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Fabio Zagonari

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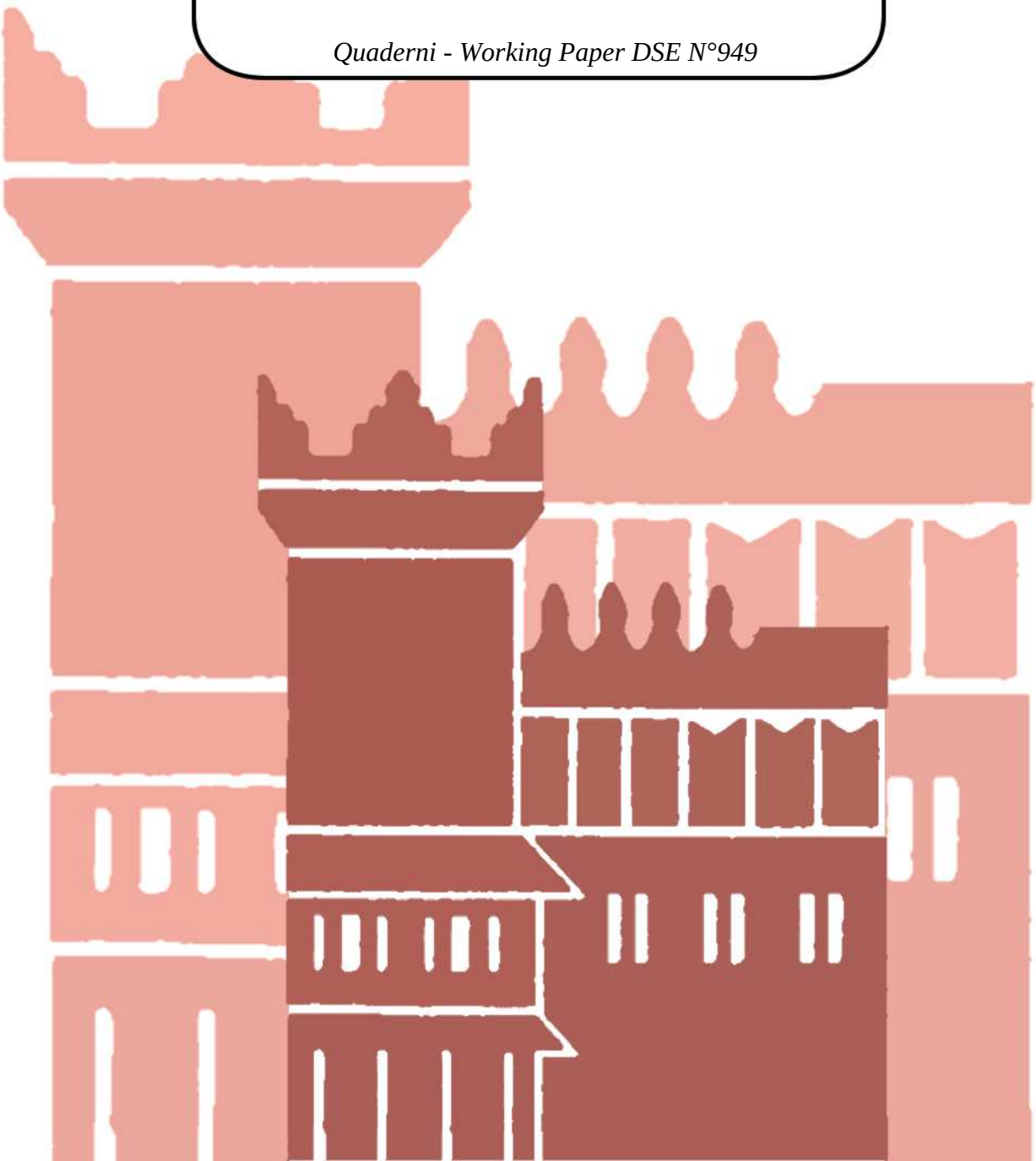

Which attitudes will make us individually and socially happier and healthier? A cross-culture and cross-development analytical model

Fabio Zagonari
Dipartimento di Scienze Economiche, Università di Bologna, via Angherà 22, 47921 Rimini (Italy)
Phone: 0039 0541 434135, Fax: 0039 0541 434120, E-mail: fabio.zagonari@unibo.it

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Abstract

This paper describes a dynamic system for the interrelationships between happiness and health that considers three main attitudes to life: α, β, and γ for Aristotelian, Epicurean, and Stoic, respectively. All variables that have been shown by empirical and theoretical studies to affect individual health and happiness are included (i.e., employment, occupation, education, ethical freedom, equity in achievements). Three main approaches are considered: behavioural and statistical ex-ante, and ex-post behavioural. I develop the model to rank the three attitudes in terms of health for a given happiness level, and consequently, provide insights into which attitude should be adopted by each individual, according to their characteristics: individuals in Protestant and non-Protestant Christian societies should adopt β and γ attitudes, respectively; educated individuals should adopt a γ attitude; and poor individuals should adopt an α attitude. Based on this analysis, I provide insights into which attitude actually is adopted by each society by comparing predicted health and achievement levels with the observed life expectancy at birth and per capita gross domestic product levels in 107 countries, thus providing an empirical test of the analytical model. This analysis revealed a prevalence of β attitudes in Protestant Developed Countries, with larger γ shares in less income-unequal countries; a prevalence of γ attitudes in non-Protestant Christian Developed Countries, with larger β shares in more income-unequal countries; a prevalence of α attitudes in Muslim Less Developed Countries, with larger γ shares in more educated countries; and a prevalence of β attitudes in more educated atheist and Jewish countries.

Keywords

Happiness; health; analytical model; attitudes; ethics; culture; religion.

JEL classification

I1, I3, Z1

1.Introduction

Many empirical studies have shown a positive impact of health on happiness. For example, Binder and Coad (2011) associated health status with quintiles for happiness after controlling for income and education. Peiro (2006) compared health status with satisfaction or happiness after controlling for age, marital status, and employment. Pedersen & Schmidt (2011) examined the effects of the level of and changes in self-reported health on life satisfaction after controlling for the level of and changes in income and labour status. Becchetti & Rossetti (2009) accounted for the effects of health deterioration on frustrated achievement after controlling for the lack of a full-time job, relative income, marital status shocks, and a poorer social life. Yakovlev & Leguizamon (2012) examined the effects of high and middle education levels, income, and health on self-reported happiness after controlling for age, trust, stress, temperature, religion, and rainfall.

A few empirical studies have shown a positive impact of happiness on health. For example, Blanchflower & Oswald (2008) compared blood pressure with happiness across nations. Binder & Coad (2010) found increases in well-being associated with subsequent increases in health, together with increases in income, marriage, and employment, but decreases in well-being associated with increases in income, marriage, and employment. Diener & Chan (2011) associated life satisfaction, the absence of negative emotions, optimism, and the presence of positive emotions with better health and longevity.

In addition, many empirical studies have shown significant impacts of various determining factors on both happiness and health. For example, Kiyani et al. (2011) examined the effect of athletic status on mental health and happiness. Oshio & Kobayashi (2010) examined the effects of regional inequality on happiness and self-rated health after controlling for gender, age, educational attainment, income, occupational status, and political views. Borgonovi (2008) examined the effects of volunteer work on self-reported health and happiness. Andersson (2008) compared self-employed vs. salaried workers in terms of their job and life satisfaction and mental and general health after controlling for physically and mentally stressful jobs. Gatab & Pirhayti (2012) examined the effects of regular group exercise on happiness, physical symptoms, depression, social functioning and general health. Salary & Shaieri (2013) examined the effects of an eccentric personality on psychological dissociation and satisfaction after controlling for social commitment, a positive mood, a feeling of control, and self-consciousness. Haji et al. (2011) examined the effects of life skills training on happiness and psychological health after controlling for emotional regulation, social relationships, and physical situations. Bostani & Saiiari (2011) examined the effects of an athletic life on stress tolerance and self-assertiveness (combined with happiness) and mental health. Maselko & Kubzansky (2006) examined the effects of involvement in religious institutions and activities on psychological distress and self-rated health and happiness after controlling for gender. Schatz et al. (2012) examined the effects of receiving a pension during retirement on health and well-being after controlling for gender. Izquierdo (2005) examined the effects of improved acculturation and permanent settlement on a change in health and well-being for the Matsigenka of the Peruvian Amazon. Easterlin (2009) examined the effects of the transition from socialism to capitalism on material living levels, satisfaction with work, health, and family life.

Note that all of these researchers studied the general population and its health; I have not included other studies on the relationship between happiness and health for specific populations such as students in schools (e.g., Shayan & Gatab, 2012; Yahyaei et al., 2012; Gatab et al., 2011) or patients in hospitals (e.g., Mukuria & Brazier, 2013). Moreover, these studies applied different definitions and measures of both happiness and health. In the present study, I will not espouse any particular definition of happiness and health nor will I specify any measure of these factors to keep the analysis as general as possible, and I will not account for other studies on the impacts of specific illnesses on happiness (e.g., Binder and Coad, 2013). Finally, all of these researchers studied both happiness and health, so I have disregarded studies that focused only on determinants of one of the two parameters.

However, my literature review found no analytical studies that described the dynamic interactions between happiness and health. Thus, the first *purpose* of this paper was to develop a dynamic system of equations that could account for all individual determinants that were investigated by the abovementioned empirical studies, with the goal being to characterise alternative long-run equilibria for happiness and health based on different attitudes to life. I selected very general assumptions; I disregarded all contextual determinants (e.g., temperature or rainfall). A by-product of this first purpose will be a ranking of attitudes in terms of individual health and achievements for a given level of happiness as a function of individual characteristics.

In particular, I will tell the following story:

- Each individual receives a feasible stock (*fs*) of opportunities from their family, which translates into economic and physical flows of countable opportunities per period. These flows are affected by personal uncertainty (*u*) and ethical freedom (*fr*).
- Each individual is aware of the relationship between happiness (*ha*) and health (*he*). In particular, current health at time t (*he*[*t*]) affects current happiness (*ha*[*t*]), whereas past happiness (*ha*[*t–1*] and *ha*[*t–2*]) affects current health, with a persistent effect on the personal mood. If people are not aware of this relationship, they could choose paths to happiness and health that instead lead to despair desperation or illness.
- Each individual is aware of the physical and psychological stress (δ) that arises from improving their economic or social status and from pursuing higher and higher achievements (*y*); however, this stress might be negligible for some people. Needless to say, δ refers to perceived inner sensations rather than revealed sentiments, and simulating feelings can actually increase the psychological stress.
- Each individual seeks a long-run equilibrium for happiness and health (*ha** and *he**). In particular, if their physical stress is negligible (δ=0), they will accept oscillations in their achievements, happiness, and health if this leads towards a long-run equilibrium; if their physical stress is positive (δ>0), they will take actions to move towards their achievement, happiness, and health equilibrium. If people have an incorrect perception of this stress, they may choose paths to achievement, happiness, and health paths that instead lead to despair desperation or illness.
- Each individual can choose from among three alternative attitudes towards life: α=seeking relative improvements in terms of their opportunities, which represents an Aristotelian attitude; β=seeking relative increases in achievements per period, which represents an Epicurean attitude; and γ=seeking relative improvements in terms of the reference group's average achievements, which represents a Stoic attitude. These choices are made according to the expected values of achievements, happiness, and health or according to the individual's degree of optimism or pessimism for a given educational level, relative economic and social status, ethical freedom, occupation type, and employment status. These approaches could lead to different choices.

Note that this analytical approach is both individually cross-cultural, since it depicts alternative attitudes (α, β, γ), and socially cross-cultural, since it considers different ethical freedom . Moreover, the model accounts for both *ex-ante* and *ex-post* perspectives, as it calculates achievement, happiness, and health at given uncertainty values (i.e., behavioural *ex-ante* such as "I am optimistic" or behavioural *ex-post*, such as "an unsolvable problem happened to me"), and the expected achievement, happiness, and calculates health over all values of uncertainty (i.e., statistical *ex-ante* such as "I am neither optimistic nor pessimistic, and any positive or negative events could happen to me"). Finally, the approach is both individually cross-developmental, as it depicts alternative education and safety occupation levels, and socially cross-developmental; indeed, different income distributions are considered.

The second purpose of this paper was to apply the analytical model to determine how well it can explain the observed differences in health in different countries or cultures in terms of the different ethical freedom and attitudes prevailing in those countries or cultures. Although these characteristics can be debated, they nonetheless represent plausible starting assumptions for this

analysis. A by-product of this second purpose will be that it provides an empirical test of the analytical model.

2.The analytical model

The purpose of this section is to develop mathematical formulas that represent the dynamic interrelationship between happiness $ha[t]$ and health $he[t]$ at time t based on factors that have been described in the empirical literature. I will refer to the following variables:

- an individual's achievements (y) and their reference group's average achievement, ay; one could think of individual income and the income distribution as proxies for y and ay, respectively.
- the feasible set fs for opportunities, which in turns depends on the individual flows of income and health that come from the original family (fy and fh, respectively), on personal uncertainty ($u[t]$), and on ethical freedom (fr); one could use family income and health as proxies for fy and fh by solving for fr, whereas one could refer to $u[t]$ as negatively or positively affecting the feasible set as a proxy for monetary loss or gain (a change in fy), injury or recovery (a change in fh), or any other uncontrolled factors that could reduce or increase the feasible set.
- the employment status (em), the educational level (ed), and the occupation type (oc); one could think of a full-time job, the number of school years, and an unsafe or dangerous job as proxies for em, ed, and oc, respectively.

Note that Powdthavee & van den Berg (2011) highlighted the problems in estimating health in monetary terms using a new well-being valuation method, whereas Lelkes (2006) showed that an individual's self-reported life satisfaction could be used as a proxy for utility, whereas commonly used measures of well-being can bias a person's evaluation of their level of satisfaction. Although the model is sufficiently general to be consistent with many definitions and measures, self-perceived happiness and health seem to be the most appropriate for analyses at an individual level. In this analysis, I will represent the dynamic interrelationship between happiness and health using two dynamic equations, in which normalisations are boldfaced (e.g., **fy**, **fh**), and parameters are italicized (e.g., *ay*, *ed*, *fr, me, oc, em*):

$$ha[t]=\alpha\{(y[t]-fs)/fs\}+\beta\{(y[t]-y[t-1])/y[t-1]\}+\gamma\{(y[t]-ay)/ay\}+he[t]+em \quad (1)$$

$$he[t]=fs+\sum_{t-me}^{t-1} ha[t]-\delta(y[t]-y[t-1])+y[t]+ed+oc \quad (2)$$

where:

$$\alpha=1 \text{ or } \beta=1 \text{ or } \gamma=1$$
$$fs=fs[t]-fs[t-1]=\mathbf{fy}+\mathbf{fh}-u[t]+fr$$
$$\delta\geq 0,\ oc\leq 0,\ em\geq 0,\ me\geq 1$$
$$u[t] \text{ in } [-u^*,+u^*]$$

where me is the number of past periods which affect the current the personal mood and u^* is the long-run equilibrium uncertainty.

Note that all coefficients are set at 1. One could introduce alternative values based on specific econometric analyses, although the qualitative insights would not be altered by this choice. Moreover, fs represents the change in the feasible set on which one can rely in the short run; a positive fs implies that $y[t]$ can be 0 or negative. Finally, one could introduce $-u[t]$ or $+ed$ in $ha[t]$, although these are qualitatively irrelevant at equilibrium, but would double the quantitative effects on $ha[t]$, since these variables linearly affect fs and he[t], respectively

Equations (1) and (2) provide a theoretical framework that justifies the many relationships observed between the many variables involved in a linear way. The goals are to obtain an analytical solution, permit the use of graphs to reveal insights, achieve an immediate empirical validation, and enable future econometric analyses. Alternatively, one could think of equations (1) and (2) as a linearized and discretised globally stable solution for the following inter-temporal optimisation problem:

Choose $y[t]$ and then $\alpha=1$ or $\beta=1$ or $\gamma=1$ to maximise
$\int_0^\infty ha(y[t], y[t-1], u[t], fr, he[t], em)\, e^{\varepsilon t}\, dt$
s.t. $(\partial he/\partial t)\{ha[t-1], y[t], y[t-1], ed, oc\}=0$

where $\varepsilon=0$ implies a co-state variable fixed at ∞ and $\varepsilon=\infty$ implies a co-state variable fixed at 0, whenever the impact of *he* on *ha* is linear. However, this would require the implausible assumptions of complete information and inter-temporal rationality.

Note that many of the parameters and coefficients that I have applied have been estimated in the literature. For example, Golden & Wiens-Tuers (2006) showed that mandatory and harmful overtime work ($\delta>0$) has a negative impact on self-reported subjective happiness and psychological health after controlling for income. Verme (2009) shows that freedom of choice predicts life satisfaction better than any other known factor, including health, employment, income, marriage, or religion, both across and within countries. Graham et al. (2004) showed that self-esteem and optimism improved both wealth and health after controlling for income level, health status, and some other factors. Carlsson et al. (2014) showed an intergenerational transmission of happiness after controlling for the income, gender, education, health status, marital status, and well-being of the parents. Gardner & Oswald (2007) estimated a positive impact of income on psychological health. Van Campen & Cardol (2009) showed that physical disabilities reduce happiness through participation in paid and volunteer work after controlling for education and age. Brown & Tierney (2009) showed a strong negative relationship between religious participation and subjective well-being after controlling for demographics, health and disabilities, living arrangements, wealth, and income. Guney (2011) showed that individuals could be helped to discover strengths such as optimism, hope, humour, and resilience.

In addition, achievements are more likely to be closer to the *fs* border for β and γ types of attitude than for the α type. By stressing that ethical freedom and its social implications (i.e., *fr*) are distinguished from personal attitudes that lack social implications (i.e., α, β, and γ attitudes), in this analysis, I will refer to Zagonari (2009) that predicted a negative *fr* for members of Protestant religions and a positive *fr* for members of non-Protestant Christian, Jewish, Muslim, Buddhist, and Hindu religions and for atheists; in addition, I have associated the α, β, and γ attitudes with the Aristotelian, Epicurean, and Stoic attitudes to life, respectively. Indeed, α evokes the flourishing of personal potentials (i.e., a percentage increase of one's feasible set), β is attached to an ongoing percentage increase in achievements (i.e., meeting one's current goals or desires), and γ evokes the awareness of a common destiny (i.e., a percentage increase over the average conditions of other individuals within one's group).

3. Analytical results

The previous section provided mathematical formulas that represent the dynamic interrelationship between happiness ($ha[t]$) and health ($he[t]$) at time t. In this section, I will characterise the equilibrium values for happiness (ha^*) and health (he^*). I will assume that $ha[t]=ha^*$ for each t and, consequently, that $\sum_{t-me}^{t-1} ha[t]=me\times ha^*$. Note that the case in which $\delta>0$ and $y[t]-y[t-1]\neq 0$ can be rejected as implausible; if an individual suffers from a change in achievements ($\delta>0$), they will seek to avoid changes, at least at each time t. Next, y is not constrained, since one's income can increase to any extent, and one could also sell their economic or health flows.

3.1. The equilibrium if $\delta=0$, $y[t]-y[t-1]\neq 0$, and $\beta=1$

Let us solve equation (2) for $y[t]$ and for $y[t-1]$ in terms of he^*:

$$y[t]= -ed-fh-fy+he^*-me\ ha-fr-oc+u[t]$$
$$y[t-1]= -ed-fh-fy+he^*-me\ ha-fr-oc+u[t-1]$$

Let us use these equations in equation (1) for a given *ha* to obtain the equilibrium u^*:

$$u^*=u[t]=u[t-1] \text{ iff } u^*=ed+em+fh+fy-he^*+me\ ha+oc+fr$$

However, $y[t]=y[t-1]=y^*=0$ at $u=u^*$. Thus, if $\beta=1$, $ha^*=he^*+em$ or $he^*=ha^*-me$, and the equilibrium u^* becomes:

$$u^*=u[t]=u[t-1]=ed+em+fh+fy-ha^*+me\ ha^*+oc+fr$$

whereas $u[t]$ as a function of $u[t-1]$ becomes:

$$u[t]=\{-[ed\ oc+em\ oc+fh\ oc+fy\ oc+oc^2+(-oc+me\ oc)\ ha^*+oc\ fr]/(1-oc)\}+\{u[t-1]/(1-oc)\}$$

Let us check for the stability conditions of $u[t]$ in terms of $u[t-1]$:

$$du[t]/du[t-1]=1/(1-oc)$$
$$u[0]=-[ed\ oc+em\ oc+fh\ oc+fy\ oc+oc^2+ha^*\ (-oc+me\ oc)+oc\ fr]/(1-oc)$$

Thus, u^* is globally stable if $u[t]$ is increasing but at a relatively low rate ($oc<-1$), either with a positive y-axis intercept ($oc>-ed-em-fh-fy+ha-ha\ me-fr$), a negative y-axis intercept ($oc<-ed-em-fh-fy+ha-ha\ me-fr$), or if $u[t]$ is decreasing but at a relatively low rate ($oc>1$), with a positive y-axis intercept ($oc>-ed-em-fh-fy+ha-ha\ me-fr$). Note that he^* does not depend on oc at $u=u^*$.
In other words, if one chooses to have a β attitude, one accepts both changing happiness and health levels by increasing achievements in the case of unlucky events, and vice versa. However, it is implausible to accept infinitely divergent changes in both happiness and health. Thus, this individual will look for a convergent path, and will choose to be a β attitude (a) if they adopt a *behavioural ex-ante* approach, where $u^*>0$ requires them to be optimistic and $u^*<0$ requires them to be pessimistic; (b) if they adopt a *statistical ex-ante* approach, where $u^*=0$; or (c) if they adopt a *behavioural ex-post* approach, where $u^*>0$ requires them to be unlucky and $u^*<0$ requires them to be lucky. Note that a change in psychological status (from optimistic to pessimistic or vice versa) or in contextual events (from lucky to unlucky or vice versa) might require a change in the attitude type to avoid long-run disequilibria.

3.2.The equilibrium if δ>0, $y[t]-y[t-1]=0$, and α=1 or γ=1

By substituting equation (2) into equation (1) and solving for y^*, we obtain:

$$y^*=\frac{ay(fh+fy+fr-u)(\alpha-em-ed-fh-fy+\gamma+ha-ha\times me-fr+u)}{fy\times\gamma+\alpha\times ay+fy\times ay+fh(\gamma+ay)+\gamma\times fr+ay\times fr-(\gamma+ay)u}$$

We can then substitute y^* into equation (2) to obtain $he^*\geq 0$:

$$he^*=ed+fh+fy+ha\times me+oc+fr-u-\frac{ay(fh+fy+fr-u)(-\alpha+em+ed+fh+fy-\gamma-ha+ha\times me+fr-u)}{fy\times\gamma+\alpha\times ay+fy\times ay+fh(\gamma+ay)+\gamma\times fr+ay\times fr-(\gamma+ay)u}$$

where $ha^*=ha$. Note that u is assumed to range from $-u^*$ to $+u^*$, whereas $he^*=ed+fh+fy+ha\ me+oc+fr-u+y^*$ is independent of ay, and y^* is independent of oc.
In other words, if one chooses α or γ attitudes, one rejects changing happiness and health levels by fixing equilibrium achievements according to one's psychological status or contextual events. In particular, this individual will choose an α or γ attitude (a) if they adopt a *behavioural ex-ante* approach, they will choose y^*, he^*, and ha^* with $u>0$ if they are optimistic, or with $u<0$ if they are pessimistic; (b) if they adopt a *statistical ex-ante* approach, they will choose y^*, he^*, and ha^* with

u=0; and (c) if they adopt a *behavioural ex-post* approach, they will choose y^*, he^*, and ha^* with u>0 if they are unlucky, versus u<0 if they are lucky. Note that a change in psychological status (from optimistic to pessimistic or vice versa) or in contextual events (from lucky to unlucky or vice versa) might require a change in the equilibrium achievements rather than a change in the attitude type, although a change in achievements will affect their health in the short-run.

4.Reasoned insights

The previous section characterised the equilibrium values for achievements (y^*), happiness (ha^*), and health (he^*) for the three attitudes (α, β, and γ). In this section, I will apply these equilibrium values to obtain rankings of the three attitudes in terms of y^*, ha^*, and he^* and, consequently, will provide insights into which attitude should be adopted by each individual, according to their characteristics, and by citizens of each country, according to its characteristics.

4.1.At an individual level

In this section, I will present analytical results and graphical insights at an individual level. Let us normalise, without loss of generality, fy=ha^*=1 (i.e., define a unitary measure), as well as fh=1 and em=0 (i.e., the he^* axis is fixed at 1). Table 1 presents the first, second, and cross derivatives of the optimal y^* and he^* with respect to fr, ed, and ay, with the other parameters and variables fixed at a reference case to make all cases comparable. An increase in ethical freedom (∂fr>0) and an increase in education (∂ed>0) would result in the same level of happiness and health, with smaller achievements (∂y^*<0), regardless of attitudes, whereas an increase in the achievements of others (∂ay>0) would require an increase in individual achievements (∂y^*>0) for a γ attitude only, unless the uncertainty is sufficiently small, in which case people may reach the same status through high luck rather than high achievement. In contrast, an increase in ethical freedom (∂fr>0) and an increase in education (∂ed>0) would result in the same level of happiness and a higher level of health (∂he^*>0), with the same achievements, regardless of the attitude, whereas an increase in the achievements of others (∂ay>0) would require an increase in the individual health (∂he^*>0) for a γ attitude only, unless the uncertainty is sufficiently small. Moreover, the second and cross derivatives are the same and are symmetrical for y^* and he^*; this means that indirect effects on he^* arise from effects on y^*. Finally, an increase in ethical freedom (∂fr>0) and an increase in education (∂ed>0) would result in the same level of happiness and health with smaller achievements (∂y^*<0) at an increasing rate (i.e., both decreasing and convex functions) for an α attitude, whereas for a γ attitude, an increase in the achievements of others (∂ay>0) would require an increase in individual achievements (∂y^*>0) at an increasing rate (i.e., an increasing and convex function), unless the uncertainty is sufficiently small, but at a decreasing rate if combined with a decrease in ethical freedom (∂fr>0) and an increase in education (∂ed>0) (i.e., both increasing and concave functions).

Table 1.First, second, and cross derivatives of y^* and he^* at the reference case values (fr=0, ed=0, ay=1, fy=1, fh=1, me=1, em=0) for alternative attitudes (α=1, β=1, γ=1) with u in [–u^*, +u^*].

	∂y^*	∂he^*	$\partial y^*/\partial fr$	$\partial y^*/\partial ed$	$\partial y^*/\partial ay$
∂fr	$(-7+6\,u-u^2)/(3-u)^2$, −1, −1/2	$2/(3-u)^2$, 0, 1/2	$-4/(3-u)^3$, 0, 0	$-1/(3-u)^2$, 0, 0	0, 0, −1/4
∂ed	$-[(2-u)/(3-u)]$, −1, −1/2	$1/(3-u)$, 0, 1/2	$-1/(3-u)^2$, 0, 0	0, 0, 0	0, 0, −1/4
∂ay	0, 0, 1/4 (−1+u)	0, 0, 1/4 (−1+u)	0, 0, −1/4	0, 0, −1/4	0, 0, 1/4(1−u)

Let us apply a standard normal distribution to u, with μ=0 and σ=1. Figure 1 to Figure 18 present the results of numerical simulations with large ranges of parameter values compared to the values in the reference case, to depict specific conditions at an individual level, with the parameters normalised to make all cases comparable. Insights based on the average values can be rejected as implausible, since they would require risk-neutral individuals who are willing to bet on their lives.
Note that if oc=0, any u for β=1 will represent an equilibrium. Moreover, fixing ha^* at 1 relies on the over-determinacy of the dynamic model, with two equilibrium equations and three control

variables. Finally, *me* is set to 1, since larger values together with *ha**=1 amount to larger education levels.

Figure 1. The reference case. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=0 (average ethical freedom); *oc* (safe occupation)= 0.

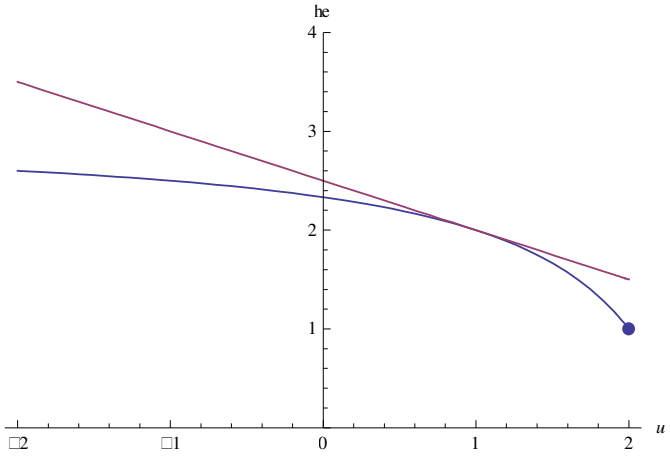


Figure 2. The reference case. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=0 (average ethical freedom); *oc* (safe occupation)= 0.

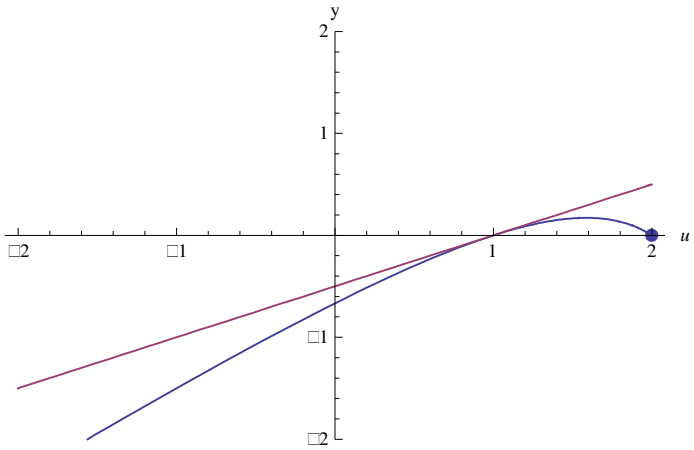


Figure 3. The reference case. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=0 (average ethical freedom); *oc* (unsafe occupation)=–1.5.

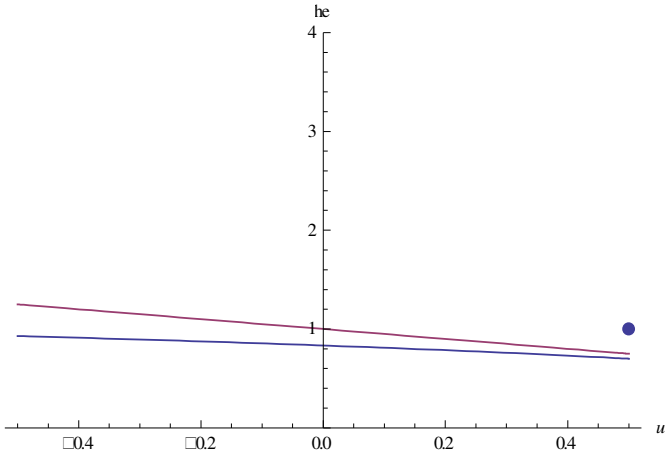


Figure 4. A non-Protestant society. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=1.5 (high ethical freedom); *oc*=0 (safe occupation).

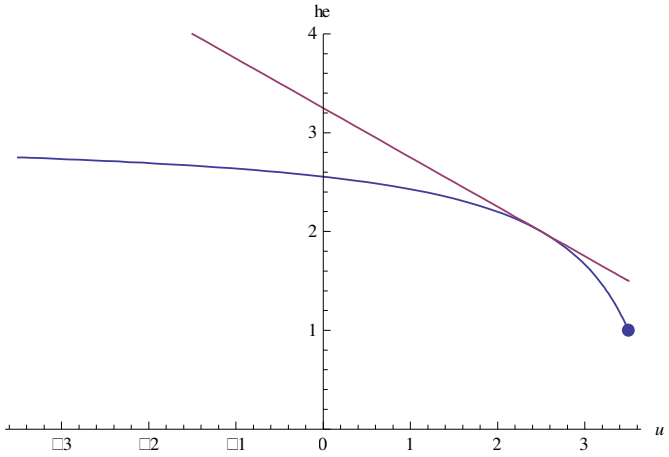


Figure 5. A non-Protestant society. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=1.5 (high ethical freedom); *oc*=0 (safe occupation).

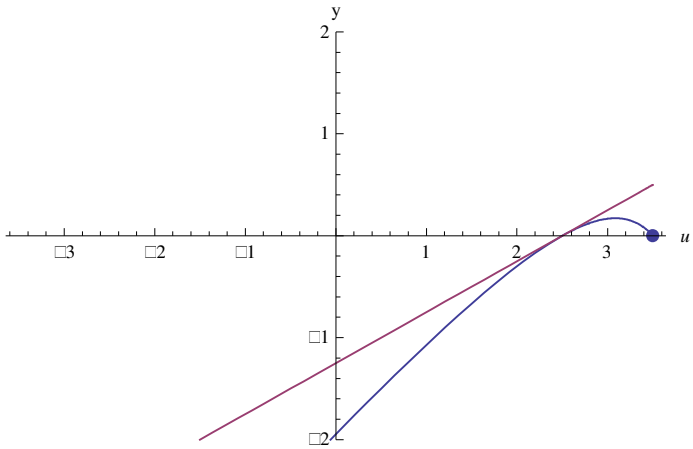


Figure 6. A non-Protestant society. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=1.5 (large ethical freedom); *oc*=–1.5 (unsafe occupation).

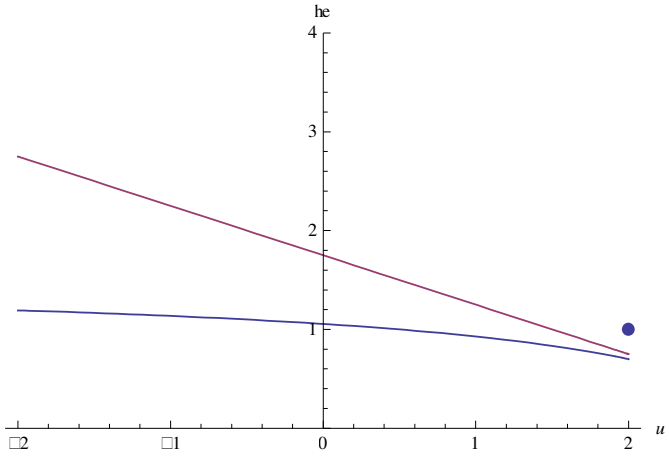


Figure 7. A Protestant society. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=–1.5 (low ethical freedom); *oc*=0 (safe occupation).

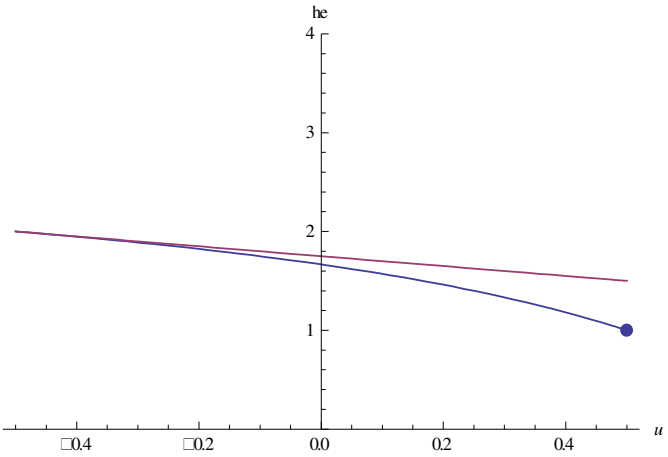


Figure 8. A Protestant society. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=–1.5 (low ethical freedom); *oc*=0 (safe occupation).

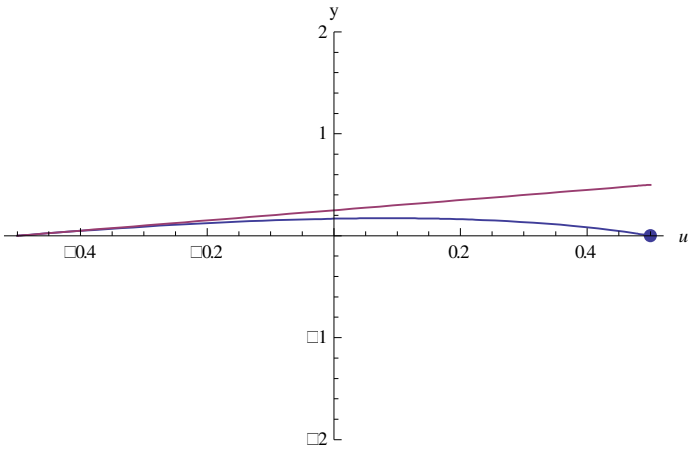


Figure 9. A Protestant society. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=0 (middle education); *fr*=–1.5 (low ethical freedom); *oc*=–1.5 (unsafe occupation).

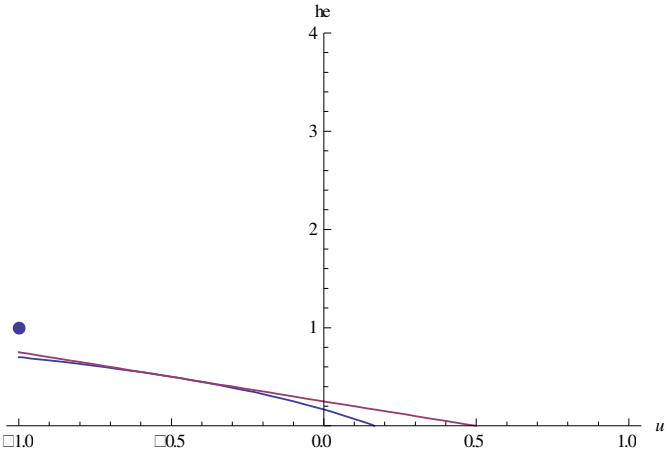


Figure 10. Low education. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=–2 (low education); *fr*=0 (average ethical freedom); *oc*=0 (safe occupation).

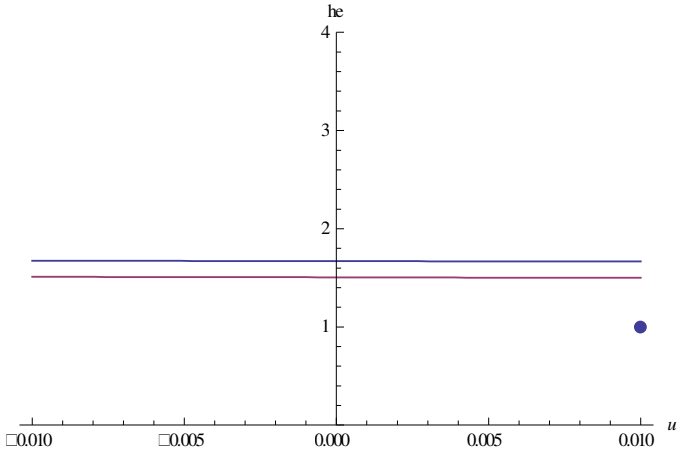


Figure 11. Low education. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=–2 (low education); *fr*=0 (average ethical freedom); *oc*=0 (safe occupation).

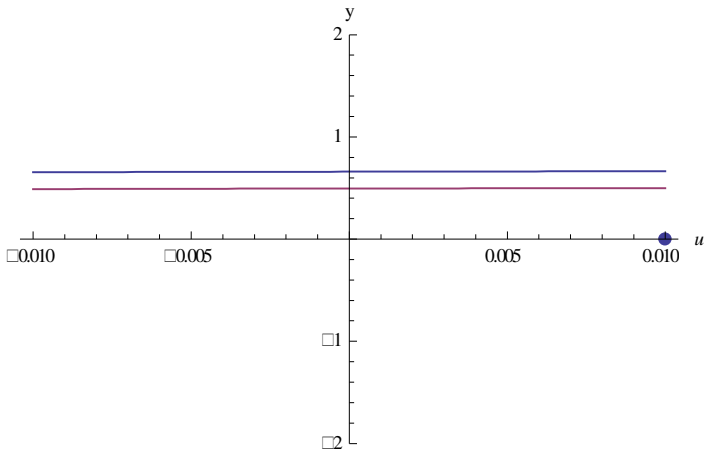


Figure 12. Low education. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=–2 (low education); *fr*=0 (average ethical freedom); *oc*=–1.5 (unsafe occupation).

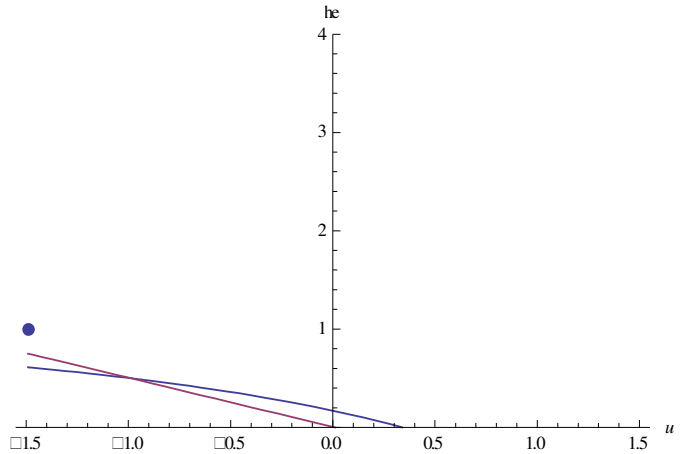


Figure 13. High education. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=2 (high education); *fr*=0 (average ethical freedom); *oc*=0 (safe occupation).

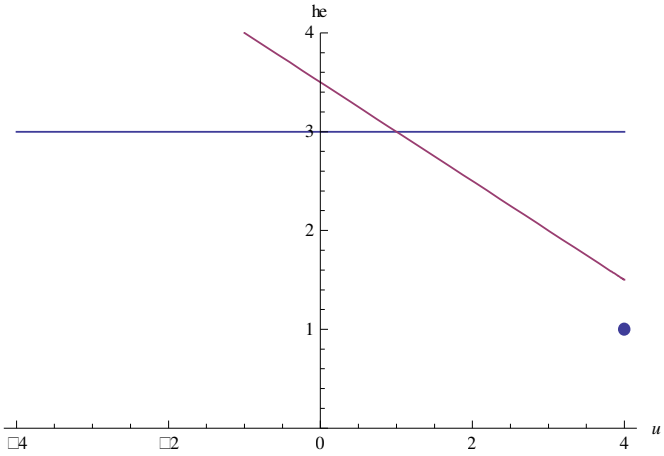


Figure 14. High education. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=2 (high education); *fr*=0 (average ethical freedom); *oc*=0 (safe occupation).

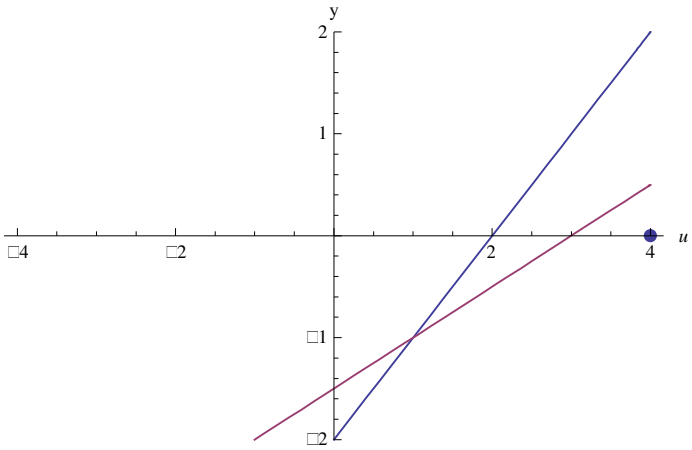


Figure 15. High education. Blue if α=1, point if β=1, purple if γ=1; *ay*=1 (average income); *ed*=2 (high education); *fr*=0 (average ethical freedom); *oc*=–1.5 (unsafe occupation).

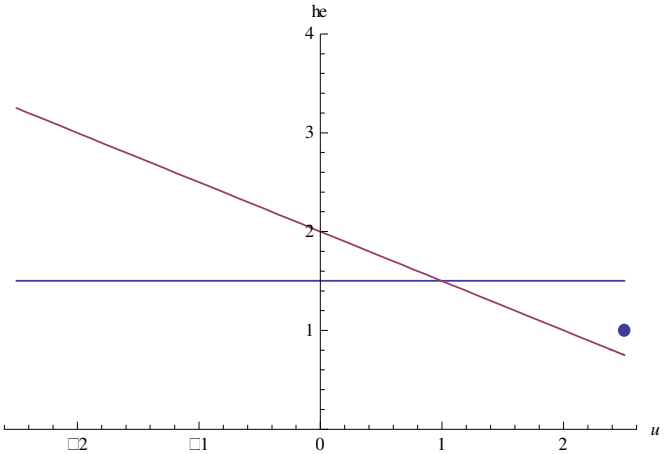


Figure 16. An income-unequal society. Blue if α=1, point if β=1, purple if γ=1; *ay*=10 (small income); *ed*=0 (middle education); *fr*=0 (average ethical freedom); *oc*=0 (safe occupation).

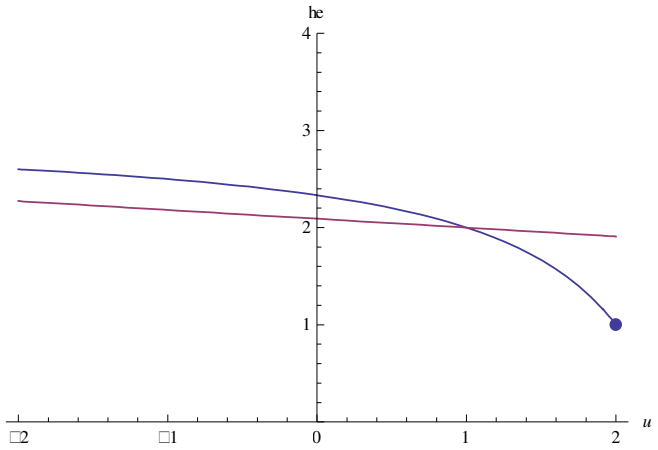


Figure 17. An income-unequal society. Blue if α=1, point if β=1, purple if γ=1; *ay*=10 (small income); *ed*=0 (middle education); *fr*=0 (average ethical freedom); *oc*=0 (safe occupation).

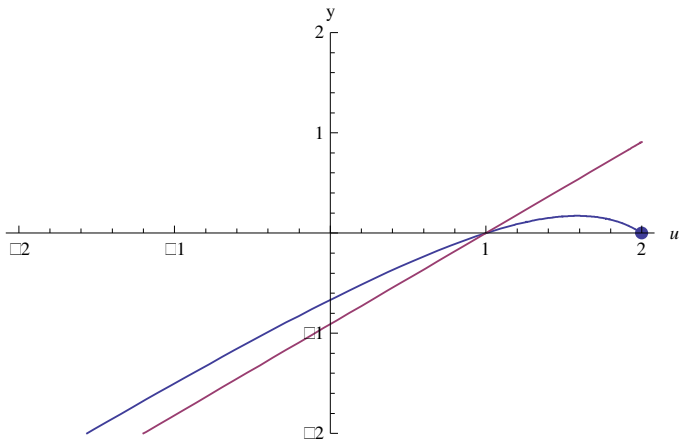
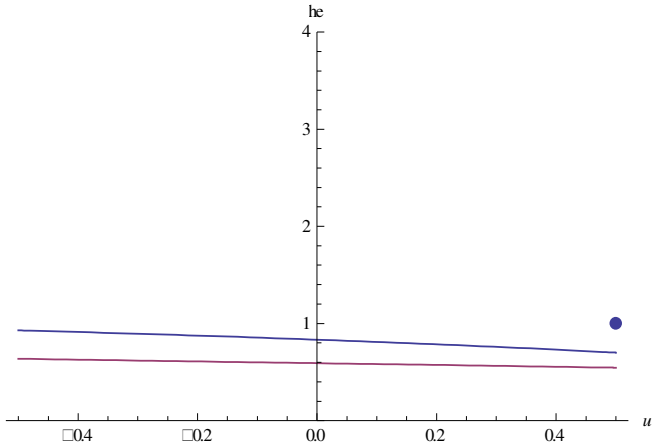


Figure 18. An income-unequal society. Blue if α=1, point if β=1, purple if γ=1; *ay*=10 (small income); *ed*=0 (middle education); *fr*=0 (average ethical freedom); *oc*=–1.5 (unsafe occupation).



The *behavioural ex-ante* approach can be described with examples: an individual with a low educational level (*ed*=–2) should follow an α attitude if they are pessimistic (*u*>1), but a γ attitude if they are optimistic (*u*<1).

The *statistical ex-ante* approach, based on expected values, leads to the following insights:

- In the reference case, for health (Figure 1), 2.38 γ>2.15 α>1 β, whereas for achievements (Figure 2), 2 β>1.53 γ>1.3 α. However, if the occupation is unsafe (Figure 3), 1 β>0.38 γ>0.31 α and 2 β>1.81 γ>1.75 α for health and achievements, respectively.
- In a non-Protestant society, for health (Figure 4), 3.24 γ>2.52 α>1 β, whereas for achievements (Figure 5), 2 β>0.76 γ>0.04 α. However, if the occupation is unsafe (Figure 6), 1.67 γ>1 β≈0.98 α and 2 β>0.81 γ>0.13 α for health and achievements, respectively.
- In a Protestant society, for health (Figure 7), 1 β>0.67 γ>0.61 α, whereas for achievements (Figure 8), 2.09 γ≈2.04 α≈2 β. However, if the occupation is unsafe (Figure 9), 1 β>0.04 α>–0.17 γ and 2.04 α≈2 β>1.83 γ for health and achievements, respectively.
- For individuals with a low level of education, for health (Figure 10), 1.36 γ≈1.34 α>1 β, whereas for achievements (Figure 11), 2 β=2 γ≈1.98 α . However, if the occupation is unsafe (Figure 12), 1 β>–0.18 α>–0.19 γ and 2 α=2 β=2 γ for health and achievements, respectively.
- For individuals with a high level of education, for health (Figure 13), 3.49 γ>2.99 α>1 β, whereas for achievements (Figure 14), 2 β>0.51 γ>0.01 α. However, if the occupation is unsafe (Figure 15), 1.97 γ>1.48 α>1 β and 2 β>0.52 γ>0.03 α for health and achievements, respectively.
- In poor families, for health (Figure 16), 2.15 α>1.99 γ>1 β, whereas for achievements (Figure 17), 2 β>1.30 α>1.14 γ. However, if the occupation is unsafe (Figure 18), 1 β>0.31 α>0.22 γ and 2 β>1.75 α>1.66 γ for health and achievements, respectively.

The *behavioural ex-post* approach can be described with examples: a well-educated individual (*ed*=2) who has problems without solutions (*u*>0) should adopt an α attitude.

Therefore, ceteris paribus, the model suggests that individuals in Protestant and non-Protestant societies should adopt a β attitude and a γ attitude, respectively (i.e., $\partial\partial he^*/\partial fr\partial\alpha>0$ and $\partial\partial he^*/\partial fr\partial\gamma>0$ with $\partial\partial he^*/\partial fr\partial\alpha<\partial\partial he^*/\partial fr\partial\gamma$); educated individuals should adopt a γ attitude (i.e., $\partial\partial he^*/\partial ed\partial\alpha>0$ and $\partial\partial he^*/\partial ed\partial\gamma>0$ with $\partial\partial he^*/\partial ed\partial\alpha<\partial\partial he^*/\partial ed\partial\gamma$); and poor individuals should adopt an α attitude (i.e., $\partial\partial he^*/\partial ay\partial\alpha>0$ and $\partial\partial he^*/\partial ay\partial\gamma>0$ with $\partial\partial he^*/\partial ay\partial\alpha>\partial\partial he^*/\partial ay\partial\gamma$).

Note that if a β attitude begins with $y[t]$ larger than the equilibrium value, then in the short-run, they could obtain larger achievements in their pathways towards equilibrium. Moreover, a persistent unlucky event could compromise an individual's health status, regardless of their chosen attitude, particularly if combined with an unsafe occupation. Finally, the convergent path towards equilibrium for a β attitude depends on their life experiences (i.e., a long-run equilibrium might not exist if optimistic individuals face unlucky events or vice versa and then someone with a β attitude could move to α or γ attitudes), whereas any life experience is consistent with reaching an equilibrium for α and γ attitudes.

4.2. At a country level

Table 2 summarises the suggested attitudes with small ranges of parameter values compared to the values in the reference case, to depict representative individuals at a country level.

Table 2.Suggested attitudes (bold) based on two sets of social characteristics (education and equity).

		DCs (*oc*=0)		LDCs (*oc*=–1)	
	Education	*ay*=1 (equal)	*ay*=10 (unequal)	*ay*=1 (equal)	*ay*=10 (unequal)
Protestant (*fr*=–1.5)	High (*ed*=1)	1.94 **γ**>1 **β**>0 α			
	Middle (*ed*=0)		1 **β**>0.74 γ>0.61 α		
	Low (*ed*=–1)				
fr=0	High (*ed*=1)				
fr=0	Middle (*ed*=0)				
fr=0	Low (*ed*=–1)		1.08 **α**≈1.06 **γ** ≈1 **β**		1 **β**>0 α>0 γ
Non-Protestant (*fr*=1.5)	High (*ed*=1)	3.74 **γ**>1 β>0 α			1.76 **α**>1.31 **γ**>1 β
	Middle (*ed*=0)				
	Low (*ed*=–1)				1.43 **α**>1 β≈0.98 γ

Therefore, under the assumption that individuals are observed at their long-run equilibrium attitude, the model predicts a prevalence of β and γ attitudes in highly educated Protestant DCs, with a larger

proportion of β in more income-unequal countries; a prevalence of γ attitudes in non-Protestant Christian DCs; a prevalence of α attitudes in income-unequal LDCs with low educational levels; and a prevalence of α and γ attitudes in income-unequal LDCs with high educational levels.

5.An empirical test of the model

The previous section provided insights into which attitudes should be adopted by each individual according to their characteristics, and which attitudes should be adopted by each society according to its characteristics. In this section, I will compare these predictions with observed achievements and health to provide an empirical test of the analytical model.

In this analysis, I will consider equations (1) and (2) from section 2 as depicting a representative individual at a country level, where α, β, and γ measure the proportion of a country's population who adopt each attitude type (i.e., α+β+γ=1 instead of α=1 or β=1 or γ=1). Moreover, I will assume that u=0 and evaluate y^* and he^* at u=0 by using an average value approach for the parameter u. Finally, I will use life expectancy at birth (LEB) as an indicator of health, average values of per capita GDP over 5 years as an achievement indicator, and will distinguish between the pre-financial-crisis period (2003 to 2007) and post-crisis period (2008 to 2012). I will also normalise the values with respect to the average, since the analytical results presented in Section 3 refer to equilibrium levels of y and he. In this analysis, I eliminated 38 of 218 countries in the World Bank Development Indicators dataset that lacked data on LEB or per capita GDP data in both periods. Where only one of the two values was missing, I used the value from the other period to provide the missing data.

To obtain the predicted he^* and y^* that were compared with the observed LEB and per capita GDP, I used the following proxies: ay=1/(1–Gini), where Gini represents the value of the Gini coefficient; ed=the enrolment in tertiary school (% of the students), with –1+each value divided by the mean to obtain a normalized value; oc=–% industry employment; and em=1–% unemployed with –1+each value divided by the mean to obtain a normalized value. In this calculation, I used Gini coefficients from the CIA World Fact Book when the coefficients were missing from the World Bank database. I eliminated 50 countries due to lack of data on tertiary education or industry employment, and 23 countries due to lack of data on Gini coefficients.

Table S in Supplementary Materials shows the calculated fr values for each country, which make the predicted health he^*consistent with the observed LEB for given values of per capita GDP, ay, ed, oc, and em.

As expected, apart from the atheist KOR and the former English colonies QAT and IRL, significantly negative fr (i.e., fr<–1 in both periods) were obtained for Protestant DCs (AUS, CHE, DNK, FIN, IRL, ISL, LUX, NLD, NOR, SWE, and USA) in both periods. In contrast, a negative fr was observed only in the first period in BEL, GBR, GRC, and KWT, and only in the second period in AUT, CHE, HKG, and NZL.

To obtain insights on the relative proportions of the population who adopted the α, β, and γ attitudes, I used the calculated fr to compare the observed per capita GDP ($y°$) and calculated the equilibrium income (y^*) at different pairs of extreme values for α and γ (i.e., α=0 and γ=0, α=1 and γ=0, α=0 and γ=1, α=1 and γ=1). To do so, I relied on the negative impacts of both α and γ on the estimated income (see Appendix for details). In particular, if $y^*–y°>0$ at α=0 and γ=0, then both α and γ must increase to reduce the overestimate of y^*; if $y^*–y°>0$ at α=1 and γ=0, then γ must increase to reduce the overestimate of y^*; if $y^*–y°>0$ at α=0 and γ=1, then α must increase to reduce the overestimate of y^*; and if $y^*–y°<0$ at α=1 and γ=1, then both α and γ must decrease to increase the underestimate of y^*. Table S in Supplementary Materials shows the calculated differences between the observed per capita GDP and the calculated income (i.e., $y^*–y°$). Table 3 summarises the description of the countries as having either single dominant or co-dominant attitude types.

Table 3.Estimated attitudes as a function of a country's social characteristics (religion and education); * means "an attitude suggested by a religion"; ¬ means "different from"; ≈ means "similar to". Latin American (LA) countries: ARG, BLZ, BOL, CRI, ECU, GTM, HND, PAN, PER, PRY, URY, and VEN. Mid-educated ex-SU (former members of the Soviet Union with middle educational levels): BGR, ROU, and SVN. High-educated ex-SU (former members of the Soviet Union with high educational levels): CZE, EST, HUN, LTU, LVA, and RUS. Low Educated Muslim (Muslim countries with a low educational level): AZE, BFA, BGD, IDN, MAR, MDA, PAK, PHL, TZA, and UGA. Mid-educated Muslim (Muslim countries with a middle educational level): ALB, GEO, JOR, KGZ, MLI, SEN, SRB, TJK, and YEM. High-educated Muslim (Muslim countries with a high educational level): ARM, BIH, DZA, EGY, IRQ, MKD, MNE, and TUN.

	DC		LDC	
	Income-equal	Income-unequal	Income-equal	Income-unequal
Protestant	β γ (AUS, LUX, NLD, SWE)	β* (CHE, DNK, FIN, HKG, ISL, NZL USA)		
Non-Protestant Christian	γ* (IRL, BEL, GBR, GRC, UKR, AUT)	γ β (CHL, FRA, ITA, POL, SVK)		¬ γ (Mid-educated ex-SU, LA, ETH)
Muslim			αγ (High-educated),≈ αγ (TUR)	α* (Low-educated), ¬ α (Mid-educated),≈ α (IRN)
Jewish		β* (ISR)		
Hindu			γ*	≈ γ (IND)
Buddhist			(αβ)*	¬ γ (BTN, KHM, LKA, THA, VNM)
Atheist	β* (CZE, HVR)		β* (High-educated ex-SU)	β* (KOR)

These results are consistent with predictions if religions account for the prevailing attitudes, with the following constancies: α attitudes are dominant in Muslim LDCs, with larger γ shares in more educated countries; a prevalence of β attitudes in Protestant DCs, with larger γ shares in less income-unequal countries; a prevalence of γ attitudes in non-Protestant Christian DCs, with larger β shares in more income-unequal countries; and a prevalence of β attitudes in more educated atheist and Jewish countries.

Indeed, the Muslim maxim "That which is left by Allah for you (after accounting for the rights of the people) is better for you" (Surat Hud, Ayah 86) seems to evoke an α attitude (see also Hamidi et al., 2010); the Protestant maxim that "Vocation from God is not limited to clergy or church, but it can be applied to any occupation or trade" (Luther, 1520) suggests a β attitude (see also van Hoorn and Maseland, 2013); the Non-Protestant Christian maxim that "Only in God will one find the truth and happiness one never stops searching for" (St. Augustine, 401) seems to evoke a γ attitude (see also Vayalilkarottu, 2012); and the many Jewish commandments concerning the kashrut (fitness) of one's money in the Torah, which are expanded upon in the Mishnah and the Talmud, suggest a β attitude (see also Van Praag et al., 2010).

The following additional insights were obtained from my analysis. First, movements towards a modern (i.e., market oriented) society implied an increase in β, both in atheist and Non-Protestant Christian societies. Some of these societies have firmly moved to β (CYP, CZE, MEX, MLT, and PRT), some are moving in this direction (CHL, FRA, HVR, ITA, POL, and SVK), and some have not yet completed this movement (ESP). Second, the economic crisis reduced β (HKG and ISL) and increased γ (CHE, DNK, FIN, and USA) in Protestant societies, whereas poor and income-unequal societies adopted an α attitude, both for Non-Protestant Christian countries (BWA, CMR, COL, JAM, MDA, MNG, and NIC) and Protestant countries (GHA, MDG, and NAM). Third, Buddhist countries could not be simply characterised, since this religion cannot be linked to any single typified attitude (α or β or γ), but rather combined aspects of the α and β attitudes; BTN, KHM, LKA, THA, and VNM could be better represented as a non-γ group. Fourth, attitudes could not be characterised when many religions had high representation in a country: DEU (30% Non-Protestant Christian, 30% Protestant, 20% atheist), CMR (38% Catholic, 15% Protestant Christian, 22% Muslim), MDG (22% Catholic, 22% Protestant, 50% local religions), MUS (49% Hindu, 32%

Protestant, 17% Muslim), QAT (77% Muslim, 12% Hindu, 10% Protestant), and CHN (57% Taoist, 25% atheist, 14% Buddhist).
Therefore, attitudes for a representative individual at a country level seem to be accounted for by the most popular religion combined with the observed education and inequality levels when certain short-run dynamics (e.g., a crisis) or long-term dynamics (e.g., market orientations) hold.

6.Discussion

In this paper, I developed an original analytical model that accounts for three main attitudes towards life (i.e., α, β, and γ for Aristotelian, Epicurean, and Stoic attitudes, respectively). The model accounts for all variables that have been shown by empirical and theoretical studies to affect health and happiness at an individual level for a general population (i.e., employment, occupation type, education, ethical freedom, opportunity distribution), and considers three main approaches (i.e., ex-ante behavioural or statistical, ex-post behavioural).
The model permitted an empirical test based on reasonable assumptions such as compensation for individual lucky and unlucky events at a country level, and the prevalence of equilibrium attitudes in the long-run.
The model can explain the results of some empirical studies. For example, Bjørnskov (2008) found an inverse relationship between happiness (*ha*) and longevity (*he*) at the country level. The present model can explain this result by considering the impacts of ethical freedom on health ($\partial he/\partial fr>0$) and happiness ($\partial ha/\partial fr<0$), and by assuming that the latter effect is larger than the former; that is, $\partial he/\partial fr+\partial ha/\partial fr<0$. Blanchflower & Oswald (2008, 2009) found a U-shaped curve for psychological well-being (*he*, based on psychiatric assessment scores, mental health levels, and depression and anxiety levels) over an individual's life cycle, with the minimum score in middle age. The present model can explain this result by remembering the impacts of attitudes on health (i.e., $\partial he/\partial\beta>\partial he/\partial\alpha>\partial he/\partial\gamma>0$), and by assuming that a β attitude prevails in young people (because the δ value is close to 0), a γ attitude prevails in middle-aged people, and an α attitude prevails in old people.
The model can confirm the insights obtained from some theoretical studies. For example, Zagonari (2009) found higher and lower happiness levels in Protestant and non-Protestant Christian countries, respectively. This can be replicated with the current model by stressing that in the two-equation dynamic model (i.e., $dhe=\partial he/\partial fr\ dfr+\partial he/\partial y\ dy+dha$, $dha=\alpha\ \partial ha/\partial y\ dy-\alpha\ \partial ha/\partial fr\ dfr+\beta\ dy+\gamma\ dy+dhe$) the health level could be fixed (i.e., $dhe=0$) rather than the happiness level ($dha=0$), and by assuming that the impact of ethical freedom on health ($\partial he/\partial fr>0$) is smaller than the impact of ethical freedom on happiness for the α attitude ($-\alpha\ \partial ha/\partial fr>0$) (i.e., $\partial he/\partial fr-\alpha\ \partial ha/\partial fr<0$).

7.Conclusions

The analytical approach adopted in the present study successfully accounted for the effects of culture on happiness and health by emphasising measurable individual characteristics (i.e., education, employment, occupation) as well as measurable social characteristics (ethical freedom, equity in achievements).
However, some caveats concerning the results obtained in this paper need to be highlighted. I normalised *ha** to 1 in order to obtain an analytical solution. However, the present analysis showed that the relationship between happiness, health, and ethical freedom was consistent with the relationship between happiness and ethical freedom discussed in Zagonari (2009). I tested the robustness of the analytical model by assuming that people are neither lucky nor unlucky on average, and by applying the average values at $u^*=0$. Alternatively, one could estimate a dynamic econometric model with cross-country time-series individual data with error values that could potentially characterise each individual. However, few countries and even fewer cultures present these kinds of datasets. I disregarded a possible preference for large variability in the short-run achievements over a large mean in the long-run achievement by comparing happiness, health, and achievements in the long-run. Alternatively, one could account for short-term fluctuations in

choosing their attitude. I tested the robustness of the analytical model by presenting qualitative insights related to *fr*, α, β, and γ. Alternatively, one could obtain an econometric estimation of these parameters using cross-country individual data. However, few countries and even fewer cultures present these kinds of datasets. I disregarded the potential for remorse in the ex-post behavioural approach. Alternatively, one could account for regret in choosing their attitude. I tested the robustness of the analytical model by assuming that people are observed at a long-run equilibrium and by looking for insights into α, β, and γ at this equilibrium. Alternatively, one could estimate a dynamic econometric model with cross-country time-series individual data and α, β, and γ values that change over time. However, few countries and even fewer cultures present these kinds of datasets.

The main future developments for the framework suggested in this paper are as follows. It may be worth estimating coefficients to be attached to the model variables from alternative cultural contexts such as Russia (Graham et al., 2004), Peru (Izquierdo, 2005), Sweden (Andersson, 2008), Japan (Oshio & Kobayashi, 2010) and the United States (Borgonovi, 2008), possibly by relying on a cross-country time-series dataset. It may be worth characterising the ethical and religious traditions in terms of typified attitudes, for example, by emphasising combinations of α and β attitudes in Buddhism (Bilimoria et al., 2008; Tomer, 2011).

Appendix

If γ=1, under the assumptions that u=0, fy=fh=0, and ha*=0 to depict the normalised situations at a country level, $\partial y^*/\partial\alpha = fr\ (em+ed-1+3\ fr)/(\alpha+2\ fr)^2$, where $\partial y^*/\partial\alpha>0$ if $fr>0$ and $fr>(1-ed-em)/3$ or if $fr<0$ and $fr<(1-ed-em)/3$. These conditions are unlikely to be met, because they require the prevalence of features characterizing Protestant DCs (e.g., negative *fr*) combined with features characterizing LDCs (e.g., small *ed* and *em*). We can assume that y^* negatively depends on α. If α=1, under the assumptions that u=0, fy=fh=0, and ha*=0 to depict the normalised situations at a country level, $\partial y^*/\partial\gamma = fr\ [1-fr+fr\ (1+em+ed+fr)]/(1+fr+\gamma\ fr)^2$, where $\partial y^*/\partial\gamma>0$ if $fr>0$ and $fr>(1/2)\ \{-ed-em+\text{Sqrt}[(em+ed)^2-4]\}$ or if $fr<0$ and $fr<(1/2)\ \{-ed-em-\text{Sqrt}[(em+ed)^2-4]\}$. These conditions are unlikely to be met, because they require the prevalence of features characterizing Protestant DCs (e.g., negative *fr*) combined with features characterizing LDCs (e.g., small *ed* and *em*). We can assume that y^* negatively depends on γ. Note that these results are reasonable, since it is likely that, on average, y^* is larger if a β attitude prevails.

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Supplementary Materials

Table S. Estimated *fr* and differences between the estimated and observed per capita GDP for different extreme values of attitudes α and γ. Country codes are from the World Bank Development Indicators dataset.

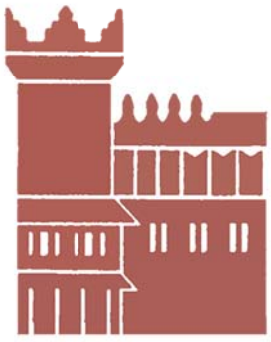
	fr	*fr*	α=0 γ=0	α=0 γ=0	α=1 γ=0	α=1 γ=0	α=0 γ=1	α=0 γ=1	α=1 γ=1	α=1 γ=1
	2003-07	2008-12	2003-07	2008-12	2003-07	2008-12	2003-07	2008-12	2003-07	2008-12
Country code										
AFG										
AGO										
ALB	2.13	1.65	–0.94	–0.89	0.20	0.22	0.26	0.24	0.74	0.69
ARE										
ARG	0.56	0.75	–1.33	–1.62	–0.02	–0.09	–0.13	–0.24	0.30	0.33
ARM	1.75	1.46	0.72	–0.30	1.33	0.61	1.22	0.60	1.49	0.95
ATG	1.35	1.53								
AUS	–1.42	–1.43	–2.09	–1.97	0.33	0.84	–1.38	–1.34	–0.36	–0.28
AUT	–0.64	–1.00	–2.27	–2.12	–2.82	146.11	–1.54	–1.44	2.11	–0.05
AZE	2.35	2.05	–1.45	–1.61	–0.14	–0.30	0.03	–0.17	0.57	0.37
BDI										
BEL	–1.04	–0.91	–1.81	–1.70	21.75	–9.93	–1.23	–1.12	0.25	0.69
BEN	2.75	2.59								
BFA	2.68	2.64	–1.54	–1.53	–0.14	–0.13	0.10	0.11	0.70	0.71
BGD	2.99	2.83	–1.83	–1.67	–0.39	–0.26	–0.02	0.05	0.57	0.64

BGR	1.49	1.06	–1.67	–1.59	–0.33	–0.30	–0.32	–0.34	0.24	0.16
BHR	0.75	1.08								
BHS										
BIH	2.30	1.98	0.60	0.37	1.26	1.04	1.09	0.93	1.42	1.24
BLR	0.83	0.38	–2.09	–1.91	–0.34	–0.20	–0.42	–0.44	0.17	0.07
BLZ	2.33	2.19								
BOL	1.77	1.86	–1.82	–1.94	–0.27	–0.37	–0.25	–0.32	0.46	0.39
BRA										
BRB	–0.33	–0.22								
BRN										
BTN	2.67	2.51	–1.83	–1.74	–0.41	–0.35	–0.15	–0.13	0.46	0.46
BWA	1.92	1.80	0.19	0.37	0.80	0.89	0.82	0.93	1.12	1.17
CAF										
CAN										
CHE	–0.98	–1.29	–2.27	–2.09	–49.45	3.37	–1.70	–1.70	–0.04	–0.36
CHL	1.00	0.47	–1.78	–1.65	–0.44	–0.40	–0.52	–0.51	0.02	–0.11
CHN	2.67	2.42	–2.16	–2.10	–0.66	–0.64	–0.42	–0.46	0.26	0.21
CIV										
CMR	2.72	2.56	–1.67	–1.56	–0.26	–0.16	–0.04	0.03	0.60	0.66
COG	2.85	2.66								
COL	1.90	1.62	–1.09	–1.11	0.08	0.07	0.08	0.05	0.64	0.60
COM										
CPV										
CRI	2.02	1.42	–1.97	–1.68	–0.57	–0.32	–0.49	–0.34	0.14	0.25
CYP	0.48	0.03	–2.17	–1.71	–1.08	–1.11	–1.11	–0.91	–0.82	–1.09
CZE	0.63	0.27	–2.19	–2.06	–0.94	–0.82	–1.00	–0.92	–0.61	–0.64
DEU	–0.66	–0.56	–1.73	–1.89	–3.23	–2.50	–1.15	–1.23	2.79	8.87
DJI										
DMA										
DNK	–1.67	–1.38	–2.14	–1.76	–0.19	1.81	–1.46	–1.25	–0.59	–0.16
DOM	1.89	1.81	–0.66	–0.77	0.39	0.28	0.39	0.29	0.86	0.76
DZA	2.36	2.17	–0.69	–1.38	0.35	–0.11	0.37	0.00	0.82	0.53
ECU	1.61	1.70	–1.57	–1.79	–0.19	–0.35	–0.17	–0.31	0.42	0.32
EGY	2.06	2.10	–1.34	–1.25	–0.03	0.02	0.10	0.13	0.63	0.65
ERI										
ESP	–0.70	–0.77	–1.77	–0.39	–2.55	–7.07	–1.02	–0.23	2.06	3.63
EST	0.15	0.19	–1.95	–1.30	–0.47	–0.44	–0.69	–0.38	–0.35	–0.31
ETH	2.83	2.72	–0.28	–0.24	0.78	0.81	0.83	0.84	1.29	1.30
FIN	–1.92	–1.65	–1.83	–1.69	0.00	0.58	–1.19	–1.09	–0.35	–0.16
FJI										
FRA	–0.55	–0.37	–1.74	–1.53	–2.29	–1.83	–1.07	–0.92	39.11	–3.53
FSM										
GAB										
GBR	–1.08	–0.66	–2.11	–1.66	7.00	–2.96	–1.38	–1.01	0.18	5.50
GEO	1.58	2.03	–0.84	–0.39	0.37	0.63	0.38	0.63	0.90	1.09
GHA	2.87	2.73	–1.76	–1.66	–0.33	–0.25	–0.03	0.02	0.59	0.63
GIN										
GMB										

GNB										
GNQ										
GRC	–1.28	–0.83	–1.61	–0.86	0.97	–5.92	–0.82	–0.33	0.27	2.13
GRD										
GTM	2.56	2.54	–2.22	–1.97	–0.69	–0.51	–0.53	–0.36	0.21	0.35
GUY										
HKG	–0.58	–1.46	–1.90	–1.95	–3.51	1.81	–1.31	–1.42	–19.86	0.26
HND	2.69	2.57	–2.06	–1.96	–0.57	–0.48	–0.42	–0.36	0.32	0.38
HRV	0.98	0.70	–1.41	–1.26	–0.35	–0.31	–0.36	–0.30	0.01	–0.02
HTI										
HUN	0.29	0.43	–2.04	–1.45	–0.55	–0.43	–0.73	–0.43	–0.34	–0.19
IDN	2.57	2.36	–1.31	–1.49	–0.02	–0.13	0.16	0.05	0.72	0.62
IND	2.78	2.60	–1.87	–1.95	–0.43	–0.47	–0.11	–0.18	0.50	0.44
IRL	–1.39	–1.26	–2.27	–1.11	1.22	6.63	–1.72	–0.92	–0.51	0.72
IRN	2.18	1.59	–1.53	–1.42	–0.29	–0.16	–0.21	–0.14	0.35	0.39
IRQ	2.67	2.61	0.06	–0.55	0.98	0.53	0.92	0.59	1.34	1.05
ISL	–1.47	–1.23	–2.35	–1.81	–0.35	2.37	–1.58	–1.16	–0.65	0.01
ISR	–0.21	–0.15	–1.67	–1.79	–1.02	–0.96	–0.79	–0.86	–1.37	–1.17
ITA	–0.63	–0.39	–2.04	–1.72	–1.98	–1.54	–1.20	–0.95	3.00	–3.47
JAM	2.16	2.12	–1.27	–0.94	–0.05	0.21	0.02	0.25	0.56	0.77
JOR	1.87	1.77	–1.02	–0.93	0.21	0.26	0.27	0.30	0.79	0.80
JPN	–0.52	–0.30	–2.34	–2.13	–1.69	–1.35	–1.41	–1.20	–13.19	–2.05
KAZ	0.97	1.26	–1.47	–1.63	–0.09	–0.28	–0.11	–0.25	0.36	0.24
KEN	2.74	2.74								
KGZ	1.84	1.95	–1.44	–1.42	0.01	0.01	0.16	0.17	0.73	0.73
KHM	3.05	2.77	–2.26	–2.22	–0.74	–0.67	–0.31	–0.30	0.34	0.36
KIR										
KOR	–1.29	–1.34	–2.35	–2.11	–2.95	–1.62	–1.15	–1.03	–0.34	–0.12
KWT	–1.06	–0.38								
LAO										
LBN	1.30	1.23								
LBR										
LBY										
LCA	2.27	2.18								
LKA	2.84	2.67	–1.82	–1.89	–0.42	–0.47	–0.21	–0.28	0.44	0.38
LSO										
LTU	–0.03	–0.18	–1.76	–1.00	–0.19	–0.46	–0.50	–0.17	–0.22	–0.74
LUX	–2.67	–2.74	–2.06	–1.82	1.20	1.41	–2.92	–2.73	–1.83	–1.65
LVA	–0.04	0.14	–1.72	–0.79	–0.08	–0.20	–0.44	0.00	–0.13	–0.09
MAC	–1.71	–2.82	–2.21	–2.12	0.17	0.20	–1.66	–2.22	–0.63	–1.25
MAR	2.78	2.66	–1.28	–1.34	–0.02	–0.06	0.15	0.10	0.71	0.67
MDA	1.94	2.02	–1.58	–1.63	–0.11	–0.16	0.04	0.00	0.64	0.61
MDG	2.85	2.83	–1.59	–1.56	–0.20	–0.17	0.03	0.04	0.67	0.69
MDV	2.94	2.59								
MEX	1.90	1.76	–2.30	–1.99	–0.85	–0.65	–0.77	–0.61	–0.13	–0.01
MKD	2.18	1.73	1.23	1.07	1.64	1.40	1.44	1.29	1.67	1.46
MLI	2.75	2.70	–1.03	–0.95	0.23	0.28	0.39	0.43	0.94	0.98
MLT	1.08	0.75	–2.00	–1.84	–0.88	–0.84	–0.88	–0.84	–0.48	–0.53

MNE	1.95	1.05	0.24	–0.24	0.90	0.42	0.74	0.42	1.04	0.64
MNG	1.57	1.38	–1.49	–1.59	–0.01	–0.04	0.07	0.00	0.66	0.59
MOZ	2.68	2.59								
MRT										
MUS	2.26	1.67	–1.84	–1.67	–0.54	–0.39	–0.40	–0.34	0.16	0.18
MWI										
MYS	1.76	1.51	–2.37	–2.19	–0.87	–0.73	–0.81	–0.72	–0.16	–0.11
NAM	2.49	2.44	0.27	0.79	1.07	1.43	1.03	1.36	1.45	1.70
NER	2.95	2.92								
NGA	2.49	2.49								
NIC	2.63	2.62	–1.80	–1.56	–0.37	–0.20	–0.12	0.01	0.50	0.61
NLD	–1.30	–1.31	–2.15	–1.98	1.49	1.90	–1.52	–1.40	–0.35	–0.20
NOR	–2.88	–2.64	–2.21	–2.16	–0.31	0.01	–2.05	–2.10	–1.25	–1.24
NPL										
NZL	–1.09	–0.88	–2.22	–1.84	–2.09	–2.85	–1.18	–0.95	–0.13	0.71
OMN	1.58	1.28								
PAK	3.10	2.92	–1.73	–1.73	–0.35	–0.33	0.01	0.01	0.58	0.58
PAN	1.33	1.27	–1.41	–1.81	–0.12	–0.43	–0.15	–0.47	0.40	0.12
PER	1.78	1.50	–1.77	–1.90	–0.32	–0.40	–0.26	–0.38	0.37	0.25
PHL	2.14	2.16	–1.31	–1.42	0.03	–0.05	0.13	0.06	0.72	0.67
PLW										
PNG										
POL	0.47	0.22	–0.99	–1.62	–0.10	–0.40	–0.07	–0.50	0.14	–0.24
PRT	0.19	0.10	–2.03	–1.34	–0.81	–0.68	–0.91	–0.51	–0.66	–0.60
PRY	2.17	1.95	–1.67	–1.73	–0.26	–0.27	–0.18	–0.22	0.48	0.45
QAT	–2.15	–1.47	–3.03	–3.07	0.31	2.61	–3.19	–3.03	–1.88	–1.33
ROU	1.39	0.87	–1.95	–1.79	–0.47	–0.40	–0.42	–0.46	0.14	0.02
RUS	0.20	–0.11	–1.83	–1.71	–0.17	–0.41	–0.48	–0.60	0.00	–0.54
RWA	2.73	2.71								
SAU	0.89	0.47								
SDN										
SEN	2.90	2.81	–1.11	–1.01	0.14	0.22	0.31	0.37	0.88	0.93
SGP										
SLB										
SLE										
SLV	2.37	2.29	–1.81	–1.66	–0.41	–0.29	–0.26	–0.16	0.37	0.45
SRB	1.39	1.31	–0.53	–0.32	0.40	0.48	0.39	0.46	0.74	0.76
STP										
SUR										
SVK	1.20	0.58	–1.26	–1.30	–0.31	–0.49	–0.32	–0.45	0.03	–0.25
SVN	–0.63	–0.62	–2.26	–1.93	–0.42	–0.75	–1.11	–0.89	0.77	1.61
SWE	–1.80	–1.28	–1.94	–1.63	0.11	3.22	–1.36	–1.18	–0.51	–0.01
SWZ										
SYC										
SYR	2.77	2.60								
TCD										
TGO	2.70	2.57								
THA	1.48	1.39	–2.36	–2.31	–0.64	–0.59	–0.69	–0.66	0.09	0.10

TJK	2.54	2.50	–1.09	–0.96	0.19	0.28	0.37	0.43	0.90	0.94
TKM										
TLS	2.47	2.51								
TON	3.18	3.09								
TTO	1.62	1.51								
TUN	2.22	2.02	–1.30	–1.02	–0.08	0.11	0.01	0.16	0.54	0.64
TUR	1.53	0.97	–1.45	–1.25	–0.25	–0.17	–0.23	–0.18	0.26	0.20
TZA	2.76	2.73	–1.54	–1.57	–0.15	–0.18	0.11	0.09	0.71	0.68
UGA	2.72	2.68	–1.62	–1.44	–0.21	–0.07	0.03	0.13	0.66	0.75
UKR	0.78	0.67	–1.69	–1.50	0.00	0.12	–0.10	0.00	0.46	0.52
URY	1.20	0.70	–1.24	–1.68	–0.03	–0.25	–0.05	–0.37	0.43	0.14
USA	–2.74	–2.48	–2.02	–1.48	–0.11	0.76	–1.69	–1.25	–0.70	–0.16
UZB										
VCT										
VEN	1.38	0.37	–1.22	–1.55	–0.04	–0.04	–0.04	–0.24	0.43	0.22
VNM	2.79	2.60	–2.25	–2.22	–0.71	–0.67	–0.33	–0.33	0.32	0.32
VUT	2.72	2.70								
WSM										
YEM	2.75	2.75	–0.51	–0.42	0.58	0.65	0.63	0.69	1.12	1.17
ZAF										
ZMB										



Alma Mater Studiorum - Università di Bologna
DEPARTMENT OF ECONOMICS

Strada Maggiore 45
40125 Bologna - Italy
Tel. +39 051 2092604
Fax +39 051 2092664
http://www.dse.unibo.it