HIAS-E-31

The Health Equivalent Adjusted Level(HEAL): Taking an Ordinal Approach to the Measurement of a Society's Health Achievements

Jacques Silber
Department of Economics, Bar-Ilan University, Israel, and Senior Research Fellow, LISER, Esch-sur-Alzette, Luxembourg

Yongsheng Xu
Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, United States

August 2016

Hitotsubashi Institute for Advanced Study, Hitotsubashi University
2-1, Naka, Kunitachi, Tokyo 186-8601, Japan
tel:+81 42 580 8604 http://hias.ad.hit-u.ac.jp/

HIAS discussion papers can be downloaded without charge from:
http://hdl.handle.net/10086/27202
https://ideas.repec.org/s/hit/hiasdp.html

The Health Equivalent Adjusted Level (HEAL):
Taking an Ordinal Approach to the Measurement of a Society's Health Achievements

Jacques Silber*

and

Yongsheng Xu**

August 2016

***Department of Economics, Bar-Ilan University, Israel, and Senior Research Fellow, LISER, Esch-sur-Alzette, Luxembourg. Email: jsilber_2000@yahoo.com**

****** Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, United States. Email: yxu3@gsu.edu**

Abstract

This paper, following earlier work on the cardinal measurement of ordinal health inequality, proposes an axiomatic derivation of the health achievement in a population when only ordinal information on health is available. An empirical illustration based on EU data for 27 countries during the period 2005-2012 is then presented which confirms the usefulness of the new measure of health achievement that has been introduced.

Key Words: axiomatic approach - European Union - health achievement - ordinal information

J.E.L. Classification: I14 – I31

1. Introduction

In many instances health variables are ordinal rather than cardinal. This is the case for surveys of self-assessed health (SAH) where the individual is asked to state his/her level health, the choice being, for example, between "very good", "good", "fair", "bad" and "very bad". Various solutions have appeared in the literature where this type of ordinal variable is transformed into a cardinal one. Such an ordinal health status may thus be considered as a latent variable and an ordered logit or probit regression may then be estimated where the observed (ordinal) health status is assumed to depend on explanatory variables such as the gender, age, area of residence, etc. of the individual. Such an approach amounts then to transforming an ordinal variable (the health status indicated by the individual) into a continuous variable (the latent variable) so that traditional inequality indices may be applied to the distribution of the cardinal variable derived from that of the latent variable. Another possibility is to implement the "interval regression" approach. Van Doorslaer and Jones (2003), for example, used the Canadian "National Population Health Survey 1994-1995", which included traditional questions on self-assessed health, as well as the "McMaster Health Utility Index Mark III" (HUI) to apply the values of the empirical distribution function of the Canadian Mc Master Health Utility Index (HUI) to the cumulative frequencies of self-assessed health (SAH) which were available in the survey they used. This technique allowed them to derive upper and lower bounds for an interval regression from which individual levels of health are predicted. The results obtained were then compared with those of an OLS regression using the HUI data and those of an ordered probit based on the SAH data.

A completely different way of looking at health, in particular at the inequality of the distribution of self-assessed health, has been proposed by Abul Naga and Yalcin (2008). Following Allison and Foster's (2004) widely cited paper, they first stressed that traditional measures of inequality such as the Gini or entropy related indices cannot be used when the variables under study are ordinal. Allison and Foster (2004) had in fact also emphasized the fact that the mean cannot serve as reference point for ordinal variables because its location relative to the distribution will be very sensitive to the scale chosen. This is why, in the case of health, Allison and Foster (2004) recommended using the median health status as reference level, the reason being that the relative position of the median will not change when the scale changes and that the median is 'responsive to significant changes in the distribution'. The main contribution of Abul Naga and

Yalcin (2008) was to derive axiomatically a cardinal measure of health inequality which can be applied when only ordinal information is available.

Applying the technique proposed by Van Doorslaer and Jones (2003), Madden (2010) then compared the values of generalized entropy indices based on the individual cardinal measures of health with those obtained on the basis of the cardinal indices of health inequality proposed by Abul Naga and Yalcin (2008) when only ordinal information is available.

Other recent contributions in this field include the work of Zheng (2011) who suggested a new approach relating socioeconomic class with health status and his proposition did not require any cardinal specification of ordinal heath data. More recently Lazar and Silber (2013), borrowing ideas from the literature on the measurement of occupational or residential segregation, suggested that the indices of ordinal segregation recently proposed by Reardon (2009) could be also applied to the measurement of health inequality. Similarly Apouey and Silber (2013) proposed two approaches to the measurement of inequality and bi-polarization when only ordinal information is available.

Finally, more recently, using a somehow different set of desirable axioms for a measure of health inequality when only ordinal variables are available, Lv, Wang and Xu (2015) developed axiomatically a new class of inequality indices. They then gave an empirical illustration based on self-reported health status data from the 2007 wave of the China Household Income Project Survey (CHIPS). They also compared their results with those obtained when using the indices proposed by Apouey (2007), Abul Naga and Yalcin (2008), Reardon (2010) and Lazar and Silber (2013).

The present study attempts to extend this previous work on the measurement of health inequality when only ordinal variables are available. It first derives axiomatically some new classes of measures of the level of health in a population when the health variable is ordinal. It may be noted that our measures of health inequality are along the line of the approach to economic inequality by Atkinson (1970) that is based on a social welfare function. The paper then gives an empirical illustration, based on data on self-assessed health in 27 countries of the European Union, which shows the usefulness of the new measure of health introduced in the present study.

2. An axiomatic approach to the measurement of health in the case of ordinal data

Let $N = \{1, \dots, n\}$ be the set of individuals in the society with $n \geq 2$. The set of health status is denoted by $\mathbb{K} = \{1, \dots, K\}$ with $K \geq 2$ and a lower number indicating a better health status. A health vector, $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$, represents the health status of each individual in the society with $s_i \in \mathbb{K}$ being individual i's health status.

A health equivalent adjusted level (HEAL) index is defined as a mapping $h: \mathbb{K}^n \to [0,1]$ so that, for each health vector $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$, $h(s)$ reflects the overall health level of the society: for any $s, t \in \mathbb{K}^n$, $h(s) \geq h(t)$ is interpreted as implying that the overall health of the individuals in the society under s is at least as good as the overall health of the individuals in the society under t, and, $h(s) > h(t)$ is interpreted as implying that the overall health of the individuals in the society under s is better than the overall health of the individuals in the society under t.

For each $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$ and every $k \in \mathbb{K}$, let $p_k(s) = \#\{i \in N: s_i = k\}$, and $p(s) = (p_1(s), \dots, p_K(s))$. Therefore, $p(s)$ is the frequency distribution of the heath vector s.

We now propose three basic properties for a HEAL index h.

Axioms for the HEAL index h

Separability. There exists a function $g: \mathbb{K} \to [0,1]$ such that, for each $s = (s_1, \dots, s_i, \dots, s_n)$, $t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$, $h(s) \geq h(t) \Leftrightarrow g(s_1) + \cdots + g(s_n) \geq g(t_1) + \cdots + g(s_n)$.

Weak Pareto Principle. For all $k, k' \in s, t \in \mathbb{K}^n$, if $k < k'$, then $h(k, \dots, k) > h(k', \dots, k')$.

Weak Equity Principle. For all $i, j \in N$ and all $s = (s_1, \dots, s_i, \dots, s_j, \dots, s_n) \in \mathbb{K}^n$, if, for some $k' \in \mathbb{K}$, $s_i < k' < s_j$ or $s_j < k' < s_i$, then, there exists $t = (t_1, \dots, t_i, \dots, t_j, t_n) \in \mathbb{K}^n$ with $[\forall i' \in N \backslash \{i, j\}: s_{i'} = t_{i'}]$ and $[s_i < t_i \leq t_j < s_j]$ such that $h(s) \leq h(t)$.

Separability is a fairly standard property used in welfare economics. It requires that an HEAL index h admits an additively separable representation so that, in this representation, the contributions of individuals' health statuses to the overall health level in society are additively separable. Weak Pareto Principle is yet another commonly used property in welfare economics and social choice theory. It requires that a health vector in which every individual has the same health status k represents a better overall health level for the society than another health vector in which every individual has the same health status k' whenever k is a better health status than k'.

Weak Equity Principle resembles the Pigou-Dalton transfer principle in the literature on measurement of income inequality. It basically requires that, other things the same, changes of two individuals' health statuses from two further-apart health statuses to two "closer" statuses should not decrease the overall health level of the society. The idea is that, in such changes, the (local) `inequality' of the health statuses among the individuals in the society seems to have decreased and this should have a positive bearing on an HEAL index.

With the help of the above three basic properties of an HEAL index, we can prove the following result.

Proposition 1. A HEAL index h satisfies Separability, Weak Pareto Principle, and Weak Equity Principle if and only if, there exists $\alpha_1, \dots, \alpha_K$ such that,

(i) for all $s = (s_1, \dots, s_i, \dots, s_n)$, $t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$, $h(s) \geq h(t) \Leftrightarrow \sum_{k=1}^{K} p_k(s)\alpha_k \geq \sum_{k=1}^{K} p_k(t)\alpha_k$,

(ii) $\alpha_1 > \cdots > \alpha_K$,

(iii) for all $k = 2, \dots, K-1$, $2\alpha_k \geq \alpha_{k-1} + \alpha_{k+1}$.

Proof. Suppose a HEAL index h satisfies Separability, Weak Pareto Principle, and Weak Equity Principle. By Separability, there exists a function $g: \mathbb{K} \to [0,1]$ such that, for all $s = (s_1, \dots, s_i, \dots, s_n), t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$,

(1) $h(s) \geq h(t) \Leftrightarrow \sum_{i=1}^{n} g(s_i) \geq \sum_{k=1}^{K} g(t_i)$.

Then, for each $k \in \mathbb{K}$, let $\alpha_k = g(k)$; and for each $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$, we have

(2) $\sum_{i=1}^{n} g(s_i) = \sum_{k=1}^{K} p_k(s)\alpha_k$.

Note that, for any $k \in \mathbb{K}$, we have $\sum_{i=1}^{n} g(k) = \alpha_k$. Then, a straightforward application of Weak Pareto Principle gives us $\alpha_1 > \cdots > \alpha_K$. Finally, for any $k = 2, \dots, K-1$, consider $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$ with $s_1 = k-1$ and $s_2 = k+1$. Note that $s_1 < k < s_2$, by Weak Equity Principle,

(3) there exists $t = (t_1, \dots, t_n) \in \mathbb{K}^n$ with $[\forall i \in N \backslash \{1,2\}: s_i = t_i]$ and $[s_1 = k-1 < t_1 \leq t_2 < s_2 = k+1]$, and $h(s) \leq h(t)$.

Clearly, from $s_1 = k-1 < t_1 \leq t_2 < s_2 = k+1$, it must be the case that

(4) $\quad t_1 = t_2 = k.$

From (1), (2), (3) and (4), we have $h(s) \leq h(t)$ iff $\sum_{k=1}^{K} p_k(s)\alpha_k \leq \sum_{k=1}^{K} p_k(t)\alpha_k$ iff $\alpha_{k-1} + \alpha_{k+1} \leq \alpha_k + \alpha_k$; that is, $2\alpha_k \geq \alpha_{k-1} + \alpha_{k+1}$.

On the other hand, it can be checked that, if a HEAL index h has the properties (i), (ii) and (iii) figured in Proposition 1, then it satisfies Separability, Weak Pareto Principle, and Weak Equity Principle. Q.E.D.

The intuition underlying Weak Equity Principle can be extended by requiring that the changes of two individuals' health statuses from two further-apart health statuses to two "closer" statuses should increase the overall health level of the society, and this intuition is captured by the following property, Equity Principle I. Obviously, Equity Principle I is logically stronger than Weak Equity Principle.

Equity Principle I. For all $i, j \in N$ and all $s = (s_1, \dots, s_i, \dots, s_j, \dots, s_n) \in \mathbb{K}^n$, if, for some $k' \in \mathbb{K}$, $s_i < k' < s_j$ or $s_j < k' < s_i$, then, there exists $t = (t_1, \dots, t_i, \dots, t_j, t_n) \in \mathbb{K}^n$ with $[\forall i' \in N \setminus \{i, j\}: s_{i'} = t_{i'}]$ and $[s_i < t_i \leq t_j < s_j]$ such that $h(s) < h(t)$.

If Weak Equity Principle is replaced with Equity Principle I, we can obtain the following result. The proof is very similar to that of Proposition 1 and we omit it.

Proposition 2. A HEAL index h satisfies Separability, Weak Pareto Principle, and Equity Principle I if and only if, there exists $\alpha_1, \dots, \alpha_K$ such that,

(iv) for all $s = (s_1, \dots, s_i, \dots, s_n), t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$, $h(s) \geq h(t) \Leftrightarrow \sum_{k=1}^{K} p_k(s)\alpha_k \geq \sum_{k=1}^{K} p_k(t)\alpha_k$,

(v) $\alpha_1 > \cdots > \alpha_K$,

(vi) for all $k = 2, \dots, K-1$, $2\alpha_k > \alpha_{k-1} + \alpha_{k+1}$.

The intuition underlying Weak Equity Principle can be extended in another direction by requiring that the changes of two individuals' health statuses from two further-apart health statuses to two "closer" statuses should neither increase nor decrease the overall health level of the society, in other words, such changes should leave the overall health level of the society unchanged. This intuition is captured by the following property, Equity Principle II. It can be easily checked that Equity Principle II is logically stronger than Weak Equity Principle.

Equity Principle II. For all $i, j \in N$ and all $s = (s_1, \dots, s_i, \dots, s_j, \dots, s_n) \in \mathbb{K}^n$, if, for some $k' \in \mathbb{K}$, $s_i < k' < s_j$ or $s_j < k' < s_i$, then, there exists $t = (t_1, \dots, t_i, \dots, t_j, t_n) \in \mathbb{K}^n$ with $[\forall i' \in N \setminus \{i, j\}: s_{i'} = t_{i'}]$ and $[s_i < t_i \leq t_j < s_j]$ such that $h(s) = h(t)$.

If we replace Weak Equity Principle with Equity Principle II, then we obtain the following result.

Proposition 3. A HEAL index h satisfies Separability, Weak Pareto Principle, and Equity Principle II if and only if,

(vii) for all $s = (s_1, \dots, s_i, \dots, s_n), t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$, $h(s) \geq h(t) \Leftrightarrow \sum_{k=1}^{K} p_k(s) \frac{(K-k)}{(K-1)} \geq \sum_{k=1}^{K} p_k(t) \frac{(K-k)}{(K-1)}$.

Proof. Suppose a HEAL index h satisfies Separability, Weak Pareto Principle, and Equity Principle II. By Separability, there exists a function $g: \mathbb{K} \to [0,1]$ such that, for all $s = (s_1, \dots, s_i, \dots, s_n), t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$,

(5) $h(s) \geq h(t) \Leftrightarrow \sum_{i=1}^{n} g(s_i) \geq \sum_{k=1}^{K} g(t_i)$.

Then, for each $k \in \mathbb{K}$, let $\alpha_k = g(k)$; and for each $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$, we have

(6) $\sum_{i=1}^{n} g(s_i) = \sum_{k=1}^{K} p_k(s) \alpha_k$.

For any $k = 2, \dots, K-1$, consider $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$ with $s_1 = k - 1$ and $s_2 = k + 1$. Note that $s_1 < k < s_2$, by Equity Principle II,

(7) there exists $t = (t_1, \dots, t_n) \in \mathbb{K}^n$ with $[\forall i \in N\backslash\{1,2\}: s_i = t_i]$ and $[s_1 = k-1 < t_1 \leq t_2 < s_2 = k+1]$, and $h(s) = h(t)$.

Clearly, from $s_1 = k-1 < t_1 \leq t_2 < s_2 = k+1$, it must be the case that

(8) $t_1 = t_2 = k$.

(viii) From (5), (6), (7) and (8), we have $h(s) = h(t)$ iff $\sum_{k=1}^{K} p_k(s)\alpha_k = \sum_{k=1}^{K} p_k(t)\alpha_k$ iff $\alpha_{k-1} + \alpha_{k+1} = \alpha_k + \alpha_k$. Now, if we "normalize" $\alpha_K = 0$ and $\alpha_1 = 1$, then, for each $k \in \mathbb{K}$, we must have $\alpha_k = \frac{(K-k)}{(K-1)}$. Therefore, for all $s = (s_1, \dots, s_i, \dots, s_n), t = (t_1, \dots, t_i, \dots, t_n) \in \mathbb{K}^n$, $h(s) \geq h(t) \Leftrightarrow \sum_{k=1}^{K} p_k(s)\frac{(K-k)}{(K-1)} \geq \sum_{k=1}^{K} p_k(t)\frac{(K-k)}{(K-1)}$.

On the other hand, it can be checked that, if a HEAL index h has the properties (i), (ii) and (iii) figured in Proposition 3, then it satisfies Separability, Weak Pareto Principle, and Weak Equity Principle II. Q.E.D.

Remark 1. It may be noted that, each of our results, Propositions 1, 2 and 3, provides a characterization of a class of HEAL indices. For example, in Proposition 1, we provide a characterization of the class of HEAL index h such that, it admits an additively separable representation g over individual health status and has the properties specified in (ii) and (iii) of Proposition 1. Therefore, for any health vector s, $h(s)$ can be given by any increasing transformation of $\sum_{k=1}^{K} p_k(s)\alpha_k$.

Remark 2. For a given $\gamma \in (0,1]$ and each $k \in \mathbb{K}$, let

$$\alpha_k = \frac{(K-k)^\gamma}{(K-1)^\gamma}$$

Then,

$$h(s) = \sum_{k=1}^{K} p_k(s)\frac{(K-k)^\gamma}{(K-1)^\gamma}$$

has the properties (i), (ii) and (iii) figured in Proposition 1 and satisfies Separability, Weak Pareto Principle, and Weak Equity Principle; further, if $\gamma < 1$, then the above h has the properties (iv), (v) and (vi) figured in Proposition 2.

Remark 3. Note that, in Proposition 3, if we let, for all $s = (s_1, \dots, s_i, \dots, s_n) \in \mathbb{K}^n$,

$$h(s) = \sum_{k=1}^{K} p_k(s) \frac{(K-k)}{(K-1)}$$

Then, noting that following,

$$h(s) = p_1(s)1 + p_2(s)\frac{(K-2)}{K-1} + \cdots + p_{K-1}(s)\frac{1}{(K-1)} + p_k(s)0$$

we have

$$(K-1)h(s) = (K-1)p_1(s) + (K-2)p_2(s) + \cdots + 2p_{K-2}(s) + 1p_{K-1}(s) + 0p_K(s)$$

Equivalently,

$$(K-1)h(s) = p_1(s) + [p_1(s) + p_2(s)] + \cdots + [p_1(s) + p_2(s) + \cdots + p_{K-1}(s)]$$

Remembering that a lower subscript indicates a better health status and defining $F_k(s)$ as $F_k(s) = \sum_{j=1}^{k} p_j(s)$, that is, $F_{\ k}(s)$ refers to the cumulative relative frequency of the various categories of health status, we can easily derive that

$$(K-1)h(s) = \sum_{k=1}^{K-1} F_k(s)$$

And therefore,

$$h(s) = \frac{1}{(K-1)} \sum_{k=1}^{K-1} F_k(s)$$

3. An empirical illustration

The data base is provided by Eurostat (2014) and gives for each country the level of self-perceived health by sex, age and educational attainment level. We have however made no distinction by gender, age or educational level. Five levels of perceived health were distinguished: very good, god, fair, bad and very bad. We computed for each country, for which data were available, and for each of the years 2005 to 2012, the index HEAL specified in Remark 2 previously, for three values of the parameter γ, namely γ = 0.5 ; γ = 1 and γ = 0.1.

Tables 1 to 3 give the results corresponding to each of these three cases for the 27 European Union countries as well as for the European Union (EU) as a whole. We also give the 5%-95% bootstrap confidence interval for the health achievement of every country and for every year. It may be noted that the values reported in Tables 1 to 3 are the corresponding values of the HEAL index multiplied by 100. For comparison reason, we note that, in our samples, $K = 5$ so that $\alpha_1 = 1$, $\alpha_2 = .75$, $\alpha_3 = .5$, $\alpha_4 = .25$ and $\alpha_5 = 0$.

In Tables 4 to 6 we classify the countries into three categories: those whose overall health achievement is significantly lower than the average heath achievement in the European Union, those whose overall health achievement is significantly higher than the average health achievement in the European Union and those whose health achievement is not significantly different from that of the European Union as a whole. In each table we present these classifications for the year 2005 and the year 2012. Table 4 refers to the case where the parameter γ is equal to 0.5. Table 5 gives the classification for γ = 1 and Table 6 for γ = 0.1.

As a whole the classifications are not very different in 2005 and 2012, whatever the value of the parameter γ we choose. Most of the countries remain in the same category and the variation between 2005 and 2012 for a given value of γ or, for a given year (2005 or 2012) for the three different cases examined (γ = 0.5, 1 or 0.1) is marginal.

4. Concluding comments

This paper, following earlier work on the cardinal measurement of ordinal health inequality, first derived axiomatically some new classes of the level of health achievement in a population, when only ordinal information on health is available. An empirical illustration based on EU data for 27 countries during the period 2005-2012 seems to confirm the usefulness of the new classes of measures of health achievement that have been introduced.

References

Abul Naga, R. H. and T. Yalcin T. (2008) "Inequality Measurement for Ordered Response Health Data," *Journal of Health Economics* 27(6): 1614-1625.

Allison, R. A. and J. Foster (2004) "Measuring Health Inequalities Using Qualitative Data," *Journal of Health Economics* 23: 505-524.

Apouey, B. and J. Silber (2013) "Inequality and Bi-polarization in Socioeconomic Status and Health: Ordinal Approaches," *Research on Economic Inequality*, vol. 21. *Health and Inequality*, P. Rosas Dias and O. O'Donnell, editors. pp. 77-109.

Atkinson, A. (1970) "On the Measurement of Inequality," *Journal of Economic Theory* 2: 244-263.

Eurostat (2014) Data on self-perceived health by sex, age and educational attainment level. Available at http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_silc_02&lang=en

Lazar, A. and J. Silber (2013) "On the cardinal measurement of health inequality when only ordinal information is available on individual health status," *Health Economics* 22: 106-113.

Lv, G., Y. Wang and Y. Xu (2015) "On a new class of measures for health inequality based on ordinal data," *Journal of Economic Inequality* 13(3): 465-477.

Madden, D. (2010) "Ordinal and Cardinal Measures of Health Inequality: An Empirical Comparison," *Health Economics* 19: 243-250.

Reardon, S. F. (2009) "Measures of Ordinal Segregation," In volume 17 of *Research on Economic Inequality*, Emerald, Bingley, UK, pages 129-155.

Van Doorslaer and E. Jones, A.M. (2003) "Inequalities in self-reported health: validation of a new approach to measurement," *Journal of Health Economics* 22: 61-87.

Zheng, B. (2011) "A new approach to measure socio-economic inequality in health," *Journal of Economic Inequality* 9(4): 555-577.

Table 1: Heal index with bootstrap based confidence intervals ($\gamma = 0.5$)

Country	2005	2005 (5%)	2005 (95%)	2006	2006 (5%)	2006 (95%)	2007	2007 (5%)	2007 (95%)	2008	2008 (5%)	2008 (95%)
EU 27	80.8	79.93	81.66	80.88	79.96	81.83	81.28	80.42	82.04	81.82	80.93	82.8
Belgium	84.17	83.35	85.05	84.61	83.75	85.46	84.61	83.83	85.43	84.29	83.39	85.07
Czech Rep	78.58	77.58	79.57	78.71	77.68	79.71	79.46	78.49	80.44	79.39	78.35	80.46
Denmark	86.94	86.13	87.78	85.95	84.92	86.83	85.95	85.08	86.95	84.62	83.68	85.58
Germany	79.51	78.65	80.32	79.49	78.63	80.28	79.22	78.4	80.11	80.69	79.77	81.46
Estonia	75.36	74.33	76.39	75.67	74.7	76.58	75.76	74.9	76.66	76.11	75.13	77.04
Ireland	89.29	88.56	90.01	89.27	88.58	90.01	89.62	88.93	90.26	89.7	89.06	90.36
Greece	87.63	86.45	88.6	87.21	86.15	88.23	87.6	86.57	88.67	87.3	86.27	88.34
Spain	81.13	80.24	82.1	81.34	80.41	82.34	81.22	80.3	82.08	82.9	82.06	83.69
France	82.05	81	82.97	82.37	81.45	83.24	84.17	83.26	84.99	82.73	81.84	83.5
Italy	79.11	78.16	79.94	78.44	77.55	79.36	79.3	78.43	80.24	79.52	78.55	80.33
Cyprus	86.29	85.22	87.12	86.93	86	87.78	86.19	85.17	87.22	87.47	86.56	88.44
Latvia	69.41	68.2	70.47	71.52	70.4	72.6	71.93	70.84	72.96	73.12	72.11	74.04
Lithuania	73.51	72.53	74.39	73.57	72.63	74.54	75.01	74.03	76.04	74.62	73.65	75.53
Luxembourg	84.57	83.66	85.47	84.66	83.72	85.47	84.68	83.84	85.48	84.4	83.48	85.19
Hungary	72.91	71.75	73.91	73.85	72.79	74.85	73.22	72.07	74.35	75.32	74.12	76.55
Malta	83.98	83.28	84.66	85.94	85.19	86.66	85.65	84.88	86.31	85.93	85.25	86.64
Netherlands	84.22	83.44	84.94	84.35	83.67	85.07	84.67	83.93	85.44	84.49	83.64	85.22
Austria	84.54	83.5	85.46	84.65	83.76	85.61	84.58	83.48	85.55	83.26	82.24	84.27
Poland	75.76	74.7	76.82	76.47	75.37	77.47	76.86	75.75	77.78	77.35	76.23	78.37
Portugal	75.27	74.21	76.31	76.07	75.08	76.96	75.6	74.62	76.55	76.1	75.04	77.17
Slovenia	76.2	75.09	77.22	77.05	75.96	78.1	77.41	76.42	78.36	78.03	77.07	79.03
Slovakia	75.97	74.87	77.22	75.96	74.78	77.19	76.37	74.98	77.49	77.41	76.2	78.63
Finland	83.94	82.76	84.98	84.04	82.98	85.16	82.42	81.49	83.34	82.45	81.65	83.23
Sweden	85.97	84.95	86.77	86.13	85.28	87	87.02	86.25	87.79	86.64	85.89	87.46
UK	84.94	84.05	85.78	85.38	84.57	86.2	86.33	85.57	87.16	86.9	86.05	87.66
Iceland	87.5	86.53	88.39	88.47	87.52	89.34	88.02	87.27	88.92	88.02	87.17	88.92
Norway	83.52	82.67	84.4	83.57	82.59	84.46	84.56	83.64	85.4	84.44	83.66	85.28

Table 1 (cont.): Heal index with bootstrap based confidence intervals ($\gamma = 0.5$)

Country	2009	2009 (5%)	2009 (95%)	2010	2010 (5%)	2010 (95%)	2011	2011 (5%)	2011 (95%)	2012	2012 (5%)	2012 (95%)
EU 27	81.81	80.86	82.72	81.97	81.03	82.9	81.83	80.86	82.75	81.95	81.02	82.81
Belgium	83.5	82.54	84.46	83.39	82.4	84.28	83.4	82.38	84.41	84.15	83.27	85
Czech Rep	79.27	78.23	80.18	79.76	78.73	80.75	78.89	77.82	79.87	78.98	77.89	79.99
Denmark	83.54	82.51	84.51	83.03	82.08	83.95	82.97	82.09	83.9	82.97	82.05	83.99
Germany	80.95	80.14	81.78	80.95	80.14	81.76	80.73	79.92	81.58	80.97	80.11	81.78
Estonia	76.23	75.33	77.01	76.22	75.32	77.14	75.5	74.54	76.47	75.67	74.78	76.62
Ireland	88.95	88.27	89.64	89.13	88.36	89.84	89.07	88.36	89.72	88.89	88.21	89.65
Greece	86.73	85.57	87.75	86.78	85.74	87.8	87.14	86.03	88.1	86.23	85.11	87.3
Spain	82.29	81.4	83.08	82.96	82.09	83.71	84.09	83.27	84.9	83.99	83.06	84.79
France	82.5	81.56	83.36	81.91	80.98	82.88	82.1	81.28	82.97	82.71	81.79	83.5
Italy	79.49	78.51	80.29	80.6	79.72	81.42	79.26	78.41	80.22	79.94	79.04	80.89
Cyprus	85.98	85	86.97	86.2	85.19	87.2	86.4	85.41	87.42	87.23	86.28	88.05
Latvia	74.24	73.41	75.27	74.09	73.07	75.07	73.59	72.53	74.54	74.06	73.06	75.03
Lithuania	74.61	73.6	75.57	74.91	73.92	75.8	72.64	71.61	73.72	72.75	71.6	73.68
Luxembourg	84.69	83.78	85.44	84.65	83.8	85.45	83.49	82.61	84.26	83.53	82.7	84.31
Hungary	76.24	75.07	77.44	76.16	74.94	77.29	76.57	75.46	77.65	76.98	75.83	78.08
Malta	83.9	83.2	84.64	83.14	82.41	83.83	84.24	83.51	84.95	83.79	83.1	84.42
Netherlands	84.88	84.14	85.59	84.94	84.16	85.61	83.99	83.24	84.65	84.43	83.67	85.12
Austria	83.25	82.26	84.24	83.24	82.24	84.11	83.1	82.06	84.13	83.44	82.46	84.44
Poland	77.11	76.02	78.13	77.75	76.71	78.78	78.15	77.2	79.12	78.17	77.2	79.16
Portugal	75.57	74.59	76.53	75.48	74.3	76.36	76.21	75.06	77.24	75.82	74.82	76.81
Slovenia	78.44	77.46	79.33	78.51	77.42	79.52	78.69	77.6	79.78	79.57	78.56	80.61
Slovakia	78.69	77.61	79.7	79.48	78.43	80.55	79.12	78.08	80.11	80.35	79.31	81.34
Finland	82.42	81.68	83.22	82.34	81.51	83.12	82.54	81.73	83.33	81.82	81.04	82.54
Sweden	86.99	86.14	87.82	86.95	86.25	87.75	87.2	86.34	87.91	86.91	86.13	87.64
UK	86.93	86.06	87.74	86.86	86.06	87.66	86.17	85.36	87	85.57	84.57	86.54
Iceland	88.17	87.28	89.04	86.88	85.99	87.74	86.56	85.63	87.4	86.59	85.74	87.44
Norway	84.81	84.04	85.65	84.85	83.91	85.68	83.3	82.39	84.13	85.69	84.79	86.56

Table 2: Heal index with bootstrap based confidence intervals ($\gamma = 1$)

Country	2005	2005 (5%)	2005 (95%)	2006	2006 (5%)	2006 (95%)	2007	2007 (5%)	2007 (95%)	2008	2008 (5%)	2008 (95%)
EU 27	68.6	67.45	69.88	68.65	67.4	69.95	69.25	67.97	70.38	69.95	68.8	71.18
Belgium	73.72	72.6	74.97	74.2	73.05	75.38	74.18	73.08	75.3	73.6	72.43	74.72
Czech Rep	65.5	64.18	66.72	65.7	64.33	66.9	66.6	65.28	67.88	66.65	65.4	68.03
Denmark	78.38	77.1	79.55	77.2	75.85	78.5	77.2	76	78.45	74.68	73.47	75.85
Germany	65.97	64.8	67.13	65.93	64.78	67.13	65.55	64.47	66.72	67.72	66.68	68.88
Estonia	60.47	59.28	61.7	60.75	59.58	62	60.8	59.7	61.9	61.2	60.03	62.35
Ireland	81.73	80.58	82.85	81.65	80.55	82.78	82.05	81	83.18	82.13	81.1	83.1
Greece	80.5	79.15	81.88	80.08	78.65	81.35	80.68	79.3	82.05	80.08	78.6	81.47
Spain	69.13	67.72	70.43	69.13	68.03	70.35	68.85	67.58	69.95	71.08	70	72.13
France	70.35	69.13	71.6	70.8	69.47	71.93	73.35	72.1	74.45	71.05	69.93	72.33
Italy	65.4	64.25	66.5	64.5	63.45	65.58	65.98	64.7	67.03	66.22	65.08	67.28
Cyprus	78.28	76.93	79.6	78.97	77.68	80.33	78.15	76.93	79.5	79.52	78.18	80.8
Latvia	52.6	51.43	53.68	55.23	54.13	56.38	55.65	54.53	56.78	57.15	56.08	58.23
Lithuania	57.45	56.28	58.75	57.65	56.55	58.65	59.6	58.38	60.8	59.1	58.05	60.33
Luxembourg	74.43	73.25	75.7	74.55	73.47	75.7	74.33	73.2	75.4	73.88	72.6	75.03
Hungary	58.13	56.83	59.4	59.25	57.93	60.48	58.85	57.45	60.13	62	60.8	63.5
Malta	72.35	71.35	73.47	75.77	74.7	76.85	75.2	74.18	76.28	75.78	74.5	76.83
Netherlands	72.88	71.83	73.9	73.05	71.95	73.97	73.58	72.53	74.6	73.45	72.33	74.55
Austria	74.78	73.3	76.08	74.77	73.45	75.93	74.72	73.35	76.18	72.72	71.45	74
Poland	61.95	60.55	63.28	62.58	61.28	63.93	63.22	61.88	64.55	63.97	62.63	65.22
Portugal	60.43	59.3	61.48	61.38	60.23	62.48	60.43	59.35	61.5	61.73	60.53	62.85
Slovenia	62.18	60.85	63.53	63.4	62.2	64.58	63.98	62.8	65.2	64.63	63.48	65.8
Slovakia	63.25	61.85	64.65	63.15	61.53	64.63	63.78	62.4	65.25	64.85	63.38	66.33
Finland	74.78	73.4	76.1	75	73.63	76.4	70.7	69.43	71.93	70.73	69.55	71.83
Sweden	76.68	75.45	77.88	76.65	75.58	77.88	78.15	77	79.2	77.45	76.28	78.63
UK	75	73.75	76.2	75.58	74.47	76.88	76.95	75.93	78.18	77.98	76.78	79.18
Iceland	80.03	78.75	81.2	81.18	79.93	82.35	79.93	78.6	81.15	80.07	78.8	81.28
Norway	72.75	71.55	74.1	72.8	71.63	73.95	74.25	73.08	75.4	73.8	72.65	74.85

Table 2 (cont.): Heal index with bootstrap based confidence intervals ($\gamma = 1$)

Country	2009	2009 (5%)	2009 (95%)	2010	2010 (5%)	2010 (95%)	2011	2011 (5%)	2011 (95%)	2012	2012 (5%)	2012 (95%)
EU 27	70.03	68.72	71.15	70.2	69.03	71.35	70.05	68.85	71.28	70.35	69.22	71.63
Belgium	72.8	71.43	73.97	72.57	71.35	73.93	72.97	71.63	74.25	73.83	72.6	75.05
Czech Rep	66.35	64.88	67.68	67.27	65.85	68.55	65.9	64.55	67.25	66.08	64.78	67.33
Denmark	73.18	72	74.3	72.27	70.95	73.53	72.28	70.93	73.45	72.1	70.9	73.4
Germany	68.17	67.03	69.3	68.13	66.95	69.25	67.9	66.72	69	68.35	67.35	69.53
Estonia	60.75	59.58	61.8	61.13	59.9	62.28	60.3	59.05	61.43	60.68	59.33	61.75
Ireland	80.88	79.8	81.85	81.3	80.18	82.35	81.02	79.83	82	80.85	79.8	81.95
Greece	79.38	78	80.7	79.23	77.75	80.55	79.65	78.3	80.93	78.23	76.75	79.63
Spain	70.43	69.35	71.47	71.25	70.03	72.45	73.2	72.1	74.45	73.05	71.97	74.18
France	70.8	69.63	72.1	69.95	68.7	71.22	70.18	69.05	71.4	71.1	69.83	72.4
Italy	66.3	65.15	67.45	67.85	66.75	68.95	66.22	64.9	67.4	67.32	66.2	68.55
Cyprus	77.48	76.08	78.78	77.65	76.55	78.95	78.4	77.03	79.75	79.13	77.83	80.38
Latvia	58.35	57.38	59.4	58.48	57.4	59.65	57.75	56.6	58.88	58.2	56.98	59.25
Lithuania	59.25	58	60.4	59.7	58.63	60.93	56.83	55.58	57.98	57	55.78	58.28
Luxembourg	74.68	73.4	75.9	74.43	73.28	75.65	72.48	71.35	73.63	72.47	71.33	73.6
Hungary	62.98	61.58	64.38	62.65	61.25	64.08	63.1	61.7	64.35	63.68	62.25	65.03
Malta	72.35	71.22	73.4	70.93	69.9	71.9	72.78	71.65	73.9	71.88	70.9	72.97
Netherlands	73.97	72.93	75.03	73.88	72.85	74.8	72.62	71.6	73.75	73.33	72.25	74.4
Austria	72.75	71.47	73.95	72.75	71.4	73.95	72.43	71.08	73.7	73.28	71.97	74.53
Poland	63.6	62.33	64.88	64.45	63.15	65.9	64.75	63.4	65.97	64.83	63.48	66.03
Portugal	61.15	59.98	62.53	60.62	59.43	61.8	61.93	60.7	63.1	61.18	59.98	62.43
Slovenia	65.38	64.2	66.55	65.47	64.33	66.78	65.85	64.5	67.28	67.1	65.68	68.45
Slovakia	66.35	65.03	67.6	67.25	65.9	68.53	66.6	65.28	67.78	68.22	66.93	69.45
Finland	70.52	69.25	71.63	70.25	69.1	71.33	70.6	69.38	71.58	69.15	68.15	70.15
Sweden	78.13	76.97	79.3	77.83	76.58	78.9	78.32	77.22	79.5	77.85	76.88	78.97
UK	78.13	76.88	79.3	78.05	76.85	79.2	76.68	75.47	78	76.47	75.25	77.83
Iceland	80.18	79.13	81.22	78.35	77.08	79.6	77.85	76.68	79.05	77.85	76.58	79.03
Norway	74.5	73.18	75.68	74.55	73.33	75.68	72.05	70.85	73.08	75.8	74.63	76.9

Table 3: Heal index with bootstrap based confidence intervals ($\gamma = 0.1$)

Country	2005	2005 (5%)	2005 (95%)	2006	2006 (5%)	2006 (95%)	2007	2007 (5%)	2007 (95%)	2008	2008 (5%)	2008 (95%)
EU 27	94.04	93.27	94.73	94.14	93.44	94.82	94.23	93.52	94.98	94.52	93.86	95.21
Belgium	95.16	94.48	95.81	95.57	94.96	96.13	95.57	94.98	96.13	95.57	94.87	96.07
Czech Rep	93.03	92.19	93.78	93.13	92.2	93.91	93.62	92.87	94.29	93.45	92.61	94.17
Denmark	96.09	95.47	96.65	95.32	94.55	96.02	95.38	94.74	96.04	95.11	94.38	95.82
Germany	94.07	93.4	94.67	94.07	93.34	94.71	93.93	93.22	94.56	94.44	93.75	95.03
Estonia	91.88	91.09	92.71	92.2	91.39	93	92.3	91.48	93.15	92.61	91.79	93.38
Ireland	97.05	96.57	97.47	97.05	96.62	97.48	97.3	96.86	97.65	97.39	96.96	97.69
Greece	95.45	94.6	96.2	95.04	94.23	95.86	95.21	94.41	96	95.29	94.47	96.05
Spain	94.05	93.22	94.69	94.41	93.82	95.1	94.39	93.67	95.07	95.07	94.48	95.61
France	94.71	93.96	95.34	94.87	94.23	95.45	95.69	95.19	96.16	95.27	94.67	95.81
Italy	93.9	93.13	94.53	93.57	92.89	94.25	93.56	92.79	94.3	93.76	93.03	94.51
Cyprus	95.13	94.31	95.89	95.73	95.07	96.32	94.96	94.14	95.76	96.18	95.54	96.75
Latvia	88.67	87.55	89.71	89.96	88.93	90.99	90.29	89.23	91.21	91.04	90.02	91.92
Lithuania	91.78	90.99	92.61	91.52	90.59	92.36	92.18	91.28	92.97	92.07	91.32	92.9
Luxembourg	95.39	94.76	95.95	95.35	94.65	95.94	95.59	94.99	96.08	95.59	94.94	96.14
Hungary	90.07	88.97	91.11	90.62	89.53	91.73	89.91	88.76	91.09	90.45	89.35	91.54
Malta	96	95.6	96.37	96.45	96.01	96.84	96.46	96.09	96.81	96.44	96.11	96.79
Netherlands	95.84	95.3	96.31	95.94	95.41	96.39	96.09	95.64	96.49	95.82	95.36	96.3
Austria	95.13	94.35	95.73	95.32	94.65	95.89	95.22	94.56	95.82	94.68	93.95	95.37
Poland	91.47	90.44	92.35	92.18	91.28	92.96	92.21	91.28	93.06	92.4	91.44	93.17
Portugal	91.59	90.76	92.47	92.23	91.22	93.03	92.27	91.39	93.11	91.93	91.03	92.81
Slovenia	91.98	91.03	92.81	92.34	91.42	93.23	92.29	91.35	93.12	92.89	92.08	93.69
Slovakia	90.45	89.38	91.52	90.59	89.48	91.59	90.77	89.62	91.82	91.36	90.34	92.39
Finland	94.11	93.32	94.99	94.06	93.21	94.84	94.9	94.23	95.5	94.91	94.26	95.46
Sweden	95.73	94.98	96.28	96.01	95.42	96.46	96.22	95.65	96.71	96.21	95.64	96.65
UK	95.48	94.86	96.01	95.67	95.11	96.26	96.13	95.57	96.59	96.18	95.61	96.66
Iceland	95.38	94.6	96.13	96.08	95.42	96.7	96.51	96.03	97	96.22	95.55	96.78
Norway	94.99	94.29	95.57	95.15	94.52	95.75	95.54	94.88	96.08	95.68	95.14	96.21

Table 3 (cont.): Heal index with bootstrap based confidence intervals ($\gamma = 0.1$)

Country	2009	2009 (5%)	2009 (95%)	2010	2010 (5%)	2010 (95%)	2011	2011 (5%)	2011 (95%)	2012	2012 (5%)	2012 (95%)
EU 27	94.44	93.56	95.09	94.56	93.83	95.2	94.45	93.77	95.08	94.4	93.57	95.03
Belgium	94.91	94.18	95.5	94.96	94.27	95.52	94.57	93.84	95.32	95.21	94.51	95.8
Czech Rep	93.5	92.72	94.28	93.47	92.68	94.23	93.19	92.36	93.95	93.2	92.4	93.93
Denmark	94.41	93.64	95.2	94.36	93.58	95.1	94.27	93.49	95.02	94.43	93.68	95.11
Germany	94.5	93.87	95.07	94.57	93.95	95.11	94.37	93.76	94.98	94.42	93.75	95.03
Estonia	93.4	92.81	94.04	93	92.25	93.64	92.51	91.72	93.23	92.47	91.7	93.28
Ireland	97.14	96.78	97.48	97.1	96.59	97.53	97.25	96.83	97.57	97.05	96.62	97.44
Greece	94.85	93.95	95.72	95.09	94.22	95.84	95.33	94.56	96.06	94.97	94.17	95.7
Spain	94.61	93.89	95.26	95.07	94.35	95.65	95.26	94.5	95.93	95.3	94.67	95.94
France	95.13	94.51	95.63	94.77	94.12	95.31	94.9	94.33	95.43	95.19	94.62	95.71
Italy	93.61	92.75	94.33	94.11	93.44	94.73	93.31	92.57	94.11	93.4	92.74	94.2
Cyprus	95.16	94.43	95.88	95.44	94.62	96.1	95.03	94.14	95.79	95.92	95.23	96.52
Latvia	91.93	90.98	92.64	91.51	90.55	92.38	91.31	90.42	92.19	91.67	90.67	92.46
Lithuania	91.91	91.02	92.7	91.98	91.04	92.69	90.66	89.69	91.6	90.75	89.77	91.65
Luxembourg	95.41	94.76	95.97	95.49	94.81	96.08	95.15	94.56	95.68	95.1	94.46	95.76
Hungary	91.21	90.21	92.3	91.29	90.27	92.22	91.62	90.62	92.63	91.8	90.83	92.64
Malta	95.9	95.55	96.24	95.75	95.29	96.11	96.07	95.67	96.47	95.98	95.61	96.34
Netherlands	96.06	95.61	96.46	96.3	95.84	96.68	95.7	95.17	96.14	95.94	95.41	96.38
Austria	94.54	93.83	95.27	94.6	93.83	95.33	94.65	93.97	95.3	94.42	93.62	95.18
Poland	92.34	91.47	93.11	92.66	91.75	93.42	93.13	92.36	93.89	93.07	92.27	93.88
Portugal	91.49	90.52	92.47	91.99	91.01	92.8	91.88	90.93	92.8	91.94	91.11	92.79
Slovenia	92.78	91.94	93.63	92.87	91.97	93.76	92.83	91.93	93.66	93.2	92.33	94.06
Slovakia	92.36	91.48	93.24	93	92.21	93.86	92.86	91.96	93.69	93.61	92.74	94.36
Finland	94.99	94.39	95.52	95.13	94.58	95.68	95.17	94.57	95.73	95.17	94.66	95.63
Sweden	96.21	95.63	96.68	96.37	95.83	96.86	96.35	95.75	96.84	96.14	95.56	96.67
UK	96.18	95.61	96.7	96.09	95.39	96.57	96.09	95.53	96.59	95.31	94.55	96.03
Iceland	96.48	95.9	97	95.79	95.15	96.43	95.78	95.15	96.42	95.73	95.1	96.35
Norway	95.69	95.14	96.18	95.77	95.17	96.26	95.26	94.67	95.82	95.99	95.43	96.48

Table 4a: Classifying countries according to the value of the index HEAL with respect to that of the EU as a whole in 2005, when $\gamma = 0.5$

HEAL index significantly smaller than that of the EU	HEAL index not significantly different from that of the EU	HEAL index significantly higher than that of the EU
Czech Republic	Spain	Austria
Germany		Belgium
Estonia		Cyprus
Hungary		Denmark
Italy		Finland
Latvia		France
Lithuania		Greece
Poland		Iceland
Portugal		Ireland
Slovenia		Luxembourg
Slovakia		Malta
		Netherlands
		Norway
		Spain
		Sweden
		United Kingdom

Table 4b: Classifying countries according to the value of the index HEAL with respect to that of the EU as a whole in 2012, when $\gamma = 0.5$

HEAL index significantly smaller than that of the EU	HEAL index not significantly different from that of the EU	HEAL index significantly higher than that of the EU
Czech Republic	Finland	Austria
Germany	France	Belgium
Estonia		Cyprus
Hungary		Denmark
Italy		Greece
Latvia		Iceland
Lithuania		Ireland
Poland		Luxembourg
Portugal		Malta
Slovenia		Netherlands
Slovakia		Norway
		Spain
		Sweden
		United Kingdom

Table 5a: Classifying countries according to the value of the index HEAL with respect to that of the EU as a whole in 2005, when $\gamma = 1$

HEAL index significantly smaller than that of the EU	HEAL index not significantly different from that of the EU	HEAL index significantly higher than that of the EU
Czech Republic	Spain	Austria
Germany		Belgium
Estonia		Cyprus
Hungary		Denmark
Italy		Finland
Latvia		France
Lithuania		Greece
Poland		Iceland
Portugal		Ireland
Slovenia		Luxembourg
Slovakia		Malta
		Netherlands
		Norway
		Sweden
		United Kingdom

Table 5b: Classifying countries according to the value of the index HEAL with respect to that of the EU as a whole in 2012, when $\gamma = 1$

HEAL index significantly smaller than that of the EU	HEAL index not significantly different from that of the EU	HEAL index significantly higher than that of the EU
Czech Republic	France	Austria
Germany		Belgium
Estonia		Cyprus
Finland		Denmark
Hungary		Greece
Italy		Iceland
Latvia		Ireland
Lithuania		Luxembourg
Poland		Malta
Portugal		Netherlands
Slovenia		Norway
Slovakia		Spain
		Sweden
		United Kingdom

Table 6a: Classifying countries according to the value of the index HEAL with respect to that of the EU as a whole in 2005, when $\gamma = 0.1$

HEAL index significantly smaller than that of the EU	HEAL index not significantly different from that of the EU	HEAL index significantly higher than that of the EU
Czech Republic	Finland	Austria
Estonia	France	Belgium
Hungary	Germany	Cyprus
Latvia	Italy	Denmark
Lithuania	Spain	Greece
Poland		Iceland
Portugal		Ireland
Slovenia		Luxembourg
Slovakia		Malta
		Netherlands
		Norway
		Sweden
		United Kingdom

Table 6b: Classifying countries according to the value of the index HEAL with respect to that of the EU as a whole in 2012, when $\gamma = 0.1$

HEAL index significantly smaller than that of the EU	HEAL index not significantly different from that of the EU	HEAL index significantly higher than that of the EU
Czech Republic	Austria	Belgium
Estonia	Denmark	Cyprus
Hungary	Germany	Finland
Italy	Greece	France
Latvia	Slovakia	Iceland
Lithuania		Ireland
Poland		Luxembourg
Portugal		Malta
Slovenia		Netherlands
		Norway
		Spain
		Sweden
		United Kingdom