diverse range of variables that feed into their publications, including several wellbeing variables. The quality of the data is very high and there is great detail as to how each variable was developed statistically and where it was sourced from. The IOM's reports show interesting trends on the impact of migration on wellbeing, looking across four different dimensions of migration: North-North, North-South, South-South and South-North. Essentially, North corresponds to developed economies and South corresponds to developing economies.[10]

A discussion of the reliability of happiness and wellbeing measures

Can happiness really be measured?

The most natural and practical way to attempt to measure happiness and wellbeing in society is to ask people what they think and feel. Indeed, as outlined in the previous section of the paper, this is the most common approach. A theme from our analysis is that the wording of the question can also have an impact and clearly it is the goal of the researcher to try to minimize this impact. In addition, there is a subjective element to the responses in the surveys, leading to a level of inconsistency and noise in almost all happiness and wellbeing measures. This is why it is

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[9] The actual variables used are life expectancy at birth, mean and expected years of schooling and income per capita.
[10] To see the key themes in the findings of this research, refer to the 2013 World Migration Report.

incredibly important to have a large sample of responses when conducting analysis using happiness measures; in small samples the results may be misleading.

Comfort can be taken from correlations between subjective wellbeing measures and determinants that people typically associate with contentment, such as cheerfulness and smiling. Experimental psychologists and neuroscientists have shown that these measures also correlate with activities in the parts of the brain associated with pleasure and satisfaction.[11] The opposite is also true, lower self-reported happiness measures correlate with parts of the brain associated with dissatisfaction and misery. In addition, research has shown that people who say they are happy tend to have stronger health, better sleep and express positive emotions more frequently. As such, the main inference from the evidence is that subjective measures of happiness and life satisfaction do provide a reliable view of what is trying to be measured.

Happiness measures and language in cross country comparisons

Another frequent criticism of cross-country happiness measures is that linguistic differences between countries mean that the responses are not likely to be consistent, due to interpreting the question differently in different languages, cultures and societies. However, there is strong evidence to show that comparability issues with respect to language are limited. For example, research has shown that whilst a person's culture can significantly impact their happiness, this is consistent across individuals and cultures, and comparing for language effects has a negligible impact on the final results[12]. In these studies, they compared participants from collectivists cultures (e.g. Japan or Argentina) with participants from individualist cultures (e.g. USA or Germany), and this to be the factor driving the difference, all else equal, and that language played a very small role, if any at all. Finally, studies have shown that "native emotions" – feelings that are unique to a particular culture and do not have equivalents in the English language – are not experienced more frequently or differently than in common translated emotions.[13] Therefore, the evidence tends to suggest that there is a basic understanding among humans about what it means to be happy and therefore cross-country subjective measures of happiness remain highly informative.

Is life satisfaction the same as happiness?

In this article, we have used happiness and life satisfaction interchangeably, as if they can be interpreted as the same in practice, however there are some important differences. When happiness measures and life satisfaction scores are compared on a scatter plot there is a clear positive correlation, but of course it's not always entirely consistent and dispersion remains. The difference in responses are consistent however with the idea that subjective wellbeing is made up of two sides: an emotional side (happiness – a short term feeling) and an evaluative or cognitive side (life satisfaction – a long term evaluation of wellbeing). Therefore, both measures are useful, and research has shown they are both statistically informative, but their use and relevance depend on the question a researcher is attempting to answer. For the majority of the research that we undertake at Exploring Happiness, we will use the life satisfaction scores since we are more currently more focussed towards the longer term cognitive state of wellbeing, than the shorter term emotional state. However, we will consider which measure is more relevant, depending on the current question we are attempting to answer.

A discussion of averages in happiness data

Typically, happiness data is summarised by taking the average of responses from individuals across countries and societies. Indeed, most cross-country comparisons and indexes with rankings include national averages with equally weighted responses for all individuals surveyed in that country. Therefore, it is important to consider whether averages of happiness and life satisfaction responses can also translate across to cardinal measures (measured numerically) of wellbeing. Fortunately, there is strong evidence that these verbal labels translate well

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[11] See Happiness (Chapter 2), Richard Layard (2011) and the final section of this paper for more information on using neuroscience to measure happiness.
[12] Diener, Ed & Suh, Eunkook & E. Lucas, Richard & L. Smith, Heidi. (1999).
[13] See Scollon et al. (2005).

across to numerical values[14], and as such, it matters very little whether you use cardinal or ordinal measures of happiness.[15]

Research that has focused on different types of measures of happiness, also found that personality traits accounted for a significant portion of the variability in an individual's self-reported happiness score.[16] Further research is necessary to fully understand what are the personality traits that lead to differences in an individual's happiness, but for policy analysis at the population level, these differences matter much less due to the approach of taking averages. Essentially, the policymaker is only concerned with the distribution of happiness within a country and how this can be affected through policies, while accepting that some individuals own characteristics mean they have a greater capacity for satisfaction than others.

But as with any aggregate indicator of social progress, averages need to be interpreted carefully. Figure 2 helps to explain this point visually. Take the example of considering happiness by age in a given country. There are two effects that need to be considered: the age effect and the generation effect. Using the example in Figure 2, if we compare generation 1 and 2 in 2010, we would conclude correctly that the younger generation 2 is happier than the older generation 1. This is an example with a strong generational effect. However, when taking this year in isolation, one must be careful not to conclude that individuals become less happy as they grow older. Clearly, when we observe the full data series we can see that for both generations, their happiness scores have increased over time, meaning the age effect is also positive. This example also holds true in the real world, using data from the US previous research has shown that self-reported happiness scores tend to increase with age across generations (positive age effect), but overall levels of happiness depend on when they were born (generational effect).

Figure 2: An example of why happiness averages need to be interpreted carefully
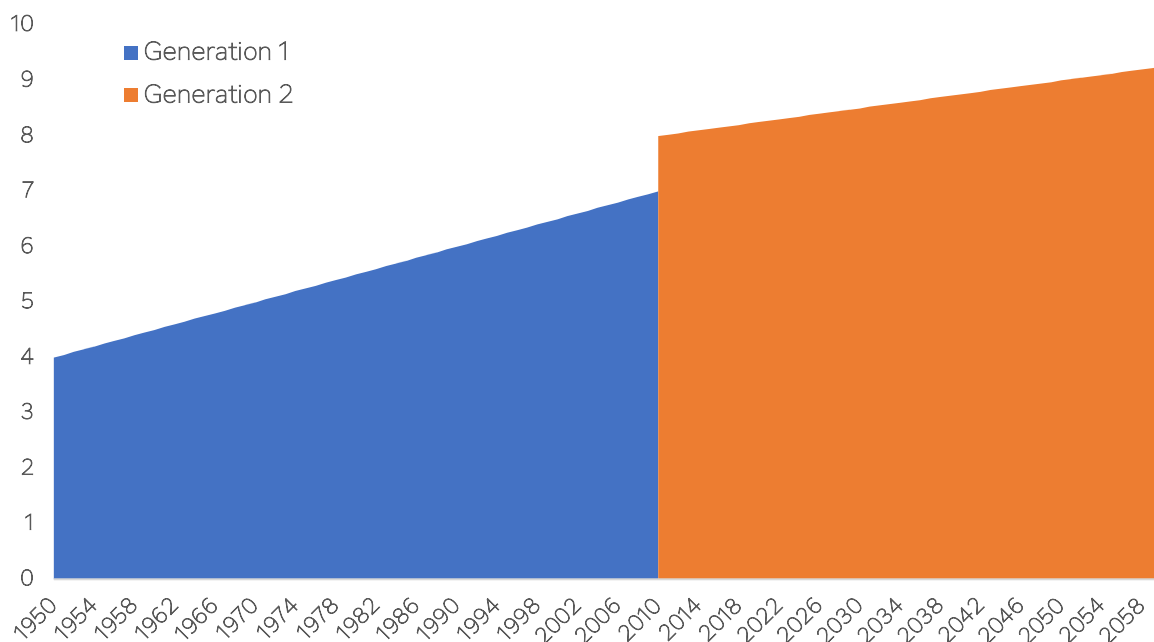
The future of happiness measures

This article has already briefly mentioned that neuroscientists have started to prove that there is a link between subjective happiness measures and brain activity. This could be part of the future of happiness measures, by supporting subjective happiness data with hard objective evidence, reinforcing their statistical significance and helping to further develop our understanding of happiness. A recent study scanned 51 individual's brains using MRI, before answering a series of questions about their general happiness and satisfaction with life. The study

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[14] Such as "very good" or "very bad".
[15] See Ferrer-i-Carbonell, A., & Frijters, P. (2004)
[16] Using fixed effects regression analysis

conducted a statistical parametric mapping analysis, investigating the association between grey matter volume and subjective happiness measures. The researchers focussed on the part of the brain called the precuneus, known to play an important role in consciousness, our sense of self and consequently, happiness. The researchers found that those who scored highly on the happiness survey – feeling joy more intensely and sadness mildly – exhibited significantly more grey of matter on this part of their brain than those with lower scores.

Psychologists have known for years that the combination between satisfaction with life, a sense that our emotional needs are being met, and physiological factors, determine our predisposition toward a happy life. Nevertheless, what is fascinating about this area of research is that this can be reflected in our physicality. In a future Exploring Happiness article, we plan to explore this in more depth, where we will study: various parts of the human brain, the main findings in this area of research and how this could be useful for happiness economics studies.

Annex 1: Calculating Happy Planet Index Scores

The final formula for the Happy Planet Index is given by:

$$HPI_{IA} = \Phi \; X \; \frac{((Experienced \; Wellbeing_{\;IA} - \; \alpha \; X \; Life \; Expectancy_{IA}) + \; \pi)}{(Ecological \; Footprint + \; \beta)}$$

where: IA = Inequality adjusted, $\alpha = 0.158, \beta = 2.067, \pi = 3.951, \Phi = 0.452$

Notice in the original equation, inequality of outcomes was included as a variable. In practice, this is actually done separately before including inequality-adjusted experienced wellbeing and life expectancy variables. The next step is to adjust the inequality-adjusted experienced wellbeing score so that their coefficient of variance is equal to the coefficient of variance for the inequality-adjusted experienced wellbeing of each country. This is α in the equation above. This is to ensure that neither of the variables contribute more to the final outcome than the other. A similar process is then done to ensure that the ecological footprint is equivalent to the coefficient of variance of the two previous variables taken together. This is β in the equation above. As such, now all three variables contribute equally to the HPI measure. And finally, two scaling constants are incorporated (Φ and π in the equation above), such that a score of 100 would indicate high performance on all three indicators. This is defined as: inequality-adjusted life expectancy of 85 years, a maximum score for inequality-adjusted wellbeing of 10/10 and an ecological footprint of 1.73 global hectares, which is equal to the worlds bio-capacity, otherwise known as the level of demand that is compatible with environmental sustainability.

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