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The Recent Dangers for European Happiness: Is Homeostatic Resilience Sufficient?

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Abstract

In the literature on life satisfaction the author came across the hypothesis that happiness oscillates around a set point given by nurture and nature. This assumption implicitly supposes a homeostatic mechanism, which implies resilience against unhappiness. The present paper aims at the exploration and quantitative description of this resilience at the national level, which may be challenged by military conflicts, pandemics, energy crises, etc. In particular, the researcher would like to know, for which European countries the postulated resilience really exists, where the related national set points are, and whether there are limits of unhappiness below which the homeostatic set points cannot be reached anymore. In order to tackle these research questions, country-specific time series of annual happiness between 2007 and 2019 are analyzed by linear and quadratic regressions, where the current national happiness is the independent and the related following level of happiness the dependent variable. By analyzing the resulting regression equations, it is possible to identify and analyze its mathematical fixed points. Depending on whether they are stable or not, they are either homeostatic set points (equilibria) or critical limits, where homeostasis is destroyed. The present empirical analysis reveals that more than 50% of the analyzed European countries have no homeostasis of happiness. Consequently, these countries are psychologically vulnerable with regard to depressing developments like energy crises or pandemics. The remaining cases do often not display the classical form of homeostasis: they have either a shifting set point or only a narrow range, within which the homeostasis of happiness is maintained. Thus, there are only a few European countries with unlimited resilience against unhappiness and a set point that is stable over time.

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Introduction and Overview

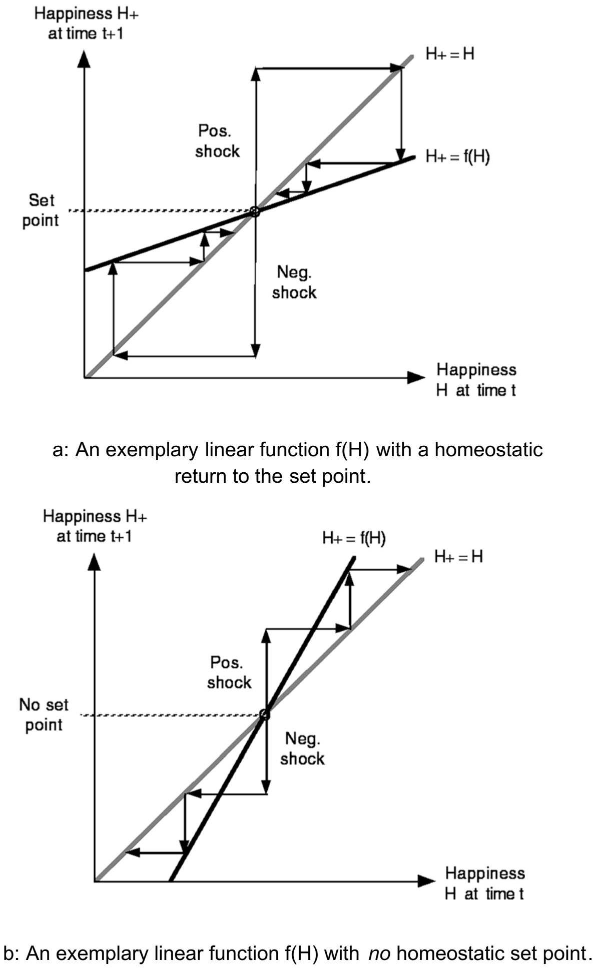
Personal happiness is permanently challenged by unexpected events beyond our own control: death of a family member, birth of a child, loss of job, or a promotion at the workplace are just a few examples related to the ups and downs of individual happiness. Similarly, the happiness of whole societies may also be affected by unforeseeable developments. The EU countries e.g. were recently exposed to Covid-19, the Ukrainian war, energy shortages, inflation, etc. The question is, whether these developments have a lasting negative effect on the collective happiness of the Europeans. The existing literature, mainly focused on *individuals*, is rather ambiguous with regard to the long-term effects of happiness shocks.[1] Cummins postulates that there is a *homeostatic mechanism,* which maintains happiness at the level of a so-called *set point* (see Cummins et al., 2012; Cummins, 2013). Veenhoven (2014), Headey et al. (2014), and Veenhoven and Kegel (2022) doubt about the temporal stability of this set point, arguing that empirical studies show a secular trend towards increased collective happiness. The critique of Easterlin (2003) is even more radical: he argues that the mentioned homeostatic stability of happiness varies with the concerned life-domain. According to him, it exists mainly for financial matters and less for non-pecuniary domains like e.g. health and family life.

In view of the controversial theoretical discussion and the lack of empirical evidence with regard to the homeostasis of collective happiness of *whole societies,* the present article tries to find out in which European countries there is a homeostatic mechanism at work that makes them resilient against unhappiness.[2] For this purpose, country-specific time series of annual happiness between 2007 and 2019 are analyzed by linear and quadratic regressions, where the current national happiness is the independent and the related following level of happiness the dependent variable. By analyzing the resulting regression equations it is possible to identify and analyze its mathematical *fixed points.* If at least one of them is stable, there exists a *homeostatic set point* and the regression coefficients can be used in order to calculate the *strength* of the equilibrating mechanism, which brings the country back to this set point. If there is no stable equilibrium at all, the country is probably not resilient against external shocks of happiness. Furthermore, unstable fixed points can be used in order to identify the *limits of resilience,* below which the homeostatic self-stabilization does not work anymore.

[1] By a positive or negative *happiness shock* we understand in this article a rapid and externally induced positive or negative change of happiness.

[2] Following Bröckling (2017: paragraph 2) *homeostasis* and *resilience* are in this article used as synonyms.

Fig. 1 **a** An exemplary linear function f(H) with a homeostatic return to the set point. Legend: $H_+ = f(H) = a + b * H$, where $b < 1$. **b** An exemplary linear function f(H) with *no* homeostatic set point. Legend: $H_+ = f(H) = a + b * H$, where $b > 1$



Methodological Considerations

Analyses Based on *Linear* Regression Functions

The simplest regression function for identifying homeostatic self-stabilization is the *linear* equation

$$H_+ = f(H) = a + b * H \tag{1}$$

where H is the current and H_+ the future happiness and a and b are coefficients, which have to be estimated from observational data. The intersection of the lines $H_+ = H$ and $H_+ = f(H)$ (see Fig. 1a, b) defines the mathematical fixed point where the equality $H = f(H)$ holds. If $b < 1$, the fixed point is generally a *stable* equilibrium (see Fig. 1a) and corresponds to the *homeostatic set point* of happiness. Any deviance from this set point by a positive or negative shock triggers a stepwise return to this equilibrium, as the dynamics of Fig. 1a show. Thus, in Fig. 1a there is *unlimited resilience*[3] against unhappiness. In Fig. 1b with $b > 1$ this is obviously not the case, as the intersection of the lines $H_+ = H$ and $H_+ = f(H)$ is an *unstable* equilibrium: any disturbance in the form of a small positive or negative shock drives happiness away from this point.

It is important to note that happiness shocks are generally *at random* (white noise) and *not correlated* with the level of happiness. To the contrary, homeostatic correction is *systematic:* the farther away from the set point the *stronger* the compensatory change of happiness (see Fig. 1a, b). This is crucial for the statistical separation of the two processes: regression coefficients are mainly influenced by the homeostatic correction and less by positive or negative happiness shocks.

Analyses Based on *Quadratic* Regression Functions

A more complex regression function for identifying homeostatic self-stabilization is the quadratic polynomial

$$H_+ = f(H) = a + b * H + c * H^2 \tag{2}$$

where H is again the current and H_+ the future happiness and a, b, and c are coefficients, which have to be estimated from observational data. For Eq. (2) there are generally two intersections of the lines $H_+ = H$ and $H_+ = f(H)$ (see Fig. 2a, b), which are mathematical fixed points with varying forms of (in)stability. In Fig. 2a where the quadratic coefficient $c < 0$, only the *upper fixed point* is stable and consequently defines a homeostatic set point. However, in this case homeostasis is not unlimited: the second, *lower fixed point* is an unstable equilibrium. Below this critical lower limit, the homeostatic mechanism does not work anymore and consequently there is only *limited* resilience.

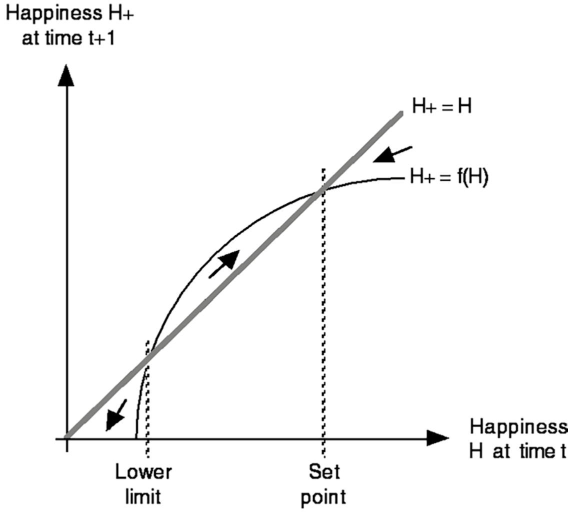
If $c > 0$ like in Fig. 2b, the homeostatic set point corresponds to the first, lower fixed point. Thus, there is no lower limit where the buffering of *negative* shocks of happiness fails. There is however an *upper* limit for the functioning of homeostasis, which is represented by the second, upper fixed point of Fig. 2b. Since we are in this paper mainly interested in *negative* shocks of happiness, this *unstable* equilibrium is not considered anymore.

Synthesis of the Two Types of Analysis

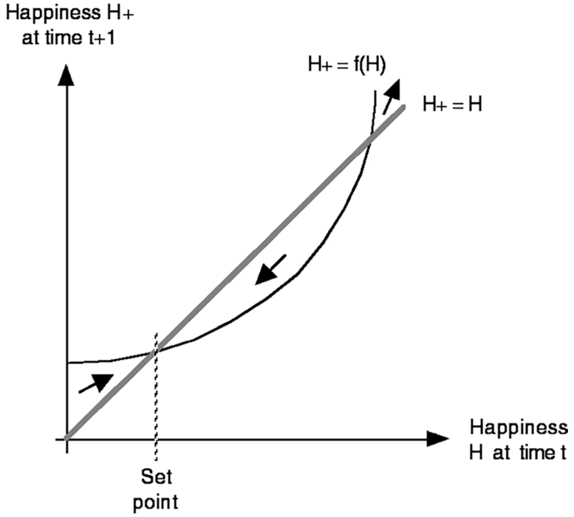
In principle it is possible to use for the analysis of homeostatic self-stabilization also higher order polynomials of the degree three and more. This opens the possibility to find other set points, which stop the race to the bottom or the top of happiness that implicitly exists in Fig. 2a and b. In view of the limited length of the available time

[3] *Unlimited* resilience does *not* mean the absence of any vulnerability. It is just the opposite of *limited* resilience, which is discussed in the next Sect. "Analyses based on quadratic regression functions".

Fig. 2 **a** An exemplary quadratic function f(H) with $c < 0$. Legend: $H_+ = f(H) = a + b * H + c * H^2$, where $c < 0$. **b** An exemplary quadratic function f(H) with $c > 0$. Legend: $H_+ = f(H) = a + b * H + c * H^2$, where $c > 0$



a: An exemplary quadratic function f(H) with c < 0.



b: An exemplary quadratic function f(H) with c > 0.

series from 2007 to 2019 and the related risk of overfitting the scarce data, we limit the analyses to the previously discussed linear and quadratic Eqs. (1) and (2). The one that yields for a given country the better statistical fit in terms of the *adjusted r-square* is used for further interpretation. If in spite of sufficient variation of H, none of the equation gives a significant adjusted r-square, we assume that for the analyzed country there is *no homeostasis* of happiness. Similarly, also the *absence* of an intersection between the lines $H_+ = H$ and $H_+ = f(H)$ suggests the absence of a homeostatic mechanism with an associated set point.

Returns from the Analyses

The most important return from the previous analyses is the distinction between countries *with* homeostasis of happiness (e.g. Figure 1a) and *without* this property (e.g. Figure 1b). If there is homeostatic resilience, the set point can be time-invariant or *changing* over time. It is assumed to be changing if the respective intersection between of $H_+ = H$ and $H_+ = f(H)$ deviates from the mean happiness of a country by more than 2 standard errors of this mean value. Thus there are cases where there is an *old* set point (= mean observed happiness) and a *new* one (= intersection of $H_+ = H$ and $H_+ = f(H)$). Furthermore, the empirical analyses allow to distinguish between *unlimited* homeostasis (e.g. Figure 1a) and homeostasis with a *lower limit* (e.g. Figure 2a), below which the homeostatic mechanism fails. The distance between this lower limit and the (old or new) set point is called the *critical distance*. Finally, the empirical analyses allow to determine the strength of resilience that is the homeostatic correction of an infinitesimal deviation from the set point $f(H) = H$. Hence, the *strength of resilience* is equal to the first derivative

$$d(H - f(H))/dH = dH/dH - df(H)/dH = 1 - df(H)/dH \quad (3)$$

of the difference between the curves $H_+ = H$ and $H_+ = f(H)$ at the set point $f(H) = H$.

In sum, based on the different types of homeostatic processes, there are four mutually exclusive categories of resilience against unhappiness:

Category 0: *No resilience,* due to missing intersections between the curves $H_+ = H$ and $H_+ = f(H)$ or a statistically insignificant auto-regression f(H). The latter may however also be the result of the absence of negative or positive shocks of H, in spite of functioning resilience.[4]

Category 1: *Limited resilience.* As compared to category 0 there is a homeostatic mechanism. However, there is also a lower limit, below which this mechanism fails.

Category 2: *Unlimited resilience,* with a *changing set point.* In comparison with category 1, there is no lower limit for the functioning of homeostasis. However, the position of the set point changes over time such that the respective intersection between $H_+ = H$ and $H_+ = f(H)$ deviates from the mean happiness of a country by more than 2 standard errors[5] of this mean value.

Category 3: *Unlimited resilience,* with a *stable set point.* As compared to category 2, the position of the set point does *not* deviate by more than 2 standard

[4] In the empirical part of this article we are assuming that there was sufficient variation of happiness in order to exclude this possibility: among others, at the beginning of the analysed period there were the economic sub-prime and debt crises, which entailed in many countries harsh austerity measures.

[5] For a z-distributed mean value the 95% confidence interval is approximately the mean ± 2 standard errors.

errors from the mean happiness of a country. Category 3 is an operationalization of the classical definition of homeostasis (Marks, 2018: chap. 2).

Empirical Analyses

Data Source and Method

The empirical analyses of the present Sect. "Empirical analyses" are based on annual figures about national happiness on a 0 to 10 scale, which are published in the World Database of Happiness (Veenhoven, 2020) for the years between 2007 and 2019.[6] The data were calculated by the editors of the World Database of Happiness by means of satisfaction-related interview questions in the Gallup World Polls. For technical details see Veenhoven and Fraquet (2021).

The data processing was performed with the module *Regression – Curve Estimation* of SPSS-25. The current satisfaction (happiness H) was used to explain the satisfaction (happiness H_+) one year later, first on the basis of the linear hypothesis of Eq. (1) and then on the basis of the quadratic hypothesis of Eq. (2). The equation with the better r-square was subsequently used for analysing the homeostatic process. As explained earlier in Sect. "Analyses based on linear regression functions", this was possible, because homeostatic correction follows *systematic* patterns, whereas the confounding external shocks of happiness are *at random.*

The Example of the UK

For illustrative purposes, this section explores the existence and the nature of the homeostasis of happiness in the UK. The data used for this analysis are given in Fig. 3 and circle around a set point represented by a dotted line, which is determined in Fig. 4. As expected for homeostatic resilience, *nearly half* of the observed data points are within the narrow band $H = 7.38 \pm 0.1$ enclosing the set point (see dashed lines of Fig. 3). There are two valleys in 2008 and 2015. The first might be the economic sub-prime crises and the second the constitutional crises of the proposed independence of Scotland. It is followed by a peak of temporary happiness after the Brexit referendum in 2016, probably boosted by (illusionary) hopes for a better future of Britain outside the EU.

The analysis of the British time series in Fig. 3 yields for the linear approach a better adjusted r-sq (0.380) than for the quadratic function, where the corresponding value is only 0.340. Consequently, we continued the analyses with the *linear* equation

$$H_+ = 2.177 + 0.705 * H \tag{4}$$

[6] https://worlddatabaseofhappiness-archive.eur.nl/hap_nat/nat_fp.php?mode=1, *distributional findings* in the *general public*, code of the time series *O-SLW-*-ds-nt-11-a.*

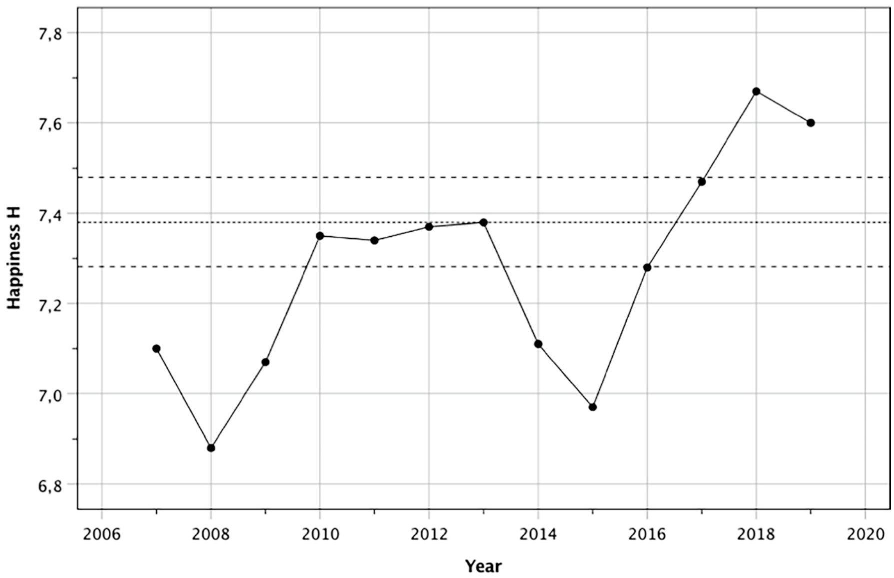


Fig. 3 The observed dynamics of happiness in the UK between 2007 and 2019. Legend: Dotted horizontal line: Set point at H = 7.38, based on Fig. 4. Dashed horizontal lines: Limits 7.38 ± 0.1 of the band enclosing the set point

which is visualised in Fig. 4. The latter diagram shows at H = 7.38 an intersection with the main diagonal that defines the *set point* of an unlimited homeostasis. There is only an insignificant difference to the general mean value H = 7.28, such that the UK belongs to resilience category 3 with a *stable* set point. According to Eq. (3) the strength of resilience is 1–0.705 = 0.295. Consequently, it takes after a happiness shock about 1 / 0.295 = 3.39 years until the original set point is regained.

This exemplary analysis of the UK has been performed for 25 other countries of the EU. The results are given in the appendix Tables 2 and 3 and visualized in the Figs. 5, 6, 7 and 8.

The Categorization of Countries by Resilience

A first overview of the different categories of resilience is given in Fig. 5, which presents a histogram on the basis of the typology at the end of Sect. "Returns from the analyses". The stacks have lengths that correspond to the absolute frequencies of the related countries and point to their names. (Tufte, 1992: 141).

By far the most important type of resilience is *category 0:* according to Fig. 5, 14 out of 26 countries have *no* homeostatic mechanism that protects their happiness against external shocks. All three countries of the next following *category 1* belong to the former Soviet bloc. By definition of category 1 they have only limited

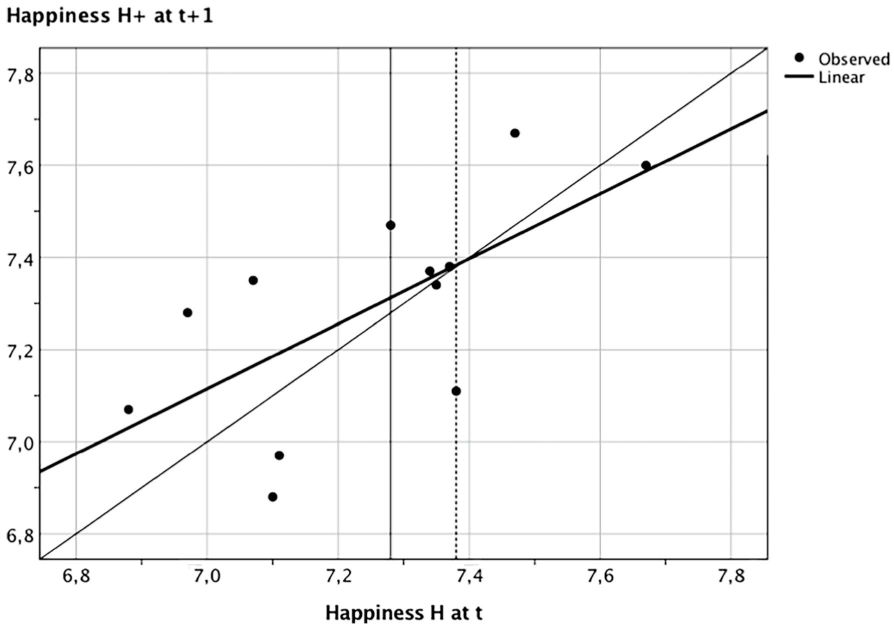


Fig. 4 The empirical relation between happiness H and H_+ of the UK. Legend: Linear: Empirically estimated function $H_+ = 2.177 + 0.705 * H$ (adj-rs = 0.38, p = 0.019). Diagonal line: Zero change $H_+ = H$. Continuous vertical line: Mean value of H, based on all years. Dotted vertical line: Set point at the intersection of $H_+ = f(H)$ and $H_+ = H$

resilience: as long as their happiness remains within the critical distance from the set point, homeostasis will return deviant happiness to this equilibrium point. Otherwise homeostasis is destroyed. This limitation does not exist for the remaining two categories 2 and 3. However, *category 2* has set points that *change over time.* Only a rather small *category 3* corresponds to the classical definition of homeostasis: a set point that does not change over time and an unconditional homeostasis maintaining this set point. This category comprises only five rather heterogeneous countries: UK, Sweden, Portugal, Lithuania, and Cyprus.

The Temporal Stability of the Set Points

As mentioned in the previous Sect. "The categorization of countries by resilience" there are many countries where the set point of homeostasis changes over time. Figure 6 gives an overview of this phenomenon for the different categories of resilience. First of all, it is remarkable that there are *no* countries with *negative* change. This is an adaptation to the increased general happiness that was observed by Veenhoven (2014) and Veenhoven and Kegel (2022). By definition (see Sect. "Returns from the analyses") countries in resilience category 3 did no change their set point at all. Category 2 is with regard to the change of the set point on the average. Figure 6

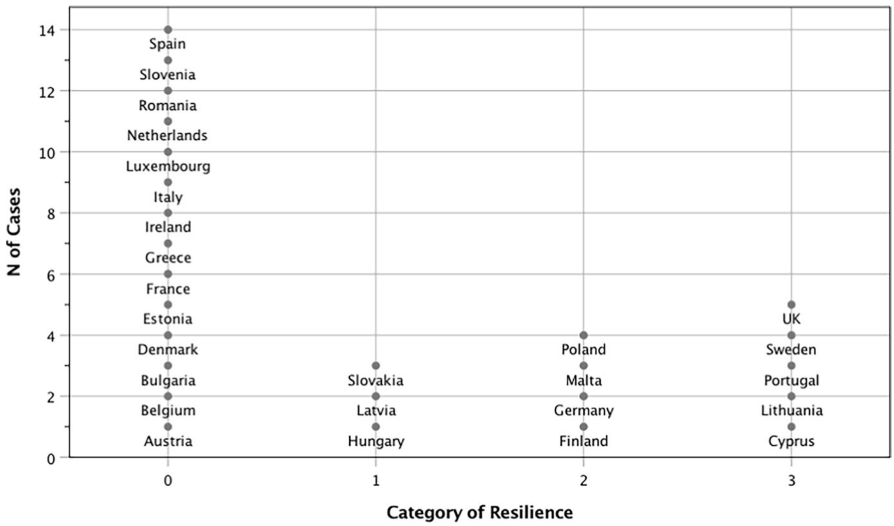


Fig. 5 Categories of resilience: Names of related countries and absolute frequencies. Legend: Category of Resilience: 0 = No resilience; 1 = Limited resilience; 2 = Unlimited resilience with changing set point; 3 = Unlimited resilience with stable set point

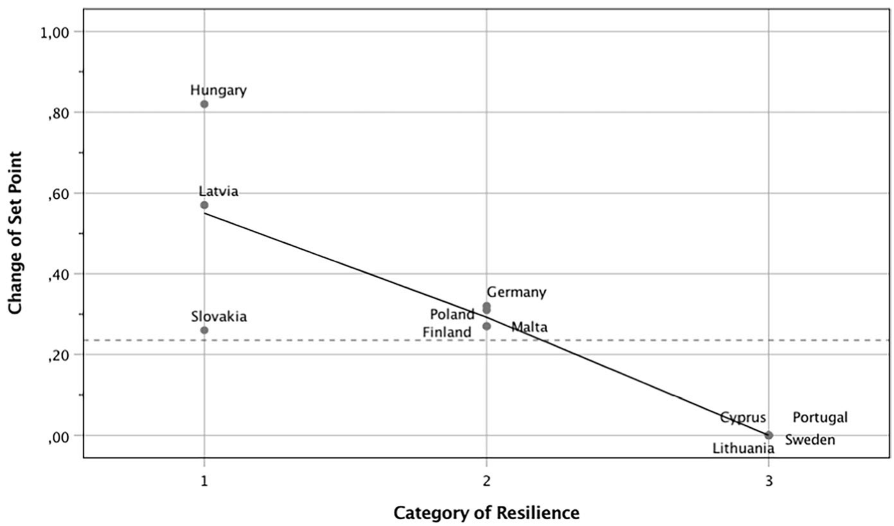


Fig. 6 Change of the set point by type of resilience. Legend: Category of Resilience: 1 = Limited resilience; 2 = Unlimited resilience with changing set point; 3 = Unlimited resilience with stable set point. Grey dotted horizontal line: Global mean

Fig. 7 The resulting current set point by type of resilience. Legend: Category of Resilience: 1 = Limited resilience; 2 = Unlimited resilience with changing set point; 3 = Unlimited resilience with stable set point. Grey dotted horizontal line: Global mean

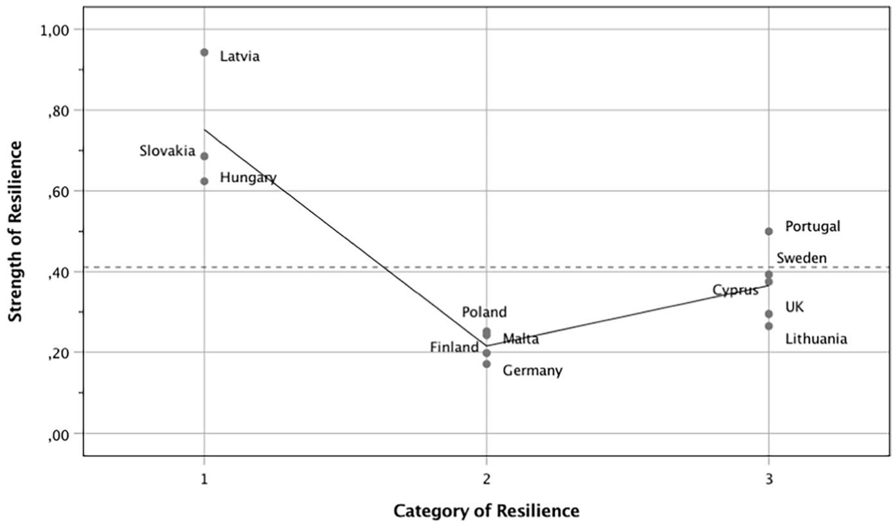


Fig. 8 The strength of different types of resilience. Legend: Category of Resilience: 1 = Limited resilience; 2 = Unlimited resilience with changing set point; 3 = Unlimited resilience with stable set point. Grey dotted horizontal line: Global mean

Table 1 The critical distances to the lower limit of resilience

Country	Category of resilience	Change of set point	Lower limit of resilience	Old critical distance	New critical distance
Hungary	1	0.82	5.45	0.68	1.50
Latvia	1	0.57	5.80	0.43	1.00
Slovakia	1	0.26	6.54	0.32	0.58

Old critical distance = Old set point - Lower limit of resilience, where *Old set point* = Mean happiness. New critical distance = New set point - Lower limit of resilience, where *New set point* = Respective intersection of $H_+ = H$ and $H_+ = f(H)$. Other definitions: See text

shows the highest changes for category 1. This is insofar rational as the countries in this category have only limited resilience and according to Table 1 the critical distance to the *old* set point was rather small. As shown in Table 1, the increase of their set point slightly *reduced the risk* of a breakdown of their homeostasis of happiness.

Figure 7 displays the *current* set points after the previously described changes. Not so surprisingly, category 3 with no changes has the lowest mean of set points, although its dispersion is remarkably high. Category 2, defined by a change of the set point, has the highest mean value. Category 1 is between the mentioned two groups of countries. The mean set point of all groups of countries together is slightly above 7.0, which corresponds to the respective value mentioned by Cummins (2003).

The Strength of the Resilience

The essence of homeostasis is the rapid correction of positive or negative deviations from the set point. This principle holds for all categories of resilience of Fig. 8. On the *average* – as the dotted line of Fig. 8 shows – only ca. 40% (= 0.40) of an (infinitesimal) deviation from the equilibrium is corrected in the next following time-step. Consequently, on the average it takes at least 2 to 3 time-steps until a happiness shock is more or less annihilated.

In category 1, with countries having only *limited* homeostasis, the strength of resilience is much higher than the global average. This level of strength is a supplementary safeguard against the risk of a loss of homeostasis: even after the previously discussed increase of the set-point (see Fig. 6) the *new* critical distance is still rather low (see Table 1). In sharp contrast the countries of category 2 with unlimited homeostasis but a *new* set point have a strength of resilience that is below the global mean. A disequilibrium with regard to the newly established set point represents for category 2 a normal situation that consequently does not mobilize additional forces for adaptation. Thus the strength of their resilience is smaller than in category 3, where the set point does not change and *substantial* deviations from the homeostatic equilibrium are consequently less common.

Summary, Methodological Limitations, and Outlook

The main lesson from the empirical analyses in Sect. "Empirical analyses" is the absence of any homeostatic mechanism for the maintenance of happiness in more than 50% of the analyzed cases. In three other countries belonging to category 1 there is only *limited* homeostasis with a *rather small* critical distance. In spite of their exceptional strength of resilience and the increase of the set point these cases are not really prepared for externally induced downturns of happiness. In sum, homeostasis is not a reliable mechanism, which protects the happiness of the European countries in turbulent times.

For future research there remains the question of the factors insuring the resilience of the remaining countries in categories 2 and 3 (see Fig. 5). Is it a *strong welfare state,* like in the case of Sweden? A strong and efficient welfare state is for poorer people a buffer against economic shocks, guaranteeing their happiness also in times of crisis (Easterlin & Switek, 2014; Ott, 2013). In Mediterranean cultures the structural equivalent of the welfare state is often the *social support by the family* (Leontopoulou, 2013; Moreno, 2006). That might explain the resilience of Portugal, Cyprus, and Malta. Perhaps resilience against unhappiness is also based on high *confidence in others* like in Finland and Sweden (Mackie, 2001: 248 ff.). Due to this confidence, fellow citizens are not considered to make one unhappy by theft, burglary, or other forms of criminality. Finally, as a residual explanation for homeostatic happiness, there may be the *national character,* as proposed by Inkeles (1997: chap. 1). The optimism of some Mediterranean cultures could perhaps fit to this category and explain the resilience of Portugal, Cyprus, and Malta.

Obviously, these explanatory factors could also influence countries, which display in our analyses *no* homeostasis of happiness: Italy and Spain are examples of Mediterranean countries with strong family bonds. Nonetheless they seem to belong to category 0 with no homeostasis. Thus, there are cases, where the theoretically expected homeostasis is inhibited by special factors. One of them might be the *methodological limitations* of the present work. Among others we are assuming that the set point of homeostasis is disturbed by a sufficient number of external shocks, which should be at random and consequently uncorrelated with the level of happiness. The absence of such shocks obviously hinders the identification of an objectively existing homeostatic mechanism. Similarly, the correlation between the deviance from the set point and the amount of the subsequent homeostatic correction can be spoiled if the level of happiness and the related shocks are not independent. Finally, we considered in this work only functional relations between the current and the next following level of happiness that were either linear or quadratic. In future empirical investigations, other mathematical relations like e.g. logistic functions would certainly deserve consideration and might reveal homeostatic processes.

Appendix

Table 2 Data appendix I: The characteristics of homeostasis

Country	Category of resilience	Current set point	Change of set point	Lower limit of resilience	Strength of resilience
Austria	0	–	–	–	–
Belgium	0	–	–	–	–
Bulgaria	0	–	–	–	–
Denmark	0	–	–	–	–
Estonia	0	–	–	–	–
France	0	–	–	–	–
Greece	0	–	–	–	–
Ireland	0	–	–	–	–
Italy	0	–	–	–	–
Luxembourg	0	–	–	–	–
Netherlands	0	–	–	–	–
Romania	0	–	–	–	–
Slovenia	0	–	–	–	–
Spain	0	–	–	–	–
Hungary	1	6.95	0.82	5.45	0.624
Latvia	1	6.80	0.57	5.80	0.943
Slovakia	1	7.12	0.26	6.54	0.686
Finland	2	8.28	0.27	–	0.198
Germany	2	7.65	0.32	–	0.171
Malta	2	7.35	0.27	–	0.243
Poland	2	7.28	0.31	–	0.252
Cyprus	3	6.65	0	–	0.375
Lithuania	3	6.12	0	–	0.265
Portugal	3	5.98	0	–	0.500
Sweden	3	7.85	0	–	0.393
UK	3	7.38	0	–	0.295

Category of resilience: 0 = No resilience; 1 = Limited resilience; 2 = Unlimited resilience with changing set point; 3 = Unlimited resilience with stable set point. Other variables: See text

Table 3 Data appendix II: Estimation of the regression parameters of $H_+ = f(H)$

Country	Category of resilience[a]	Constant a	Lin. coeff. b	Quad. coeff. c	Adjusted r-sq.
Austria	0	6.376	0.183	–	–0.104
	(no stab)	–283.27	74.800	–4.803	0.523*
Belgium	0	11.954	–0.596	–	0.133
	(no sig)	9.724	0.000	–0.040	0.135
Bulgaria	0	0.572	0.918	–	0.900***
	(no cross)	–3.844	2.633	–0.165	0.888***
Denmark	0	6.035	0.264	–	–0.039
	(no sig)	6.035	0.264	0.000	–0.039
Estonia	0	–1.132	1.181	–	0.843***
	(no stab)	–6.294	2.786	–0.124	0.827***
France	0	4.371	0.346	–	0.025
	(no sig)	30.460	–7.675	0.616	–0.061
Greece	0	2.904	0.513	–	0.080
	(no sig)	61.092	–19.499	1.716	0.075
Ireland	0	5.337	0.264	–	–0.064
	(no sig)	6.261	0.000	0.019	–0.061
Italy	0	3.639	0.455	–	0.106
	(no sig)	63.190	–17.342	1.329	0.093
Luxembourg	0	3.187	0.590	–	0.207
	(no sig)	132.46	–33.591	2.258	0.325
Netherlands	0	3.160	0.591	–	0.058
	(no sig)	5.438	0.000	0.038	0.058
Romania	0	0.151	0.994	–	0.896***
	(no cross)	–12.321	4.729	–0.278	0.892***
Slovenia	0	1.214	0.842	–	0.358*
	(no cross)	122.76	–34.159	2.517	0.548*
Spain	0	5.580	0.195	–	–0.039
	(no sig)	10.961	–1.347	0.110	–0.152
Hungary	1	0.165	0.995	–	0.833***
		–15.490	**6.075**	**–0.410**	**0.835*** **
Latvia	1	–0.622	1.108	–	0.925***
		–37.586	**13.004**	**–0.952**	**0.984*** **
Slovakia	1	0.949	0.869	–	0.704**
		–55.345	**17.231**	**–1.188**	**0.710** **
Finland	2	**1.635**	**0.802**	–	**0.571* **
		4.856	0.000	0.050	0.571*
Germany	2	**1.310**	**0.829**	–	**0.700*** **
		10.515	–1.738	0.179	0.671**
Malta	2	**1.781**	**0.757**	–	**0.497* **
		17.921	–3.832	0.325	0.447
Poland	2	**1.830**	**0.748**	–	**0.593** **
		37.763	–9.653	0.752	0.585*

Table 3 (continued)

Country	Category of resilience[a]	Constant a	Lin. coeff. b	Quad. coeff. c	Adjusted r-sq.
Cyprus	3	**2.495**	**0.625**	–	**0.328***
		–24.498	8.787	–0.615	0.272
Lithuania	3	**1.620**	**0.735**	–	**0.461****
		9.928	–2.050	0.232	0.418*
Portugal	3	–0.017	1.021	–	0.603**
		60.702	**–18.803**	**1.614**	**0.669***
Sweden	3	**3.089**	**0.607**	–	**0.290***
		–65.801	18.387	–1.147	0.257
UK	3	**2.177**	**0.705**	–	**0.380***
		37.842	–9.134	0.678	0.340

First line per country: Linear model: $H_+ = a + b^*H$. Second line per country: Quadratic model: $H_+ = a + b^*H + c^*H^2$. Bold model: Model chosen for further analyses due to higher adjusted r-sq. and significance at level $\alpha \leq 5\%$. Category of resilience: 0 = No resilience; 1 = Limited resilience; 2 = Unlimited resilience with changing set point; 3 = Unlimited resilience with stable set point; no cross = Model with higher adj. r-sq. has *no* intersection between $H_+ = H$ and $H_+ = f(H)$; no stab = Model with higher adj. r-sq. has no stable set point; no sig = Model with higher adj. r-sq. is *not* significant at $\alpha = 5\%$. Significance of *Adjusted r-sq.:* ***: ≤ 0.001; **: ≤ 0.01; *: ≤ 0.05; others: not significant

[a]If in the linear model $0.90 < b \leq 1.00$, the coefficient b is considered as being too close to 1 for a reliable crossing of $H_+ = H$ and $H_+ = f(H)$. Consequently, the respective case is in category 0 (no cross)

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