THE EASTERLIN ILLUSION:
Economic growth does go with greater happiness

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ABSTRACT:
The 'Easterlin Paradox' holds that economic growth in nations does not buy greater happiness for the average citizen. This thesis was advanced in the 1970s on the basis of the then available data on happiness in nations. Later, data have disproved most of the empirical claims behind the thesis, but Easterlin still maintains that there is no long-term correlation between economic growth and happiness. This last claim was tested using the time trend data available in the World Database of Happiness, which involve 1,531 data points in 67 nations that yield 199 time-series ranging from 10 to more than 40 years. The analysis reveals a positive correlation between GDP growth and rise of in happiness in nations. Both GDP and happiness have gone up in most nations, and average happiness has risen more in nations where the economy has grown the most; r = +0.20 p < 05. On average a 1% growth in income per capita per year was followed by a rise in average happiness on scale 0-10 of 0.0034; thus, a gain in happiness of a full point would take 60 years with an annual economic growth of 5%.

Keywords: happiness; economic growth; trend; cross national; progress.

1   INTRODUCTION

The economy has grown over the last decades in most contemporary nations and economic growth is likely to continue in the future. Though generally welcomed, there are also reservations about this ongoing economic growth. Over the ages, there have been warnings against the lures of material wealth and since the 1960s there has also been growing concern about sustainability issues. In this context, the question arises as to what increasing wealth does to human wellbeing and that question has become a subject of empirical research.

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1.1 The Easterlin Paradox

In 1974, Easterlin (1974) published the seminal paper 'Does economic growth improve the human lot?' His answer was no. This conclusion was based on the then available survey data on happiness. Comparing within nations he saw that rich individuals are typically happier than their poor compatriots. Yet, comparing across nations, Easterlin noted that average happiness was not higher in rich nations than in poor nations and comparing over time he observed no rise in average happiness in the USA between 1944 and 1970, in spite of impressive economic growth in that period.

This finding came to be known as the 'Easterlin Paradox' and is commonly seen as the start of 'happiness economics'. It prompted a stream of scientific publications.[1] A search in Google Scholar on 'Easterlin Paradox' yields more than 4,500 hits. Most of these publications are about explanations for the phenomenon, but a considerable body of literature is on whether it really exists.

Over the years, this has resulted in a watering down of the thesis. As we will see in more detail in Section 1.3, Easterlin (1995) first dropped the claim that there is no same-time correlation between economic development and average happiness in nations, but maintained that there is no over-time correlation. Current textbooks typically mention that second version and illustrate with the case of the USA, where income rose but happiness not. Recently, Easterlin admitted that economic growth tends to boost happiness in the short run, but still maintains that there is no long-term effect of economic growth on happiness in nations (10 years and more). He also added that in the long run higher rates of economic growth do result in proportionally greater happiness (Easterlin and Angelescu, 2009; Easterlin et al., 2010).

1.2 Explanations for the paradox

In his 1974 paper, Easterlin explained the non-relation between the wealth of nations and average happiness of its citizens in terms of interpersonal comparison, in line with the sociological theory of 'relative deprivation', which Stouffer (1949) uses to explain dissatisfaction with rank among American soldiers. In the same vein, Easterlin assumes that satisfaction with life depends on interpersonal comparison and since reference persons are typically compatriots, the distance to these is about the same in rich and poor countries. Easterlin also mentions the role of rising aspiration and in this context refers to the notion of a 'hedonic treadmill', a term coined by Brickman and Campbell (1971) in this days.[2]

Though these explanations seem plausible, it has appeared difficult to prove that they really apply. Over time, the explanations have also lost plausibility. One reason is in comparison theory itself, because the related thesis of shifting standards (e.g., VanPraag and Kaptein, 1973) predicts that satisfaction will tend to the neutral level and do so both among the poor and the rich. This is clearly not the case: average happiness is above neutral, at least in developed nations, and the rich remain happier than the poor. At a more basic level, Veenhoven (1991, 2009a) has cast doubt on the theory that happiness is a matter of comparison. In his view not all satisfaction is equally dependent on social comparison and satisfaction with domains, such as rank and income, more so than satisfaction with life as a whole. He argues that life satisfaction depends on affective experience rather than on cognitive comparison, and that affective experience depends on meeting innate 'needs' rather than learned 'wants'.

The paradox has also been explained by the negative effects of economic growth. One line of argumentation is that economic growth involves high costs, such as the work it involves and the stresses of competition (e.g., Schorr, 1993, 1999). Another negative effect is seen in the effects of economic prosperity on life style, such as increased consumption

of high caloric food and too much television viewing. In this line, Scitovsky (1976) makes the case that mass-consumption does not really satisfy and Lane (2000) argues that the attendant culture of materialism tends to blind people to more solid sources of happiness.

1.3   Tests of the reality of the paradox
Rather than seeking for explanations, some scholars have inspected the evidence for the empirical claim. Ever more data on happiness in nations has become available over the years and this has gradually changed the picture.

1.3.1 *Comparison across nations*
The first piece of evidence presented by Easterlin is that average happiness does not differ between rich and poor nations. This claim is based on analyses of average happiness in a dozen countries against the log of income per head. Yet, consideration of absolute income, rather than log-income radically changes the picture and yields a correlation of +0.59 (Veenhoven, 1989). Later studies in this line using an ever greater number of nations have also shown strong correlations and a recent study among 123 nations even found a strong correlation between average happiness and log-income
across nations (Deaton, 2008) of an equal magnitude as the within country correlation between individual income and happiness (Stevenson and Wolfers, 2008, 2013).

1.3.2 *Comparison over time*
Easterlin also used time series data on happiness and income per head to show that economic growth in the USA was not followed by a rise in average happiness. In later publications, he presents longer time series on the USA, which also show a pattern of stagnant happiness in spite of rising wealth (Easterlin, 1995).

One line of criticism does not doubt these facts, but questions the interpretation. A positive effect of economic growth on happiness may have been suppressed by other developments. In this line, Fisher (2008) has argued that in the USA happiness has stagnated because of a demonstrable deterioration in family life, which is unrelated to economic development. Likewise, Phelps (2011) explains the stagnation of happiness as a response to a decline in the percentage of altruists in the population. In a similar vein, Veenhoven (2007) suggests that the pains of cultural change have delayed a rise in happiness in Japan and South Korea.

Another approach is to check the empirical claim made by Easterlin as such: Is there really no correlation between economic growth and happiness in nations? One question in this context is whether average happiness in nations tends to remain at the same level, as Easterlin observed in the USA, or if rising happiness is more common. Another question is whether rising happiness goes together with economic growth.

Evidence of rising happiness in nations
Using time series data from 21 nations, Hagerty and Veenhoven (2003) note that stagnant happiness is the exception rather than the rule, since average happiness has gone up in most nations of the world, even in the USA, since the 1970s. In reply, Easterlin (2005) argues that the evidence for rising happiness is still 'fragmentary'. Yet, evidence of rising happiness is mounting. In an analysis of the World Values Surveys, Inglehart et al. (2008) found a pattern of rising happiness in most participating nations since the 1980s and happiness has also increased in most of the nations where the Eurobarometer started in the early 1970s (Vergunst, 2011; Veenhoven, 2012c).

Evidence of link with economic growth

The last question is whether this rise in happiness is due to economic growth. Hagerty and Veenhoven (2003) argue that rising happiness typically coincides with economic growth. Yet, Easterlin replies that there is still no correlation between the rate of growth in GDP and happiness, at least when the analysis limits to cases of significant change (Easterlin and Angelescu, 2009). Recently, he has presented more data to support this view, based on an analysis of 54 countries (Easterlin et al., 2010).

In another recent paper (Easterlin and Angelesco, 2009), Easterlin states that there are countries where economic growth and average happiness go hand in hand, but claims that this is a short-term effect. On that basis, he maintains that economic growth does not add to happiness in the long run.

Research findings on this matter are mixed so far. In an analysis of 15 European nations over the years 1973 to 2002, Bjornskov et al. (2008) found no relation of happiness with economic growth as such, but observed growing happiness in response to accelerations of economic growth. Graham (2011) reports a negative effect of growth rate in the last 5 years, which she calls the 'paradox of unhappy growth'. Yet, several studies have shown positive correlations between happiness and economic growth (e.g., Di Tella et al., 2003; Stevenson and Wolfers, 2008). All these studies consider a limited number of nations.

The best available data of the moment are reported by Diener et al. (2012), who use five yearly waves of the Gallup World Poll over the years 2007 to 2011 in 158 nations. Contrary to Easterlin's thesis they found a positive effect of economic growth on happiness. One particular strong point of this study is that it considers both change in GDP per capita and change in household consumption. Another strong point is that they measured both cognitive contentment and affective experience. Remarkably, this study did not provide evidence of a reference shift. A weak point of the study is that it covers only 5 years, so Easterlin can still maintain that economic growth does not add to happiness in the long run.

In this context, the present study was focused on the long-term effects of economic growth on average happiness in nations and used time-series of at least ten years.

1.4   Aims of this study

This paper is about that last surviving empirical claims of the Easterlin Paradox, that is, version 3 as mentioned in Section 1.1. We consider whether economic growth in nations tends to go together with rising average happiness in the long run, and if so, whether more growths yields proportionally greater happiness. In line with Easterlin, we conceive 'long run' as periods of 10 years or more. We use the latest available data on the largest available number of nations to answer the following research questions:

1   Did average happiness in nations remain at the same level over the last decade? a Is the number of cases of rise in happiness about the same as the number of
    decline in happiness? b If happiness risen, does this tendency manifest both in the short and the long run?

2   If happiness has risen, is its rise typically paralleled by economic growth?

   a Has happiness risen more often in countries where the economy has grown than in countries where the economy has stagnated?
   b Has average happiness raised more in nations where the economy has grown the most?

3   If rising happiness has tended to go together with economic growth, is this correlation similar across situations, or:
   a Has the correlation existed only in the short-term and not in the long-term?
   b Does the correlation exist only in poor nations, or also in rich nations?
   c Is the correlation stronger in nations where economic growth is constant than in nations where economic growth has been erratic?

4   Do the correlations between happiness and economic growth differ across measures of happiness used?

Note the difference between questions 2a and 2b. Economic growth may add to happiness irrespective of its size; some growth may have a similar effect on happiness as much growth has. Tests of the Easterlin Paradox deal typically with question 2b, neglecting question 2a. Question 3 deals with contingencies. The Easterlin Paradox may apply to specific conditions and may not apply in other contexts. From a policy point of view it is important to know where it applies and where not. Question 4 is a test of robustness.

2   DATA

The data used in this study were obtained from the following sources.

2.1   Data on change of average happiness in nations
The data on average happiness in nations were taken from the World Database of Happiness (Veenhoven, 2012e). This is a 'findings archive' on happiness in the sense of subjective enjoyment of one's life as a whole.

2.1.1   *World database of happiness*
The archive contains research findings yielded with measures that fit this concept of happiness as life-satisfaction. All acceptable indicators are included in the collection 'measures of happiness' (Veenhoven, 2012b).
    Most measures are single survey questions, such as the famous item 'taking all together, how happy would you say you are these days, are you very happy, pretty happy or not too happy?' This is just one of many acceptable measures of happiness. Survey questions have used different key words, such as 'satisfaction with life', and different response options, such as numerical scales. Next to these single questions there are also multiple questions, some of which constitute a 'balance scale'.
    This diversity of measures of happiness used in the many surveys makes it difficult to compare scores and in particular to assess change in average happiness over time. The different measures of happiness are therefore sorted into 'equivalent' kinds, that is, questions that address happiness using the same keyword and a rating scale of the same length.
    Research findings yielded using these acceptable measures of happiness are described in standard excerpts using standard terminology. Two kinds of findings are distinguished, 'distributional findings' and 'correlational findings'. Distributional findings denote how happy people are in a particular population and are often summarised in a measure of central tendency, typically the mean. Correlational findings are about things that go together with more or less happiness and summarised using measures of association, such as Pearson's correlation coefficient.

Distributional findings are sorted into findings among special publics, such as elderly persons, and findings in the general population. The findings on happiness in the general public are further subdivided by the kind of areas from which samples were drawn, such as 'regions', 'cities' and 'nations'. These latter findings are gathered in the collection of 'happiness in nations' (Veenhoven, 2012c), which we used for this research.

2.1.2 Collection happiness in nations
To date (November 2012) the collection 'happiness in nations' contains 5204 findings on average happiness of the general population[3] in 164 nations over the years 1946 to 2011. These findings are sorted in three levels, one by nation, two within nations by kind of measure used and three within measures of the same kind by year.

An example of a 'nation page' is presented on Appendix A. This is the case of Argentina for which 35 distributional findings in the general public are available. These findings are sorted in blocks of equivalent survey questions. The first block consists of seven findings yielded by a survey question on how 'happy' one is, the answers to which were rated on a four step verbal response scale. The measure codes link to the precise text of that question and detailed information about the investigation can be found behind the 'i' icon.

Findings are sorted by year within each block, and this first block consists of the years 1981, 1991, 1995, 1999, 2002, 2005 and 2008. Looking at the blocks in Appendix A, we see no clear trend in the responses to the question on happiness (measure type 111C) between 1981 and 2008, but a gradual change to the better in the responses to questions about life-satisfaction (measure type 121C and 122F) and the Cantril ladder (measure type 31D).

2.1.3 Identical questions
Within these blocks of equivalent questions there are still small differences in the wording of the lead question and/or response options. These variations are marked by the last symbol in the measure code. There are also variations in the timeframe addressed in the question, and these are marked with the third letter code, where 'c' stand for 'current', 'g' for in 'general' and 'u' is used for 'unclear'. These minor variations in the wording of questions can result in small differences in the mean scores and could as such overshadow the small changes in actual happiness over time. For that reason we limited our data set to time-series based on identical questions, that is, questions with the same measure code.[4]

In the above mentioned case of seven questions on how 'happy' one is in Argentina this meant that we considered only the five findings based on the question variant 'a'. Since the series of answers to question variant 'f covered only 6 years, these were left out.

2.1.4 Transformation to common 0-10 numerical scale
We decided to use the transformed means, provided in the World Database of Happiness, for reasons of comparability. These transformed means are expressed on a common numerical scale ranging from 0 (low) to 10 (high). Scores on numerical response scales, shorter than this, are linearly stretched to give a range of 0-10. Scores on scales with verbal response options are transformed using a procedure first described by Thurstone (1927), in which experts rate the numerical value of response options. This procedure is described in more detail in Veenhoven (1993), chapter 7 'How the data are homogenised'.

2.1.5 Series
On this basis, we constructed several series of responses to identical questions on happiness in the same nation over time. Since we focus on the long-term, we limited our

analysis to series that covered a minimum of 10 years. We also limited the analysis to data gathered using probability samples. If the same question had been used in several surveys in the same year in the same country, we used the average response to that question. We did not require that a series involved more than two data points, though most series involve more.

This resulted in 199 time-series for average happiness in 67 nations, which together gave 1,531 data points. The data matrix is presented in Appendix B. This database is about twice the size of the one used in the latest test of this aspect of the Easterlin Paradox by Stevenson and Wolfers (2008).

2.2   Data on economic growth in nations

Data on the economic performance of nations were taken from the World Bank (2012) online database. We considered both the income per capita in the year before each data point on happiness and the growth of that nation's economy in the same year as a percentage of the GDP. Additional data for Taiwan were found in the library of the IMF (2012).

Income per capita for each of the years in each of the countries was expressed in US dollars. Economic growth in nations was measured using the yearly growth of the GDP as a percentage measured in local currency.

These data did not cover all the periods for which we had data on happiness. One reason is that the World Bank does not provide data for the years before 1960. Another reason is that some nations have only emerged recently, for example, Croatia, a nation which was born from the death of former 'Great' Yugoslavia in 1991.

3   METHODS

The following methods were used to find answers to the questions set out in Section 1.4.

3.1   Assessing change of average happiness over time

Question 1 dealt with whether average happiness has typically remained at the same level, or has risen in most nations. We answered that question in two ways. We first assessed change in each of the 199 series of responses to the same question on happiness in the same country. Next, we computed the average change over all series in the same country.

3.1.1 *Change of average happiness in series of identical questions*

We regressed happiness against year in all the 199 time series. The resulting regression coefficients were used to indicate the yearly change in happiness in the period covered by the series. Since happiness is expressed on range 0-10, a regression coefficient of 0.01 means a rise of 0.1 point per year, which amounts to a 1 point gain in happiness over 10 years. These yearly coefficients were used in the following ways.

Ratio of rise or decline
We first counted the number of series in which happiness had gone up and the number in which happiness had gone down. On that basis, we assessed the ratio; a ratio greater than 1 indicates that increasing happiness is more common than decline; a ratio of 1 that rising and declining happiness are equally frequent, and a ratio smaller than one that a decline in happiness is the most common. The Easterlin Paradox holds that happiness tends to remain at the same level, around which is at best some random fluctuation and this predicts a ratio of about 1.[5]

Average change coefficient
The above bi-partitions provide a view on the relative frequency of rise and decline in happiness, but do so at the cost of loss of variation. In order to use the available variance more fully we computed the average change over all 199 series and assessed whether that average coefficient was positive or negative.

3.1.2 Change of average happiness in countries
Using the change coefficients in the series, we computed the average change coefficients for each of the 67 nations. Where only one series was available, we took the change coefficient observed in that one and when more series were available we computed the average change score.

These change scores in nations were analysed in the same way as the change scores in the series. First, a ratio of rise or decline in happiness was obtained and then the average change scores were computed and we assessed the statistical significance of these scores.

3.2   Assessing economic growth
We assessed the average yearly growth of GDP per capita for each of the countries, for each of the periods for which a series on average happiness was available. These change coefficients ranged from -0.034 in Belarus 1990 to 2000 to +0.120 in China 2000 to 2009. With three exceptions the coefficients were positive.

3.3   Assessing correspondence between growth of GDP and happiness
Different questions are at stake here: research question 2a deals with whether economic growth tends to go with any change in happiness. Next, question 2b deals with whether more economic growth is followed by a greater rise in happiness. Question 3 deals with the possible variations on these general patterns of correlation.

3.3.1 Is there any correlation?
Question 2a serves as a first test of Easterlin's claim that economic growth does not buy greater happiness. To check this hypothesis we counted the number of cases in which this thesis applied and compared it with the number of cases in which it did not.

To that end we first ordered the possible combinations of growth and decline, see the 2 x 2 table presented in Table 1. The 'paradoxical' cases are called 'discordant' and coloured red. The cases that fit common sense are called 'concordant' and coloured green. We next counted the number of cases in each category and assessed the odds ratio. If Easterlin is right, that ratio must be about 1.

3.3.2 More cases of rising happiness in strong growing economies?
Question 2b deals with whether happiness has raised more in countries where the economy has grown the most. One answer to this question is whether rising happiness is more common in the fastest growing economies. A related, but not identical, question is whether the rise of happiness is proportionally greater in the fast growing economies.

Odds of rise or decline of happiness in slow and fast economic growth
We distinguished between cases of modest economic growth and strong economic growth, using the median of the growth percentages found.

Correlation between change scores of happiness and GDP
Next, we assessed the correlation between the rates of yearly change in GDP and happiness. We did this for all of the 199 time series for happiness and then computed the

average correlation over all the time series. We then considered the average change coefficients per nation and regressed the average change in happiness against the growth of GDP in that nation in the same period, again with a one-year interval.

Estimates of effect size
In a first analysis, we considered the average effect of a 1% change in GDP on happiness on a range 0-10. Then we computed the average effect of a $100 rise in GDP per capita on happiness.

3.3.3 Correspondence contingent to situations?
Question 3 deals with possible variations on this general pattern. Question 3a covers whether the effect of economic growth on happiness is short lived or rather manifests in the long-term. Question 3b deals with whether the effect differs across poor and rich nations and question 3 c with whether smooth economic growth works out better on average happiness than bumpy growth.

Short and long-term
To answer question 3, we repeated the above mentioned analyses for each of the three time intervals considered, the short-term of 10 to 20 years, the medium term of 21 to 40 years and the long-term of more than 40 years.

Poor and rich nations
To answer question 3b, we measured economic prosperity of nations using the GDP per capita in US$. The data used for this analysis were again taken from the website of the World Bank (2012). We followed the distinction made by the World Bank between: 'low' income' 'lower-middle' income, 'upper-middle' income and 'high income nations. Our data set did not include any 'low-income' countries, as rated by the World Bank.

Smooth versus bumpy growth
To answer question 3c, we estimated instability (i) in economic growth by taking the variance in yearly GDP per capita that cannot be explained by the linear trend over the years. To that end we first regressed GDP on year, with GDP dependent and year independent. In the case of perfect stability, all GDP scores should be on the trend line, and the regression coefficient 1. We computed the deviation from that pattern, using the following formula: $i = 1 - R^2$.

3.3.4 Robust across measures of happiness?
Finally, we checked whether these patterns differed across the measures of happiness used in these time series.

3.4 Significance
So far how we assessed average change in happiness and GNP per capita and the correlation between these changes. A next question was whether the observed coefficients are worth considering or not.
One way to answer that question is to consider the effect size and pick a minimum, such as over a 10 year period, a 0.1 point change in happiness and a correlation coefficient with economic growth of at least +0.20. In that case, our conclusion limits to the series studied here.
　　Another way is to generalise beyond the observations and in that context it is common practice to infer the probability that the correlation observed in the sample is positive, while there is actually no correlation in the population from which this sample is drawn. In

that context, a 95% probability is usually deemed 'significant'. This is how Easterlin treated the time series.

Though routinely performed, this test for significance involves making strong assumptions that do not fully apply in this case. One such assumption is that the 199 series provide a random sample of all possible time series in the 67 nations. Another dubious assumption is that the 67 nations provide a random sample of all nations in the world. Still another thing to be kept in mind is that significance depends very much on the sample size, small effects are significant in big samples, and big effects insignificant in small samples. Significance depends also on the dispersion in the observations and on choices made by the investigator, with respect to the null-hypothesis, one-sided or two-sided testing, and the probability level. All this makes tests for significance precarious.

In our view, the descriptive approach is the most informative in this case. The number of series at hand is large and covers all we can ever have over this period. The interpretation is straight forward, we can easily see in Appendix B where the Easterlin Paradox has applied (coefficient 0) and where not (all the positive coefficients).

Still, we realise that many readers are accustomed to significance testing and some are willing to buy the above mentioned perils, even when acknowledged. We therefore did some significance tests. We tested whether the observed positive change in happiness is more common than negative change and whether concordance with economic growth is more common than discordance.

In these analyses, we used all available coefficients, even those based on a limited number of data-points. A reviewer argued that we should consider only significant coefficients. We disagree. The number of data-points in most of the separate series is too small for a meaningful significance test and restricting to the sufficiently dense series would lead into the selectiveness that has played Easterlin false. We also avoid his fault of taking non-significance in too small series for evidence of non-correlation.[6]

4   RESULTS

Our findings contradict Easterlin's predictions: average happiness has increased in most nations and increased more in the nations where the economy had grown. This pattern was found over long time spans and appeared both among poor and rich nations.

4.1   Happiness rose in most nations
Question 1 dealt with whether average happiness in nations tends to remain at the same level over the years (as Easterlin holds), or that average happiness tends to rise (as Hagerty and Veenhoven hold).

4.1.1 *More advance than decline*
Of the 199 series 67% showed a rise in happiness and 33% a decline, which resulted in a ratio of 2.0. Likewise happiness rose in 62% of the 66 nations and declined in 38%, which is a ratio of 1.6. See Table 2(a). This is clearly more than the ratio of about 1 that Easterlin predicts.

The average yearly rise in happiness observed in the 199 series is +0.016. The average rise in the 67 nations was +0.012.

These numbers may seem small at first sight, but result in a considerable improvement in happiness in the long term. At this growth rate average happiness will rise one point on a 0-10 scale in 70 years. Given that the actual range on this scale is between 2.5 and 8.5 (Veenhoven, 2012d), a one point rise equals a gain of 17%.

4.1.2 *In the long run*

In his latest paper Easterlin argues that happiness rises in the short run only. Our data show otherwise. Remember that we considered time-series of at least 10 years, so we deal with long-term change in Easterlin's use of that term. We can see from Table 2(b) that the average change in happiness does not differ very much between the long and very long-term and that the rise is slightly stronger in the longest term considered, that is, 40 years of more.

4.2   Rise of happiness paralleled by economic growth

Now that we have established that average happiness has risen in most nations, the next questions are about the relationship of this rise with economic growth. Question 2a deals with whether there any parallel at all between increase of average happiness and GDP. If so, question 2b is whether there is proportionality in the relationship: Has happiness increased more in the nations were the economy has grown the most? Lastly, question 3 is whether we are dealing with a general pattern or whether the correlation between rising happiness and growth of the economy is contingent on specific situations.

4.2.1 *More concordant than discordant combinations*

Question 2a covers whether economic growth tends to be accompanied by rising happiness. According to Easterlin, this is typically not the case and the term 'paradox' is also used to denote this difference between common sense expectation and reality.

    What is the most common pattern in the period observed here? Following the method presented in Section 3.1.1, we counted the number of cases in which economic growth was paralleled by rising happiness (concordant with common sense) and the number of cases in which it was not[7] (discordant) and next assessed the ratio of these. See Table 3(a). As one can see, there are hardly any cases of long-term economic decline. Most of the variation is in changes of average happiness. In this table, the number of concordant cases is 132 and the number of discordant cases 64, which equals a ratio of 2.2. So 'paradoxical' combinations are clearly not the rule.

4.2.2 *Greater rise of happiness in nations where the economy grew most*

Question 2b, in extension to question 2a, deals with proportionality in the relationship between increase of happiness and economic growth: has more economic growth come together with a greater rise in happiness? This correlation was assessed in two ways.

More rise of happiness in fastest growing countries
We distinguished between slow and fast growing economies, using the median of economic growth in our dataset. We next counted the cases of rising and declining happiness in each of these categories, see Table 3(b). Again, we compared the number of cases that fit the common sense expectation that more growth goes with more happiness to the discordant situation. Once more the former outweighed the latter. The odds ratio was 2.14 and statistically significant.

Significant correlation
Considering the correlation between average economic growth in the past year and average change of happiness we observed a correlation of +0.20. This correlation is significantly different from zero at the 95% confidence level. A split-up of the data by length of the time period considered showed similar correlations. See Table 3(c). Two of these three similar correlations are statistically significant, but the third is not. Since the effect size is

the same, this non-significance is due to the limited number of 18 observations. One-sided tests yielded the same result.

The pattern of correlation is presented visually in the scatter plots shown in Figures 1(a), 1(b) and 1(c). In each of these figures one can see a modest correlation. There is no clear pattern of non-linearity. So the Easterlin Paradox fails this test.

Size of the effect
The average effect of 1% economic growth on happiness in the next year is a gain of about 0.00335 points on a scale of 0-10. Whether this effect is strong of small will be discussed in section 5.2.

4.3   Variation across situations
Question 3 deals with possible contingencies. Are we dealing with a general pattern or does economic growth add to happiness only in specific conditions?

Little difference across time-span
The available data show a positive correlation between economic growth and happiness over all three long-term time spans considered here. The correlation of the yearly change rates is lowest over the shortest time span of 10-20 year periods: 0.003 compared to 0.006 over the 10-40 years periods and 0.005 in the series of 40 or more years. See Table 4(a).

Stronger in poor nations
In line with expectation, we found that the correlation between happiness and economic growth is strongest in the poor nations. The correlation is quite strong in the 20 'lower middle' income nations in this data set and relatively small in the nations where the income per capita is at the upper middle level and the high level [see Table 4(b)].

No less in bumpy growth
We expected that the effect of economic growth on happiness would be smaller in nations that have gone though economic ups and downs than in nations where the economy has grown more smoothly. This expectation was not supported by the data [see Table 4(c)].

4.4   Similar across measures of happiness
Finally, we checked whether the correlations between happiness and economic growth differ across the measures of happiness used. To that end, we limited our examination to cases for which at least 15 time-series were available, since the variation in the nations involved might otherwise cloud the effect of the measures. There were four such cases in the data set, all of which yielded yearly change correlations in the range of +0.0025 to +0.034. Results not shown.

5   DISCUSSION

Our aim with this study was to check the claim that average happiness in nations tends to remain at the same level in spite of economic growth. Our data do not support that claim; we found that happiness tends to rise over time and to rise more in nations where the economy has grown the most. This begs the question of why our findings differ from Easterlin's. The next question we must ask is about the observed effect size: Is this small or substantial? We conclude that the long-term effect of economic growth on happiness is substantial and this opens a new agenda for research.

5.1   Why are our results different from Easterlin's latest reading of the data?
Easterlin et al.'s (2010) latest analysis is based on data for 37 nations over time spans varying from 12 to 34 years. The number of data points used is not reported. The analysis reported in this paper draws on data from 67 nations and over periods running from a minimum of 10 years to 46 years, which gave us 1,531 data points. This difference in size of the available data pool is crucial. The law of greater numbers helped us to see a general pattern, which Easterlin could not see.

Additionally, Easterlin uses responses to a question on financial satisfaction as the dependent variable in his separate analysis of 17 Latin American nations. Yet, financial satisfaction is not the same as life-satisfaction and is more likely to adjust to changed income levels as has been shown by VanPraag and Kaptein (1973). We consistently used the available data on happiness in the sense of life-satisfaction and in this respect our data are better suited to the question to hand.

5.2   Is the effect of economic growth on happiness big or small?
As we have seen, 1 % economic growth was followed by a rise in average happiness in the next year of 0.0034. This yearly gain in average happiness may appear small at first sight and could as such be taken as a proof of the thesis that economic growth does not buy greater happiness. Yet, economic growth is typically higher than 1% a year and small effects amount to a considerable increase in the long-term. An annual 5% growth of the economy will lead to a gain of a full point in average happiness on a scale 0-10 in 60 years, which equals 10% of the theoretical variation on a scale of 0-10 and 17% of the actual variation between 2.5 and 8.5.

When expressed in effect of a $100 increase in GDP per capita the average effect of economic growth on happiness is about 0.10 in poor countries and 0.003 in rich countries [Table 4(b)] This means that in poor nations a gain of one point of happiness on scale 0-10 will require a $1,000 increase and in rich countries an increase of about $ 33,000.

The above figures are probably an underestimation of the real effects of economic growth on happiness. One reason is that the law of big numbers may not have neutralised all the random measurement error in both the measures of happiness and economic growth, such as due to variation in data sources and data massage. This will have attenuated the change coefficients. Another reason is that our perspective on the real effect of economic growth is still blurred by external shocks such as the regime changes in the East European nations after the fall of communism and the civil wars in Africa.

Seen in this perspective, the rise of happiness is comparable to the extension of longevity in modern society, where a long process of piecemeal increments has resulted in a doubling of our life time.

In the long-term perspective, it is also clear that the rise of happiness is unlikely to continue forever, since an average happiness of about 8.5 is probably the maximum possible in a country. So there will be a point where economic growth no longer adds to greater happiness. Yet, economic development is also likely to contribute to longevity, which seems to be less bound to a maximum. If so, economic growth will still result in a rising number of happy life years for individuals (Veenhoven, 2005).

5.3   New research questions
The question raised by the Easterlin Paradox is why does economic growth not result in greater happiness. Now we have seen that economic growth typically does add to average

happiness in nations, the questions to ask are: how does economic growth add to happiness and why does it not always do so? To answer these questions we can build on the earlier research instigated by the Easterlin Paradox, such as on negative effects of economic growth and adaptation processes, but take these as elements in wider a balance of effects.

In exploring how economic growth adds to happiness a crucial question is to determine to what extent the effect is due to increased consumption and to what extent it is due to institutional changes that tend to go together with economic development, such as political democracy and women's emancipation. The recent study of Diener et al. (2012) suggests that a great deal of the effect of economic growth on happiness can be found in material comfort, but this is certainly not the last word.

6   CONCLUSION

Economic growth in nations does tend to go with rising happiness. Though there are cases where happiness remains stable in spite of economic growth, these are exceptions rather than the rule. The 'Easterlin Paradox' has become the 'Easterlin Illusion'.

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NOTES

1   All this literature is listed in the Bibliography of Happiness, Section Fg02 'Happiness and economic growth/decline' (Veenhoven, 2012a).
2   The idea that average happiness in nations will not change over time also fits with the 'set-point' theory of happiness, which became popular some 10 years later (e.g., Lykken, 1999).
3   This collection includes only findings based on probability samples in the general population, typically aged 15 years or more. Studies among specific subgroups in a country are left out, such as people living in urban areas, working age people or internet users.
4   We made an exception for the two variants of the question on life satisfaction used in the Latino Barometro, that is, the questions coded O-SLU-g-sq-v-4-b and O-SLu-g-sq-v-4-c, which differ slightly in the wording of the answer options. In this case we could use the first data yielded by the happiness scale interval study (Veenhoven, 2009b) in which native speakers rated the degree of happiness denoted by the answer categories in intervals on scale 0 to 10. This enabled us to transform the observed frequency distributions to a mean on a common scale.
5   An alternative to this bi-partition is to distinguish an additional intermediating category of small change. This requires an arbitrary definition of how small a small change should be and involves a loss of statistical power. Analyses of that kind showed the same pattern but did not reach statistical significance.
6   In this context, Stevenson and Wolfers (2008, p. 18) rightly observe that "... absence of evidence should not be confused with evidence of absence".
7   The right top-case of rising happiness in spite of economic decline is not part of the Easterlin Paradox, but mentioned for the sake of completeness.

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Floris Vergunst received his Bachelor in Economics and Business Economics from the Erasmus University Rotterdam in 2011. Under the supervision of Prof. Veenhoven, he has written his Bachelor thesis about the relationship between economic growth and happiness. After Economics, he continued studying Sociology at Tilburg University. In 2013, he graduated with honour on a thesis about the relation between religion and happiness. At the moment, he is studying Philosophy at the Katholieke Universiteit Leuven in Belgium.

Scheme 1a
Combinations of change in happiness and change in GDP per capita
Rise or decline in GDP

Change happiness	*Change GDP*	
	growth	*decline*
increase	**concordant**	**discordant**
decline	**discordant**	**concordant**

Scheme 1b
Combinations of change in happiness and change in GDP per capita
Great or small rise in GDP

Change happiness	*Growth GDP*	
	great	*small*
increase	**concordant**	**concordant**
decline	**discordant**	**discordant**

Concordant   =   in line with common sense, changes in happiness and GDP go together
Discordant   =   contrary to common sense, but in line with Easterlin's thesis; no relation between change in happiness and GDP

Table 2a
Change of average happiness in nations
Frequency of rise versus decline

Pattern of change	*series*		*nations*	
	N	*%*	*N*	*%*
Rise	133	67%	41	62%
Decline	66	33%	25	38%
Total	199	100%	66	100%
Ratio rise-decline	**2.02**		**1.63**	

Table 2b
Change of average happiness in nations
Average yearly change in points on scale 0-10, split-up by length of period

Period	*series*		*nations*	
	N	*b*	*N*	*b*
10- 20 years	114	+0.017	30.5	+0.010
20-40 years	67	+0.013	27.0	+0.009
> 40 years	18	+0.020	8.5	+0.030
Total	**199**	**+0.016**	**67**	**+0.012**

Table 3a
Rise or decline of happiness and GDP
Combinations of change coefficients observed in 199[1] series

Change happiness	*Change GDP*	
	rise	*decline*
rise	**132**	**1**
decline	**64**	**2**
Concordant/discordant ratio	**2.1**	

Table 3b
Rise *or* decline of happiness by strong *or* modest economic growth
Combinations observed in 199[1] series

Change happiness	*Growth GDP*	
	strong growth > median	*modest growth < median*
rise	**74**	**59**
decline	**24**	**41**

Odds Ratio = 2.14; 95% confidence interval +1.29 to +4.18

[1] Case of median economic growth not included

Table 3c
Correlation between change in average happiness and growth GDP
in 199 time series

Time span	Correlation coefficient Δ Happiness with Δ GDP	95% confidence of r
10-20 years	+0.20	+0.01 to +.037
21-40 years	+0.21	+0.05 to +0.50
> 40 years	+0.20	-0.03 to +0.61
All periods	+0.20	+0.08 to +0.34

Table 4a
Average effect of 1% growth GDP p.c. on average happiness on scale 0-10
Split-up by time span

Time span	*series*	
	N	*b*
10-20 years	114	0.0030
21-40 years	67	0,0063
> 40 years	18	0.0048
All	**199**	**0.0034**

Table 4b
Average effect of 1% growth GDP p.c. on average happiness on scale 0-10
Split-up by initial wealth of the nation

Average income per capita in nation	*series*	
	N	*b*
Low	0	-
Lower middle	20	0.0117
Upper middle	56	0.0034
High	123	0.0029
Total	**199**	0.0034

Table 4c
Average effect of 1% growth GDP p.c. on average happiness on scale 0-10
Split-up by instability of economic growth on a 0-1 scale

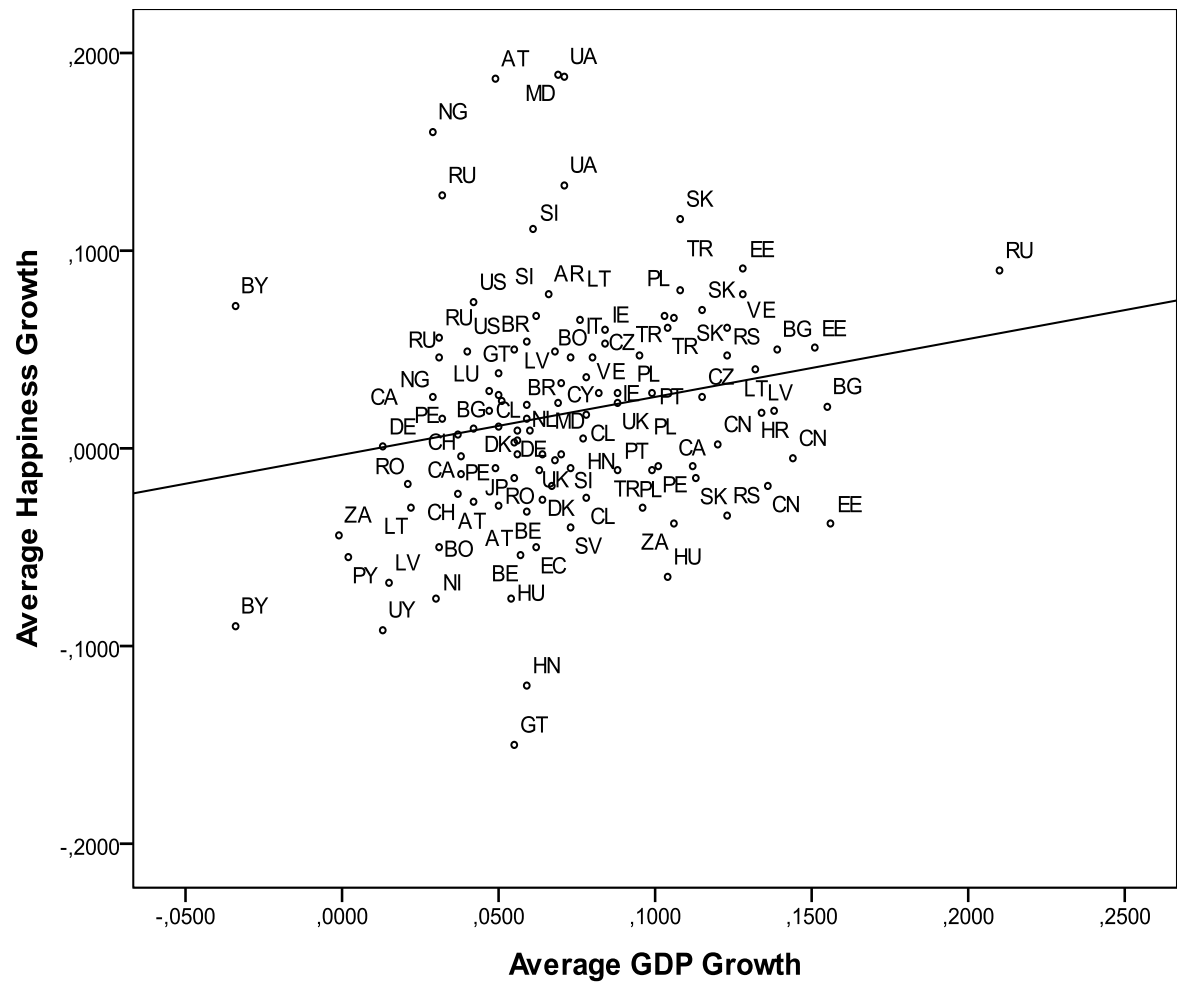| *Economic development*	*series*	
	N	*b*
Smooth: i < 0.1	57	0.0054
Medium: 0.1 < i < 0.25	80	0.0032
Bumpy: i > 0.25	62	0.0061
Total	**199**	0.0034

Figure 1a
Economic growth and rising happiness in nations
Correlation in 114 series over <u>10 to 20 year</u> periods
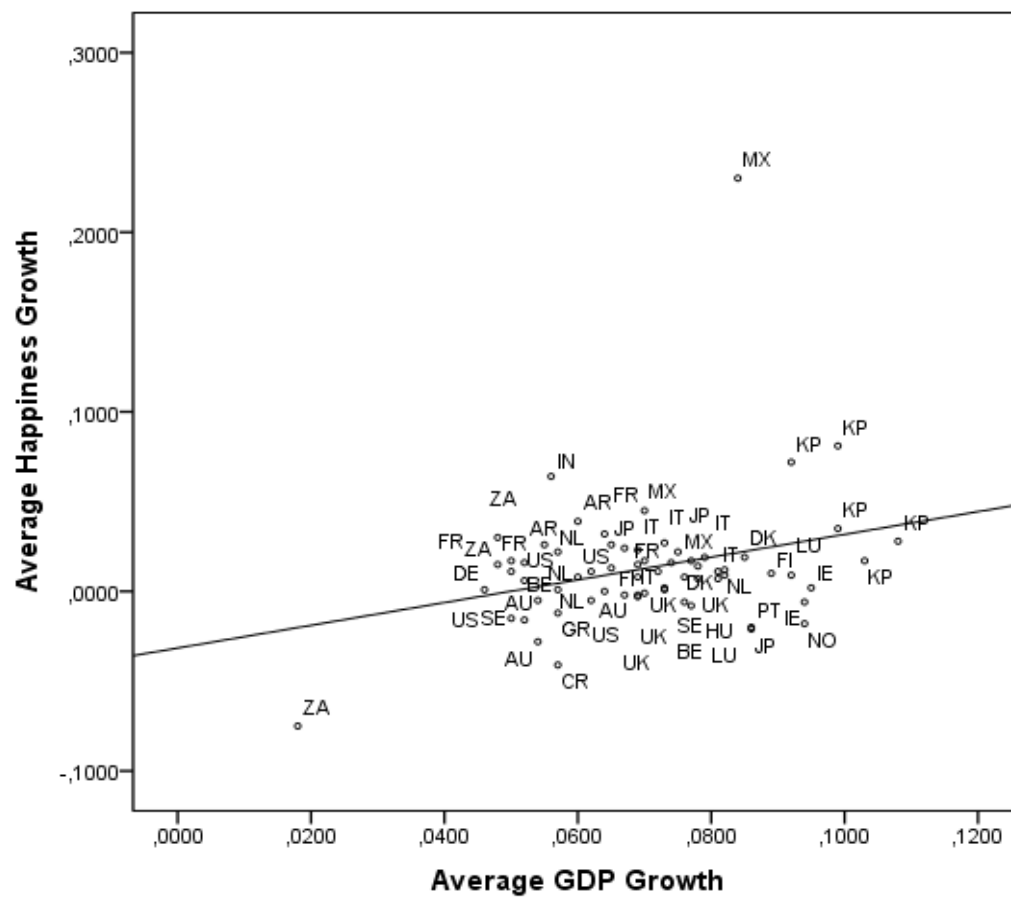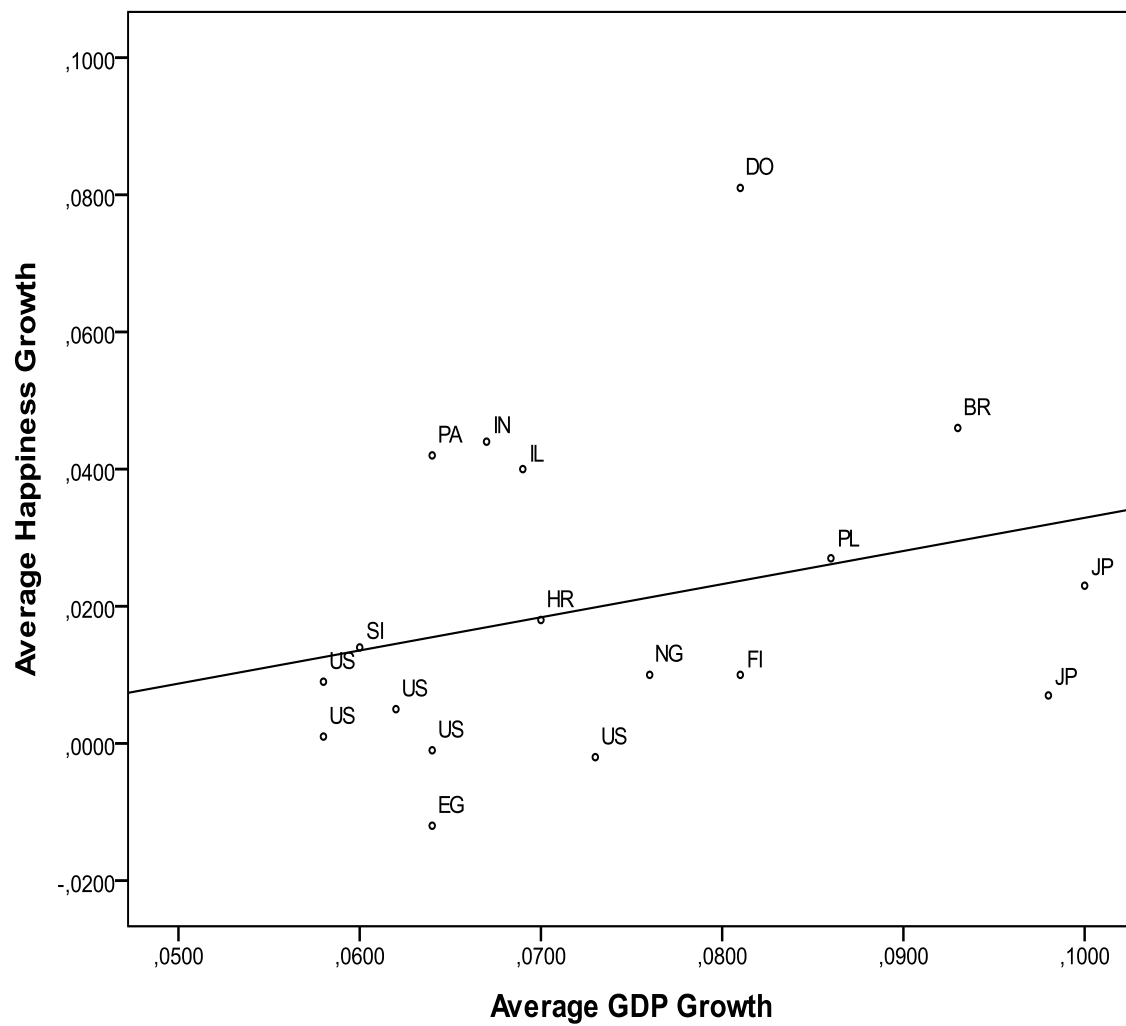
Figure 1b
Economic growth and rising happiness in nations
Correlation in 67 series over <u>21 to 40 year</u> periods

Figure 1c
Economic growth and rising happiness in nations
Correlation in 18 series over periods of <u>more than 40 years</u>

APPENDIX A

Example of a presentation of findings on average happiness in nations in the collection 'Happiness in Nations' of the 'World Database of Happiness'

Distributional findings on happiness in Argentina (AR)

Table A1
Measure type: 111C four-step verbal happiness (see online version for colours)

Taking all things together, would you say you are?:

- Very happy
- Quite happy
- Not very happy
- Not at all happy

very = 4 ......not at all = 1

Details	Measure code	Year	On original range 1–4		On range 0–10	
			Mean	SD	Mean	SD
i	O-HL-u-sq-v-4-a	1981	2.95	0.65	6.80	1.88
i	O-HL-u-sq-v-4-a	1991	3.07	0.82	7.00	2.27
i	O-HL-u-sq-v-4-a	1995	3.09	0.73	7.13	2.01
i	O-HL-u-sq-v-4-a	1999	3.13	0.75	7.20	2.08
i	O-HL-g-sq-v-4-f	2002	2.60	0.92	5.11	2.64
i	O-HL-u-sq-v-4-a	2005	3.20	0.67	7.45	1.78
i	O-HL-g-sq-v-4-f	2008	3.03	0.72	6.37	2.03
Average			3.01	0.75	6.72	2.10

Table A2
Measure type: 121C four-step verbal life satisfaction (see online version for colours)

How satisfied are you with the life you lead?

- Very satisfied
- Fairly satisfied
- Not very satisfied
- Not at all satisfied

very = 4 .... not at all = 1

Details	Measure code	Year	On original range 1–4		On range 0–10	
			Mean	SD	Mean	SD
i	O-SLu-g-sq-v-4-b	1997	2.14	0.96	6.41	2.01
i	O-SLu-g-sq-v-4-b	2000	2.21	1.01	6.52	2.02
i	O-SLu-g-sq-v-4-c	2001	2.81	0.86	5.99	2.34
i	O-SLu-g-sq-v-4-c	2003	2.91	0.77	6.27	2.13

Details	Measure code	Year	On original range 1–4		On range 0–10	
			Mean	SD	Mean	SD
i	O-SLu-g-sq-v-4-c	2004	2.92	0.83	6.30	2.29
i	O-SLu-g-sq-v-4-c	2005	2.92	0.84	6.30	2.31
i	O-SLu-g-sq-v-4-c	2006	3.02	0.74	6.57	2.05
i	O-SLu-g-sq-v-4-c	2007	2.85	0.75	6.11	2.04
i	O-SLu-g-sq-v-4-dc	2008	3.01	0.77	6.82	2.00
i	O-SLu-g-sq-v-4-c	2010				
i	O-SLu-g-sq-v-4-da	2010	2.94	0.89	6.64	2.31
Average			2.77	0.84	6.39	2.15

Table A3
Measure type: 122F ten-step numeral life satisfaction (see online version for colours)

All things considered, how satisfied are you with your life as-a-whole now?
10 satisfied

.

. .

1 dissatisfied

Details	Measure code	Year	On original range 1–10		On range 0–10	
			Mean	SD	Mean	SD
i	O-SLW-c-sq-n-10-aa	1981	6.80	2.10	6.44	2.34
i	O-SLW-c-sq-n-10-aa	1990	7.25	2.03	6.95	2.25
i	O-SLW-c-sq-n-10-aa	1995	6.92	2.32	6.58	2.58
i	O-SLW-c-sq-n-10-a	1999	7.33	2.26	7.03	2.51
i	O-SLW-c-sq-n-10-a	2006	7.79	1.91	7.54	2.12
Average			7.22	2.12	6.91	2.36

Table A4
Measure type: 122G 11-step numeral life satisfaction (see online version for colours)

All things considered, how satisfied or dissatisfied are you with your life as-a-whole these days?
10 very satisfied

.

.

0 not satisfied

Details	Measure code	Year	On original range 0–10		On range 0–10	
			Mean	SD	Mean	SD
i	O-SLW-c-sq-n-11-a	2007	7.14	1.82	7.14	1.82
Average			7.14	1.82	7.14	1.82

Table A5

Measure type: 222 ten-item affect balance scale (Bradburn) (see online version for colours)

During the past few weeks did you ever feel (yes/no)

- Particularly excited or interested in something?
- So restless that you could not sit long in a chair?
- Proud because someone complimented you on something you had done?
- Very lonely or remote from other people?
- Pleased about having accomplished something?
- Bored?
- On top of the world?
- Depressed?
- That things were going your way?
- Upset because someone criticized you?

Details	Measure code	Year	On original range −5–5		On range 0–10	
			Mean	SD	Mean	SD
i	A-BB-cm-mq-v-2-a	1991	1.26	1.93	6.26	1.93
Average			1.26	1.93	6.26	1.93

Table A6
Measure type: 235 more days like yesterday (see online version for colours)

Do you want more days like yesterday?

- Yes
- No

% yes

Details	Measure code	Year	On original range 0–100		On range 0–10	
			Mean	SD	Mean	SD
i	A-AOL-yd-sq-v-2-a	2008	76.00			
Average			76.00			

Table A7
Measure type: 236 14-item yesterday's affect balance (see online version for colours)

Did you feel yesterday… (yes/no)?

- Well rested
- Worried
- Proud
- Depressed
- …etc.

Computation: % positive affect minus % negative affect

Details	Measure code	Year	On original range –100–100		On range 0–10	
			Mean	SD	Mean	SD
	A-AB-yd-mq-v-2-b	2008	47.00			
Average			47.00			

Table A8
Measure type: 31D 11-step numeral best-worst possible life (see online version for colours)

Suppose the top of the ladder represents the best possible life for you and the bottom of the ladder the worst possible life. Where on this ladder do you feel you personally stand at the present time?

- 10
- .
- .
- 0

Details	Measure code	Year	On original range 0–10		On range 0–10	
			Mean	SD	Mean	SD
	C-BW-c-sq-l-11-c	2002	5.99	2.40	5.99	2.40
	C-BW-c-sq-l-11-c	2006	6.27	2.01	6.27	2.01
	C-BW-c-sq-l-11-c	2007	6.69	1.87	6.69	1.87
	C-BW-c-sq-l-11-c	2008	6.20	1.80	6.20	1.80
	C-BW-c-sq-l-11-c	2008	6.00		6.00	
	C-BW-c-sq-l-11-c	2010	6.30	1.80	6.30	1.80
	C-BW-c-sq-l-11-c	2011	6.80		6.80	
Average			6.32	1.97	6.32	1.97

Table A9
Measure type: 411B 3-step feel happy (see online version for colours)

Do you feel...?

- Happy
- Fairly happy
- Unhappy

Details	Measure code	Year	On original range 1–3		On range 0–10	
			Mean	*SD*	*Mean*	*SD*
¿	M-FH-u-sq-v-3-k	2011	2.61	0.60	6.23	1.22
Average			2.61	0.60	6.23	1.22

Source: Cite as: R. Veenhoven, Distributional findings on Happiness in
Argentina (AR), World Database of Happiness, Erasmus University Rotterdam, The
Netherlands [online]
http://worlddatabaseofhappiness.eur.nl (accessed 2012-10-07)

APPENDIX B
Table B1 Datamatrix

Ruut Veenhoven & Floris Vergunst

The Easterlin Illusion

Period	Country	OHL3	OHL4	OHL5	OSL2	OSL3	OSL4	OSL5	OSL7	OSL10	OSL11	CBW	Happ/GDP	GDP-growth	Term	Development	Instability
2002-2011	Argentina											0,078	0,006	0,066	10-20	Upper mid.	0,491
1981-2005	Argentina		0,026										0,003	0,055	21-40	Upper mid.	0,687
1981-2006	Argentina						0,039						0,001	0,060	21-40	Upper mid.	0,733
1975-2008	Australia									0,011			0	0,070	21-40	High	0,15
1981-2005	Australia		-0,005										-0,001	0,054	21-40	High	0,178
1981-2005	Australia										-0,001		-0,003	0,054	21-40	High	0,178
1975-2011	Australia												0,001	0,072	21-40	High	0,185
1995-2011	Austria						-0,027						-0,001	0,042	10-20	High	0,289
1990-1999	Austria								0,187				0,018	0,049	10-20	High	0,314
1990-2006	Austria		-0,029										-0,002	0,050	10-20	High	0,428
1990-2000	Belarus		0,072										-0,559	-0,034	10-20	Upper mid.	0,243
1990-2000	Belarus									-0,09			-0,317	-0,034	10-20	Upper mid.	0,243
1981-1999	Belgium								0,011				0,001	0,050	10-20	High	0,133
1989-2008	Belgium										-0,032		-0,002	0,059	10-20	High	0,27
1975-1986	Belgium	-0,054											-0,004	0,057	10-20	High	0,833
1973-2011	Belgium						-0,008						0	0,077	21-40	High	0,098
1981-2006	Belgium		0,016										0,002	0,052	21-40	High	0,154
2002-2011	Bolivia									0,046			0,036	0,073	10-20	Lower mid.	0,116
1997-2007	Bolivia						-0,05						0,055	0,031	10-20	Lower mid.	0,912
1990-2006	Brasil		0,054										0,024	0,059	10-20	Upper mid.	0,92
1990-2006	Brasil							0,022					0,001	0,059	10-20	Upper mid.	0,92
1960-2011	Brasil									0,046			0,009	0,093	> 40	Upper mid.	0,249
2001-2011	Bulgaria					0,05							0,009	0,139	10-20	Upper mid.	0,053
2002-2011	Bulgaria									0,021			0,004	0,155	10-20	Upper mid.	0,055
1990-2006	Bulgaria		0,029										-0,008	0,047	10-20	Upper mid.	0,734
1990-2006	Bulgaria								0,019				0,014	0,047	10-20	Upper mid.	0,734
1968-1977	Canada					-0,009							-0,001	0,112	10-20	High	0,053
1981-2000	Canada		0,01										-0,002	0,042	10-20	High	0,174
1982-2000	Canada									-0,004			0	0,038	10-20	High	0,203
1997-2010	Chile						0,009						0,007	0,060	10-20	Upper mid.	0,334
1990-2005	Chile		0,017										0,007	0,078	10-20	Upper mid.	0,383
1990-2005	Chile									-0,025			-0,015	0,078	10-20	Upper mid.	0,383
1990-2007	China		0,002										-0,002	0,120	10-20	Upper mid.	0,088
1997-2011	China										-0,005		0,001	0,144	10-20	Upper mid.	0,16
1990-2009	China									-0,019			-0,006	0,136	10-20	Upper mid.	0,198
1990-2010	Costa Rica						-0,041						-0,016	0,057	21-40	Upper mid.	0,08
1995-2007	Croatia								0,019				0,003	0,138	10-20	High	0,209
1962-2011	Croatia									0,018			-0,011	0,070	> 40	High	0,19
2001-2011	Cyprus					0,033							0,002	0,070	10-20	High	0,075
2001-2011	Czech										0,026		0,002	0,115	10-20	High	0,075
1990-2006	Czech		0,047										0,002	0,095	10-20	High	0,177
1981-1999	Denmark								0,003				0	0,055	10-20	High	0,081
1975-1986	Denmark	-0,026											-0,006	0,064	10-20	High	0,51
1972-2006	Denmark		0,019										0,002	0,085	21-40	High	0,072
1973-2011	Denmark						0,014						0,001	0,078	21-40	High	0,084
1962-2011	Dom. Republic									0,081			0,081	0,081	> 40	Upper mid.	0,177
1997-2007	Ecuador						-0,05						-0,016	0,062	10-20	Upper mid.	0,483

Table B1   Datamatrix (continued)

Period	Country	OHL3	OHL4	OHL5	OSL2	OSL3	OSL4	OSL5	OSL7	OSL10	OSL11	CBW	Happ/GDP	GDP-growth	Term	Development	Instability
1960-2011	Egypt											-0,012	-0,107	0,064	> 40	Lower mid.	0,173
1991-2010	El Salvador						-0,04						-0,03	0,073	10-20	Lower mid.	0,013
1997-2006	England							-0,006					0	0,068	10-20	High	0,166
1975-1986	England	0,023											0,004	0,088	10-20	High	0,305
1973-2011	England						0,008						0,001	0,076	21-40	High	0,074
1975-2011	England										0,002		0,001	0,073	21-40	High	0,074
1981-2006	England		-0,002										0	0,069	21-40	High	0,075
1981-2006	England								-0,003				0	0,069	21-40	High	0,075
1990-1999	Estonia								-0,038				0,071	0,156	10-20	High	0,036
2001-2011	Estonia						0,091						0,006	0,128	10-20	High	0,153
1990-2006	Estonia		0,051										0,008	0,151	10-20	High	0,162
1956-2011	Finland						0,01						0,002	0,081	> 40	High	0,103
1972-2006	Finland		0,01										0,001	0,089	21-40	High	0,104
1981-2005	Finland									0			0	0,064	21-40	High	0,247
1975-1986	France	-0,003											0	0,064	10-20	High	0,546
1973-2011	France						0,016						0,002	0,074	21-40	High	0,083
1975-2011	France										0,032		0,003	0,064	21-40	High	0,092
1981-2006	France		0,017										0,002	0,050	21-40	High	0,167
1981-2006	France								0,011				0,001	0,050	21-40	High	0,167
1991-2009	Germany	0,009											0,001	0,056	10-20	High	0,447
1997-2006	Germany		0,001										0	0,013	10-20	High	0,814
1990-2010	Germany						0,001						0,001	0,046	21-40	High	0,34
1981-2011	Greece						-0,012						-0,002	0,057	21-40	High	0,151
2002-2011	Guatamala											-0,15	-0,104	0,055	10-20	Lower mid.	0,044
1997-2009	Guatamala						0,05						0,054	0,055	10-20	Lower mid.	0,238
1997-2007	Honduras						0,005						0,004	0,077	10-20	Lower mid.	0,037
2002-2011	Honduras											-0,12	-0,106	0,059	10-20	Lower mid.	0,042
1981-1999	Hungary								-0,076				-0,048	0,054	10-20	High	0,074
2001-2011	Hungary						-0,065						-0,007	0,104	10-20	High	0,138
1981-2006	Hungary		-0,006										-0,002	0,076	21-40	High	0,234
1981-1999	Iceland	0,004											0,001	0,056	10-20	High	0,192
1981-1999	Iceland									-0,003			0	0,056	10-20	High	0,192
1990-2006	India		0,027										0,072	0,050	10-20	Lower mid.	0,226
1962-2011	India										0,044		0,087	0,067	> 40	Lower mid.	0,272
1975-2007	India									0,064			0,315	0,056	21-40	Lower mid.	0,184
1981-1999	Ireland								0,028				0,003	0,088	10-20	High	0,069
1975-1986	Ireland	0,06											0,016	0,084	10-20	High	0,216
1981-2006	Ireland		-0,006										0	0,094	21-40	High	0,13
1973-2011	Ireland						0,002						0	0,095	21-40	High	0,153
1961-2011	Israel										0,04		0,008	0,069	> 40	High	0,085
1975-1986	Italy	0,053											0,011	0,084	10-20	High	0,188
1973-2011	Italy						0,019						0,002	0,079	21-40	High	0,071
1975-2011	Italy										0,027		0,003	0,073	21-40	High	0,075
1975-2009	Italy									0,011			0,001	0,081	21-40	High	0,088
1981-2006	Italy		0,024										0,003	0,067	21-40	High	0,156
1981-2005	Italy								0,008				0,001	0,069	21-40	High	0,175
1988-2005	Japan						-0,01						-0,001	0,049	10-20	High	0,623
1964-2011	Japan						0,007						0,001	0,098	> 40	High	0,099

Table B1   Datamatrix (continued)

Period	Country	OHL3	OHL4	OHL5	OSL2	OSL3	OSL4	OSL5	OSL7	OSL10	OSL11	CBW	Happ/GDP	GDP-growth	Term	Development	Instability
1962-2011	Japan											0,023	0,002	0,100	> 40	High	0,099
1978-2002	Japan						-0,021						-0,001	0,086	21-40	High	0,136
1975-2007	Japan								0,022				0,002	0,075	21-40	High	0,159
1981-2005	Japan		0,026										0,002	0,065	21-40	High	0,241
1981-2005	Japan							0,013					0,001	0,065	21-40	High	0,241
1981-2011	Korea										0,072		0,009	0,092	21-40	High	0,08
1981-2005	Korea		0,081										0,014	0,099	21-40	High	0,093
1981-2005	Korea							0,035					0,006	0,099	21-40	High	0,093
1980-2007	Korea							0,028					0,004	0,108	21-40	High	0,096
1981-2001	Korea						0,017						0,003	0,103	21-40	High	0,13
2001-2011	Latvia						0,018						0,001	0,134	10-20	Upper mid.	0,193
1990-2006	Latvia		0,049										0,011	0,068	10-20	Upper mid.	0,383
1990-1999	Latvia							-0,068					0,1	0,015	10-20	Upper mid.	0,975
2001-2011	Lithuania						0,04						0,004	0,132	10-20	Upper mid.	0,135
1990-2006	Lithuania		0,065										0,011	0,076	10-20	Upper mid.	0,338
1990-1999	Lithuania							-0,03					0,113	0,022	10-20	Upper mid.	0,968
1975-1986	Luxembourg	0,038											0,008	0,050	10-20	High	0,707
1975-2004	Luxembourg									0,009			0,001	0,082	21-40	High	0,092
1973-2011	Luxembourg						0,009						0	0,092	21-40	High	0,145
2001-2011	Malta						-0,011						-0,001	0,063	10-20	High	0,062
1975-2011	Mexico										0,017		0,009	0,077	21-40	Upper mid.	0,146
1975-2007	Mexico								0,23				0,01	0,084	21-40	Upper mid.	0,176
1981-2005	Mexico		0,045										0,032	0,070	21-40	Upper mid.	0,248
1981-2005	Mexico							0,017					0,016	0,070	21-40	Upper mid.	0,248
1996-2006	Moldavia		0,023										-0,008	0,069	10-20	Lower mid.	0,649
1996-2006	Moldavia							0,189					0,25	0,069	10-20	Lower mid.	0,649
1975-1986	Netherlands	0,015											0,008	0,059	10-20	High	0,712
1973-2011	Netherlands						0,007						0,001	0,078	21-40	High	0,103
1977-2011	Netherlands			-0,005									0	0,062	21-40	High	0,113
1981-2008	Netherlands		0,022										0,002	0,057	21-40	High	0,114
1981-2008	Netherlands							0,001					0	0,057	21-40	High	0,114
1974-2009	Netherlands						0,012						0,001	0,082	21-40	High	0,121
1997-2007	Nicaragua						-0,076						-0,207	0,030	10-20	Lower mid.	0,149
1990-2000	Nigeria		0,16										1,198	0,029	10-20	Lower mid.	0,953
1990-2000	Nigeria							0,026					0,438	0,029	10-20	Lower mid.	0,953
1962-2011	Nigeria										0,01		0,012	0,076	> 40	Lower mid.	0,597
1981-1996	Norway							-0,019					-0,001	0,067	10-20	High	0,095
1972-2007	Norway		-0,018										-0,001	0,094	21-40	High	0,109
1962-2011	Panama											0,042	0,032	0,064	> 40	Upper mid.	0,112
1997-2007	Paraguay						-0,055						-0,082	0,002	10-20	Lower mid.	0,672
2002-2011	Peru										-0,009		0	0,101	10-20	Upper mid.	0,045
1997-2007	Peru						-0,013						-0,007	0,038	10-20	Upper mid.	0,589
1996-2005	Peru		0,015										0,002	0,032	10-20	Upper mid.	0,995
1991-2000	Poland	0,028											0,01	0,082	10-20	High	0,05
1990-2007	Poland		-0,011										-0,005	0,099	10-20	High	0,096
1990-2007	Poland							0,028					0,08	0,099	10-20	High	0,096
2001-2011	Poland						0,066						0,031	0,106	10-20	High	0,108
1962-2011	Poland											0,027	0,007	0,086	> 40	High	0,173

Table B1   Datamatrix (continued)

Period	Country	OHL3	OHL4	OHL5	OSL2	OSL3	OSL4	OSL5	OSL7	OSL10	OSL11	CBW	Happ/GDP	GDP-growth	Term	Development	Instability
1990-1999	Portugal									-0,011			-0,002	0,088	10-20	High	0,166
1990-2006	Portugal		0,036										0,005	0,078	10-20	High	0,169
1985-2011	Portugal						-0,02						-0,002	0,086	21-40	High	0,062
1990-2006	Romania		-0,003										0,009	0,070	10-20	Upper mid.	0,467
1990-2005	Romania								-0,015				0,031	0,055	10-20	Upper mid.	0,5
1990-2003	Romania							-0,018					-0,003	0,021	10-20	Upper mid.	0,692
2002-2011	Russia											0,09	0,01	0,210	10-20	Upper mid.	0,115
1990-2005	Russia		0,046										0,037	0,031	10-20	Upper mid.	0,892
1990-2005	Russia								0,056				0,073	0,031	10-20	Upper mid.	0,892
1992-2005	Russia						0,128						-0,001	0,032	10-20	Upper mid.	0,981
1996-2006	Serbia					-0,034							-0,018	0,123	10-20	Upper mid.	0,834
1996-2006	Serbia					0,047							0,017	0,123	10-20	Upper mid.	0,834
1990-1999	Slovakia								-0,015				-0,004	0,113	10-20	High	0,04
2001-2011	Slovakia					0,116							0,008	0,108	10-20	High	0,074
2002-2011	Slovakia										0,061		0,005	0,123	10-20	High	0,09
1990-2006	Slovakia		0,07										0,011	0,115	10-20	High	0,129
2001-2011	Slovenia					-0,01							0	0,073	10-20	High	0,104
1990-2007	Slovenia								0,067				0,006	0,062	10-20	High	0,197
1992-2006	Slovenia		0,111										0,013	0,061	10-20	High	0,228
1962-2011	Slovenia										0,014		0,003	0,060	> 40	High	0,154
2002-2011	South-Africa										-0,038		-0,006	0,106	10-20	Upper mid.	0,114
1983-2002	South-Africa			-0,044									0,059	-0,001	10-20	Upper mid.	0,85
1981-2007	South-Africa		0,03										0,015	0,048	21-40	Upper mid.	0,655
1981-2007	South-Africa								0,015				0,041	0,048	21-40	Upper mid.	0,655
1983-2004	South-Africa							-0,075					0	0,018	21-40	Upper mid.	0,924
1985-2011	Spain						0,007						0	0,081	21-40	High	0,135
1981-2007	Spain		0,015										0,002	0,069	21-40	High	0,137
1981-2007	Spain								0,023				0,003	0,069	21-40	High	0,137
1995-2011	Sweden						0,024						0,001	0,051	10-20	High	0,229
1972-2006	Sweden		0,001										0	0,073	21-40	High	0,111
1981-2006	Sweden								-0,015				-0,001	0,050	21-40	High	0,222
1990-2007	Switzerland		0,007										0,001	0,037	10-20	High	0,471
1990-2007	Switzerland								-0,023				-0,002	0,037	10-20	High	0,471
1995-2006	Taiwan		-0,038										-0,01	0,034	10-20	High	0,415
1995-2006	Taiwan								0,002				0	0,034	10-20	High	0,415
2002-2011	Turkey										0,08		0,009	0,108	10-20	Upper mid.	0,089
2001-2011	Turkey					0,067							0,006	0,103	10-20	Upper mid.	0,111
1990-2007	Turkey								0,061				0,025	0,104	10-20	Upper mid.	0,305
1990-2000	Turkey		-0,03										-0,026	0,096	10-20	Upper mid.	0,394
1996-2006	Ukrain		0,133										0,131	0,071	10-20	Lower mid.	0,644
1996-2006	Ukrain								0,188				0,159	0,071	10-20	Lower mid.	0,644
1997-2007	Uruguay					-0,092							0,02	0,013	10-20	Upper mid.	0,563
1991-2004	USA					0,049							-0,001	0,040	10-20	High	0,009
1991-2008	USA					0,074							0,005	0,042	10-20	High	0,986
1959-2011	USA										0,009		0,001	0,058	> 40	High	0,04
1957-2010	USA	0,001											0	0,058	> 40	High	0,042
1959-2007	USA									0,005			0	0,062	> 40	High	0,044
1946-2002	USA			-0,001									0,001	0,064	> 40	High	0,045

Table B1   Datamatrix (continued)

Period	Country	OHL3	OHL4	OHL5	OSL2	OSL3	OSL4	OSL5	OSL7	OSL10	OSL11	CBW	Happ/GDP	GDP-growth	Term	Development	Instability
1946-1990	USA	-0,002											-0,007	0,073	> 40	High	0,075
1981-2006	USA		0,006										0	0,052	21-40	High	0,008
1981-2006	USA									-0,016			-0,001	0,052	21-40	High	0,008
1975-2008	USA	0,008											0,001	0,060	21-40	High	0,011
1973-2008	USA				0,011								0,001	0,062	21-40	High	0,012
1968-2000	USA					-0,002							0	0,067	21-40	High	0,016
2002-2011	Venezuela											0,078	0,007	0,128	10-20	Upper mid.	0,138
1997-2007	Venezuela						0,046						0,009	0,080	10-20	Upper mid.	0,553

Missende data GDP: Egypte 1959, Croatia 1961-1989, Polen 1961-1984, USA 1945-1959, Finland 1955-1959, Estonia 1989-1994, Czech 1989, Lithuania 1989, Moldavia 1989, Serbia 1995-1996, Belarus 1989.